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**A MODEL TO EXAMINE THE INFLUENCE OF PERCEIVED  
SECURITY AND TRUST TO ADOPT MOBILE BANKING IN  
THE UNITED ARAB EMIRATES**

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## Abstrak

Selama bertahun-tahun, tingkah laku penggunaan perbankan mudah alih telah mendapat banyak perhatian daripada sarjana akademik. Pengguna sering ragu-ragu terhadap keselamatan m-perbankan disebabkan peningkatan trend serangan siber. Selain itu, kekurangan penyelidikan di Emiriah Arab Bersatu (UAE) khususnya, di mana isu berkaitan keselamatan telah dikenal pasti sebagai salah satu halangan yang menghalang pelanggan bank daripada menggunakan pakai m-perbankan. Oleh itu, kajian ini dijalankan untuk menyiasat faktor m-niat penggunaan perbankan. Kajian ini memanjangkan Teori Penerimaan dan Penggunaan Teknologi Bersepadu (UTAUT) dengan membangunkan model yang menggabungkan persepsi keselamatan sebagai faktor penyederhana dan kepercayaan sebagai faktor bebas dengan faktor UTAUT lain untuk meramalkan niat pakai m-perbankan di UAE. Data yang dikumpul daripada 239 pengguna m-banking di UAE menggunakan teknik tinjauan web dan kaedah Partial Least Square (PLS) digunakan untuk mengesahkan model penyelidikan dan menguji hipotesis. Kajian ini menggunakan pensampelan bukan kebarangkalian kerana penyelidik tidak dapat mewujudkan bingkai persampelan disebabkan isu privasi, kerana bank tidak boleh mendedahkan data pelanggan mereka yang menggunakan perbankan mudah alih. Teknik persampelan bukan kebarangkalian yang digunakan di sini persampelan mudah kerana kesederhanaan, kos rendah dan ketersediaannya. Keputusan menunjukkan bahawa jangkaan prestasi, jangkaan usaha, kepercayaan, dan persepsi keselamatan mempengaruhi secara positif niat pakai m-perbankan. Selain itu, persepsi keselamatan didapati menyederhanakan hubungan ini secara positif. Walau bagaimanapun, keputusan menunjukkan sokongan statistik yang tidak ketara menjelaskan hubungan antara pengaruh sosial dan niat pengguna untuk menerima pakai m-perbankan. Kesimpulannya, kajian ini secara teorinya menyumbang kepada badan pengetahuan dengan mengenal pasti faktor penting yang mempengaruhi niat pakai m-banking di UAE. Selain itu, kajian ini menunjukkan bahawa persepsi keselamatan adalah pemboleh ubah penyederhana yang penting dan kepercayaan sebagai faktor bebas juga merupakan salah satu faktor penting untuk mempengaruhi niat pengguna untuk menggunakan m-perbankan. Secara praktikal, kajian ini menyumbang dengan mencadangkan mekanisme dan strategi yang akan membantu bank untuk menggalakkan penggunaan m-perbankan.

**Kata Kunci:** Niat perbankan mudah alih, Keselamatan yang dirasakan, Kepercayaan, Emiriah Arab Bersatu, Teori Penerimaan dan Penggunaan Teknologi (UTAUT)

## Abstract

For years, mobile banking adoption behaviour has received much attention from academic scholars. Users are frequently sceptical of m-banking security due to an increasing trend of cyber-attacks. Also, there is a scarcity of research in the United Arab Emirates (UAE), particularly where security-related issues have been identified as one of the barriers that prevent bank customers from adopting m-banking. Thus, this study is conducted to investigate the factors of m-banking adoption intention. This study is extending the Unified Theory of Acceptance and Use of Technology (UTAUT) by developing a model that incorporates perceived security as moderator factor and trust as independent factor with other UTAUT factors to predict m-banking adoption intention in the UAE. The data was collected from 239 m-banking users in the UAE using a web survey technique and the Partial Least Square (PLS) method to validate the research model and test the hypotheses. The study used non-probability sampling because the researcher could not establish the sampling frame due to privacy issues, as banks cannot disclose the data of their customers who are using mobile banking. The non-probability sampling technique used here is convenience sampling due to its simplicity, low cost, and availability. The results showed that performance expectancy, effort expectancy, trust, and perceived security positively influenced m-banking adoption intention. Additionally, perceived security was found to be positively moderating these relationships. However, the results showed insignificant statistical support explaining the relationship between social influence and users' intention to adopt m-banking. In conclusion, this study theoretically contributed to the body of knowledge by identifying the significant factors that influence m-banking adoption intention in the UAE. Additionally, this study demonstrated that perceived security is an important moderating variable and trust, as an independent factor, is also one of the important factors influencing users' intention to adopt m-banking. Practically, this study contributed by suggesting mechanisms and strategies that will help banks promote the adoption of m-banking.

**Keywords:** M-Banking adoption intention, Perceived Security, Trust, United Arab Emirates, Unified Theory of Acceptance and Use of Technology (UTAUT)

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I dedicate this thesis to the world.

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## List of abbreviations

ATMs	Automated Teller Machines
AVE	Average variance extracted
BI	M-banking Adoption Intention
CR	Composite reliability
$D^2$	Mahalanobis distance
E	Equality of variances
EE	Effort Expectancy
$f^2$	Effect size of moderating variable
GoF	Goodness of Fit
HTMT	Heterotrait-Monotrait
ICT	Information and Communication Technology
IS	Information Systems
M-banking	Mobile banking
MENA	Middle East and North Africa
OTP	One Time Password
P	Path coefficient
PE	Performance Expectancy
PLS-SEM	Partial Least Square Structural Equation Modelling
PS	Perceived Security
$Q^2$	Predictive relevance
$q^2$	Effect size of $Q^2$
$R^2$	Coefficient of determination
SD	Standard deviation

SI	Social Influence
Sig	Significant variance
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TR	Trust
TRA	Theory of Reasoned Action
UAE	United Arab Emirates
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variance Inflation Factor



# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

Industrial Revolution 4.0 (IR 4.0) has brought a new dimension to the industry whereby all the conventional methods of operating a business have changed towards the implementation of automation and the utilization of robotics in the business (Alaloul, Liew, Zawawi, & Kennedy, 2020). All the changes happening in the business field have pushed the industry to be more creative and innovative in crafting their products and services to be used by people around the world. Moving forward, the banking industry has also been affected with the revolution of changing the conventional methods in servicing their clients towards adopting methods where clients can be served virtually.

Banking is segmented into a service industry whereby it is highly regulated, standardized, and has supervised financial operations in place (Mayliza & Yusnelly 2021). Banking is a place that deals with financial services such as loans, money exchange, credit facilities, and other financial activities for both individuals and corporations (Haralayya, 2021). According to Putranto (2020), banking is one of the major drivers of the economy because it provides the liquidity that allows people and companies to invest in the future.

With time, banks have broadened their offerings of products and services which are not only limited to checking accounts, opening and managing accounts, certificates of deposit, and processing loans, including car loans and home mortgages. They have also added additional services that include safe deposit boxes, investment-related services, and gold transactions (Magdalena, Marpaung & Indira, 2019). The usage of the internet for financial and banking services has expanded the traditional banking

services by providing customers with new and innovative ways to access and manage their finances. Online banking, mobile banking (m-banking), online investing, and online payments are just a few examples of how the internet has revolutionized the banking and financial industry. M-banking is seen as the subset of online banking using mobile devices and is different compared to both online investing and online payment, as online investing platforms are specifically designed for managing investments and trading securities and online payment specifically focuses on facilitating payments and transactions over the internet. These advancements in technology have made banking more convenient and accessible than ever before and have opened doors for new players to enter the financial industry. Overall, the internet has transformed the banking and financial industry, offering customers a more efficient and convenient way to manage their finances (Ismaili & Spaho, 2021).

According to Zhang, Lu and Kizildag (2018) m-banking is the act of making financial transactions on mobile devices (i.e., smartphone, tablet, etc). Kwateng, Atiemo and Appiah (2018) mentioned that the utilization of m-banking is referred to activities such as paying bills, money transfers, and other financial services. The growth of m-banking services is also being “pushed” by the evolution of the m-commerce industry which gives options to the customers to shop online at any time and from anywhere (Khrais & Alghamdi, 2021). This scenario is advantageous to both parties; banks and m-commerce providers should collaborate and provide better payment transaction services to secure users from any harms and unauthorized accesses from unknown parties. M-banking assists users with using banking services beyond the constraints of time and place (Zhou, Lu & Wang, 2010). Moreover, m-banking helps traditional banks with reducing operational costs and cross-selling of financial products (Hoehle,

Scornavacca & Huff, 2012), acquire new customers, and enhances customer retention (Shaikh & Karjaluo, 2015).

Functions provided by m-banking apps are categorized into financial ones and non-financial ones (Jebarajakirthy & Shankar, 2021). Financial functions normally cover features such as account checking, money transfer and remittance, management of credit cards, and wealth management services (i.e., insurance products, funds, and bonds). Non-financial functions generally include mobile payment of bills, fine payments, phone account top-up, standing instructions etc. Those non-financial functions are often facilitated based on the cooperation between banks and third parties to facilitate and ease the life of people specially in the m-commerce industry as most governments and businesses are shifting towards the online and virtual environments (Jebarajakirthy & Shankar, 2021).

Despite the advantages of m-banking, users are still uncertain about the safety of their personal financial information. Users believe that this information could be retrieved by unauthorized parties without the permission of the users (Singh & Srivastava, 2020). Security factors is always one of the most important factors that will determine the user's decision to adopt a new innovation (i.e., m-banking) (Jebarajakirthy & Shankar, 2021; Singh & Srivastava, 2020). For instance, according to Sharma, Banerjee and Paul (2022) m-banking has not been widely adopted due to security concerns factors. Many users are worried about that their personal financial information that could be compromised if they use m-banking services. Researchers have identified a number of cybersecurity threats associated with m-banking, such as cyberattacks, account hijacking, and data breaches. These threats have led to a lack of confidence in m-banking among many consumers, which led to low adoption rate (Jebarajakirthy & Shankar, 2021; Al Amin et al., 2021; Shaikh and Karjaluo, 2015).

## 1.2 Background of the Study

M-banking has become a viable alternative to traditional banking channels (Jadil et al., 2021) and despite the widespread use of smartphones and the popularity of m-banking, studies show that the adoption rate of m-banking has been relatively low worldwide and has not met industry expectations, as users are sceptical of the security of m-banking due to cyber security compromises, cyber-attacks, and data breaches (Al Amin et al., 2021; Giovanis et al., 2019; Zhang, Lu & Kizildag, 2018).

M-banking users are still uncertain about the safety of their personal financial information when using the banking platform (Jebarajakirthy & Shankar, 2021; Al Amin et al., 2021). For example, users believe that their personal financial information could be retrieved by unauthorized parties without the permission of the users due to the fact that security breaches and threats such as phishing attacks etc are always a challenge for users to adopt m-banking (Giovanis et al., 2019; Zhang, Lu & Kizildag, 2018).

Security is always one of the most important deterrent factors that will influence the user's decision to adopt a new innovation, especially the ones related to financial technologies (e.g., m-banking, mobile wallet, etc.) (Jebarajakirthy & Shankar, 2021; Singh & Srivastava, 2020; El Hendy et al., 2020). For instance, according to Sharma, Banerjee, and Paul (2022) m-banking has not been widely adopted due to users perceived security concerns that might lead to exposing their financial data due to existing security threats. The low execution of security of m-banking has jeopardised the digital transformation of the banking system (i.e. m-banking) (Hanif & Lallie, 2021).

The United Arab Emirates (UAE) has no exception to understand the deterrent factors that influence the user's adoption of m-banking as UAE became a highly

digitized country due to its supportive infrastructure and regulations, with an impressive 99 percent of the population being active internet users, making it the most digitally friendly country in the Middle East (Majumdar & Pujari, 2022; El Hendy et al., 2020). With the government's push towards a cashless society (Al Ryalat, 2017), there has been a surge in the adoption of contactless payment strategies, such as m-banking and digital mobile wallets like Apple Pay, Google Pay, and Samsung Pay. The Central Bank of the UAE has sponsored the implementation of these technologies, which are expected to have a significant impact on the payment's environment.

In the UAE, 53% of users connect to the internet via smartphones, with 18.38 million mobile connections in January 2020 (Majumdar & Pujari, 2022). The UAE is attempting to transition to a cashless economy. With the advancement of technology, consumers and businesses are adopting a contactless payment approach, which is considered a convenient, fast, and cost-saving mode of transaction. In order to promote a cashless society through various smart government initiatives, the Central Bank of the UAE supported the launch of the Emirates Digital Wallet, which is expected to drastically change the payment landscape.

However, despite the UAE's progress in building a conducive cashless environment, challenges still exist. The level of m-banking adoption in the country remains relatively low, as noted by Majumdar and Pujari (2022). Although the UAE is not an exception, it is essential to address these challenges to ensure a smooth transition to a cashless society. With the continued efforts to improve digital infrastructure, regulations, and security measures, more understanding about the deterrent factors specially the factors related to security, which will influence the adoption of financial technologies solutions and platforms such as m-banking needs to be investigated

further (Rahmiati, Susanto, Hasan, & Pujani, 2022; Wandira & Fauzi, 2022; Konteos et al., 2022).

### **1.3 Problem Statement**

Application-based financial transactions, characterized by uncertainty, anonymity, and a lack of interpersonal interaction, underscore users' concerns regarding security and trust in the virtual realm (Ramli et al., 2021). The inherent uncertainty regarding security perceptions and trust in digital environments contributes significantly to users' cautious approach towards adopting m-banking (Ramli et al., 2021). Perceived security and trust emerge as pivotal and essential factors influencing customers' confidence in online financial transactions, given the sensitive nature of information divulged during such interactions (Kumar & Yukita, 2021; Obaid, 2021). A lot of research conducted to explore perceived security and trust impact across various countries (Obaid, 2021; Kumar & Yukita, 2021; Merhi et al., 2021; Merhi et al., 2019; Mutahar et al., 2018; Lim et al., 2019).

Trust in m-banking is crucial for establishing credibility among users, especially amidst concerns about technological competence and system protection from security threats (Kumar et al., 2023). Moreover, users' limited awareness about security measures contributes to their apprehensions and lack of trust in m-banking platforms (Majumdar & Pujari, 2022; Obaid, 2021). Despite advancements in internet and security technologies, user perceptions of m-banking security remain influenced by gaps in knowledge (Mutahar et al., 2018; Stewart & Jürjens, 2018). Perceived security and trust have been identified as critical factors shaping intentions towards adopting m-banking (Ramos et al., 2018), with several studies emphasizing their role in mitigating mistrust among users (Hanif & Lallie, 2021; Baabdullah et al., 2019; Chawla et al., 2018).

From a psychological perspective, security is both a technological and human factor, where users fear manipulation and exploitation by m-banking technologies (Ammar & Ahmed, 2016; Mathew et al., 2014). Most literature on security in m-banking focuses on its technological aspects (Chauhan et al., 2021; Puriwat & Tripopsakul, 2017; Chiu et al., 2016), establishing its direct relationship with adoption intentions (Choudrie et al., 2018; Al-Sharafi et al., 2018; Amro & Tiantian, 2017), albeit with some studies reporting inconsistent findings (Wandira & Fauzi, 2022). Consequently, perceived security is pivotal factors warranting investigation in the context of m-banking adoption intentions.

Scholars have advocated for further research to explore how perceived security moderate's user intentions to adopt m-banking (Islam et al., 2019; Baabdullah et al., 2019) especially in the Middle East and North Africa (MENA) region, with focus on its psychological dimensions as suggested by Baabdullah et al. (2019) to address this gap (i.e., psychological). Ibrahim, Shahid, and Syed (2020) emphasize proactive governmental measures in the UAE to address challenges related to secure m-banking.

Despite extensive research on perceived security and trust in m-banking, particularly in developed nations, there remains a dearth of studies examining how individual differences and traits moderate their effects. For instance, Natarajan et al. (2018) found gender and age differences influencing m-banking adoption, where females and older individuals exhibited higher levels of trust. Furthermore, regional and cultural factors can influence perceptions of security and trust, thereby impacting m-banking adoption intentions (Apaua & Lallie, 2022). Additionally Hanif and Lallie (2021) found that perceived security and trust significantly influence adoption intentions among the senior population in the UK (aged 55+).

Given the variability in findings across literature, there is a need for further research to understand the influence of perceived security as moderator and trust on m-banking adoption intentions. From statistical point, Baron and Kenney (1986), recommended incorporating moderating factors can enhance understanding of relationships where inconsistencies exist between independent variables and predicted outcomes. This aligns with scholars in the m-banking domain recommending for more studies to explore how perceived security moderates' users' intentions to adopt m-banking (Islam et al., 2019; Baabdullah et al., 2019).

In light of these considerations, this study argues that perceived security moderates the impact of functional aspects (e.g., performance expectancy, effort expectancy), social factors (e.g., social influence), and trust on users' behavioural intentions to adopt m-banking. Consequently, the study posits that higher perceived security beliefs among users correlate with increased adoption of m-banking and vice versa (Ramos et al., 2018). While previous research underscores the importance of perceived security in m-banking adoption, limited attention has been given to its role as a moderating factor and trust as an independent factor of adoption intentions.

Moreover, there is limited research addressing m-banking adoption in the UAE, particularly regarding security-related factors and trust from the user perspective. This knowledge gap necessitates investigation within the UAE context to comprehensively understand these factors (i.e., perceived security and trust) and their implications for m-banking adoption. Additionally, as highlighted by Majumdar and Pujari (2022) and Al Ryalat (2017), m-banking adoption in the UAE lags behind despite high smartphone penetration, emphasizing the necessity for research.

Therefore, this study seeks to investigate factors of m-banking adoption intention in the UAE, with a specific focus on perceived security and trust as barriers hindering

adoption (El Hendy et al., 2020). It aims to extend the Unified Theory of Acceptance and Use of Technology (UTAUT) by integrating perceived security as moderator factor and trust as independent factor, thereby enhancing understanding of user intention towards m-banking adoption. Additionally, this study aims not only to understand user intentions but also aims to inform policymakers and practitioners on strategies and mechanisms to enhance perceived security and trust in m-banking applications in the future.

#### **1.4 Research Questions**

The research questions for this study are:

1. What are the factors that have influence on user's m-banking adoption intention in the UAE?
2. How do the identified factors influence user's m-banking adoption intention in the UAE?
3. How does perceived security moderate's user's m-banking adoption intention in the UAE?

#### **1.5 Research Objectives**

The objectives of this study are:

- i. To identify the factors that have influence on user's m-banking adoption intention in the UAE.
- ii. To examine the relationship between the identified factors in influencing user's m-banking adoption intention in the UAE.
- iii. To examine the moderating influence of perceived security on m-banking user's adoption intention in the UAE.

## 1.6 Significance of the Study

The significance of the study is discussed as follows:

1) The identification of suitable factors is very important as the existing study lacks empirical evidence of what factors influence m-banking adoption among user in the UAE. Users in UAE is uncertain about security and trust of m-banking (Obaid, 2021; Majumdar & Pujari, 2021). This is partly due to the absence of information about m-banking security. Users' perception of m-banking security measures has been impacted by their lack of knowledge about these safeguards, even with the advancements in internet and security technologies (Mutahar et al., 2018; Stewart & Jürjens, 2018). As financial transactions continue to quickly move from the real world to the virtual world, perceived security and trust are regarded as variables that are always changing. As a result, users' adoption of m-banking are mostly determined by their perceptions of security, and trust (Apau, Koranteng, & Gyamfi, 2019).

Furthermore, this study provides an empirical evidence based on the analysis conducted on the proposed research framework. The findings of this study are important to empirically extend the existing understanding of the significant factors of m-banking adoption intention in UAE.

2) Investigation for the moderating role of perceived security on m-banking adoption intention among users in the UAE. Previous studies have confirmed that m-banking research is still in its infancy globally. As a result, more studies may be conducted to gain a deeper understanding of banking users' intentions to use m-banking (Singh and Srivastava, 2020; Danyali, 2018). People's desire to use m-banking is strongly influenced by their perception of security, which in turn strengthens adoption intention of m-banking (Merhi et al., 2019). Perceived security has been

operationalized as direct variable in understanding adoption intention of m-banking in previous studies, and inconsistent results about perceived security have been reported. In this study proposing the operationalization of perceived security as a moderating variable in the suggested model due to the reasons that in the realm of statistical modelling, moderating variables play a crucial role in enhancing the predictability and understanding of a model's outcomes, it allows for a more sophisticated understanding of the relationship between the independent and dependent variables. It accounts for nuances and complexities that might otherwise be overlooked in a simpler model (i.e. enhanced nuances and complexities), the model becomes more accurate in predicting outcomes for different groups or scenarios. It helps refine predictions by considering how the relationship between variables may differ among various subgroups within the dataset (i.e. improve accuracy and precision), models with moderating variables can provide a richer explanation of the relationships among variables. They offer insights into the circumstances under which the effects of independent variables on the dependent variable might differ (i.e. better explanation of the relationship) and in many real-world scenarios, relationships are seldom straightforward so moderating variables allow models to better reflect this complexity by acknowledging that the impact of one variable on another can vary across different contexts (i.e. accounting for real-world complexity) (Baron & Kenny, 1986).

3) M-banking is proliferating worldwide, and UAE is no exception to that. UAE is on the route to emerge as a cashless economy in the future (Srouji, 2020). Owing to the rising technological advancements, businesses and individual customers in the country are shifting towards a contactless payment approach. Such mode of payment is being considered as more convenient, faster, and characterised by greater cost savings (Anene, 2021). In order to promote a cashless economy in the UAE through

various technological initiatives, the UAE central bank has been supporting the introduction of various digital banking tools. So this study will aid in understanding the users perception about security when it comes to adopt m-banking in the cashless economy.

4) Additionally, the study enhances the robustness of UTAUT by introducing the moderating role of perceived security within the theory. The extended version of UTAUT provides researchers and practitioners with a more comprehensive overview of how users perceive security when it comes to m-banking adoption intention, especially given the continuous development of technical security. The model's features of perceived security and trust can aid in better understanding users' intentions to use m-banking in the future. By incorporating perceived security and trust constructs in the model, the extended UTAUT offers a more holistic perspective on the factors that influence m-banking adoption and usage as it will have diverse type of factors which measures the adoption intention in m-banking. This can inform the development of more effective strategies for promoting m-banking adoption and enhancing user satisfaction and trust (Merhi et al., 2019).

5) Based on the empirical findings, this study contributes by proposing practical mechanisms (i.e. customer support and education, transaction security and app security, compatibility and accessibility, real-time alert and in app notifications, compliance with regulations and continuous improvement) to help banks improve their performance, effort, trust, and security expectations. By elaborating on the influence of the predictors on m-banking adoption, this practical mechanism can assist banks in promoting better adoption rates. The factors identified in this study can also

aid banks in developing more secure m-banking applications, strengthening customers' perception of security and awareness to use m-banking in the future.

Therefore, this study offers practical insights that can inform the development of more effective strategies for promoting m-banking adoption, enhancing user satisfaction and trust, and improving overall adoption rates. It is important for constructing an enhanced version of the UTAUT model that includes perceived security as a moderator and trust as core variable for m-banking adoption intention. The addition of perceived security and trust factors to the model will add to the body of knowledge, particularly in the context of m-banking adoption intention (Merhi et al., 2019).

The study's significance lies in addressing the gap in the literature regarding m-banking adoption within the UAE context. By exploring the moderating role of perceived security, the study seeks to provide a more comprehensive and nuanced understanding of the factors that influence m-banking adoption intention among users in the UAE. The findings could be beneficial for banking institutions and policymakers in the UAE in designing more effective m-banking services and developing regulations that promote the adoption of m-banking while ensuring user security and privacy (Majumdar & Pujari, 2022).

6) In terms of practical contribution, this study identifies the important factors that influence the adoption of m-banking. While banks often prioritize developing technical security features to protect m-banking applications, relying solely on this perspective may not guarantee higher adoption rates (Majumdar & Pujari, 2022; Al Ryalat, 2017). Instead, banks need to understand users' perceptions of security towards m-banking adoption, as adoption is influenced by personal beliefs, and perceived security is psychological in nature. By understanding a user's psychological

state on security in adopting m-banking, banks can encourage positive interest in adoption.

As a conclusion, this research aims to examine the moderating influence of perceived security on m-banking adoption intention among users in the UAE. The study's significance lies in addressing the gap in the literature regarding m-banking adoption within the UAE context. By exploring the moderating role of perceived security, the study seeks to provide a more comprehensive and nuanced understanding of the factors that influence m-banking adoption intention among users in the UAE. The findings could be beneficial for banking institutions and policymakers in the UAE in designing more effective m-banking services and developing regulations that promote the adoption of m-banking while ensuring user security and privacy (Majumdar & Pujari, 2022).

### **1.7 Research scope and Limitations**

Meanwhile the limitation of the study can be listed as below:

The scope of this study discusses the adoption intention of m-banking in UAE by looking at the adoption from the security perception of UAE population in general and the study did not focus on specific m-banking services. The key variable in this study is perceived security and its relationship with m-banking adoption intention and other predictors (i.e. Performance and effort expectancies, social influence and trust). The study's key themes are m-banking adoption in the UAE, perceived security, and trust concerns in m-banking adoption intention. The study presents a conceptual model based on existing theories. Existing literature reports that m-banking adoption intention is still in its initial phases in the UAE. This study contributes to the literature by highlighting the importance of trust and perceived security in m-banking adoption

intention, in addition to the factors of performance, effort expectancy, and social influence that have been previously identified in literature.

Further, the scope of this study is also to elaborate on the moderating influence of perceived security on users' intention to use m-banking in the UAE. The motivation behind this study is the lack of literature addressing the challenges of m-banking adoption intention among the UAE population.

To collect data, the study develops an instrument through a web survey. The collected data is analysed using Structural Equation Modelling (SEM) and Partial Least Squares-SEM (PLS-SEM). The measurement model is examined by assessing the internal consistency, convergent validity, indicator reliability, and discriminant validity. The results of the variables' relationships are examined using PLS path modelling to test the study's hypotheses.

The majority of respondents in this study were found to be subscribing to m-banking services offered by local banks in the UAE. This limits the opportunity to evaluate the perceptions of m-banking users who subscribe to foreign banks operating within the UAE. It is possible that those associated with foreign banks may have higher expectations of security due to the robust security infrastructures provided by these banks, as they have received global security support worldwide.

The findings of this study are based on purposive sampling techniques, as banks do not share customer details, limiting the ability to establish a sampling frame. Respondents were only reached through social media posting (i.e., Facebook, Instagram, and WhatsApp). It is important to note that the UAE is home to more than 200 nationalities, and this cultural diversity may impact the findings. English is not the native language for some nationalities, which may affect their understanding while

participating in the survey. Therefore, the researcher used simple English language to convey the correct meaning of the questionnaire contents to the participants. The perception of security for each of these ethnicities may differ significantly from each other. Some users might only hear about m-banking and use it for the first time during the survey, and this could impact their perceptions. Some nationalities may prefer Apple devices over Android devices and believe that Apple devices are more secure than others and vice versa. This might also impact the findings as some users may link the perceived security of the applications used with the device brand and the store offering the application (i.e., Google Play or Apple App store).

### **1.8 Operational Definitions**

In this study, the researcher operationalized key constructs to provide a clear understanding of the concepts under investigation. To measure the constructs, the researcher used established scales from previous literature where possible and adapted them to the context of m-banking in the UAE. Below are the operational definitions used in this study.

**M-banking adoption Intention** is defined as the degree to which a person has formulated conscious plans to perform or not perform a specified future behaviour (Warshaw & Davis, 1985). Specifically, the researcher examined user intention to adopt m-banking in the UAE, focusing on the factors that influence this intention.

**Performance Expectancy** defined as the degree to which an individual believes and perceives that the usage of technology or a system is helpful or advantageous in improving the performance of a task (Onaolapo & Oyewole, 2018).

**Effort Expectancy** defined as how an individual feels when using a technology, in terms of how efficiently they might be able to use it and how much strength of ease is there in the usage of technology (Ghalandari, 2012).

**Social Influence** defined as how individuals change their behaviour to meet the demands of a social environment (Crabbe et al., 2009).

**Trust** defined as the willingness to be vulnerable to an information technology based on expectations of technology predictability, reliability, and usage (Lippert, 2016).

**Perceived Security** defined as the extent to which one can transmit sensitive information over the internet without fear or risks (Kim et al., 2010).

## 1.9 Organization of the Thesis

This thesis begins with Chapter One, which serves as an introduction to the research. It starts by discussing the impact of technology adoption in the banking industry, particularly the shift from conventional methods of dealing with clients to using m-banking. The background of the study section provides an overview of m-banking, including its functions, benefits, and the technologies adopted in the UAE context. It also highlights the importance of perceived security in influencing users' intention to use m-banking. The problem statement section identifies the issues related to m-banking that affect users' perceptions of m-banking security. The research questions and objectives sections provide direction to the researcher in conducting the study. The significance of the study section highlights both the theoretical and practical significance of this research. The theoretical significance lies in its contribution to the existing literature on m-banking adoption intention in the UAE, particularly in relation to the moderating influence of perceived security. The practical significance

of this study is that it provides insights into the factors that influence users' intention to adopt m-banking, particularly in relation to perceived security, which could inform the development of more secure m-banking services. Then the research scope and limitations section which discusses the limitations while conducting this research and the scope of work for this study. After that, a list of operational definitions is provided to help readers understand the terms used throughout the study. These definitions provide a clear understanding of the concepts under investigation and allow for accurate measurement of the constructs. Lastly, the chapter concluded with the organization of thesis section, which explains the thesis structure and chapters in this study.

Meanwhile, in Chapter Two, the researcher discusses, explains, and elaborates systematically the core concept of this research. The topic is discussed in detail to carefully improve the understanding of the researcher regarding the topic. A theoretical framework is developed which presents the core mechanism, indicators, and underlying relations. The hypotheses are developed based on the conceptual framework of this research.

In Chapter Three, the research methodology is explained, starting from the research paradigm in which a positivist paradigm is selected to provide comprehensive research findings. Moreover, this paradigm is inclined towards a quantitative method, and hence it is suitable for this research. In terms of data collection, primary sources were used, with a questionnaire as the research instrument, and a non-probability sampling technique. For data analysis, the researcher used PLS together with Smart PLS to assess the moderating impacts for the path models comprising of interactive effects. Additionally, PLS-SEM and IBM SPSS are used for statistical processes and analysis.

In Chapter Four, the researcher reports the empirical result of this study. It begins with a response rate trail by preliminary analysis and data screening together with a test of non-response bias. It explains the demographic profiles of the participants and describes the descriptive analysis of the constructs. Moreover, the key analysis of the results of the study are reported using a technique called PLSA path modeling. It further discusses the assessment of the structural model addressing the assessment of the various items elaborated in the endogenous latent construct, the assessment of the predictive relevance, and the effect size of the structure model. Lastly, PLS-SEM analysis is reported, which focuses on the moderating effect, the dependent, and independent variables.

Chapter Five comprises a comprehensive discussion and overall summary of the research. It highlights the key objectives and aim of the study and discusses how the research methodology has helped to collect data and to obtain the research findings. The conclusion significantly explains the effects and impact of m-banking adoption intention in the context of UAE.

Chapter Six provides a summarized overview of the entire thesis along with a discussion of the practical and theoretical contributions of the study. Additionally, the limitations along with the suggestions for future research studies are also provided in this chapter. The chapter ends with recommendations and concluding remarks and marks the completion of this research.

## 1.10 Chapter Summary

As a summary, chapter one gives an overall picture about the m-banking adoption intention and how the users perceive it in terms of the security aspect. In regard to all the issues identified with m-banking adoption intention, it gives a direction to this study to understand how perceived security and trust plays important roles in influencing a user's intention to adopt m-banking. Hence, in the next chapter, the researcher will review the literature to understand the security factors which user intention to adopt m-banking and the theoretical models employed in the area of m-banking adoption intention. Furthermore, the conceptual framework will be developed according to the literature review conducted.



## **CHAPTER TWO**

### **LITRATURE REVIEW**

#### **2.1 Introduction**

This chapter presents the analysis of literature review related to the m-banking adoption topic. The analysis explains the relevance of key constructs of this study which including m-banking, m-banking in the UAE, the significance of technology adoption theories adoption of m-banking, previous studies related to m-banking and the adoption theories used, and key variables used in m-banking. Moreover, the researcher discusses and includes a theoretical framework and hypotheses to better understand the underlying concepts in understanding the influence of perceived security as moderator and trust on the user's intention to adopt m-banking in the UAE.

#### **2.2 M-banking**

People rely heavily on their smartphones and the internet these days to get everything done. More smartphone-based service innovations are created as a result to help individuals do their tasks quickly and effectively. M-banking is defined as software applications that enable customers to conduct banking transactions using their mobile devices, such as smartphones and tablets. These applications provide customers with a convenient and accessible way to manage their finances on the go (Baabdullah et al., 2019).

One of the developments in the financial technology space that makes it easier to make financial functions and non-financial functions using a smartphone is the m-banking. It integrates all of the users' banking needs and provides a simple and convenient way without regard to time or place (Talwar et al., 2020). With the usage

of automated teller machines (ATMs), phone banking, and m-banking as interaction channels, m-banking has helped to dramatically improve the relationship between consumers and their financial institutions. Access to the internet and cell phones has evolved into a convenient means of carrying out banking tasks such as monitoring account balances, transferring money between accounts, and processing payment transactions. With sophisticated features supplied by mobile phones and associated software, when compared to traditional online banking using personal computers, using cell phones with internet connectivity to execute financial transactions is regarded as more comfortable and secure (Bucko, 2017).

In recent times, technological advancement has made it possible for m-banking customers to transact on their mobile phones and other portable devices. Consequently, financial services that were previously only accessible via computers are now available on portable smart devices (i.e., smartphones) (Harma & Dubey, 2009). Moreover, the application of portable devices for mobile transactions is not only limited to m-banking. These devices can be used for shopping, email, subscriptions, payments, and social media engagements. The advantage of using mobile devices for such services include ease of accessibility, flexibility, personalisation, and real-time location.

M-banking is one of the most disruptive innovations in the retail banking and financial sector that has revolutionized the global financial sector (Quirici, 2020). Through m-banking, consumers are not only benefiting in terms of quick transactions, but banks are also benefiting in offering their services 24/7, thereby simplifying the process of banking operations (Shankar & Rishi, 2020). According to Breeders and Khanna (2015), banks have three to five years to become digitally proficient when adopting a new technological innovation. Although banks have been making

significant strides to navigate the digital disruption caused by the technologies, they are required to constantly maintain the pace of innovation to improve their m-banking services to provide a more customer centric experience (Broeders & Khanna, 2015). The advancement of technology has enabled financial institutions to offer instant and more convenient transaction options to customers and incorporate self-service technologies. In addition to this, it is found that the adoption of new technologies like m-banking has given rise to the consumer demand for proactivity and flexibility in their financial dealings through the enriched functionality that m-banking can offer (Fenu & Pau, 2015).

Consequently, in the present times, the banking and financial institutions offer a wide variety of services such as traditional branch services as well as self-service devices such as ATMs, electronic banking, and m-banking (Lee & Chung, 2009). By its nature, m-banking is relatively a new phenomenon (Payne et al. 2018); it helps customers to interact with the bank through mobile devices from anywhere and at any time, providing clients the ease and accessibility to make financial transactions.

To conceptualise, m-banking can be understood as a means or channel via which an individual can interact with the bank using a mobile device. This implies that the users of m-banking can use a variety of financial services and make transactions using their mobile phones (Gu, Lee & Suh, 2009). Shaikh and Karjaluo (2015) added that in the era of new information and communication technology (ICT), m-banking has the potential to be an alternative to financial transactions and banking activities such as shopping and donations, remittances, peer-to-peer payments, and other non-financial services such as PIN changes, account balance inquiries, and much more.

Since all such transactions are an indispensable service for financial institutions, the users of m-banking can easily make bank transactions through their mobile devices. Thus, m-banking enables the users to perform financial transactions such as wire transfers, bill payments, stock market transactions, and other financial services provided by the financial institutions itself (Tam & Oliveira, 2017). Hence, with m-banking, almost all financial transactions and processes can be performed online via mobile devices (Shaikh & Karjaluo, 2015).

In terms of number of m-banking users, it is noted that the m-banking users as of 2020 were estimated to be 1.9 billion individuals, which is forecasted to reach 2.5 billion by the end of 2024 (Kumar, 2021). As per the findings of Elkhodr, Shahrestani and Kourouche (2012), the increase in the usage of the m-banking can be attributed to the fact that the use of mobile phones is becoming ubiquitous among people worldwide. Another factor influencing the rising adoption of m-banking applications is the high degree of flexibility and mobility of the financial and banking services associated with its adoption and use (Ahmed et al., 2017). Thus, this allows users to conduct financial transactions anytime and anywhere in the world, regardless of the operational timings of the bank branches.

As per Shaikh and Karjaluo (2015) m-banking has emerged as one of the widely accepted modes of financial transactions and performing various banking activities. One of the most common transactions in m-banking services is mobile payment. Mobile payments can be understood as a set of services built into mobile devices for the payment of goods, services, and invoices (Yang et al., 2012). The call for m-banking offerings has elevated because of the rapid rise in the use of mobile devices making them a ubiquitous part of life. Thus, m-banking channels are being ensured in every financial institution by providing various new applications to attain its clients.

Banking services are proliferating in terms of mobile payments, cell top-ups, credit applications, financial institution account transactions, money transfers, and various other financial transactions and services (Hanafizadeh et al., 2014).

It is posited that with the adoption of m-banking, the benefits transcend beyond electronic banking. This is because, the ubiquitous use and high penetration of mobile devices have reached all social classes, and mobile applications can be used anytime, anywhere, breaking the boundaries of online banking (Baptista & Oliveira, 2015). As a consequent impact, the access to financial services such as making fund transfers, paying invoices and utility bills, and inquiring about any financial matter is not only limited to advanced and large financial institutions anymore, but also to all types of financial institutions that offer banking services for individuals.

In this regard, it is asserted that m-banking has various competitive advantages over traditional banking since, unlike conventional banking, m-banking enables users to perform banking transactions quickly from their phones at any time or any location. Furthermore, the users of m-banking are not required to visit the bank for processing their financial transactions (Shaikh & Karjaluoto, 2015). It also enhances customer convenience, perceived ease of access, and efficiency, as bank customers are not bonded to location and time limitations and also have greater control and autonomy over financial matters, service availability of 24 hours, and cost reduction in terms of handling financial services and transactions (Chandran, 2014), which leads to customer satisfaction, and hence becomes a source of competitive advantage (Wairimu, 2017).

Due to the high penetration of mobile phones and the associated advantage of having a reach via mobile devices, financial institutions, particularly banks, have been actively investing in the development of their mobile applications by adding various

features and options such as fund transfers, bill payments, and remote deposits(Isa, Hamdan & Alareeni, 2023).As a consequent impact of this, the adoption of m-banking should have been much faster as compared to the adoption of other electronic banking channels. The banking institutions consider that the m-banking channels can facilitate the reduction of transaction costs as well as an increase of the user retention and engagement (Gupta, 2013).

So, in conclusion m-banking can be understood as a set of services, involving the use of portable devices connected to telecommunications networks. These provide users with access to mobile payments, transactions and other banking and financial services linked to customer accounts, with or without the direct participation of traditional banking institutions. This concept can also be applied to the banking channel through which the digital mobile services are provided by the institutions to their clients, i.e. by integrating the concepts of the service and channel.

### **2.3 M-banking in the UAE**

The rising e-commerce and online financial exchanges have influenced the people to use digital payment modes such as Apple Pay, Google Pay, Samsung Pay, and other m-banking applications (TechSci Research Report, 2018). As per the industry review, the use of these mobile payment modes in the UAE is projected to exceed 2.3 billion USD by the end of 2022 (Business Insider, 2018).

It is found that the digitization in UAE has been transformed over the last decade by enabling infrastructure and government policies. As per Majumdar and Pujari (2022), UAE is currently emerging as the most digital friendly country in the Middle East, with 99 per cent of its population being active internet users. In recent years, the UAE has received increasing attention to digital services, and the use of smartphones has

increased tremendously. The proliferation of mobile internet adoption is due to the availability of advanced equipment on low-cost plans. It turns out that the majority of the people in the UAE always remain connected via mobile devices (Global Media Insights, 2020).

According to Majumdar and Pujari (2022), the preference of the people in the UAE is changing as the people show a greater preference towards accessing banking services via m-banking as opposed to using conventional banking services. Increasingly, locals and expatriates living in the UAE tend to be able to deal with their simple banking needs without having to talk to a financial adviser in person or over the phone. In a recent survey, 83 per cent of respondents in the UAE indicated their preference for online banking and m-banking. The advantages highlighted in the survey included usability, 24-hour accessibility, and security (Srouji, 2020). Consequently, a diverse range of banking applications is available in the UAE, from simple bank transactions to complex worldwide currency conversions.

M-banking in the UAE is at an important level relative to many other nations. The influx of m-banking in the region stems from the prevalence of sophisticated digital technology. The UAE banks have been able to leverage the buoyant ecosystem to appeal to many expatriates for personal and business purposes (TechSci Research Report, 2018; Srouji, 2020). Despite the rise of m-banking services in the UAE by the banks, and the users' digital preferences, surveys on banking activities in the UAE have shown the opposite.

Interestingly, the findings of previous studies show that the financial sector in the UAE has remained highly branch-driven, with the majority of the financial and banking activities still being conducted through conventional branches (Owusu-Antwi, Ofei & Eveland2020). Only 61 per cent of the banking activities are conducted

via mobile devices, and 51 percent of the respondents have used m-banking only once (Owusu-Antwi, Ofei & Eveland, 2020).

One of the plausible reasons that might contribute to this scenario is due to the number of fraud cases that are taking place in the UAE, and this number is rising every year (Sharma et al., 2017). The fraudulent cases include false WhatsApp messages, identity theft, phishing, email fraud, and fraudulent methods aimed to trick people into disclosing confidential financial information. Although not all the cases are related to m-banking, this scenario might give consumers a negative perception of security as a result of these circumstances.

As a result, the bank institutions are imposing on their customers, methods to utilise numerous security measures such as fingerprint and face recognition, two-factor authentication, one time password (OTP) via text messages, and emails to protect their accounts (Ali et al. 2020). Hence, such security concerns can either be an enabler or barrier to the proliferation of m-banking adoption in the country (Owusu-Antwi, Ofei and Eveland, 2020). According to Baabdullah et al. (2019), The elements that influence whether a person might adopt m-banking include not only how well a technology, such as mobile security, can protect them from fraudulent acts that might harm them in the future, but also encompass individual's perceived security and social considerations. Individuals are inherently driven by a constant pursuit of a sense of security. This perception is particularly complex when they become aware of a specific need. Along these lines, requirements, and the perceived need to meet them contribute to a person's motivation to perform a specific function (Chakiso, 2019).

The next subsection discusses about the that theoretical model that are found to be suitable and are used to study the adoption behaviour.

## 2.4 Theoretical Models Used to Examine M-banking Adoption Intention

The present section discusses the commonly used adoption theories for the adoption of m-banking in literature namely, Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). Moreover, the m-banking theoretical models relevant to m-banking adoption were discussed in the next subsections (Kumar et al., 2020; Hamed et al., 2020; Venkatesh et al., 2003).

### 2.4.1 Technology Acceptance Model (TAM)

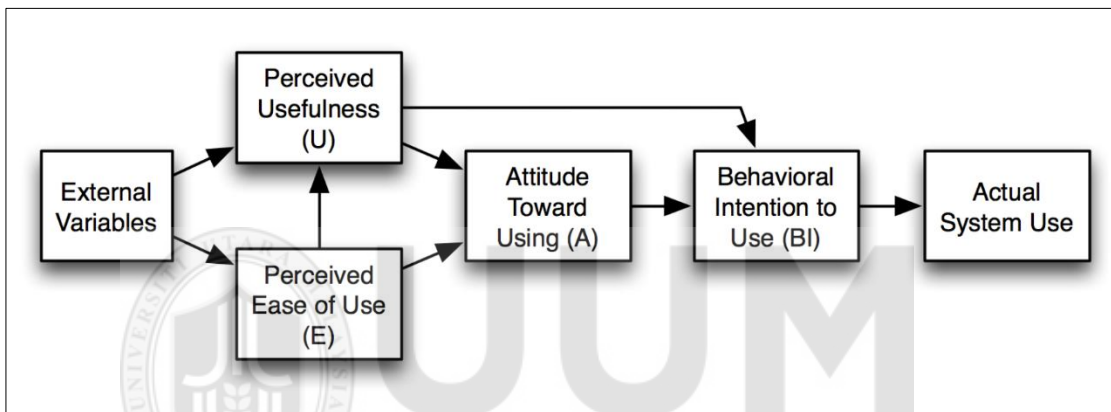


Figure 2.1: Technology Acceptance Model (TAM)

The most highly and widely used model in the context of m-banking is the TAM. The TAM model is widely incorporated for the investigation of the acceptance level for a variety of information technologies and systems. The model was originally proposed by Davis (1989) as shown in Figure 2.1 to delineate the motivation or factors influencing the acceptance of the users towards a particular information system (Yaghoobi & Bahmani, 2010). Basically, TAM is an adaptation of the theory of reasoned action (TRA) that proposed system use evaluated by the intention and usage of technology, which is further influenced by attitude, perceived usefulness, and perceived ease of use, which are impacted by other external factors. The motivational aspect of the individual's actions and decisions are reflected through their intentions. The individual intent to perform a particular action is at the core of Planned Action

Theory (TPB). Conversely, the TAM model predicts the intentions of the people towards the use of technological systems or online services (Aggarwal & Rahul, 2017).

Davis (1989) puts forward two constructs as important factors of the attractiveness of any information system or technology, which are, perceived ease of use and perceived usefulness. To conceptualise, the former is described as the perceptions and belief of the people that the use of a selected technology or system will enable them to save on effort and time, while the latter is defined as the belief of the user that the usage of a particular technology will help them in enhancing their performance and productivity on a particular task (Yaghoubi & Bahmani, 2010).

Both constructs were found to be influencing the intentions and attitude of the peoples towards a variety of online services. Various studies have also tested the relationships and influences offered by the TAM in the online context; particularly m-banking. The majority of the studies have validated the application and the relevance of the constructs of this model for the adoption of m-banking applications by the people (Verma et al., 2022; Albashrawi & Motiwalla, 2019; Mohammadi, 2015; Akturan & Tezcan 2012; Sanayei, Shaemi & Salajegheh, 2011; Yaghoubi & Bahmani, 2010; Reid & Levy, 2008).

Despite its (i.e., TAM) robustness to predict technology adoption behaviour, this theory is usually integrated with other technology adoption related factors to help further understand why people decide to adopt a technology. For instance, Verma et al. (2022) developed an enhanced variant of this model for investigating the acceptance level towards m-banking services. In pursuit of this objective, they proposed a predictive model which integrated TAM with various other factors along with the perceived usefulness of the system and perceived ease of use.

Cheah et al. (2011) investigated factors influencing Malaysian intention to adopt m-banking by an extension of TAM by adding relative advantages, perceived risk, and personal innovativeness. The findings showed that factors such as personal innovativeness, relative advantage, perceived ease of use, and perceived usefulness positively impact the adoption of m-banking services. However, social norm was found to be insignificant.

Alkhalidi and Kharma (2019) applied TAM to investigate the factors influencing users' intentions to adopt m-banking, assessing the significance of perceived usefulness and ease of use in predicting adoption behaviour within specific demographic or cultural contexts.

TAM has shown significant predictive power in explaining users' intentions to adopt m-banking. When users perceive m-banking as both useful and easy to use, they are more likely to adopt the technology. TAM primarily emphasizes perceived usefulness and perceived ease of use as the main factors of user acceptance. It doesn't consider other influential factors such as social influences, subjective norms, or individual differences that might impact technology adoption. As technology evolves rapidly, the relevance of perceived usefulness and ease of use might change or become more complex, challenging the model's ability to adapt to new contexts or emerging technologies. TAM doesn't extensively address emotional or hedonic aspects of technology adoption. Users might be motivated by enjoyment, pleasure, or emotional attachment to technology, which TAM doesn't fully encompass. The model's applicability across different cultures and contexts might be limited. Cultural differences in perception and adoption behaviour might not be adequately captured by the model and narrow focus on just two factors, overlooking other influences like social factors or external conditions (Venkatesh et al., 2003).

## 2.4.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

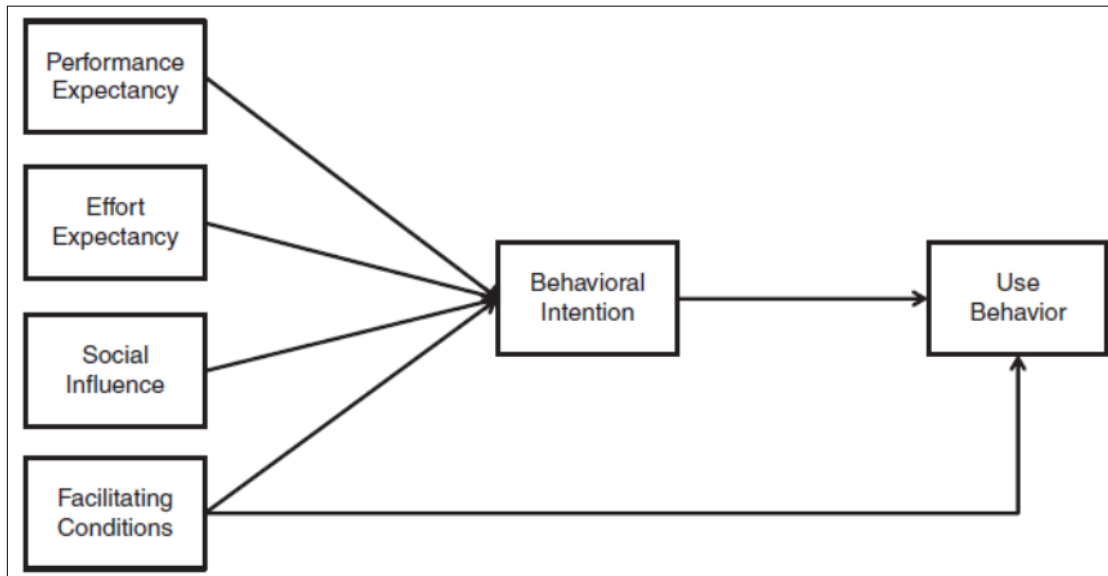


Figure 2.2: Unified Theory of Acceptance and Use of Technology (UTAUT)

The second highly adopted theoretical framework to examine m-banking adoption is UTAUT. Figure 2.2 illustrates the UTAUT. It is one of the preferred theoretical models adopted for determining the adoption of technology by users (Shaikh et al., 2018; Tan and Lau, 2016; Bhatiasevi, 2016). Venkatesh et al. (2003) introduced UTAUT with the integration of various technological factors for determining the adoption of a particular technology. The authors proposed that behavioural intention is the major factor of the usage and adoption of a particular technology.

As per this proposition, the behavioural intention of the user's intent to use a particular technology is dependent on four independent constructs. They are performance expectancy, effort expectancy, facilitating condition, and social influence (Tan and Lau, 2016). Several researchers have adopted the original UTAUT model as a theoretical basis in their studies pertinent to m-banking. For instance, Zhou (2018) formulated a conceptual model grounded on the UTAUT model to examine the intention to switch from online to m-banking in China. Rachmawati et al. (2020)

attempted to conduct an empirical evaluation of the independent factors; performance expectancy, effort expectancy, social influence, and facilitating condition on the user's intent of choosing m-banking in Indonesia, involving 190 m-banking users.

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a comprehensive model that integrates the essential elements of eight previous innovation acceptance theories namely:

- 1- The Theory of Reasoned Action (TRA): TRA emphasizes the influence of subjective norms and social factors on an individual's behavioural intentions. UTAUT integrates this aspect by including the construct of social influence (Venkatesh et al., 2003).
- 2- The Technology Acceptance Model (TAM): UTAUT incorporates the core elements of TAM, focusing on perceived usefulness and perceived ease of use as factors of technology acceptance (Venkatesh et al., 2003).
- 3- The Motivational Model: this model delves into the motivational aspects such as intrinsic interest, extrinsic incentives (rewards, benefits), and personal goals driving individuals' adoption behaviour, however UTAUT offers a comprehensive view by considering not only motivational aspects but also social, cognitive, and contextual factors influencing technology adoption (Venkatesh et al., 2003).
- 4- The Theory of Planned Behaviour (TPB): UTAUT builds upon TPB, which includes attitudes, subjective norms, and perceived behavioural control. UTAUT takes into account these factors and extends them with additional constructs (Venkatesh et al., 2003).
- 5- The Model of PC Utilization: this model focuses on actual utilization behaviour post-adoption, whereas UTAUT encompasses factors influencing

both acceptance and subsequent use. UTAUT's scope is broader, encompassing various factors of technology adoption and use, while the model of PC utilization specifically focuses on utilization factors (Venkatesh et al., 2003).

- 6- Innovation Diffusion Theory: IDT explains how innovations are adopted and diffused within a social system. UTAUT considers elements of innovation diffusion by incorporating constructs like performance expectancy and effort expectancy (Venkatesh et al., 2003).
- 7- Social Cognitive Theory (SCT): SCT focuses on the social-cognitive processes underlying behaviour, while UTAUT centres on factors influencing technology acceptance and use. SCT aims to explain behavioural change processes, whereas UTAUT specifically addresses technology adoption and use. UTAUT's scope is broader, encompassing various factors of technology adoption, while SCT focuses on the cognitive and social processes underlying behaviour in various contexts (Venkatesh et al., 2003).
- 8- Combined TPB/TAM: UTAUT has a wider scope, considering a more comprehensive set of factors compared to the combined TPB/TAM model. UTAUT explicitly includes social influence as a factor, whereas TPB/TAM's emphasis is more on individual cognitive perceptions. The combined TPB/TAM model is simpler and more straightforward compared to UTAUT (Venkatesh et al., 2003). TPB/TAM model focus on cognitive aspects when examining behavioural intentions in specific contexts which is an existing focus in UTAUT (Venkatesh et al., 2003).

UTAUT introduced the concept of a moderating variable (Venkatesh et al., 2003). It has been demonstrated that the proposed factors account for 70% of the variance in

use intention (Venkatesh et al., 2003), offering stronger predictive power compared to other technology acceptance models such as the TAM (Davis, 1993) and the Theory of Reasoned Action (Sheppard, Hartwick & Warshaw, 1988).

UTAUT originally developed to explain and predict technology acceptance in an organizational context (Venkatesh et al., 2003), UTAUT has also been tested in non-organizational settings (Venkatesh, Thong & Xu, 2016; Venkatesh, Thong & Xu, 2012) and has shown wide application, enhancing the generalizability of the theory (Venkatesh, Thong & Xu, 2012; Neufeld, Dong & Higgins, 2007). Over the years, scholars have extended UTAUT to adapt it to different contexts or improve its predictive power (Venkatesh, Thong & Xu, 2012).

The original and extended UTAUT models have been employed to examine technology acceptance in various sectors, including healthcare (Chang et al., 2007), e-government (Gupta, Dasgupta & Gupta, 2008; Chan et al., 2010), mobile internet (Venkatesh, Thong & Xu, 2012; Thong et al., 2011), enterprise systems (Chauhan & Jaiswal, 2016; Ling Keong et al., 2012), and m-banking and apps (Mütterlein, Kunz & Baier, 2019; Zhou, Lu & Wang, 2010).

UTAUT provides a comprehensive framework for measuring technology acceptance and use, and its inclusion of the concept of moderation enhances its usefulness in explaining complex relationships between variables (Venkatesh, Davis & Morris, 2007; Venkatesh et al., 2003).

UTAUT has a broader scope, encompassing more factors influencing technology acceptance compared to other models. UTAUT tends to have higher predictive power than other models due to its consideration of social influence, facilitating conditions, etc. UTAUT is more complex than other models due to its inclusion of multiple

factors, making it more comprehensive but potentially more challenging to operationalize. UTAUT is an evolution of other models, integrating additional constructs to address some of other models' limitations.

UTAUT's unique contribution lies in consolidating other models constructs into a unified framework, providing a broader understanding of technology acceptance. By integrating elements from eight prominent theories, UTAUT offers a more comprehensive explanation of the factors influencing technology adoption behaviours (Venkatesh et al., 2003). The model's creators, Venkatesh, Morris, Davis, and Davis synthesized these constructs from different theories to create a unified and versatile framework that could better explain and predict technology acceptance across various contexts, technologies, and user groups. This integration allows UTAUT to capture a wider range of influences on technology adoption compared to any single theory in isolation (Venkatesh et al., 2003).

In addition, UTAUT provides a wider perspective on what determines a user's decision to adopt a technology compared to TAM. TAM provides a limited insight to predict user's decision to use a technology, as its focus is only limited to technology related factors (i.e., perceived ease of use and perceived usefulness) (Al-Qeisi, 2009). Through UTAUT, researchers can examine the decision to adopt m-banking by looking beyond technological perspectives, where it incorporates four core constructs (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions). This wider perspective is helpful in providing a better understanding of the 'real-world' environment that can help researchers and practitioners evaluate user intention to adopt a specific system (Williams, Rana & Dwivedi, 2015).

UTAUT has been used by researchers to investigate the adoption and willingness to adopt m-banking. Farzin et al. (2021) successfully used UTAUT to determine the

behavioural intentions of customers in the Iranian context. The model helped in identifying factors like perceived value, hedonic motivation, effort expectancy, performance expectancy, trialability and facilitating conditions as the proponent in the adoption of m-banking adoption. The intention to adopt m-banking also had a positive effect on the actual use and word of mouth behaviour of individuals. The study, using UTAUT, identified word of mouth as the mediating factor in the relationship between m-banking adoption intention and the actual use behaviour.

The UTAUT model is also feasible in identifying the factors leading to the adoption of m-banking along with the degree of influence that each factor holds in the Thailand context. The result of the study shows that social influence, perceived credibility, effort and performance expectancy, behavioural intention, and perceived convenience are a positive contributor in the adoption of m-banking in Thailand (Bhatiasevi, 2016).

This theory is selected in this research due to its theoretical and empirical robustness in predicting technology adoption behaviour (Khechine, Lakhel & Ndjambou, 2016). Its ability to determine adoption behaviour has been tested in various technology adoption behaviour contexts. For instance, Venkatesh et al. (2011) investigated the use of e-government services; and other researchers have targeted more specific users of the technologies such as doctors (i.e., digital health application) and teachers (i.e., online learning) (Pynoo et al., 2011).

In conclusion, while the UTAUT theory is valuable for understanding technology adoption, its limitations regarding security related factors highlight the need for extending the theory by introducing security related factors. By incorporating these factors, the model can provide a more nuanced understanding of the factors influencing technology adoption, particularly in sensitive areas like financial services

(Mohd et. al 2022). This extended approach could help identify strategies for enhancing user confidence and, ultimately, driving higher adoption rates of m-banking and other technologies as well.

The next section of this chapter will discuss the outcome of the literature analysis that has been conducted on previous studies that examine the m-banking adoption topic. The literature analysis is useful in providing the state of research related to m-banking adoption, especially within the UAE context. This study is interested to examine the factors that influence the adoption of m-banking within the UAE context. This understanding is important to help further understand the lack of m-banking adoption despite the high internet and mobile penetration in the UAE as claimed by the literature.

## **2.5 Review of M-banking Adoption Literature**

This section provides a review of the existing literature on M-banking adoption. It synthesizes findings from empirical studies, theoretical frameworks, and conceptual models that investigate the factors of M-banking adoption intention. The review aims to identify factors influencing adoption decisions, explore theoretical foundations that underpin m-banking adoption models, and highlight gaps in literature that warrant further investigation. For this research 16 papers were identified examining the topic of adoption and intention to use m-banking. The articles were charted in Table 2.1 presenting key information of the articles reviewed during the literature analysis.

Table 2.1

Summary of papers selected for the literature analysis for this study.

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
1	Wandira & Fauzi (2022)	TAM	Using TAM to investigate and examine the impact of levels of security on users' intention of m-banking in Indonesia.	<u>IVs:</u> Security, Perceived Ease of Use, Perceived Usefulness <u>DV:</u> Intention to Use	The findings highlighted that the security of m-banking has a positive and significant impact on the perceived usefulness of m-banking. Though, an insignificant relationship was found between security and ease of use and intention to use m-banking.	Quantitative method using online survey, and Smart PLS application with SEM methods for data analysis. (Quantitative)
2	Konteos et al. (2022)	UTAUT	To reveal the elements that influence users to use m-banking apps. The paper adapts key factors of theories including UTAUT and includes several elements which are viewed as	<u>IVs:</u> Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Trust, Innovativeness, Compatibility, Convenience <u>DV:</u> Use m-banking apps	The study found that key elements of UTAUT together with trust, convenience, compatibility, and innovativeness are the factors that influence the use and adoption of m-banking. It was noted that innovativeness exerts a positive impact on the usage of the m-banking	The study used a quantitative method with survey design and PLS tool using Smart PLS factor analysis to analyse the data. It emphasizes on the key variables such as performance expectancy, effort expectancy, facilitating

Table 2.1 (Continued)

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
3	Prayudi et al. (2022)	TAM	To explain and examine the role of trust in mediating the impact of perceived usefulness and perceived ease of use on the intention of reusing m-banking on the BNI (Indonesia) m-banking app.	<u>IVs:</u> Perceived Ease of Use, Perceived Usefulness, <u>Mediating:</u> Trust <u>DV:</u> Intention to reuse mobile banking	app; hence, the higher in innovativeness an individual is, the more he/she would prefer using m-banking. The findings showed that both perceived usefulness and perceived ease of use have a significant and positive impact on the intention to reuse, and trust has a significant and positive impact on the intention to reuse along with partially mediating the link between both the factors in the intention to use BNI m-banking app.	conditions, social influence, trust, innovativeness, compatibility, and convenience. (Quantitative)

Table 2.1 (Continued)

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
4	El Hendy et al. (2020)	UTAUT	To test the influence of perceived security and trust on the behavioural intent of the people to use m-banking applications in the UAE. An extended version of the UTAUT model was adopted with five predictors performance expectancy, effort expectancy, social influence, perceived security and trust for predicting the influence on the user's intention to use m-banking applications in the UAE.	<u>IVs:</u> performance expectancy, effort expectancy, social influence, perceived security, trust <u>DV:</u> the user's intention to use m-banking applications	The results of the study empirically proved that trust and the security perceptions of the users have influenced them to use the m-banking application while from the UTAUT model, only efforts expectancy was found to be the influencing factor for the use of m-banking applications in the UAE.	The study employed survey design and non-probability convenience sampling technique, data was collected from 283 users and was analysed by PLS-SEM

Table 2.1 (Continued)

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
5	Alkhalidi & Kharma (2019)	UTAUT	To develop a conceptual model for determining the moderating influence on the factors linked to the adoption of m-banking in Saudi Arabia.	<u>IVs:</u> Effort Expectancy, Performance Expectancy, Perceived Risk, Perceived Cost of Use, Mobile phone Experience, Awareness of Services <u>Moderators:</u> Age, Education Level, Income <u>DV:</u> Behavioural Intention to use m-banking	Key findings indicate that perceived risk is neutral, and risk is not a factor that influence adoption. The findings suggest that user experiences with mobile, knowledge and awareness of mobile banking, performance expectancy, along with effort expectancy, influenced the adoption of mobile banking services. Additionally, demographic factors such as income, age, and education level were found to influence mobile banking adoption.	The researcher distributed questionnaires in Saudi Arabia and the responses were analysed using SEM approach. (Quantitative)
6	Islam et al. (2019)	UTAUT	To investigate the factors influencing consumer behaviour to adopt m-banking in Bangladesh.	<u>IVs:</u> Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Perceived Credibility <u>DV:</u>	The study found that all factors except performance expectancy influenced the Bangladeshi consumer behaviour to adopt m-banking.	Quantitative using a questionnaire. The study applied PLS, and SEM for data analysis. (Quantitative)

Table 2.1 (Continued)

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
7	Akhtar, Irfan, Sarwar & Rashid (2019)	TAM	To determine the influencing factors towards the adoption of m-banking in Pakistan and China	<p><u>IVs:</u> Perceived Ease of Use, Usefulness, Social Influence</p> <p><u>Moderator:</u> Cultural Values</p> <p><u>DV:</u> Intention to use mobile banking.</p>	The findings revealed that cultural values played a moderating role in affecting the adoption of m-banking in Pakistan and China; while perceived usefulness, social influence, and perceived ease of use were found to be significant predictors in the adoption of m-banking in Pakistan, while perceived usefulness played the most crucial role in China.	The study applied a quantitative method with a questionnaire survey, multiple, and hierarchical regression analysis (SPSS). (Quantitative)
8	Nawaz and Yamen (2018)	TAM	To suggest a tested model that outlines the factors impacting banking customer's behaviour intention to use mobile banking in Sri Lanka.	<p><u>IVs:</u> Perceived Usefulness, Perceived Ease of Use, Perceived Compatibility, Perceived Trust</p> <p><u>DV:</u> Behavioural Intension to Use M-Banking</p>	All the proposed variables influenced banking customers' intention to use M-banking. However perceived trust was the strongest among the factors. Perceived compatibility, and perceived trust	Questionnaire used and data analysed using SPSS 22 and AMOS 22 using SEM method. (Quantitative)

Table 2.1 (Continued)

empirically proved their influence towards m-banking intention adoption along with TAM factors.

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
9	Zhang et al. (2018)	TAM	To examine consumer adoption of mobile technology to facilitate their banking activities and services and to focus on factors influencing their engagement and adoption in USA.	<u>IVs:</u> Perceived Ease of Use, Perceived Usefulness, Perceived Enjoyment, Consumer Innovativeness, Perceived Privacy, Perceived Reliability <u>Mediating:</u> Attitude <u>DV:</u> M-banking adoption intention	The study found that PEU and PU are key factors influencing the adoption of mobile technology by consumers. However, privacy, reliability, and safety concerns were found to play a key role in influencing consumers to adopt m-banking.	The study conducted online survey for testing the link between the factors and used SEM for data analysis. (Quantitative)
10	Abbas et al. (2018)	TAM	The study emphasized on several factors that influence the adoption of m-banking in Pakistan.	<u>IVs:</u> Social Influence, Ubiquitous Finance Control, Relative Perceived Advantage, Personal Trust, Perceived Risk, Perceived Cost	The study showed that except ubiquitous financial services, all other factors showed a significant impact on the adoption of m-banking in Pakistan.	The study used a structured questionnaire with a snowball sampling technique and applied OLS regression for data analysis. (Quantitative)

Table 2.1 (Continued)

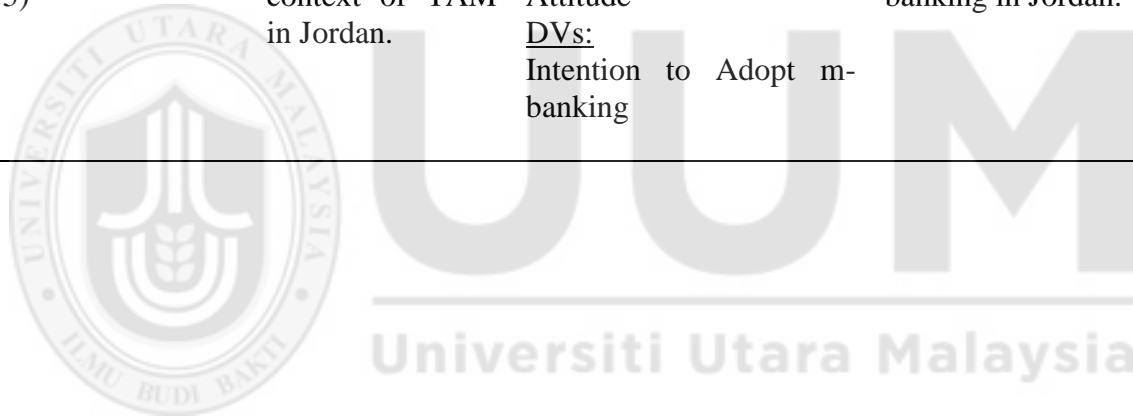
No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
11	Makanyeza (2017)	TAM	To investigate the factors of the intention of the consumer to adopt m-banking in Zimbabwe.	<p><u>DV:</u> Behavioural Intention</p> <p><u>IVs:</u> Perceived Self-Efficacy, Perceived Usefulness, Perceived Ease of Use, Social Influence, Relative Advantage, Perceived Complexity, Perceived Compatibility, Perceived Trialability, Awareness-Knowledge, Perceived Risk, Facilitating Conditions, Demographics (Gender, Age, Education, Income)</p> <p><u>DV:</u> Intention to Use m-banking</p>	The findings showed that perceived compatibility, relative advantage, social influence, perceived self-efficacy and perceived usefulness have a positive impact, while perceived risk has a negative impact on the intention to adopt m-banking.	The study applied quantitative design using surveys from bank customers, and applied SEM, ANOVA and T-test for data analysis. (Quantitative)
12	Glavee-Geo, Shaikh & Karjaluoto (2017)	TAM & TPB	The study focused on the key factors influencing the intention of individuals to adopt m-banking services in Pakistan.	<p><u>IVs:</u> Self-Efficacy, Perceived Risk, Perceived Ease of Use, Perceived Usefulness, Attitude, Regulatory Support, Technology Support, Perceived Behavioural Control, Social Norms</p>	The study found a positive effect on perceived attitude and behavioural control towards m-banking adoption. Key differences between genders were noted to impact social norms on the intention of usage. The impact of the social	The study applied a survey approach using multi-group analysis to detect and identify the differences among genders in the process of adopting m-banking. (Quantitative)

Table 2.1 (Continued)

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
13	Raza et al. (2017)	TAM	The study focuses on the factors influencing the intention of users to continue m-banking in Pakistan.	<p><u>Moderation:</u> Age</p> <p><u>DV:</u> Adoption Intention</p> <p><u>IVs:</u> Resistance, Perceived Risk, Compatibility Awareness</p> <p><u>Mediating Variables:</u> Attitude, Perceived Ease of Use, Perceived Usefulness</p> <p><u>DV:</u> Intention to Adopt mobile banking</p>	norm on the adoption of m-banking was higher among women compared to men.  The findings showed that all the constructs have positive influence on perceived usefulness and perceived ease of use, except awareness, which did not influence perceived usefulness towards the intention to adopt mobile banking.	The study applied a quantitative method with a questionnaire survey and used SEM for checking the factors affecting users' intention to adopt m-banking. (Quantitative)
14	Puriwat, & Tripopsakul (2017)	TAM and Mobile Service Quality (MSQ)	To determine the factors impacting the intention of the customer to adopt m-banking in Thailand.	<p><u>IVs:</u> Perceived Usefulness, Perceived ease, Mobile Service Quality</p> <p><u>DV:</u> M-banking Adoption Intention</p>	The key findings revealed that perceived ease of use, usefulness, and mobile service quality have a positive effect towards m-banking adoption intention.	Web-based survey used to collect the data which was analysed using SEM. (Quantitative)
15	Alalwan, Dwivedi, Rana, & Williams (2016)	TAM	The study analysed the key determining factors affecting the intention of the customers	<p><u>IVs:</u> Self-Efficacy</p> <p><u>Mediators:</u> Perceived Usefulness, Perceived Ease of Use, Perceived Risk.</p>	The behavioural intention was found to be highly affluent with the perceived usefulness, perceived ease of use, and	Self-administered questionnaire and data analysed using SEM. (Quantitative)

Table 2.1 (Continued)

No.	Author(s)	Theory	Focus of the Study	IVs/DVs	Key Findings	Methodology
16	Al Khasawneh (2015)	TAM	towards m-banking adoption in Jordan. The key factors influencing the m-banking adoption of consumers in the context of TAM in Jordan.	Behaviour Intention <u>DV:</u> M-banking Adoption  <u>IVs:</u> Perceived Usefulness, Perceived Ease of Use, Perceived Credibility, Perceived Trust, Attitude  <u>DVs:</u> Intention to Adopt m-banking	perceived risk.  The findings showed that perceived ease of use is positively linked to the attitude of consumers to use m-banking in Jordan.	The study used a self-administered survey, and used descriptive statistics, PLS regression, factor analysis, correlation, and reliability analysis to analyse the data. (Quantitative)



Based on the findings from literature review and Table 2.1 conclusion is summarized as follows:

The topic of m-banking adoption is still relevant and has received attention by many researchers around the world. Despite its popularity, very few studies have been conducted within the middle east region. Study was conducted within the context of Saudi Arabia (Baabdullah et al. 2019), Sudan (Karma et al. 2014), and Jordan (Al-Dwairi et al. 2019). Although this literature review was not exhaustive, there is clear evidence that very limited studies were conducted within the context of UAE. Hence, studying the UAE context is worth researching as it can help fill in the gap that is missing in the literature of this research topic.

Interestingly, the previous studies have mainly used IS adoption theories as is (i.e. UTAUT and Technology Acceptance Model (TAM)). Some research has been done in extending the IS adoption theories, especially in the context of m-banking adoption. This study is not in a position to argue on the robustness of these theories. The origin of these theories is mainly related to stand alone applications within an organizational context. Hence, adapting these theories within mobile platforms requires a better understanding of new variables or relationships that might influence user decision to adopt emerging technology (i.e., m-banking). The literatures selected here focused on the adoption behaviour of m-banking in different regions worldwide, and the variables used in examining m-banking adoption behaviour to find out if the customer would have the intention to adopt m-banking. Studies were conducted with the country as a major factor, such as Indonesia, Kingdom of Saudi Arabia (KSA), Bangladesh, Pakistan, China, Zimbabwe, India, Thailand, Sudan, Jordan, Bahrain, Mauritius, and Taiwan. They examined the elements that influence users to use m-banking apps.

M-banking are affected by user perception of security (Merhi et al., 2021). Karjaluoto et al. (2021) highlighted that several factors come into play to compromise m-banking security. Cyber security threats remain major concerns for m-banking (Win et al., 2021; Rehman & Shaikh, 2020; Prabhakaran et al., 2020; Tham et al., 2017).

Additionally, reviewing the empirical studies in the field of m-banking has revealed that some literature included additional precedents along with the factors of the UTAUT model to investigate the adoption of the m-banking applications and to predict the other factors that might have an influence on their decisions (Bhatiasevi, 2016). In this context, an empirical study was conducted by Bhatiasevi (2016) in Thailand that extended the UTAUT model to include additional factors which were perceived credibility, perceived cost, and perceived convenience of the m-banking adoption.

UTAUT has been considered as a comprehensive model for understanding the adoption of m-banking, as well as having strong predictive power compared with other models. Although the UTAUT model has several benefits, it also has some limitations, such as a lack of factors related to security, privacy, and trust. One significant limitation of the UTAUT model is its insufficient emphasis on security concerns. In an increasingly digital landscape, where cyber threats and data breaches are prevalent, the perception of security plays a crucial role in users' willingness to adopt technologies like mobile banking. Users often weigh the risks associated with potential security vulnerabilities against the benefits of adopting new technologies. However, the original UTAUT model does not adequately address how perceived security influences user behavior, leaving a gap in understanding the full spectrum of factors that drive adoption. Additionally, the UTAUT model falls short in addressing privacy issues. With growing awareness and concerns about data privacy, users are

becoming increasingly cautious about sharing their personal information. Factors such as data protection, the transparency of how information is used, and the overall trustworthiness of the service provider are critical in shaping user attitudes towards adoption. The lack of attention to these privacy-related concerns within the UTAUT framework may hinder its applicability in contexts where these factors are paramount, such as financial services and mobile banking. Trust is another critical dimension that the UTAUT model does not sufficiently incorporate. Trust in service providers whether banks or technology firms significantly influences user adoption decisions. Users are more likely to adopt m-banking services if they trust that their financial data will be handled securely and ethically. The absence of a clear construct for trust within the UTAUT model limits its effectiveness in predicting adoption behavior in environments where trust is a pivotal factor. To address these limitations, researchers and practitioners have suggested extending the UTAUT model by integrating additional constructs that specifically focus on security, privacy, and trust. By incorporating these elements, the model can provide a more nuanced understanding of the factors influencing technology adoption, particularly in sensitive areas like financial services. This extended approach could help identify strategies for enhancing user confidence and, ultimately, driving higher adoption rates of mobile banking and other technologies (Mohd et. al 2022). Thus, in this research the researcher compensates for this limitation by adding new external factors, which they are perceived security and trust.

UTAUT offer valuable insights into understanding user acceptance of technology, UTAUT consider a wider range of factors, providing a more comprehensive framework for analysing technology adoption.

Furthermore, in previous studies, several researchers have added security related factors to the UTAUT model to assess the usage behaviour of several technologies, such as e-banking (Mombeuil & Uhde, 2021), e-commerce (Almaiah et al., 2022), and mobile commerce (Alrawad et al., 2022). Based on the above discussion, this research established the proposed conceptual model based on the UTAUT model while adding perceived security and trust factors, as shown in Figure 2.3 (page 58). Furthermore, it is also reflected in the analysis that it is one of the more preferred theoretical models (please refer to Table 2.1) to predict m-banking adoption behaviour.

Since this study focus on the influence of perceived security on users' intention to adopt m-banking in the UAE and employed UTAUT as the underpinning theory to predict user's behaviour to adopt m-banking in the UAE context. Factors to be further analysed to select the factors for the predicted model are the four UTAUT factors (Namely: performance expectancy, effort expectancy, social influence, and facilitating conditions) along with trust.

Hence, considering these aspects, and the objectives of this research, TAM is not found to be suitable as the theoretical underpinning for this study, since the emphasis of this study is to assess the behaviour and intent of user to use m-banking. Therefore, it can be concluded that UTAUT is found to be a more appropriate and suitable selection in helping this study understand the users' intentions to adopt m-banking in the UAE.

Considering Table 2.1 and the literature analysis, factors were identified from the literature on which some of the factors are factors related to the existing theories such as UTAUT and TAM and these factors were dominant in the reviewed articles such as performance expectancy, social influence, perceived ease of use, perceived

usefulness, effort expectancy and facilitating conditions. It is found that most of the previous studies employed TAM and UTAUT as a core for their research work and extended or employed other factors with the factors of each model factors or merged more than one theory factors together along with other factors. Overall, the literature analysis aided in understanding the list of the various factors that can influence user adoption of m-banking services, and how they interact with each other, and the most used theories employed are UTAUT and TAM. Additionally, consumers pay their monthly bills, transfer money, and pay for other services via m-banking. M-banking is also recognised as a form of payment on mobile devices in several countries, including Indonesia. According to Crisanto (2021), m-banking is highly adopted in one of the six nations in Southeast Asia with the largest adoption of 82.7% of people there are aware of m-banking. Mobile money transactions increased by 38.62% between 2019 and 2020, according to the Central Bank of Indonesia (Crisanto, 2021), and by 2025, it is expected that the value of these transactions will have reached \$83,520 million (Nurhayati-Wolff, 2021).

Many studies have been undertaken to investigate users' trust, and security perceptions of m-banking in general (Obaid, 2021; Kumar & Yukita, 2021; Merhi et al., 2021). This research has produced a variety of findings and analyses regarding the security and trust associated with m-banking. Although trust and perceived security in m-banking have been thoroughly examined, especially in industrialized nations, they have failed to investigate how individual differences and traits temper the effects of perceived security, and trust.

The analysis of the literature found that some of the previous studies which studied the adoption factors had used bank or financial institutes as units of analysis.

However, for this research, these factors have found not to be relevant. This study focuses on individual intention to adopt m-banking applications.

Many studies have extended existing theories by incorporating various variables as independent factors. However, there has been a notable absence of attempts to enhance these theories by introducing factors like perceived security as moderators and trust to better understand the adoption of m-banking. While previous studies mostly focused on demographic factors as moderators, Basbeth and Sumapraja (2021) employed moderator factor by introducing perceived security as a moderator variable in their investigation of mobile payment in online shopping. Notably, they modified and extended the Technology Acceptance Model (TAM) to incorporate the influence of perceived security, contributing to a more nuanced comprehension of the adoption dynamics in the realm of mobile payments.

Based on the analysis and summary as depicted in Table 2.1, limited studies have focused on m-banking adoption in the UAE. The focus of the reported studies in literature showed a high interest in understanding user behaviour intention towards m-banking adoption in many countries. The literature studies employed mainly TAM and UTAUT as the theoretical lens for their m-banking adoption intention studies. Other theoretical models such the Information System Success model was employed as well, but in a very limited number of studies. Furthermore, there are many other variables identified besides the theoretical models' original variables. These variables are introduced as an extension to IS adoption theory variables in the context of m-banking. Tables 2.2 summarizes the identified factors.

Table 2.2

*List of identified factors from the literature analysis*

Age	Perceived Compatibility	Risk
Attitude	Perceived Complexity	Security
Awareness Knowledge	Perceived Cost of Use	Self-Efficacy
Awareness of Service	Perceived Credibility	Social Influence
Compatibility	Perceived Ease of Use	Social Norms
Compatibility Awareness	Perceived Enjoyment	Subjective Norms
Convenience	Perceived Privacy	Technology support
Cultural values	Perceived Reliability	Trust
Education Level	Perceived risk	Ubiquitous Finance Control
Effort Expectancy	Perceived Security	Performance Expectancy
Facilitating Conditions	Perceived Self-Efficacy	Perceived Behavioural Control
Gender	Perceived Trialability	Personal/ Consumer Innovativeness
Income	Perceived Trust	
Innovativeness	Perceived Usefulness	
Mobile service quality	Regulatory Support	
Mobile Phone Experience	Relative Advantages	
Perceived Benefits	Resistance	

In addition to the UTAUT factors other security related factors to be considered which they are: security, perceived security, risk, perceived risk, and trust.

In general, security, perceived security, risk, perceived risk, and trust are commonly considered as important security related factors in models related to technology adoption, including the adoption of m-banking (Mohd Thas Thaker et. al 2022).

Security and perceived security are a critical factor in the adoption of m-banking, as users need to feel confident that their personal and financial information is safe and secure while using the m-banking (El Hendy et al. 2020; Puriwat, & Tripopsakul, 2017). Moreover, the issue of perceived security as a key factor in influencing

intention to adopt m-banking has been thoughtfully examined in the literature for so long time (i.e. Haider et al., 2018; Sharma & Sharma, 2019; Kim et al., 2009; Jahangir & Begum, 2008; Nie & Hu, 2008; Linck et al., 2006). Alabdan (2017) found that the intention to adopt m-banking among Saudi females is affected by a number of factors (i.e. trust, perceived security, user-friendly, comfortable, and availability). Among the aforementioned factors, Alabdan (2017) indicated that perceived security constitutes the most significant factor over intention to adopt m-banking in Saudi Arabia.

Linck et al. (2006) delineated a division of the idiom of security into subjective and objective security. While objective security addresses the issues of authorisation, confidentiality, integrity, authentication, and non-repudiation, subjective security is perceived security, and it expresses the level to which a user believes that adopting a certain mobile payment method or adopting m-banking would be secure. Distinctive studies have affirmed the importance of the role of perceived security on customers to adopt m-banking (e.g. Mashhour and Saleh, 2015; Gu et al., 2009; Laukkanen, 2007). Moreover, studies by Al-Husein and Sadi (2015) and Alkhaldi (2016) focused on the path of perceived security and the user's intention to adopt m-banking in Saudi Arabia.

Given the higher degree of uncertainty present in an online environment, perceived security is even more critical in m-banking adoption intention than in traditional banking (Purwanto, Deviny, & Mutahar, 2020). The lack of security can lead to the failure of m-banking (Rahman et al., 2020), and it can create a negative impact on customers' adoption of m-banking (Hidayat-ur-Rehman et al., 2021). The impact of security on the uptake of m-banking in India was also studied by Chauhan et al. (2021). The study's findings demonstrated the significant influence that perceived security has on consumers' intentions to adopt m-banking.

Trust has been widely examined and proven to be a crucial factor predicting customer's perception and intention toward m-banking (Lafrraxo et. al, 2018). Trust is the basis for any relationship in the world. In business, trust is very crucial to sustaining the liaison between businesses and customers. Studies have shown that trust is one of the key factors that impacts adoption of mobile services (Kim et al., 2009; Koenig-Lewis et al., 2010). Trust is an important decision-making factor for users as trust related to risks and users do not believe in technology because of their uncertainty and risk about the usefulness, and also how to use it (Avoka, 2016). Considering the above discussion perceived security and trust is selected for this study by extending the UTAUT model.

Users are more likely to adopt technology when they perceive it as trustworthy. Trust can be influenced by various factors, including perceived security of transactions, transparency of information handling practices, reliability of service delivery, and the reputation of the technology provider or platform (McKnight and Chervany, 2001).

Understanding the trust construct in m-banking adoption is essential for designing effective strategies to enhance user acceptance and mitigate barriers to adoption (Lafrraxo et. al, 2018). Policymakers and businesses can leverage insights into trust dynamics to build secure and reliable technological infrastructures that foster user confidence and facilitate widespread adoption (Lafrraxo et. al, 2018).

Risk and perceived risk are also important factors to consider in the adoption of m-banking, as users may be hesitant to adopt m-banking services due to concerns about potential negative consequences, such as financial loss or privacy violations (Dan Robinson, 2020). Users also may perceive a level of risk associated with using m-banking services, such as the risk of identity theft, financial loss, or technical

difficulties. Perceived risk can be influenced by various factors, such as the user's previous experience with technology and their level of trust in the service provider (Karjaluoto, Mattila & Pentto, 2015). Perceived risk has two dimensions: technology-driven risk resulting from infrastructure and relational risk resulting from behaviours of service providers (Pavlou 2003). These kinds of technological and relational risks reduce the trust of the users in m-banking, which in turn reduces the intention to adopt m-banking (Pavlou 2003). According to Gerrard and Cunningham (2003), they highlighted that perceived risk is about security aspect with respect to the use of an innovation. Avoaka (2016) in his study about m-banking in Ivory coast highlighted that perceived risk relates to security concerns associated with using technology in banking. Alkhaldi and Kharma (2019) in their study in Saudi Arabia reported that perceived risk is neutral, and risk is not a factor that influence adoption of m-banking. Considering the discussion above, issues related to risk is part of perceived security and trust as well, so this factor is not selected in this study. Since perceived security and trust are the selected two factors in the predicted proposed model and both has relation with risk measurement.

Perceived security and trust are multifaceted elements that are continually evolving as banking transactions transition from the physical to the virtual realm. Because of this, customers' intention to adopt m-banking is primarily determined by perceived security and trust (Apau, Koranteng, & Gyamfi, 2019). Thus, m-banking customers are delighted when they believe the system can handle their privacy and security concerns. This can be accomplished by assuring information security and transaction secrecy, which promotes consumer intention to adopt m-banking.

The next section of this chapter is going to examine the key variables that will be used together with the UTAUT factors in this study. Despite UTAUT's predictive ability,

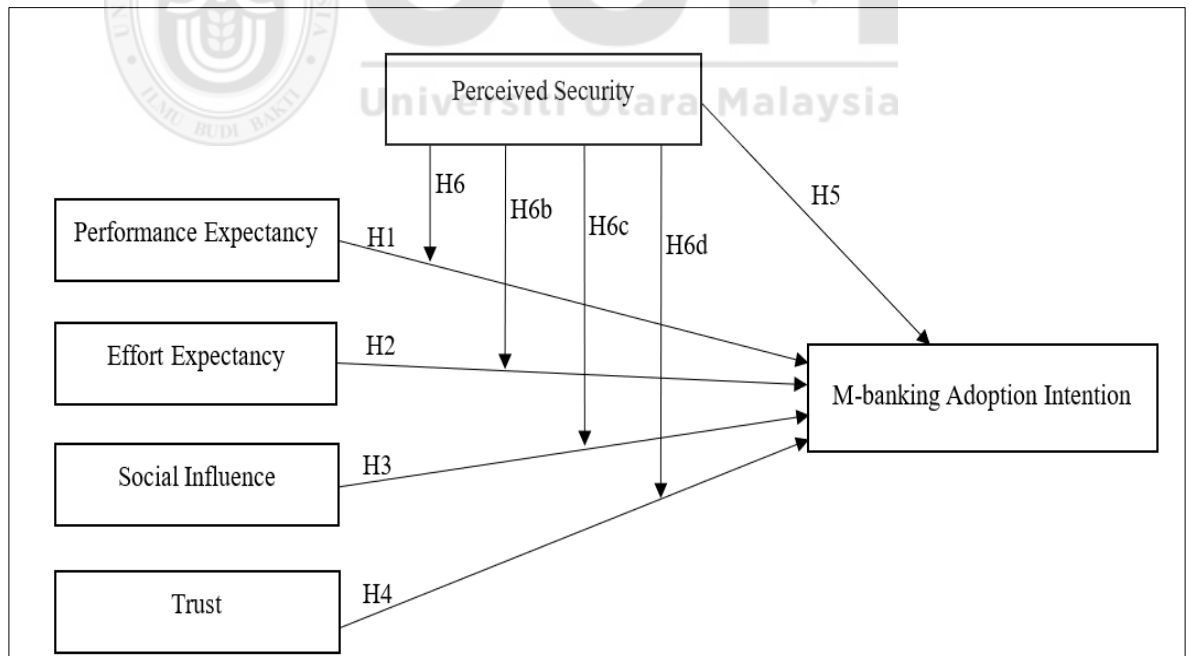
there is still a need to integrate UTAUT with other variables that can better help understand a user's decision to adopt a specific technology (i.e., m-banking) (Williams, Rana & Dwivedi, 2015). According to many authors, as explained above and presented in Table 2.1, this theoretical lens still requires more investigation on how other new variables can be integrated into the UTAUT original model.

## **2.6 Research Framework and Hypotheses Development**

This study aims to delineate the moderating effects of the perceived security between the trust as well as other system-related functional aspects, and the behavioural intent of the people when adopting m-banking applications in the UAE (see Figure 2.3). In pursuit of this objective, the research model for the present study is based on the UTAUT model. The study extends the UTAUT model with the inclusion of trust variable as an additional independent variable, and perceived security variable as a moderating variable. Figure 2.3 illustrates the proposed theoretical model used to predict users' m-banking adoption intentions in the UAE.

The UTAUT model provides a better understanding of technology adoption than other similar theories do (Marikyan & Papagiannidis, 2023). This model provides four key indicators that explain behavioural intentions (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions). The examination of these constructs enables a better understanding of the consumers' intention to use specific information systems, allowing a determination of the critical influences on behavioural intention in any given context to be achieved (Williams et al., 2015). Consequently, the UTAUT model has been widely used by the researchers to explain and predict an individual's intention to adopt and use various technologies such as e-governance (Rodrigues et al., 2016), ICT (Oye et al., 2012), mobile learning/e-

learning (Abbad, 2021), mobile payment (Khalilzadeh, Ozturk & Bilgihan, 2017), health information technology (Hoque & Sorwar, 2017), online information services (Oh & Yoon, 2014), the use of social media (Gruzd et al., 2012), social learning system (Khechine et al., 2020), the acceptance of interactive whiteboard (Wong et al., 2012), and Radio Frequency Identification (RFID) enabled services (Nysveen & Pedersen, 2014). The model is equally applied to predict the use and acceptance of mobile/internet banking (Sharma et al., 2020; Akhtar et al., 2019; Islam et al., 2019; Raza et al., 2019; Oliveira et al., 2014). Additionally, Souiden, Ladhari and Chaouali (2021) in their research highlighted that UTAUT is still one of the main conceptual frameworks and models adopted and adapted by scholars to explain consumers' use or intention of using m-banking. Finally, this model is chosen in the present study as it is the most comprehensive model that explains technology acceptance and usage.



*Figure 2.3:* Proposed research framework to predict user intention to use m-banking applications.

The factors considered in the proposed model are performance expectancy and effort expectancy, social influence, trust, and perceived security. In the proposed model, the performance expectancy, effort expectancy, social influence, and trust are the exogenous variables, while perceived security is the moderating variable. The present study measures m-banking adoption intention as the main dependent variable.

In UAE, it is witnessed that m-banking is still considered to be at their initial stages. So, it is important to consider the role of the selected variables to contribute positively to encouraging the intentions of individuals to adopt m-banking.

The performance expectancy is directly related with consumer attitude and adoption intention towards m-banking applications and services. When consumers receive m-banking innovation, performance expectancy affects the behavioural intention to adopt m-banking (Baabdullah et al. 2019; Rahi et al., 2019; Ali & Kamran, 2017). Effort expectancy has direct correlation with the adoption of m-banking. It has a direct connection to the use of smartphones for learning purposes, transactions, and business (Onaolapo & Oyewole, 2018; Ghalandari, 2012). In the UAE the use of mobile applications is mostly relevant to the benefits that the user can get correspondingly. For this, the social influence variable is included in the model. Furthermore, a user is more likely to adopt m-banking if he/she believes that the application is reliable. For this reason, the trust variable is added. Users would be willing to adopt technology if they believe that a specific system would not be susceptible to financial loss or breach of security (Safina et al., 2018), this drives the attention to include the perceived security in the model.

The validity and reliability of the research model are assessed using data from a pilot study before collecting the study data and the findings from the pilot study guide

researcher in making necessary modifications and refinements to the research model and instruments.

Performance expectancy and effort expectancy they are related to the user's perception of the technology itself. These factors are essential factors of technology adoption because if users believe that a technology will help them accomplish their goals efficiently and effectively, they are more likely to adopt it (Hong & Cha, 2013).

Perceived security and trust are related to the user's beliefs and attitudes towards the technology and the service provider. These factors are critical to the adoption of m-banking services because users need to feel confident that their personal and financial information is safe and that the service provider is reliable.

Social influence was included as it relates to the impact of social norms and subjective norms on an individual's behaviour. This factor is important to consider because people are influenced by the opinions and actions of others around them, and this can affect their decision to adopt a new technology.

Finally, perceived security was included as a moderating variable because it can influence the relationship between the extrinsic variables (performance expectancy, effort expectancy, social influence, and trust) and the user's intention to adopt m-banking. This variable helps to account for the potential impact of security concerns on the other factors and how they relate to user adoption (Kim, Ferrin & Rao, 2008).

### **2.6.1 Performance Expectancy**

Performance expectancy has been highlighted as one of the prominent variables impacting the intentions of populations to adopt m-banking applications (Rahi et al. 2019). Performance expectancy can be defined as the belief to use a specific method or technology (Ogunsola & Olojjo, 2021). A plethora of studies have evaluated the

role of performance expectancy in influencing behavioural intentions of users to adopt technologies like m-banking, and these studies have found a positive relationship between performance expectancy and the behavioural intention to use m-banking services (Farzin et al. 2021; Hamzat & Mabawonku, 2018; Ghalandari, 2012). Alkhaldi and Kharma (2019), used TAM, UTAUT, and SEM approaches for data analysis, noted that demographic factors including age, income, educational level along with performance expectancy, awareness, and experience with mobile devices positively influence the adoption of m-banking services.

The findings presented by Islam et al. (2019) highlighted that performance expectancy did not impact the adoption of Bangladeshi consumers towards m-banking adoption intention. These findings have implications for understanding the factors that drive or inhibit the adoption of m-banking in Bangladesh. It suggests that other factors may play a more critical role in shaping consumers' decisions regarding the adoption of m-banking services.

Performance expectancy refers to 'how much an individual agrees that the person in question will be enabled to achieve improvements in task performance by using the system' (Venkatesh et al., 1996). The definition suggests that performance expectancy involves practical and specific implementations of full trade expectations. This could mean that individuals are not only considering the theoretical benefits but are also evaluating how the use of the system will manifest in their actual, day-to-day tasks or activities (Singh, 2020).

The context of the study has widely focused on central Asian developing economies and Asian countries (Ivanova & Kim, 2022; Shaikh, Glavee-Geo & Karjaluo, 2021; Hariyanti, Hidayatullah & Prasetya, 2020; Kwateng et al., 2018). The present studies, thus provide an opportunity to discuss whether the variable of performance

expectancy holds similar importance in shaping the intention and behaviour of individuals in the UAE or not.

Shaikh et al. (2021), have found that performance expectancy is an important antecedent in consumer's acceptance of m-banking. For instance, a user is more likely to adopt m-banking if he/she believes that using the application can help them to accomplished multiple tasks. Therefore, the following hypothesis can be developed as:

*H<sub>1</sub>: Performance Expectancy has a positive relationship on M-banking Adoption Intention (Farzin et al., 2021; Shaikh et al., 2021).*

### **2.6.2 Effort Expectancy**

Effort expectancy is centred on the concept that is linked between effort to work, performance accomplished from the effort, and the benefit gained from that effort. It has positively influenced the adoption behaviour of users towards technology (Ghalandari, 2012). Studies have investigated effort expectancy on the use of smart phones (Onaolapo & Oyewole, 2018). Additionally, studies including Saprikis et al. (2022) and Alalwan et al. (2017) showed that effort expectancy has a significantly positive impact on the adoption of m-banking applications. Thus, it can be said that effort expectancy is positively related to a user's behavioural intention to adopt m-banking. The authors Alkhalidi and Kharma (2019) using TAM, UTAUT, and SEM approaches for data analysis noted that demographic factors including age, income, educational level along with effort expectancy, awareness, and experience with mobile devices positively influence the adoption of m-banking services. The findings presented by Islam et al. (2019) highlighted that effort expectancy positively impacted the adoption of Bangladeshi consumers toward m-banking. The study by Alsheikh

and Bojei (2014) focused on the UTUAT theory and concluded that effort expectancy also played a crucial role within the m-banking adoption in Saudi Arabia. Ammar and Ahmed (2016) examined factors influencing the adoption of m-banking by the Sudanese microfinance sector using UTAUT and found that factors including effort expectancy positively affected the adoption of m-banking.

Alalwan et al. (2017) define effort expectancy as the level of ease associated with the use of a system. This definition suggests that usability is an important aspect that affects the dedication of customers to adopt a particular m-banking system (Tzavlopoulos et al., 2019). Effort expectancy is based on the concept that there is relationship between effort put for the work, and the performance achieved from that work, and the reward over that effort.

For instance, a user is more likely to adopt m-banking if he/she believes that using the application is easy. Therefore, the following hypothesis can be developed as:

*H<sub>2</sub>: Effort Expectancy has a positive relationship on M-banking Adoption Intention*  
(Saprikis et al., 2022).

### **2.6.3 Social Influence**

Social influence involves the effort, which can be intentional and unintentional, that is required to change the behaviour, attitude, and belief of the other person. Social influence can be a deliberate attempt to influence people to change their perception or view related to a specific thing (Dahl, 2013). In context of consumer behaviour studies, social influence is the critical factor that impacts people to develop a favourable intention towards a product or service, such as m-banking applications (Mokhtar et al. 2018; Dewan, 2010). For example, recent studies (i.e., Mohtar et al. (2019)) and Hassan and Farmanesh (2022) have showed that social influence

increases willingness among users to try and adopt m-banking due to favourable reviews, and positive experiences of people, thus positively affecting users to have high intentions to adopt m-banking services.

The impact of social influence on the adoption of m-banking applications has been studied by Rachmawati et al (2020) and Zhou, Lu and Wang (2010). Apart from these studies, several studies have also endorsed the impact of social influence on m-banking adoption and attribute this factor as the strongest in shaping the behavioural intention of individuals to adopt m-banking applications (Arruda Filho et al., 2021; Le et al, 2020). The findings presented by Islam et al. (2019) highlighted that factors such as social influence positively impact the adoption of Bangladeshi consumers towards m-banking. The researcher Makanyeza (2017), with the support of TAM and survey methods, found that factors including social influence exerted a positive impact on the behavioral adoption of m-banking among Zimbabwean consumers. The findings by Akhtar et al. (2019) reported that social influence affected the adoption of m-banking adoption in Pakistan and China. The research by AlSoufi and Ali (2014) showed that the quantitative analysis of their study predicted social influence as the vital factor that affected people's intention to use m-banking in Bahrain.

Social influence is defined as the degree to which people perceive or contend that a social paradigm can be used (Peng et al., 2017). In previous studies, social influence is defined as the degree to which people perceive or contend that a social paradigm can be used (Peng, et al., 2017). Moreover, It relies on the planning and execution of the UTAUT model, which was historically integrated into the Reasoned Action Theory (Fishbein & Ajzen, 1976). The result of this preservation is that customers are able to buy and sell products and services on their mobile devices (Santana-Vega et al., 2019). In addition, polls, and posts from friends, family members, and

companions deeply influence the consumer's preference (Blaise et al., 2018 ; Wang et al., 2017). As demonstrated by Malik et al. (2017), the social impact on the use of m-banking is immense. Therefore, the following hypothesis can be developed as:

*H<sub>3</sub>: Social Influence has a positive relationship on M-banking Adoption Intention* (Arruda Filho et al., 2021; Le et al, 2020).

#### **2.6.4 Trust**

Kim et al. (2018) defined trust as the willingness of the individual to appear as vulnerable towards the actions of the other party while expecting them not to cause harm to the trustor. Trust is a significant enabling element in relations where there is a fear of opportunism, risk, interdependence, and uncertainty. Trust in the context of mobile services, is defined as the faith or belief of users at a level to which a specific service can be viewed to have no privacy or security threats (Gao, Krogstie & Gransæther, 2008). Studies such as the one by Von Watzdorf et al. (2010) have found that trust positively influences and impacts the user intention to use and adopt technologies. Likewise, Nwaiwu et al. (2020) also found that it impacts the behavioural intention to use technologies such as mobile services. Safety, ease of access, and privacy are few of the elements that increase trust among users to adopt and use services like m-banking (Baabdullah et al. 2019; Ramos et al. 2018; Deb & Lomo-David, 2014). Nevertheless, studies conducted by Gao and Yang (2014) showed that unfamiliarity of users with m-banking service providers make their perception about mobile service activities suspicious. For example, the inability to inspect and feel the real or desired product and limited physical presentation of service operations may increase the reluctance of users to adopt or use mobile services. Overall, it can be argued that trust is a pivotal element that influences the

adoption and intention to use services like m-banking; and therefore, has a positive relationship with the use of m-banking services. Konteos et al. (2022) found that key elements of UTAUT together with trust are the factors that influence the use and adoption of m-banking in Greece.

Nevertheless, it is also discussed that user trust in m-banking services is one of the important factors behind the behavioral intent to use and adopt m-banking. Customers who are satisfied and convinced with services and facilities provided by m-banking are largely to have a positive behavior and intent to use m-banking services, because they have developed trust in the banking services (Ramos et al. 2018). Therefore, the following hypothesis can be developed as:

*H<sub>4</sub>: Trust has a positive relationship on M-banking Adoption Intention (Konteos et al., 2022).*

#### **2.6.5 Perceived Security**

One of the top issues related with m-banking is security, and it is often being perceived as a major issue by the users in adopting m-banking in their daily lives. In UAE, there are a number of security threats which may arise when using m-banking. Hence, these negatively influence the consumer's perceived security in m-banking. When m-banking is perceived as a security threat to personal data, consumers will no longer be relying on the services due to the exposed security threats. Perceived security is considered as a psychological concept and defined as the perceived level to which an individual can transmit critical information safely over the internet (Jiaxin Zhang, Luximon & Song, 2019; Du & Agami, 2017). Perceived security is largely applied in the context of the adoption of services and technology; therefore, in this perspective, it is defined as the level to which users believe or perceive that carrying

out financial services in certain applications is secure in terms of personal and financial information aspects and their privacy is protected (Sharma et al., 2018).

In this study the intention is to look at security from a individual perspective. Although banks implement a lot of security features, users still believe it is insecure to use m-banking applications (Lafraxo, Hadri, Amhal, & Rossafi, 2018; Zhou, 2012). Understanding user's psychological state on security in adopting m-banking can help the user to have a positive interest in adopting m-banking. Perceived security is a psychological context that refers to the extent to which one can transmit sensitive information over the internet without fear or risks. Individuals are constantly striving for a sense of security that is complicated when they are made aware of a need. So, requirements and the need to meet them contribute to a person's motivation to perform a specific function (Isaac et al., 2018; Andarwati et al., 2019; Singh & Ghatak, 2021). According to Hartono et al. (2014), perceived security has a crucial role in users' behaviour associated with technology, and efforts have been made to assess the relationship between perceived security and users' intention to adopt the technology. As perceived security can change the adoption behaviour of users, researchers such as Suh and Han (2003) have focused on the influence and impact of perceived security on the adoption of e-commerce, and have noted that data integrity, privacy protection, and non-repudiation have a positive impact on e-commerce adoption. It is further added that users usually fail to comprehend the technicality of security control, and their perceived security is normally determined by the functions and information provided by the interface. Safeena, Kammani, and Date (2018), discussed that the perception linked to security is viewed as one of the key influencers for the risk-associated perception of the users, ultimately influencing their intention to adopt applications like internet banking. In addition, security perceptions play a major rule

in influencing the user's intention to adopt any sort of technological service. Kim, Wang and Chen, (2018) in this perspective support that perceived security positively influences the intent of users to adopt internet banking. Users are likely to adopt technologies if the perceived security associated with risk of the technology is low. Therefore, users would be willing to adopt technology if they believe that a specific system would not be susceptible to financial loss or breach of security (Safeena et al., 2018).

The findings of Johnson et al. (2020) are also interesting in this regard, as they have found that perceived security positively impacts behavioural adoption. The findings from the study of Fadila et al. (2022) also showed that perceived security has a significantly positive impact on user adoption to m-banking. Besides, perceived security was found to link with behavioural intention to use m-banking, and was considered to be the critical element, and contributed the most in behavioural intention. The findings of Merhi et al. (2019), Svilar and Zupančič (2016), and Shareef et al. (2018) noted perceived security as a key element in the adoption of m-banking. Likewise, Qureshi, Zafar and Khan (2008) have identified perceived usefulness, privacy, and security as the key factors for the acceptance of m-banking.

Moreover, Zhang et al. (2019) identified perceived security to be a dominating factor having an impact on the use of mobile payments. Therefore, the perceived security of m-banking significantly affects the behavioural intention of people to use m-banking in the UAE. The findings of our previous work (El Hendy et al., 2020), and Lee, Zhang, and Chen (2013) also support that perceived security is linked with the beliefs and perceptions that m-banking is secure in terms of protecting personal and private data, securing financial transactions, ensuring safety, and averting cyber-attacks.

Other studies have also proposed that perceived security is a critical factor in establishing and maintaining the confidence of the people over online services (Balachandran et al., 2015; Hosseini et al., 2015; Mullan et al., 2017). It is evident by the research that effective protection from any kind of threats increases the confidence of the people and fulfils their expectations regarding effective security. This ultimately enables them to positively use electronic banking and financial services. Thus, the perceptions regarding the security of the application appear to be highly crucial for the adoption of m-banking by the users.

As per Schnall et al., (2015), the perceived security of the m-banking application indicates the perceptions of the users, that their personal and financial information will not be subjected to any kind of security threats. Thus, this influences their confidence level over the m-banking applications, making them believe that no third party can get access to their data or intervene during conducting their financial transaction through m-banking applications.

Based on this explanation, the perception of m-banking security is subjective, as it largely relies on the customer's perspective. This subjectivity is amply reflected in the degree to which the customers assume that the technology used to transmit confidential information is secure. Studies have shown that consumers who perceive that m-banking security is secure will use the system frequently and offer valuable feedback to the bank system (Damghanian, Zarei, & Kojuri, 2016; Gu, Lee & Suh, 2009). Overall, a conclusion can be drawn based on these studies, that perceived security influences the behavioural intention to adopt technologies such as m-banking.

Despite many technical security issues that are affecting m-banking services such as credit card or bank loan scams, online romance scams, hitman scams, phishing

attacks, and Nigerian scams (Datta, Tanwar, Panda & Rana, 2020), banks are eventually taking many initiatives to improve the security level of the mobile applications by implementing multiple layers of security authentication mechanisms such as one time passwords (OTP) and utilizing biometric features in mobile devices (i.e. face, iris & thumb) in addition to the traditional use of username and password authentication methods to prevent the user from being a victim of such security threats. However, as many of the past studies have claimed, while m-banking today is more secure in dealing with biometric authentication. It was reflected in a study by Merhi et al. (2019), that consumers were observed to be concerned the most with issues related to digital banking security when it comes to m-banking adoption decisions.

As it relates to this study, it can be deduced that the awareness of security and the incorporated mechanisms to combat such hazards can act as a catalyst for establishing certainty and confidence between the users of the m-banking application and the service provider (Merhi et al., 2019; Zhang et al., 2019; Damghanian, Zarei & Kojuri, 2016). For instance, a user is more likely to adopt m-banking if he/she believes that using the application is secure (Zhang et al., 2019; Damghanian, Zarei & Kojuri, 2016). Therefore, the following hypothesis can be developed as:

*H<sub>5</sub>: Perceived Security has a positive relationship on M-banking Adoption Intention (Zhang et al., 2019; Damghanian, Zarei & Kojuri, 2016).*

Perceived security is related to service providers' ability to create a secure system for users to use when utilising the service. Perceived security is the consequence of the cognitive process that users go through when evaluating the service's security processes (Lim et al., 2019). This procedure leads to users believing that the services have offered a secure system (Gupta et al., 2020). As a result, users' emotional

responses and behaviour towards the service will be influenced by this positive notion (Lim et al., 2019).

In our previous work we have tested the influence of perceived security on the behavioural intent of the users in the UAE to adopt m-banking applications (El Hendy et al., 2020). They adapted the UTAUT model with five predictors performance expectancy, effort expectancy, social influence, perceived security, and trust. The results of the study empirically proved that trust and the security perceptions of the users have influenced them to use the m-banking application. Though perceived security in this model was employed as an independent variable, it motivated the researcher to employ perceived security as a moderator in the UAE context to better understand the influence of this factor in same context of that research along with the same other factors used in their research.

For this study the intention is to look at security from users' perspective. Although banks implement a lot of security features, users still believe it is insecure to use m-banking applications (Lafraxo et al., 2018; Zhou,2012).

Hence, this study believes the operationalization of perceived security as a moderating factor might help to explain the inconsistent results from previous studies. Previous studies from other adoption domains (i.e., online shopping) have shown that perceived security is able to magnify user intention to adopt online shopping when they believe that the platform is secure. For example, Basbeth and Sumapraja (2021) found that perceived security significantly moderates consumer intention to adopt mobile payment in online shopping. A user who believes that the platform is secure will be more likely to use the platform.

Interestingly, previous findings have showed that there is a contradicting finding on explanations of how perceived security influences the intention to adopt m-banking. For instance, a study by Puriwat and Tripopsakul (2017) in Thailand revealed that perceived security has a positive influence towards m-banking adoption intention. However, Wandira and Fauzi (2022) in their study about m-banking adoption in Indonesia revealed that perceived security of m-banking insignificantly affects the intentions of users towards m-banking. Taking the guidance from Baron and Kenney (1986), when there is an inconsistent or varying relationship between the dependent variable and the predicted variable, the operationalization of the moderating factor can help to provide a better understanding of the influence between the dependant and the independent variables. This is also supported by Islam et al. (2019), where they state that future studies to examine m-banking adoption topics should operationalize moderating factors to help better explain the decision of users to adopt m-banking.

Considering the above discussion, and taking the recommendation from Baron and Kenny (1986) that in social research employing a moderator in model will enrich the finding (i.e. statistical results when moderator is employed), helps in better understanding the relation between variables in the model and improve the model's predictability, introducing perceived security as a moderating variable in the proposed model for m-banking adoption can significantly enhance its predictability. Perceived security can moderate the relationship between factors: performance expectancy, effort expectancy, social influence, trust, and the m-banking. It will help to understand the impact of perceived security as it enables the model to differentiate between individuals who prioritize security over other features and those for whom perceived security is less influential in adoption decisions. Perceived security can vary among different user segments and integrating it as a moderating variable allows the model to

distinguish between segments where perceived security significantly influences adoption and those where it has minimal impact. By incorporating perceived security as a moderating variable, the model gains a more comprehensive understanding of how security perceptions influence m-banking adoption decisions, leading to more accurate predictions. It accounts for the nuanced differences in how individuals assess security concerns and how these assessments influence their decisions regarding m-banking adoption intention.

This study hypothesizes that the perceived security moderates the relationship of the independent variables (i.e., performance expectancy, effort expectancy, social influence and trust) on the intention to adopt m-banking in the UAE. A user will be more likely to adopt m-banking if he/she believes that the application is able to secure their financial multi-tasking activities (performance expectancy), the ease to use the application (effort expectancy), user social surrounding (social influence), and user trust towards the m-banking application (trust). Therefore, the following hypotheses can be developed as:

*H<sub>6a</sub>: Perceived Security has a positive moderating effect on Performance Expectancy and M-banking Adoption Intention relationship (Zhang et al., 2019; Damghanian, Zarei & Kojuri, 2016).*

*H<sub>6b</sub>: Perceived Security has a positive moderating effect on Effort Expectancy and M-banking Adoption Intention relationship (Zhang et al., 2019; Damghanian, Zarei & Kojuri, 2016).*

*H<sub>6c</sub>: Perceived Security has a positive moderating effect on Social Influence and*

*M-banking Adoption Intention relationship* (Zhang et al., 2019; Damghanian, Zarei & Kojuri, 2016).

*H<sub>6d</sub>: Perceived Security has a positive moderating effect on Trust and M-banking Adoption Intention relationship* (Zhang et al., 2019; Damghanian, Zarei & Kojuri, 2016).

## **2.7 Facilitating Conditions**

Facilitating conditions refer to consumers' perceptions of the support and resources available to facilitate their behaviour and performance. They are closely connected to the accessibility and availability of resources that promote behavioural adoption (Farzin et al., 2021). Several studies have shown that facilitating conditions play a crucial role in the adoption of technology and banking services (Islam et al., 2019; Alalwan et al., 2016; Zhou, Lu & Wang, 2010). Electronic banking channels normally require technical infrastructures, resources, and skills, and hence customers are motivated to adopt m-banking if they find a certain level of resources and support which would lead them to perceive m-banking as compatible with related technologies they already use (Alalwan et al. 2017). Recent studies, including Saprikis et al. (2022), have highlighted the significant influence of facilitating conditions on the intention of users to adopt m-banking.

However, some studies have focused on other factors such as ease of use, perceived usefulness, and security concerns, which are highly significant in impacting user adoption of m-banking (Zhang et al., 2018; Elhajjar & Ouaida, 2019; Obaid, 2021; Putra & Rachmat, 2022). These studies have not always included facilitating conditions as a factor, although it is proven to be effective in influencing m-banking adoption. One possible reason for this could be that m-banking is only adopted in

regions where facilitating conditions are already in place, and hence the focus shifts to other factors like ease of use, usefulness, and security, which are important to users when planning to use m-banking. Some studies have found that facilitating conditions might not consistently exert a significant influence on technology adoption across different contexts or technologies (Venkatesh et al., 2003).

Some studies, such as those by Kumar et al. (2023), Hoque and Sorwar (2017), Warshaw and Davis (1985) have reported that facilitating conditions had no significant impact on the actual use of m-banking services, perhaps because the sample respondents were highly educated and working professionals who had the required knowledge and skills to operate m-banking on their smartphones. However, other studies, such as those by Saprikis et al. (2022) and DA Gayan et al. (2020), have emphasized the importance of facilitating conditions, particularly when looking at organizational infrastructure. The study by Rachmawati et al. (2020) also depicted that facilitating condition is not affecting behavioural usage through behavioural intention as a moderator. Additionally, Zhou (2018) in his research work did not include facilitating conditions as part of his extended proposed model.

Some researchers also reported that the rejection of some original factors (i.e., facilitating conditions) in well-known behaviour theories such as UTAUT, is normal when the model is extended with additional factors, because such tactics can significantly modify the constructs' dynamics (Saprikis et al., 2022; Oliveira et al., 2016).

In this study, the researchers focused on performance expectancy, effort expectancy, social influence, trust, and perceived security as factors of m-banking adoption intention. The researcher viewed this factor (i.e. facilitating conditions) as not an important factor in user adoption, particularly in countries like the UAE where

facilitating conditions for m-banking are already in place and well-established as the country has robust infrastructure, accessible technology, and supportive regulatory environments so users are not in pressure when making decisions about adopting new technologies (Alrashdi & Binti Nizam, 2022). The researchers also introduced perceived security as a moderator construct for the four independent variables mentioned, which is relatively less explored in previous studies but deemed important for user adoption.

Overall, while facilitating conditions have been shown to be a key element in influencing the adoption of technology and banking services, their impact on m-banking adoption intention is still debatable. Some studies have reported no significant impact, while others have emphasized their importance in specific contexts. From the discussion above, we can conclude that, looking at the infrastructure of UAE banks (i.e., state-of-the-art infrastructure which exists in all aspects of technology (as this is supported by the UAE government) and at the studies conducted in other countries, the facilitating condition is not always a strong factor to be considered (Kumar et al., 2023; Rachmawati et al., 2020; Hoque & Sorwar, 2017; Warshaw & Davis, 1985). Facilitating conditions might sometimes overlap with other constructs in the model, leading to concerns about redundancy or shared variance (Venkatesh et al., 2003). Researchers may opt to exclude facilitating conditions based on their study's specific objectives or hypotheses, aiming for a more targeted investigation (Venkatesh et al., 2003). Individual research decisions about inclusion or exclusion of factors may vary based on the context, research objectives, available data, and the technology under study (Venkatesh et al., 2003). Finally, for this study, the facilitating condition was not part of the proposed model.

## 2.8 Chapter Summary

In Summary, chapter 2 offers a comprehensive picture pertinent to the studies conducted in the context of m-banking adoption intention, and how the users perceive its use in terms of the security aspect. The review of the extant literature highlights the gap and gives direction to this study to understand how perceived security and trust play an important role in influencing the user's intention to adopt m-banking applications in the UAE. In this regard, the study is dedicated to studying the moderating role of perceived security and trust as independent factor for m-banking adoption intention, and the impacts of other functional factors (UTAUT model factors except facilitating conditions).



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter illustrates the methodology employed in this study through a number of sections discussing about the research paradigm adopted, research design and research process used. Additionally, the researcher discusses the instrument in relation to the implementation of this study, instrument development, content and face validity, and the pilot study. Moreover, the researcher discusses about the demographic analysis and sampling technique as this study has adopted a convenience sampling strategy. Towards the end of this chapter, the researcher has explained the method used for the data collection and discusses about the analysis technique used in this study (i.e., Structural Equation Modelling) towards analysing the measurement and the structural model.

#### **3.2 Research Paradigm**

Quantitative research methods and tools are commonly used in management and behavioral sciences to simplify complex relationships (Marvasti, 2018). In this study, the researcher adopted a positivist paradigm, which involves formulating hypotheses and empirically testing them. A comprehensive analysis was conducted to measure and codify the results (Cassell, Cunliffe, Grandy, & Su, 2018).

The main goal of the study was to effectively understand and forecast the behavior of respondents by using a quantitative methodology that involves data collection and testing of a theoretical model. The researcher used numbers, statistics, and different values to demonstrate the concepts of the study, and the data was measured and analyzed to examine the associations and causality of the study variables. This

approach is advantageous because the research findings are more objective (Alase, 2017). Hypotheses testing was used to interpret the empirical results, normalize the data, and strongly relate to the positivist paradigm adopted in the study (El-Hendy et al., 2020).

### **3.3 Research Design**

This research follows a strategy that enables finding answers to the research questions and problem. The plan refers to the overall scheme or application of the research. It contains a description of what the investigator will accomplish, from drafting the hypotheses and its operational implications to the final analysis evaluation (Asenahabi, 2019).

Since causal research is focused on hypotheses testing and the need to explain the nature of specific interactions (Kamat & Reiter, 2020), then this study employs casual research as the objective of this research is to understand the cause-and-effect relationship among the factors for the m-banking adoption intention through collecting statistical evidence and analysing it against the hypotheses and assessing the validity and reliability of the proposed the research framework model.

### **3.4 Research Processes**

According to Saunders et al. (2019) positivist research is a scientific and systematic search for desired information on a specific topic. It is the procedure of analyzing and redefining the research problem, formulating the research questions and hypotheses, collecting, managing, and evaluating data, analyzing, and interpreting the collected data, and concluding the result to make sure that they are in line with the direction of the research objectives (Kothari, 2004).

Figure 3.1 illustrates the outline of the research process that has been implemented for this study.

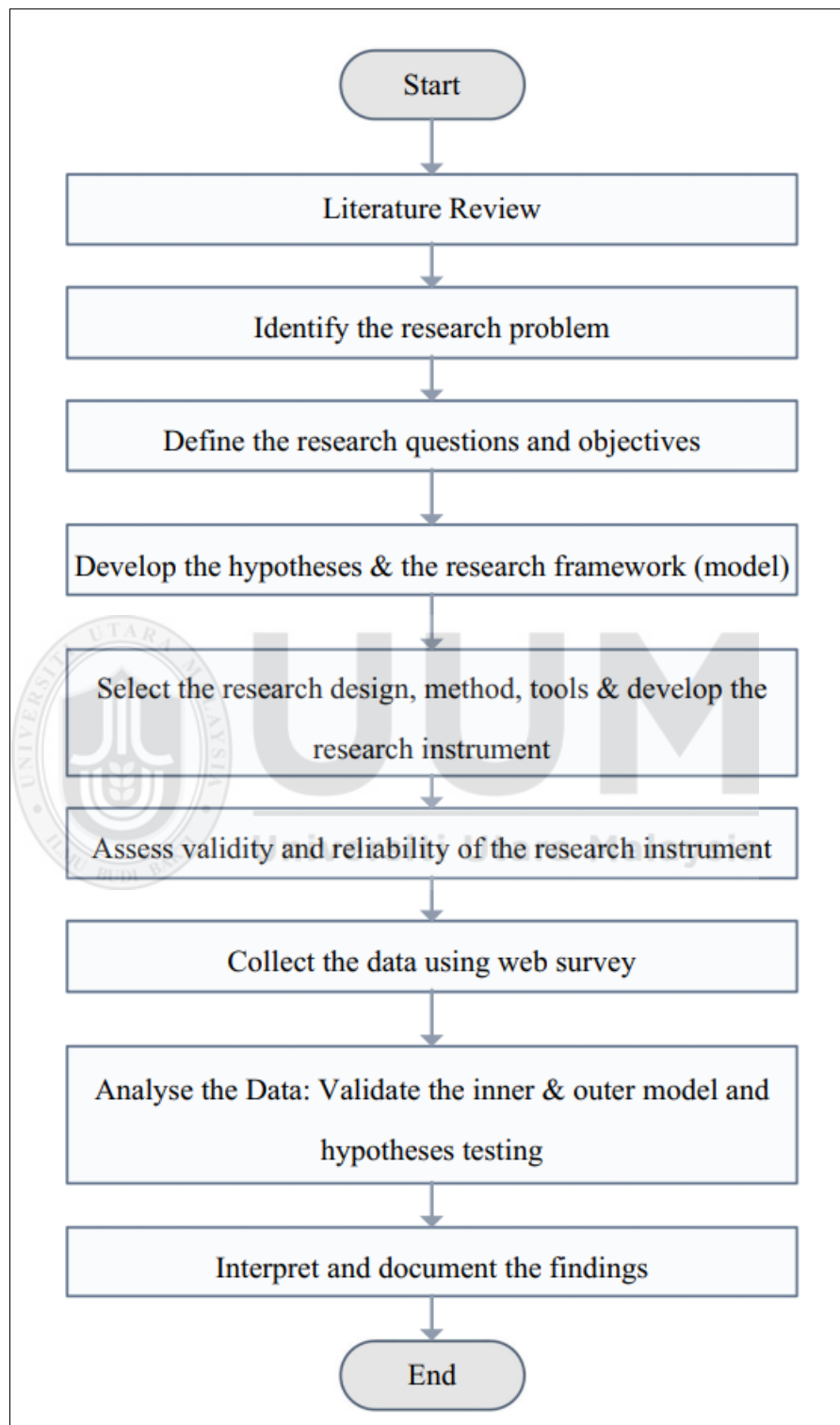


Figure 3.1: Research Process

The research begins with reviewing and analysing literature related to m-banking subject and focuses on findings of m-banking adoption in addition to theories, models, frameworks, and ideas. Based on the findings, the research problem was defined. The researcher identifies the objectives and set the relevant questions. These research steps are aligned with the first research objective which is to identify the factors that have influence on user's m-banking adoption intention in the UAE.

The researcher proposed a model to relate the input variables (performance expectance, effort expectancy, social influence, and trust) to the output variable (m-banking adoption) considering the moderating variable (perceived security) based on the research hypotheses. The researcher identifies forms of investigation, researcher interference, units of analysis, and time horizon. The research also selected the tools suitable for the implementation by adapting the measurement scales identified from previous studies. Changes are made to the instrument's items to ensure that they are appropriate and fit the context of this study. The validity and reliability of the research instrument are assessed using content and face validity and data from a pilot study. After the research instrument has been validated, the real data is collected using a web survey technique for three months. Data are interpreted and sampled using the convenience sampling strategy. The data were then analysed using a partial least square structural equation modelling (PLS-SEM) technique. Finally, the outcomes were interpreted and documented. These research steps are aligned with the second and the third research objectives which are:

- To examine the relationship between the identified factors in influencing user's m-banking adoption intention in the UAE.
- To examine the moderating influence of perceived security on m-banking user's adoption intention in the UAE.

### **3.5 Literature Analysis Procedures:**

This section explains the procedures used in reviewing literature that have been conducted on the adoption of m-banking in different regions. In order to understand the literature better, this study has outlined a few guideline questions. The questions are:

- 1- What are the key variables being used by previous studies to examine m-banking adoption behaviour?
- 2- What is the focus of previous studies on the topic of m-banking adoption?
- 3- How previous studies conceptualized perceived security when examining m-banking adoption behaviour?

To conduct a comprehensive review of the literature on m-banking adoption intention, the decision was made to utilize Google Scholar as the primary search engine. The rationale behind choosing Google Scholar over other databases like Scopus or PubMed is rooted in the specific needs and objectives of this study.

Google Scholar was selected for its inclusivity and user-friendly interface, which enables a broad exploration of scholarly literature from various disciplines. Unlike more specialized databases, Google Scholar indexes a diverse range of sources, including journals, conference papers, theses, and reports. This inclusivity was deemed crucial for capturing a holistic view of m-banking adoption, given its interdisciplinary nature and the need to consider empirical studies from various academic domains.

The search was narrowed down to journal articles published between 2015 and 2022, focusing on empirical-based research. This temporal restriction ensured the examination of the most recent and relevant literature within the contemporary

landscape of m-banking adoption. Exclusion criteria were established to enhance the precision of the search; conceptual papers without empirical data were omitted to maintain a strong empirical foundation, and identical papers published in both conference and journal formats were merged to avoid redundancy.

The decision to search exclusively in English-language journals was driven by practical considerations, considering the language proficiency of the researcher. While this introduces a potential language bias, it was a pragmatic choice to facilitate a more thorough analysis of the selected literature. Additionally for researchers to communicate their research results to global scientific community publish their research in English as it is the common language globally.

Specific keywords, including 'mobile banking adoption,' 'm-banking adoption,' 'intention to use mobile banking,' and 'smartphones banking,' were employed to refine the search and align it with the key objectives of the study. These keywords were chosen to encompass various dimensions of m-banking adoption, ensuring the inclusion of diverse perspectives and approaches.

### **3.6 Research Instrumentation Development**

Selection of instrumentation is important as it leads to a desired result aligned with the objective of the study. According to Marcovich and Shinn, (2017), instrumentation selection is an important process that resembles the aspects of reality that turn into specific numbers and values which can then be interpreted accordingly. Teimouri et al. (2016) supported the statement by emphasizing that accurate instrumentation will lead to empirical values that will indicate the right form of the statistic.

Research instrumentation has been adapted from previous studies conducted by Venkatesh et al (2003), Venkatesh, Thong, and Xu, (2012), Chandra et al., (2010),

Wakefield, (2013) and Chandra, Srivastava, and Theng, (2010). The justification of these instrumentations' selection is due to several reasons, as highlighted in the study of Taherdoost (2016),

- i. The questionnaire constructed is depicting the definite idea that has been discovered previously.
- ii. The questionnaire constructed is fit with the objective of this research.
- iii. The questionnaire constructed can be used generally as it has not been developed by focusing on a specific organization.

In this study the research instruments are divided into six sections.

Section A collects demographic data about the respondents and includes a question to check if the participants are an existing user of a m-banking application. In this section five demographic related questions were asked to the participants (see Appendix – I).

Section B collects data about m-banking experience. In this section nine related questions were asked to the participants (see Appendix – I).

Sections C, D, E and F, questions related to technology adoption were asked to the participants using a 7-point Likert scale (see Appendix – I).

The use of a 7-point Likert scale rating offers seven separate response options, which is relevant to an agreement that would be adequately distinct for the participants without misleading them. It typically includes a moderate or neutral midpoint, which is known to be a common occurrence in Likert scales (Taherdoost, 2019). Apart from that, it could lead to a lowering “frustration level” of respondents (Chyung, Roberts, Swanson, & Hankinson, 2017). The purpose of using a 7-point Likert scale is to

provide multiple options for the participants to select regarding their behavioural adoption of m-banking; besides, it helps in comprehensively evaluating the responses provided by the participants.

Furthermore, the psychometric literature recommends that having more than 5 scale points is better, and a scale should not exceed 11 points, as this will result in diminishing returns (Nunnally & Bernstein, 1994). Applying seven points is a decent weighing scale between having sufficient points of discrimination without having to maintain too many response options (Nunnally & Bernstein, 1994).

In determining the font size of the questionnaire, the researcher decided to use Times New Roman with 12 points size. According to Paelke, Büttner, Mucha, & Röcker, (2018), Times New Roman with 12 points in size will help the respondent's eyes to be relaxed while reading all questions, which covered two pages in total. The questionnaire was constructed in English as a medium of communication.

### **3.6.1 Demographic**

Demographic data is actual information collected about the characteristics of the population, such as gender, age, location, and occupation. Data could be collected using questionnaires. Five questions are prepared to be answered by the respondents.

See Table 3.1.

Table 3.1  
*Demographic questions asked in the questionnaire.*

No	Construct	Values
1	Gender	Male
		Female
2	Age	21 to 30
		31 to 40
		41 to 50
		51 to 60
		Older than 60
3	Location	Abu Dhabi
		Dubai
		Sharjah
		Ajman
		Umm Al Quwain
		Ras Al Khaimah
4	Education	Fujairah
		High School Degree
		Diploma
		Bachelor's degree
		Postgraduate degree
		Professional Qualification
		Other
5	Occupation	Self-employed
		Government Sectors Employee
		Private Sectors Employee
		Multi-National Company Employee
		Semi-Government Employee
		Retired
		Unemployed

### **3.6.2 Mobile Banking Adoption in Banking Services**

The m-banking adoption in banking services section contains three factors, which are performance expectancy, effort expectancy, and social influence. All the three factors' questions are adapted from Venkatesh et al., (2003). This research focuses only on UAE citizens and residents of well education, high qualifications, and familiarity with mobile technology. The research is limited to exploring factors that affect m-banking adoption. The selected factors are adapted within the UTAUT theory and design with addition of trust and perceived security as a moderator due to the variant results achieved by the literatures. The research framework underwent validation through a pilot survey and was assessed via IBM SPSS and PLS-SEM. Participants from Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah, and Fujairah were involved in the study. The research utilized the PLS-SEM technique, and Smart PLS software was employed to analyse the data. The 10-times rule method was applied to estimate the minimum sample size required for the study, which is a widely utilized estimation method in the field of information systems and other similar fields (Hair et al., 2017). Amongst many adaptations of this method, the most widely observed and applied one is based on the practice that the sample size should be more than ten times of the maximum number of links or associations in the structural model (inner model) or the measurement model (outer model) pointing at any latent variable in the model (Goodhue et al., 2012). See Table 3.2 for the details.

Table 3.2

*Items measuring performance & effort expectancies & social influence.*

No	Construct	Items	Coding
1	Performance	1- Using a mobile banking application enables me to accomplish my online banking tasks more quickly.	PE1
		2- Using a mobile banking application improves the quality of the banking services I do.	PE2
	Expectancy	3- Using a mobile banking application makes it easier to do my banking services.	PE3
		4- Using a mobile banking application enhance my effectiveness in performing my banking services.	PE4
2	Effort Expectancy	1- I would find learning to operate the mobile banking application would be easy for me.	EE1
		2- I would find it easy to get the mobile banking application to do what I want it to do.	EE2
		3- My interaction with the mobile banking application would be clear and understandable.	EE3
		4- I would find the mobile banking application system to be flexible to interact with.	EE4

Table 3.2 (Continued)

		5- It would be easy for me to become skilful at using the mobile banking application.	EE5
3	Social Influence	1- People who influence my behaviour think that I should use the mobile banking application.	SI1
		2- People who are important to me think that I should use the mobile banking application.	SI2
		3- People in my surrounding who use mobile banking applications have more prestige than those who do not.	SI3
		4- People in my surrounding who use the mobile banking application system have a high profile.	SI4
		5- Having a mobile banking application is a status symbol in my surrounding.	SI5

### 3.6.3 Trust

To measure trust, the researcher adapted the items from Chandra, Srivastava, and Theng, (2010). For trust, there are four questions that needed the respondents to answer. See Table 3.3 for the details.

Table 3.3

*Items measuring trust.*

Construct	Items	Coding
Trust	1- I trust Mobile Banking Applications are reliable.	TR1
	2- I trust Mobile Banking Applications are secure.	TR2
	3- I believe Mobile Banking Applications are trustworthy.	TR3
	4- I trust Mobile Banking Applications.	TR4

### 3.6.4 Mobile Banking Intention to Use (m-banking adoption intention)

To measure behavioural intention, the researcher adapted from Venkatesh et al., (2012) three questions. See Table 3.4 for the details.

Table 3.4

*Items measuring M-banking Adoption Intention*

Construct	Items	Coding
M-banking Adoption Intention	1- I intend to use a mobile banking application.	BI1
	2- I predict that I would use the mobile banking application.	BI2
	3- I plan to use a mobile banking application.	BI3

### 3.6.5 Perceived Security

To measure perceived security, the researcher adapted the questions from Wakefield, (2013). See Table 3.5 for the details.

Table 3.5

*Items measuring Perceived security.*

Construct	Items	Coding
Perceived Security	1- Mobile banking application has enough safeguards to make me feel comfortable using it to make transactions.	PS1
	2- I feel assured that legal and technological structures adequately protect me from problems while using mobile banking applications.	PS2
	3- I feel confident that encryption and other technological advances in mobile banking applications are safe for me to make transactions.	PS3
	4- In general, the mobile banking application is a safe environment in which to make transactions.	PS4

### **3.7 Instrument Validation (Content and Face Validity)**

The instruments were examined by a panel of three experts to ensure their content and face validity. The experts consisted of one Assistant Professor, and two Associate Professors. All the experts are in the field of Information Systems and have a vast amount of experience conducting research using quantitative methodology. Experts' recommendations were considered, and them.

comments are listed below:

- i) Grammatical error and language check: The experts asked the questionnaire to be sent for proof-reading to ensure that there will be no grammatical mistakes in the sentences.
- ii) Simplicity: There were questions that were too long, and it might confuse the respondents during the actual data collection. Hence, question numbers 8 and 21 were rewritten to ensure simplicity.
- iii) Relevance: None of the experts reported any irrelevancy issue with the questions as the questions were adapted from previous studies.
- iv) Clarity and ambiguity: There were some vague questions in addressing the objective of the question, especially for question 6 and 7. Hence, these questions were reworded to ensure clarity.

Following the validation of the instruments, the researcher made some changes to the instrument based on the recommendations of the three members of the panel. The instrument was corrected and updated to avoid any difficulties or misunderstandings during the data collection phase.

### 3.8 Pilot Survey

A pilot survey was conducted where the questionnaire was sent by the researcher to a relatively small size of the population compared to the actual target audience. The use of a pilot survey is an easy and cost-effective way of collecting data. It saves both resources and time and helps identify and correct mistakes that will likely affect the data-collection process (Dźwigoł, 2020).

According to Lee & Sung (2018), in survey research, a pilot study is a starting process of the interpretation of data. It was also mentioned that in fieldwork research, a pilot study gives a real consequence on a collection of data. It also helps to understand predicted issues that researchers can pro-actively handle (Majid, Othman, Mohamad, Lim, & Yusof, 2017).

Moreover, a pilot study is constantly being conducted to assess the instrumentation's reliability (Majid et al., 2017). In this research, a pilot study was conducted on fifty m-banking users in the UAE. According to Shahab et al. (2017) and supported by Kaur et al. (2017), the pilot study commonly involves a small group of the sample that of around 10 to 30 respondents . After that, the value of reliability analysis will give helpful insights to the researcher to conduct data collection on the actual fieldwork process (Womack et al., 2018).

Cronbach's Alpha value was assessed to test the measurement items' reliability which will be gained from an exploratory element examination. All information obtained from the pilot study was analysed using the IBM statistical package for social science (IBM SPSS). The closer Cronbach's Alpha is to 1.0, the higher the internal consistency reliability. See table 3.6.

Table 3.6

*Values of Cronbach Alpha*

<b>Value Cronbach Alpha</b>	<b>Interpretation</b>
1.00	Best
0.80	Good
0.70	Acceptable
< 0.60	Poor

The researcher had conducted Cronbach Alpha analysis for the variables of interest with good reliability. See Table 3.7.

Table 3.7

*Cronbach Alpha results for the pilot study*

<b>Latent Construct and Indicator (Dimension)</b>	<b>Value Cronbach's Alpha</b>	<b>Interpretation</b>
M-banking Adoption Intention	0.942	Good
Perceived Security	0.968	Good
Trust	0.994	Good
Performance Expectancy	0.972	Good
Effort Expectancy	0.972	Good
Social Influence	0.941	Good

The finding of the pilot study showed satisfactory results and the data collected during are reliable, valid, and sufficient for the intended analysis.

### **3.9 Study Population, Sample Size, Sampling Technique and Unit of Analysis**

This section highlights the study population and its desired sample size, sampling technique, and the unit of analysis used for achieving this research.

### **3.9.1 Study Population**

Identifying the population and sampling before starting the research will help the researcher in directing this research in alignment with the objective outline. In this study the selected samples are citizens (locals and expatriates) of the UAE who are using m-banking applications in their smart phone.

### **3.9.2 Sample Size**

To conduct this study, the SmartPLS software was utilized for data analysis, and the minimum sample size was estimated using the 10-times rule method, which is commonly employed in PLS-SEM, particularly in information systems and related fields (Hair et al., 2022). The study utilized the PLS technique and structural equation modelling (SEM). Amongst many adaptations of this method, the most widely observed and applied one is based on the practice that the sample size should be more than ten times the maximum number of links or associations in the structural model (inner model) or the measurement model (outer model) pointing at any latent variable in the model (Goodhue et al., 2012).

Looking at both the outer model and the inner model developed in this study, the estimated sample size is 140 respondents.

### **3.9.3 Sampling Techniques**

Non-probability sampling is selected for this study because the researcher cannot establish the sampling frame due to privacy issues, as the banks cannot disclose their customers' data who are using m-banking (Vehovar et al. 2016). Every person in the population does not have an equal probability of being chosen.

Convenience sampling method has been utilized in this study, which represents m-banking users in the UAE. The benefits behind using this type of sampling include:

- i. It is easy and simple, meaning that the participants are contacted for the study based on their availability and accessibility.
- ii. It is inexpensive to create samples primarily because limited financial resources are needed to create samples. Furthermore, the samples are readily available, and as such, convenience sampling is suitable to apply.

With the help of convenience sampling, the users who were easily accessible and available to participate and contribute to the study were contacted. Overall, the use of random sampling was not possible because the banks were reluctant to share the details of the customers who used their m-banking applications.

Hence, it was not possible for the researcher to randomly select the participant without having a sample frame. As such, convenience sampling was appropriate to select those participants who are willing and are easily available to give their responses. The study used the convenience sampling technique because it was also applied in previous similar studies which had a similar scope and research area (Ashwood, Vanguelova, Benham, & Butt, 2019; Gupta, Khan, & Shabbir, 2018; Espa, Giuliani, Santi, & Taufer, 2017; Ngu, Harangsri, & Shepherd, 2004).

#### **3.9.4 Unit of Analysis**

Unit of analysis is the entity that structures what is being investigated in the research, or an entity studied as whole. It is considered to be the main parameter that a researcher investigates in a study. It is significant, as it helps the researcher to define what aspect is being investigated and provides means to know the scope of the study, and what is beyond the domain that is being examined (Dolma, 2010).

According to Jiang, Xiong, & Cao (2017), unit analysis can be segmented into three parts, which are individual, organization, and group or people. Apart from that, Wülferth (2013) relates the selection of unit analysis with social and humanities science fields that can help researchers conduct their research with the right approach. The aim of this research is to study user intention to adopt m-banking in the UAE, therefore the most suitable unit of analysis is individual (i.e., m-banking application users).

### **3.10 Data Collection**

This section describes the method used in collecting data in testing the hypotheses outlined. As indicated by Couper (2005), the objective of utilizing a survey is to gather data about similar factors or qualities from various situations, and to quantitatively analyse the responses.

A web-survey tool was applied for collecting data from m-banking users. As the focus of this study is on understanding the moderating influence of perceived security on the user's intention to use m-banking, the use of web-survey is appropriate. Moreover, web-survey is selected due to the advantage listed by Hashim (2012) in Table 3.8.

Table 3.8

*Advantages of web survey, Adapted from: Hashim (2012)*

<b>Advantage</b>	<b>Explanation</b>
Global Reach	As this research focuses on perceived security on user's intention to use m-banking, using a manual survey may not serve the purpose. The benefit of a web survey is that it enables global reach, making it cheaper and convenient to acquire information for the participants that are geographically dispersed.
Attractive Format	A number of stylistic formats are offered in a web survey to present a questionnaire, and it is useful in presenting questions in various formats (such as multiple and single responses, open-ended questions, multiple-choice questions and dichotomous questions), making it highly attractive. Besides, a web survey can be used to control and filter logical flows to avert confusion.
Less unanswered questions	The design of the web survey can be such that participants cannot move to the next questions without answering the previous ones. Therefore, these are significantly helpful in reducing incomplete responses.
Easy data entry and analysis	The participants' responses are automatically stored in databases and can be retrieved easily for data analysis.

Web survey also has its limitations (Bryman and Bell, 2007) such as confidential issues, multiple replies, and unclear answers in addition to risks and chances of errors where few participants may intentionally complete the questionnaire multiple times or might be reluctant to participate due to security and privacy issues of their data, and a lack of explanation as to the ways their responses will be treated confidentially, before they involve in the web survey.

Hence, this research overcomes the issues by managing the hyperlinks shared with respondents, as most of the survey packages have a feature of tracking IP addresses of participants along with basic device information as well as a one-time hyperlink which is generated by the survey tool, allowing respondents to participate only once

in the survey. Additionally, the respondents were provided with clear guidance and information about the intentions of conducting the survey in written form, and how the data will be treated, and how the confidentiality of the respondents will be treated. Furthermore, the researcher did not request respondents to provide any personal information such as names, bank account types, or number, or contact details. For this research, Microsoft Forms was selected as the survey package, as it is convenient to manage respondents, allowing multiple channel distribution, and enabling the researcher to evaluate and analyse progress data in real time.

To conduct the web survey, m-banking users were invited using an invitation message and a one-time hyperlink, where the message provided a brief overview about the purpose of the study and confidentiality. The hyperlink attached with the invitation allowed participants to land on the first page of the web survey. The participants were then invited to provide their feedback and comment on the web survey regarding the factors of m-banking adoption in the UAE.

The researcher used an online medium in reaching bank customers in the UAE by inviting them to participate voluntarily in this survey. The researcher contacted the selected banks for the study and requested them to support this study by posting the survey link in their social media accounts, particularly in LinkedIn, Twitter, Facebook, and Instagram. The participants/active users following the banks' social media accounts were considered for data collection.

The respondents were informed about the objective of this study through the landing page of the survey, which included an introduction and explanation about the purpose and the objective of this study. The researcher followed up with the selected banks to keep reposting the survey link on a weekly basis. Additionally, the researcher posted the survey link in LinkedIn, Twitter, Facebook, and Instagram as a public post with

customized hashtags about m-banking applications and bank lists used in this study. Furthermore, the researcher broadcasted the survey link through WhatsApp to his contact list and asked them to broadcast the link to their contacts lists to reach the maximum number of respondents possible. The researcher followed up with the broadcast list by sending a reminder message every week to participate in the survey. The researcher conducted the survey within a three months' time frame, from January 1, 2020, until March 30, 2020.

All the respondents who responded to the questionnaire with the hyperlink had to enter all the information and automatically, the web survey generated the information keyed-in. Further action had been taken by the researcher in analysing and filtering any incomplete or invalid data. After all the processes, some responses were found to be incomplete and invalid. Among the reasons why these responses were considered incomplete are:

- i. There were questions that had not been answered or left blank (although the web survey is set to force respondents to answer all questions, there are some cases where respondents stop answering the questionnaire halfway through. This caused the responses to be incomplete).
- ii. Respondents keyed in the same answer for all questions stated (e.g., answered 3 for all questions).
- iii. Respondents took less than three minutes to complete the survey. This is an indication that the respondents are not paying enough attention when answering the web survey.

Therefore, only results from respondents who completed the survey successfully were used for further analysis.

### 3.11 Data Analysis using PLS-SEM

Both Statistical Package for Social Science (SPSS) and Structural Equation Modelling (SEM) are widely used statistical modelling techniques in the behavioural sciences. Contemporary SEM software was used to assist with command or matrix style version specifications. Also, the statistical software SPSS (v.20) was used to analyze data.

Partial Least Square (PLS) falls under the types of Structural Equation Modelling (SEM). The two types of SEM are Covariance-SEM and Component-based-SEM (CB-SEM). PLS is part of Component based-SEM. Numerous rationales exist for using either of the two types of SEM in a research work (Hair & Sarstedt, 2021). For PLS path modelling using Smart PLS software (Hair, Risher, Sarstedt & Ringle, 2019) had employed it in a study to test the theoretical model. The PLS modelling is considered as the most appropriate method of data analysis in this study based on several reasons: Firstly, PLS path modelling is selected in this study because of the estimation of the interactions between constructs or structural models and associations between indicators and their corresponding latent constructs or measurement models concurrently, even though it is similar to a conventional regression technique (Chin, Barbara, & Peter, 2003; Henseler & Chin, 2010). In this regard, the approach focusing on path modelling is needed to be effectively utilized as it has been suggested that if the research does not validate or compare different theories or is prediction-related or an addition of an already existing theory, PLS path modelling is needed to be used (Hair, Page, & Brunsveld, 2020).

The structural model of this research is considered complicated to some extent, as the intention of this research is to analyse both the direct and indirect relationship, in addition to the moderating influence of the variables selected for this research. Additionally, there are some reflective constructs also associated with the study.

Furthermore, in comparison with other PLS techniques such as Analysis of Moment Structures (AMOS), another software, namely Smart PLS, was critically opted for this study as a data analysis tool based on its user-friendly graphical interface, which facilitates to develop a moderating impact for the path models constituting of interactive effects (Ringle et al., 2012).

Other rationale for the selection of PLS adapted is that it provides the probability for multiple variable calculations varying from ratio to categorical (Joo et al., 2019). In line with the aforementioned rationale, PLS-SEM is deemed most suitable for this research. For example, PLS-SEM is based on few factors, which include types of measurement modes, research objectives, model evaluation, data characteristics, and modelling of structural model. PLS-SEM is appropriate to use when the objective of the research is for theory development, and prediction also identified as soft modelling, in which the emphasis is on the identifying prediction of association between the variables as in the present study. Moreover, PLS-SEM is also considered because it helps in analysing a model comprising of formative and reflective construction. It uses least square evaluation for multi and single component models, and for correlation (Sosik et al. 2009; Chin, 1998).

Researchers at present accept the PLS-SEM method to be a strong estimation of the structural method. It is considered as an alternate way, when CB-SEM distributional assumptions are not applicable (Henseler et al., 2009; Hair et al. 2018). Additionally, the distributional and informational demands needed by CB-SEM are considered to be unrealistic in different disciplines of inquiry, particularly in the field of social sciences. Therefore, this research has the viewpoint of not considering both statistical methods as a competitive statistical one; instead, it should be considered as a complementary one, as cited in the study of Jöreskog and Wold, (1982). To

determine the suitability of the statistical method, this research follows the rules of thumb suggested in the study of Hair et al. (2018) for opting for PLS-SEM.

The statistical processes would be executed utilizing Structural Equation Modelling (SEM) along with IBM SPSS. The complications of the model are not considered a challenge for SEM, as it is capable of handling the data accurately, whether it be numeric or non-numeric constructs (Shmueli et al., 2019). SEM is also capable of evaluating the multiple associations between the dependent and the independent variables (Hair et al., 2019).

### **3.12 Evaluation of the Model**

In the evaluation of the model in this study, the initial step requires the assessment of the measurement (outer) model, followed by the structural (inner) model.

#### **3.12.1 Evaluation of the Measurement Model (Outer model)**

A confirmed composite analysis is initially used for the evaluation of the outer model on the basis of outer loadings, composite reliability, average variance extracted (AVE), and discriminant validity (Hair et al., 2017). Initially, the investigation of the outer loading is performed on the basis of significance and size. Moving further along, an evaluation of the composite reality is done. Any outer loadings more than 0.707 depict the reliability of the composite. An assessment of the AVE is then performed in case there exists convergent validity of the outer model. A valuation of AVE higher than 0.50 for all the measured items reflects convergent validity (Fornell & Larcker, 1981). Convergent validity determines whether all the items existing in the construct ought to be identical or, in fact same.

The final evaluation of the outer model is called discriminant validity, which assesses that either of the items should be estimating varying concepts and hence are not similar to one another (Cheung & Wang, 2017). There are three ways to evaluate the discriminant validity as per the findings of (Fassott, Henseler, & Coelho, 2016; Fornell & Larcker, 1981). Additionally, discriminant validity is also measured by making use of the Fornell-Larcker test, which signifies that the AVE of a factor needs to be greater than the squared correlations with other variables within the model. Another alternate technique to examine the discriminate validity is via the utilization of Heterotrait-Monotrait (HTMT) Ratios of Correlations. It has been noted that values of all HTMT need to be less than 0.85 for all of the constructs which are conceptually different, and less than 0.90 for variables that are conceptually related (Henseler, Ringle, & Sarstedt, 2015).

Once the outer model has been validated, the next stage is to substantiate the inner model by evaluating the hypothesized association. The evaluation of the inner model is then performed for analysing its predictive abilities, along with the construct relationships (Hair et al., 2017). This evaluation is performed via the investigation of the strength, direction, and importance of the causal associations found between the research variables (Henseler et al., 2015).

The research model is evaluated in this study using a two-step process: 1) the measurement model assessment, and 2) the structural version evaluation. The goal of model validation is to see if both the measurement and structural models meet the quality requirements for empirical research (Urbach & Ahlemann, 2010). Estimation of the reflective measurement model can be made on the basis of the previous literature by assessing the internal consistency, convergent validity, indicator reliability, as well as discriminant validity (Lewis et al., 2005; Straub et al., 2004).

### **3.12.2 Internal Consistency**

Cronbach's alpha is used to assess the internal consistency of a measurement item (CA). High CA values in constructs indicate that the items in the construct have the same range and meaning (Vaske et al. 2017). Based on indicator inter-correlations, CA provides a reliability estimate. Internal consistency is also tested using composite reliability (CR) within PLS (Chin, 1998). This is because, while CA and CR both measure the same thing (internal consistency), CR takes into account the varied loadings of indicators. CA provides a significant underestimating of internal consistency reliability, since it does not imply that the measures are identical and that the indicators are equally weighted (Werts, Linn, & Joreskog, 1974).

Internal consistency reliability is deemed adequate when the value is at least 0.7 in the early stages of research, and the values are above 0.8 or 0.9 in more advanced stages, regardless of whether a reliability coefficient is used, whereas values below 0.6 indicate a lack of reliability (Nunnally & Bernstein, 1994).

In the present work, composite reliability is used as an indicator for measuring the internal consistency reliability of the measurement scale used in the study. For composite reliability, the resultant value should be between 0.6 to 0.7. Values higher than 0.7 are considered as satisfactory, while values lower than 0.6 are considered as non-acceptable, concluding that they lack internal consistency reliability (Hair et al., 2019).

### **3.12.3 Indicator Reliability**

When evaluating the reliability of indicators, the researcher compares the quantity to which a variable or a set of hard and fast variables is constant with what it is supposed to measure (Urbach & Ahlemann, 2010). According to Chin (1998), indicator

loadings should be large, at least at the 0.5 stage, and they should be greater than 0.7. The significance of indicator loadings can be investigated using a resampling technique like bootstrapping or jack-knifing.

#### **3.12.4 Convergent Validity**

According to Hair et al. (2019) and Hair et al. (2017), convergent validity refers to the scale that correlates significantly with various indicators of the same framework. Making use of the PLS, convergent validity can be measured through the value of the AVE. As per the findings of Fornell and Larcker (1981), adequate convergent validity is accomplished in a case when the AVE is valued at less than 0.5.

#### **3.12.5 Discriminant Validity**

Discriminant validity is a method for distinguishing between different construct measurements. The researcher used the Fornell-Larcker (1981) method to determine discriminant validity. It evaluates the square root of every construct's AVE reading to the correlations between the latent constructs (Fornell & Larcker, 1981).

#### **3.12.6 Evaluation of the Inner (Structural) Model**

Following the evaluation of the measurement (outer) model, the present research examined the structural model, also known as the inner model. In studies by Hair et al. (2017), the researchers have used the usual bootstrapping approach with 5000 bootstrap samples and the collected instances to determine the importance of the path coefficients. Similarly, Henseler et al. (2012) and Hair et al. (2017) also employed the results of the structural model direct correlations with moderating variable using SmartPLS 3.2.6 (Ringle, Wende & Becker, 2015).

Validating the structural model can assist the researcher in methodically evaluating if the structural model's hypotheses are supported by the data (Urbach & Ahlemann, 2010). Only once the measurement model has been properly validated, the structural model can be examined. The coefficient of determination ( $R^2$ ) and path coefficients can be used to evaluate a structural model in PLS.

According to Chin (1998), an  $R^2$  value of 0.67 is deemed large, 0.333 is considered average, and 0.19 and lower are considered weak. Path coefficients should be more than 0.100 and significant at the 0.05 level of significance to account for a particular impact within the model. The validation guidelines for the structural model are summarised in Table 3.9.

Table 3.9

*Summaries of Validity*

Validity Type	Criterion	Guideline
Model Validity	Coefficient of determination ( $R^2$ )	0.67—substantial 0.333—moderate 0.190—weak
	Path coefficients	Path coefficient must be at least 0.100 and at significance of at least 0.05

### 3.12.7 Moderating Relationship

According to Baron and Kenny (1986) a moderating factor is a third variable that accounts for the relationships between the independent variable (predictor) and dependent variable (outcome); in other words, the variable which affects or alters the relationship between the independent variable and dependent variable is known as a moderator.

The most prevalent technique utilised by previous studies to analyse a moderator relationship is by Baron and Kenny's (1986) guideline presented as follow:

- i. To show that there is a significant relationship between the predictor (independent variable) and the outcome (dependent variable)
- ii. To show that the predictor is related to the moderator.
- iii. To show that the moderator is related to the outcome variable.
- iv. To show the strength of the relations between the predictor and the outcome when the moderator is added to the model.

If only the first three principles are completed, the relationship between the predictor and the outcome variable is said to be only partially moderated.

The relevance of the moderation effect must be evaluated when the association between moderator, predictor, and outcome has been established. The statistical significance of the moderation reduction is determined using the following procedure. After the structural model has been evaluated successfully, then the interpretation of the structural equation model can be conducted based on theoretical foundations (Urbach & Ahlemann, 2010).

### **3.13 Data Screening and Preliminary Analysis**

As per Hair et al. (2017), preliminary analysis and data screening play a crucial role in multivariate data analysis as they help identify potential violations of key assumptions related to the use of these techniques. Moreover, conducting preliminary analysis and data screening assists the researcher in gaining a comprehensive understanding of the collected data before applying multivariate data analysis techniques, as stated in the study conducted by Hair, Page, and Brunsveld (2020).

In this study, 876 participants viewed the survey, and out of them, 327 participated in the survey. Out of the 327 respondents, only 32 respondents did not complete the survey, and 44 respondents reported that they are not using m-banking applications.

The remaining 251 responses were the only ones eligible for the data analysis. These numbers were generated by the tracking functionality embedded within the Microsoft Forms (<https://forms.office.com>) survey authoring package. The completion time for the web survey was three months.

The web questionnaires completed by all 327 participants were initially coded and then entered SPSS v.20. However, during the initial analysis, it was discovered that 32 participants did not complete the survey, and 44 participants reported not using m-banking, making them unsuitable for the requirements of the research. As a result, their responses were excluded from analysis. Subsequently, preliminary analysis and data screening were conducted on the remaining 251 participants to assess outliers, inspect missing values, evaluate multicollinearity, and assess normality, as suggested by Hair, Binz, Moisescu, Radomir, Sarstedt, Vaithilingam, Ringle (2020) and Hair et al. (2017).

### **3.13.1 Analysis of Missing Values**

Kwak and Kim (2017) noted that missing values in data analysis can occur due to non-responses or information loss from study participants. In the study by Hair et al. (2017), missing data is defined as "information that is not available for a case for which information is accessible." However, in this study, no missing data was found using frequency statistics. The frequency analysis did not reveal any incomplete questionnaires or missing values, indicating that the data was complete. The online web survey was designed in such a way that respondents could not proceed without answering all the questions. If any question was left unanswered, the survey tool alerts the respondent, and they could not move on to the next part of the survey until

all questions were answered. Additionally, the survey tool verified that the survey was completed before submission, ensuring that no unanswered data was left behind.

### **3.13.2 Assessment of Outliers**

Normally, another significant issue that researchers face during the screening and preliminary analysis phase of the data is the recognition of outliers, referring to the extreme values in data that unusually stand outside the distribution pattern of the overall data (Kwak & Kim, 2017). According to Barnett (1994) study, outliers are observations or subsets that appear to be different from the rest of the data. Verardi and Croux (2009) have noted that the presence of outliers in a dataset can significantly affect the estimation of regression coefficients, leading to inconsistent results. Response errors and data entry errors are also considered factors that contribute to outliers. Hence, managing outliers is an essential task before conducting multivariate analysis, as emphasized in studies by Kwak and Kim (2017), Hair et al. (2019), and Hair et al. (2017).

Initially, the dataset was presented and analyzed in the SPSS software, assessing the maximum and minimum statistics of variables of the study, to sort values that seemed to be outside the given labels, resulting in data entry errors. It was noted from a frequency statistics perspective, that no value seemed outside the given range of values. In other words, all the data was found to be within the range of the chosen Likert scale, which clearly shows that there were no data errors, as the survey tool used has the Likert scale question style along with other styles that minimize the manual data entry by participant. Additionally, the researcher set all questions as mandatory for the entire survey.

Moreover, it was also observed that multivariate outliers can be detected by utilizing the Mahalanobis distance or ( $D^2$ ). According to Tabachnick and Fidell (2007), Mahalanobis distance ( $D^2$ ) is defined as “the gas of a case from the centroid of other cases, where the point (centroid) is formed at the crossing of the meanings of variables (pg.4)”.

To detect outliers, the Mahalanobis distance ( $D^2$ ) was calculated at the multivariate level. It can be said that a multivariate outlier can be the case if the chances linked with its  $D^2$  are 0.001 or less. A chi-square distribution is followed by  $D^2$ , with a level of freedom equivalent to the number of variables found in the calculation. Twelve multivariate outliers were noted considering this criterion, and later removed from the key dataset, as these could have impacted the multivariate data analysis’s accuracy and validity. Subsequently, after removing the multivariate outliers, the overall data comprised of 239 cases. Table 3.10 shows a list of the 12 cases of multivariate outliers.

Table 3.10  
*Cases with Multivariate Outliers*

Case No.	Mahalanobis distance ( $D^2$ )	$D^2$ Chi-square
165	45.11907	0.00000
150	40.38363	0.00001
36	40.04524	0.00001
63	39.63573	0.00001
76	37.78319	0.00002
205	37.54343	0.00002
188	35.48759	0.00005
152	37.23812	0.00002
234	33.37029	0.00012

Table 3.10 (Continued)

112	29.61362	0.00051
141	29.74405	0.00048
41	45.19883	0.00000

### 3.13.3 Normality Test

Cepeda-Carrion, Cegarra-Navarro, and Cillo (2018) have suggested that PLS-SEM is an accurate model for assessing both normal and non-normal data. However, (Hair, Howard, and Nitzl (2020) state in their recent study that it is crucial to examine the data and conduct a normality test before performing multivariate data analysis using the PLS-SEM model. This is because it helps ensure that there are no significant outliers that could potentially disrupt the findings from the data and inflate the bootstrapped standard error estimations. Therefore, it is important to conduct a thorough assessment of the data to ensure the accuracy of the results obtained from the PLS-SEM model.

Therefore, on this basis, a graphical method was used to ensure the normality of the data set. Additionally, it was imperative to ensure that the data set had a normal distribution through a graphical method. This was done to avoid inaccurate measurements due to the values of skewness, which are more apparent in a study that is based on 200 samples or more. As stated by Field (2009), it is apparent in the study having a large sample size, to undervalue the standard error estimation, which contributes towards inflating the kurtosis value. This opens the need for using a graphical method as a strategy for normality check in place of examining the statistical methods.

Skewness and kurtosis values were used to examine the distribution of data normality for each variable. As stated by Bono et al. (2019), skewness helps the researcher in

illustrating the symmetry of the allocated score; therefore, a skewed variable would mean that the particular observation is not at the center of the distribution.

This is different from kurtosis, which serves to estimate the peak of a distribution. This can include examples like thick tail or short tail, flat or long tail, etc. It is also important to note that when the value of skewness and kurtosis is nil, then it is considered as a normal distribution. There is also a difference in the behavior of both positive as well as negative skewness. For instance, a positive skewness will project the clusters on the left, while a negative skewness value would tilt towards the right-hand side (Tabachnick & Fidell, 2001). If the kurtosis value is zero, then it will have a flat distribution, which is also called “platykurtic”. On the other hand, “leptokurtic” is the name given to the distribution when the value of kurtosis is above zero. According to George and Mallery (2019), if the data set has a skewness or kurtosis value between  $\pm 2.00$ , it is considered as having a normal distribution.

The normality test was conducted using SPSS, and both the values of skewness and kurtosis were found to be greater than  $\pm 2.0$ . This is an indication that the data is not symmetric and does not have a normal distribution. Therefore, it can be reinstated that the data set for this study is not normally distributed.

As a matter of fact, PLS-SEM is used based on several rationales in the methodological literature. It is mainly because its use tends to be new in modern studies. Rouf and Akhtaruddin (2018) used PLS-SEM because of having non-normal distribution of data and use of latent construct measurements. Similarly, it is used in this study mainly due to non-normal distribution of data and simultaneous estimation of associations among variables.

Table 3.11 below captures the kurtosis and skewness for all the variables. It is evident from the below observations that the variables in the data are not normally distributed. Hence, it can be concluded that the variables show a high level of deviation from the requirement of a normality test.

Table 3.11  
*Skewness and Kurtosis for the Variables*

<b>Construct</b>	<b>Skewness</b>		<b>Kurtosis</b>	
	<i>Statistic</i>	<i>SE</i>	<i>Statistic</i>	<i>SE</i>
M-banking Adoption Intention	2.042	0.158	-1.473	0.316
Perceived Security	-2.115	0.158	-3.235	0.316
Trust	-3.292	0.158	4.529	0.316
Performance Expectancy	-1.012	0.158	-2.718	0.316
Effort Expectancy	-2.160	0.158	-2.290	0.316
Social Influence	-4.460	0.158	-3.204	0.316

#### **3.13.4 Multicollinearity Test**

When one of the independent variables is merged with another independent variable, there occurs a singularity (Tabachnick & Fidell, 2001). On the contrary, when the independent variables are highly correlated, multicollinearity poses a problem for multiple regressions. In such a case, because of high standard errors, the regression coefficients are negligible. Another assumption relates to multicollinearity and singularity, corresponding to correlations between the predicting variables. Furthermore, it is stated that there is a presence of high multicollinearity when the tolerance value approaches zero. Therefore, this study does not violate any assumptions, since all the tolerance values of independent variables have a value greater than 0.1, and a variance inflation factor (VIF) value of less than 10.0, as per

the results shown in Table 3.12. The tolerance values are greater than 0.1 for all the constructs, and the VIF values are below 10.0. for all the constructs as well. This confirms that there are no issues in this study with regards to multicollinearity.

Table 3.12

*Test of Multicollinearity*

<b>Construct</b>	<b>Tolerance</b>	<b>VIF</b>
Perceived Security	0.186	5.374
Trust	0.292	3.421
Performance Expectancy	0.160	6.252
Effort Expectancy	0.149	6.723
Social Influence	0.682	1.467

### 3.13.5 Non-Response Bias Test

When there is a significant difference between respondents of a study as compared to non-respondents, there is a chance of a non-response bias (Berlin et al. 2018). Additionally, a non-response bias is defined by Fricke et al. (2020) as a difference in the responses between those of respondents and non-respondents. To mitigate the non-response bias in a study, it is recommended that a time-tend extrapolation approach to be used. This is because this approach has the ability to compare the difference between late and early responses.

In terms of the data collection from the survey, initial data was collected on the day when survey questionnaires were distributed, while the remaining data was collected later through a follow-up with the participants. In addition, the total collected responses were then categorized into two key groups, i.e., Early group and Late group. Table 3.13 below illustrates the detail of the responses. Moreover, it is

significant to note that the independent sample t-test was used for detecting any kind of discrepancy in the studied variables.

In Levene's test for equality of variances, for the results to be significant, it is essential that the values be greater than 0.05 (Field, 2009; Pallant, 2010). In this regard, it can be noted that results of the independent samples t-test (see Table 3.13) show that the equality of variances values was insignificant, as they were found to be greater than the threshold value of 0.05. Furthermore, the results of the independent samples t-test did not reveal any kind of significant variance among the two participant groups (as shown in Table 3.13). From these results, it can be deduced that the study did not face any kind of non-response bias issue.



Table 3.13

*Results of Independent Sample t-Test for Non-Response Bias*

<b>Construct</b>	<b>F</b>	<b>Sig.</b>
M-banking Adoption Intention	0.024	0.877
Perceived Security	0.000	0.998
Trust	0.068	0.794
Performance Expectancy	0.453	0.502
Effort Expectancy	0.354	0.552
Social Influence	0.423	0.516

**3.14 Chapter Summary**

In a nutshell, a research method is critical in accomplishing the research objective. This chapter discussed the entire research method approach utilized for this study. Positivism is the selected paradigm for this research. It also covered the research design and processes applied. The approach followed to design the instrument is also discussed. A web survey was used for this quantitative research. Face and content validity was conducted to moderate the instrument used. A pilot study was conducted to assess the validity and the reliability of the instrument, and the results were reported. Evaluation of structural and measurement models are discussed. PLS-SEM is the data analysis technique applied. The next chapter discusses the findings for both the measurement and structural model.

## **CHAPTER FOUR**

### **ANALYSIS AND FINDINGS**

#### **4.1 Introduction**

This chapter of the study included data analyses and findings based on the objectives highlighted in chapter one and the hypotheses developed in chapter two. The data is analyzed using statistical software SPSS (v.20) for preliminary analysis and screening of primary data. Later, SmartPLS (v.3.2.6) is used for evaluation of the structural and measurement model together with moderation analysis.

#### **4.2 Demographic Profile of the Respondents**

This section describes the demographic profile of the respondents. The demographic features that were analyzed in the current study include gender, age, location, education, employment status, experience, and frequency in using m-banking applications, and a list of their banks. The overall data comprised of 239 cases used for the analysis.

Table 4.1 indicates that most of the respondents (around 63.60%) were females compared to males (36.40%). Additionally, most of the respondents (41.80%) were aged between 30 to 40 years old. Similarly, 36.40%, 15.1%, 2.10% of the participants were aged between 21 to 30 years, 41 to 50 years and 50 to 60 years or older, respectively. Moreover, since Dubai population almost represents 43% of UAE population according to the population statistical data published by the Federal Competitiveness and Statistics Authority of the UAE (FCSA) in 2020, it is obvious that most of participants in this study comes from Dubai representing (67.40%), followed by 12.60% who were from Abu Dhabi, 10.70% were from Sharjah, 3.8%

from Ajman, 2.5 % from Fujairah, 1.7% from Umm Al Quwain and 1.3% from Ras Al Khaimah.

The majority of the respondents (78.2%) had obtained undergraduate or postgraduate degrees, and the remaining of the respondents obtained high school, diploma, professional certificate, and other types of academic qualifications. In terms of employment status, a high number of the respondents were working within the government sector, which was around 44.8%, whereas only 1.30% of the total participants retired were from services.

Apart from these, it is noticed that most of the participants (60.70%) have experience of using m-banking applications for about 1 to 5 years. In contrast, the lowest number of respondents (6.70%) had used such apps for more than 10 years. Interestingly, this study's findings showed that most of the research participants (around 38.10%) used m-banking applications every week, while 11.30% used the applications every month, this being the smallest in number.

Moreover, the participants were asked to mention the name of the bank whose m-banking application was being used by them. As a result, most of them (25.20%) mentioned the Emirates NBD/Emirates Islamic Bank for this question. However, the lowest number of participants (2.80%) indicated that they used CitiBank. In conclusion, for demographic analysis, this sample is able to represent the population of the study.

Table 4.1

*Respondents' Demographic Analysis*

<b>Demographic</b>	<b>Choices</b>	<b>Frequency (N=239)</b>	<b>Percent (%)</b>
Gender	Male	87	36.4
	Female	152	63.6
Age	Less than 20	6	2.5
	21 to 30	87	36.4
	31 to 40	100	41.8
	41 to 50	36	15.1
	51 to 60	5	2.1
	Older than 60	5	2.1
Location	Abu Dhabi	30	12.6
	Ajman	9	3.8
	Dubai	161	67.4
	Fujairah	6	2.5
	Ras Al Khaimah	3	1.3
	Sharjah	26	10.7
	Umm Al Quwain	4	1.7
Education	High School Degree	20	8.4
	Diploma	16	6.7
	Bachelor's degree	115	48.1
	Postgraduate degree	72	30.1
	Professional Qualification	11	4.6
	Others	5	2.1
Employment Status	Government Sectors Employee	107	44.8
	Semi-Government Employee	26	10.9
	Multi-National Company Employee	11	4.6

Table 4.1 (Continued)

	Private Sectors Employee	48	20.1
	Self-employed	18	7.5
	Unemployed	26	10.9
	Retired	3	1.3
<b>Demographic</b>	<b>Choices</b>	<b>Frequency (N=239)</b>	<b>Percent (%)</b>
How long have you been using the Mobile Banking Application(s)?	Less than 1 year	28	11.7
	Between 1 to 5 years	145	60.7
	Between 5 to 10 years	50	20.9
	More than 10 years	16	6.7
What the name of the bank(s) that you are currently using their mobile banking application(s).	EmiratesNBD/Emirates Islamic; Other;	17	6.8
	Abu Dhabi Islamic Bank (ADIB), EmiratesNBD/Emirates Islamic	14	5.6
	Dubai Islamic Bank (DIB)	40	16.0
	Abu Dhabi Islamic Bank (ADIB)	46	18.4
	Mashreq Bank	16	6.4
	EmiratesNBD/Emirates Islamic, First Abu Dhabi Bank (FAB)	9	3.6
	EmiratesNBD/Emirates Islamic, HSBC Middle East	16	6.4
	Abu Dhabi Commercial Bank (ADCB)	10	4.0
	EmiratesNBD/Emirates Islamic	63	25.2
	Rash Al Khaimah Bank (RAK), Citibank, First Abu Dhabi Bank (FAB);	12	4.8
	Citibank	7	2.8
	How often do you use mobile banking?	Everyday	88
Every week		91	38.1
Every two weeks		33	13.8
Every month		27	11.3

### 4.3 Descriptive Analysis of the Latent Constructs

After the screening and preliminary analysis of the data was conducted, the researcher conducted the descriptive statistics for all the latent variables in the study. The descriptive stats are aimed at explaining the general characteristics and the features of the variables, performance expectancy, effort expectancy, social influence, trust, perceived security, and m-banking adoption intention. The results of the statistics helped in determining the relative importance of all the variables. Taking guidance from Sassenberg et al., (2011), the values were categorized as low, moderate, and high. In this regard, on the basis of this scale, the average values less than 3 were considered as low; average values ranging from 3 to 5 were considered as moderate, and average values greater than 5 were considered as high. The results of the descriptive statistics are presented in Table 4.2 below.

Table 4.2  
*Descriptive Statistics for Latent Variables*

<b>Construct</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>SD</b>
m-banking adoption intention	4.00	7.00	5.72	0.74627
Perceived Security	4.00	7.00	5.82	0.64311
Trust	4.00	7.00	5.71	0.59694
Performance Expectancy	4.75	7.00	6.03	0.62873
Effort Expectancy	4.00	7.00	5.52	0.64196
Social Influence	1.40	7.00	4.97	1.30338

Table 4.2 provides the results obtained from the descriptive analysis of the latent constructs; it reveals that the mean scores of the latent constructs ranged from 4.97 to 6.03. Furthermore, the standard deviation scores of these latent constructs ranged from 0.60 to 1.30. Specifically, the mean and standard deviations for m-banking

adoption intentions were high (mean = 5.72, sd = 0.75). Table 4.6 also shows that the mean scores of perceived securities (mean = 5.82, sd = 0.64), trust (mean = 5.71, sd = 0.60), performance expectancy (mean = 6.03, sd = 0.63), and effort expectancy (mean = 5.52, sd = 0.64) were also high. Lastly, results of the descriptive analyses indicated that the respondents moderately agree to social influence (mean = 4.97, sd = 1.30). These statistics prove that the data is supportive of the study's propositions. Hence, the data is found to be favorable, with a lower dispersion among sample responses, as the standard deviation of all the variables is close to 1, indicating a higher tendency of responses to the mean.

#### 4.4 Assessment of PLS-SEM Path Model Results

According to Henseler et al., (2009), a two-step process for the assessment and interpretation of the results was obtained from the PLS-SEM path model. The first step was to assess the measurement model, while the second step was to assess the structural model (Hair et al., 2017). This two-step process is illustrated in Figure 4.1.

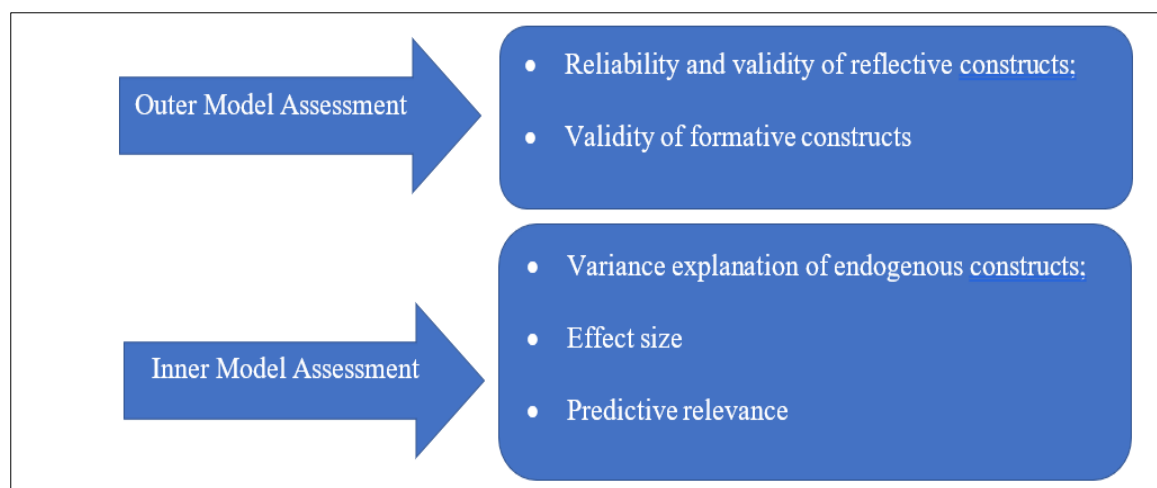


Figure 4.1: PLS Path Modeling Assessment (Two Steps Process) Source: Henseler et al. (2009)

#### **4.5 Assessment of Measurement (Outer) Model**

According to Hair et al., (2017) and Henseler et al., (2009), the measurement model can be validated by assessing the model item reliability, the internal consistency of the model, convergent validity, and the discriminant validity. For this study, Figure 4.2 illustrates the assessment of measurement model.



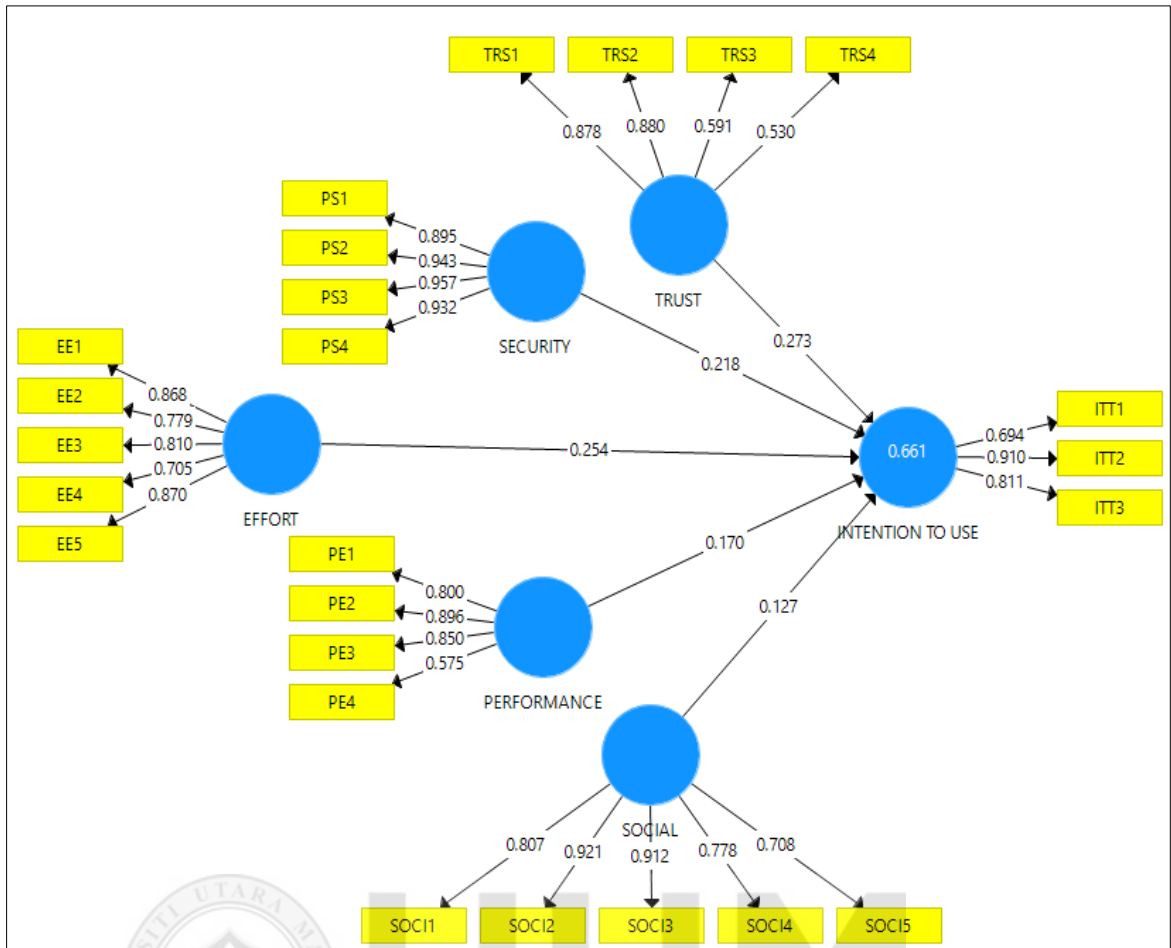


Figure 4.2: Assessment of Measurement Model

#### 4.5.1 Individual Item Reliability

According to Hair et al., (2017), Duarte and Raposo (2010), and Hulland (1999), the analysis of outer loadings of each of the construct item was conducted to determine the individual item reliability. In this context, the results of the data revealed that the minimum outer loadings of all the items in the study were higher than the minimum threshold point of 0.4.

In particular, the outer loadings of all the items were found to be between 0.705 and 0.957. Table 4.3 presents the outer model loadings of all the items.

#### 4.5.2 Internal Consistency Reliability

As shown in Table 4.3, the values of the composite reliability for all the latent constructs were found to be within the range of 0.705 to 0.957. This indicates that internal consistency reliability was satisfactory, with values higher than 0.7.

Table 4.3

*Loadings, Composite Reliability and Average Variance Extracted*

Main Variable	Latent Construct and Indicator	Loading	Cronbach's Alpha	Composite Reliability	AVE
Performance Expectancy	PE1	0.800	0.792	0.866	0.624
	PE2	0.896			
	PE3	0.850			
	PE4	0.755			
Effort Expectancy	EE1	0.868	0.866	0.904	0.654
	EE2	0.779			
	EE3	0.810			
	EE4	0.705			
	EE5	0.870			
Social Influence	SI1	0.807	0.883	0.916	0.687
	SI2	0.921			
	SI3	0.912			
	SI4	0.778			
	SI5	0.708			
Perceived Security	PS1	0.895	0.950	0.964	0.869
	PS2	0.943			
	PS3	0.957			
	PS4	0.932			
M-banking	ITT1	0.794	0.729	0.849	0.655

Table 4.3 (Continued)

adoption intention	ITT2	0.910			
	ITT3	0.811			
Trust	TR1	0.878			
	TR2	0.880	0.729	0.820	0.544
	TR3	0.791			
	TR4	0.731			

As been discussed in subsections 3.10.2 and 3.10.3 in chapter 3 the analysis indicates that the measurement model of this study achieved its internal consistency and indicator reliability.

#### 4.5.3 Convergent Validity

As presented in Table 4.3, the AVE readings of all latent constructs in the present study were more than the minimum threshold of 0.50. In PLS, convergent validity has been assessed utilizing the value of AVE. In the light of the study of Chin (1998), this study reported sufficient convergent validity if the value of AVE achieved was at least 0.5.

As been discussed in subsection 3.10.4 in chapter 3 the analysis indicates that the measurement model of this study achieved its convergent validity.

#### 4.5.4 Discriminant Validity

The square root of the AVE readings ought to be bigger than the correlations among the latent constructs, according to the given standards of Fornell and Larcker (1981). Table 4.4 shows that the square roots of the AVE values of every construct (bolded values) were significantly higher in comparison to the correlations across the latent

constructs, indicating appropriate discriminant validity of the constructs (Fornell & Larcker, 1981).

Table 4.4  
*Discriminant Validity*

	Effort Expectancy	Behavioral Intention	Performance Expectancy	Perceived Security	Social Influence	Trust
EFFORT	<b>0.809</b>					
M-BANKING ADOPTION INTENTION	0.623	<b>0.810</b>				
PERFORMANCE	0.463	0.556	<b>0.790</b>			
SECURITY	0.415	0.636	0.369	<b>0.932</b>		
SOCIAL	0.426	0.600	0.538	0.504	<b>0.829</b>	
TRUST	0.537	0.709	0.442	0.682	0.601	<b>0.738</b>

Furthermore, according to Chin (1998) discriminant validity was assessed by correlating the indicator's loadings of each construct along with the cross-loadings of other constructs in the present investigation. According to Chin's (1998) proposal, the indicator's loadings ought to be bigger than cross-loadings, in exchange to attain appropriate discriminant validity (Grégoire & Fisher, 2006).

Additionally, the Chin (1998) criterion is regarded as the second way to assess discriminant validity using cross-loadings (Grégoire & Fisher, 2006). The indicator's loadings of every construct ought to be greater than its cross-loadings of other constructs predicated on this requirement. Furthermore, Henseler et al. (2015) suggest

the heterotrait-monotrait correlation ratio (HTMT) as a third technique (new criterion) for determining discriminant validity. Henseler, Hubona, and Ray (2016) explain that the HTMT serves as an indicator of factor correlation. Therefore, to effectively distinguish between two factors, the HTMT value should be significantly less than one.

These methods were employed in the current investigation to determine the discriminant validity concerns. Firstly, the Chin (1998) criterion was exploited to establish discriminant validity by contrasting the indicator's loadings of each construct with the cross-loadings of the other constructs in the present investigation. According to Chin's (1998) proposal, the indicator's loadings should be bigger than the cross-loadings in order to attain appropriate discriminant validity (Grégoire & Fisher, 2006).

Furthermore, the Henseler et al. (2009) criterion was used to establish discriminant validity by contrasting each assemble' s indicator loadings to the cross-loadings of the current study's distinct assembly. To attain adequate discriminant validity, Henseler et al. (2009) state that indicator loadings must be higher than cross-loadings. Table 4.5 demonstrates how various assemble loadings influence the loadings of the indicator (bolded values). The loadings of each assemble indicator were observed to be higher than the cross-loadings, showing the discriminant validity of the right assembles.

Table 4.5

*Cross Loadings Analysis Result*

Item Code	Effort	M-Banking Adoption Intention	Performance	Security	Social	Trust
EE1	<b>0.868</b>	0.570	0.367	0.316	0.415	0.502
EE2	<b>0.779</b>	0.478	0.318	0.226	0.279	0.364
EE3	<b>0.810</b>	0.426	0.399	0.367	0.338	0.389
EE4	<b>0.705</b>	0.496	0.435	0.438	0.328	0.424
EE5	<b>0.870</b>	0.528	0.357	0.333	0.351	0.472
ITT1	0.385	<b>0.794</b>	0.333	0.305	0.395	0.351
ITT2	0.490	<b>0.910</b>	0.513	0.516	0.593	0.475
ITT3	0.641	<b>0.811</b>	0.496	0.321	0.454	0.481
PE1	0.350	0.388	<b>0.800</b>	0.268	0.423	0.287
PE2	0.432	0.505	<b>0.896</b>	0.414	0.516	0.432
PE3	0.394	0.522	<b>0.850</b>	0.317	0.424	0.337
PE4	0.262	0.298	<b>0.755</b>	0.100	0.321	0.347
PS1	0.421	0.512	0.368	<b>0.895</b>	0.504	0.253
PS2	0.411	0.571	0.325	<b>0.943</b>	0.497	0.350
PS3	0.395	0.648	0.368	<b>0.957</b>	0.454	0.355
PS4	0.329	0.625	0.319	<b>0.932</b>	0.436	0.374
SI1	0.296	0.525	0.390	0.427	<b>0.807</b>	0.523
SI2	0.446	0.536	0.485	0.473	<b>0.921</b>	0.466
SI3	0.429	0.533	0.482	0.488	<b>0.912</b>	0.504
SI4	0.359	0.415	0.434	0.331	<b>0.778</b>	0.383
SI5	0.222	0.460	0.439	0.344	<b>0.708</b>	0.497
TR1	0.476	0.508	0.463	0.622	0.626	<b>0.878</b>
TR2	0.403	0.605	0.445	0.609	0.494	<b>0.880</b>
TR3	0.395	0.300	0.114	0.345	0.247	<b>0.791</b>
TR4	0.334	0.339	0.108	0.351	0.275	<b>0.730</b>

In the present research, the heterotrait-monotrait ratio of correlations (HTMT) criterion has been employed to evaluate discriminant validity, as reported by (Henseler et al., 2015). As per Henseler et al. (2016), the HTMT evaluates factor correlation; therefore, the HTMT value needs to be less than 1. This is in order to differentiate between two factors (constructs) in the study. If the HTMT value is less than one, it shows that the correlation between the two elements (constructs) is distinctive. Therefore, the value of each factor must be different. Additionally, if the HTMT value exceeds this level, there is a dearth of discriminant validity. Furthermore, researchers by Kline (2011) and Clark and Watson (1995) advocate for the 0.85 criterion, whereas scholars including Teo et al. (2008) and Gold et al. (2001) advocated for a 0.90 threshold. The HTMT values for the discriminant validity of the present study constructs are shown in Table 4.6.

Table 4.6  
*Heterotrait-Monotrait Ratio (HTMT)*

	<b>Effort</b>	<b>Adoption Intention</b>	<b>Performance</b>	<b>Security</b>	<b>Social</b>	<b>Trust</b>
Effort						
Adoption Intention	0.785					
Performance	0.554	0.717				
Security	0.462	0.763	0.405			
Social	0.482	0.742	0.645	0.549		
Trust	0.673	0.810	0.517	0.776	0.686	

Table 4.6 shows the statistical results for each latent construct's HTMT scores. According to the table, all of the HTMT values were less than the threshold value of 1, and also the threshold values of 0.90 and 0.85. These values are comparable to the scholars', including Henseler et al.'s (2015) and Kline's (2011) proposed values. Additionally, Teo et al. (2008) and Gold et al. (2001) have also proposed these values to show the overall discriminant validity of approved constructs.

As been discussed in subsections 3.10.1 and 3.10.5 in chapter 3 the analysis indicates that the measurement model of this study achieved its discriminant validity.

#### **4.5.5 Summary of the Measurement Model**

The summary of the assessment conducted on the measurement model is shown in Table 4.7. The figure of measurement model is displayed in Figure 4.2. It can be seen from these illustrations, that this measurement model has achieved the requirement to proceed for a structural model.

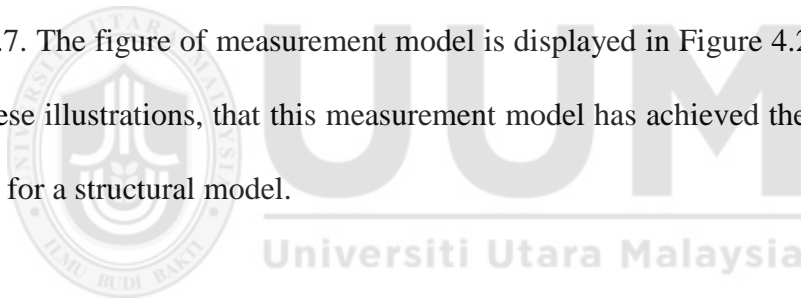


Table 4.7

*Summary of Assessment of the Measurement Model*

Assessment	Criterion	Comment	Results
Internal Consistency	CR	Exceeded 0.08, thus demonstrating internal consistency.	Achieved
Indicator reliability	Indicator loading	All items loaded more than 0.5, hence demonstrating indicator reliability.	Achieved
Convergent Validity	AVE	Each construct had an AVE value of more than 0.5, thus demonstrating convergent validity.	Achieved
Discriminant Validity	1-Fornell-Lacker 2-Cross Loading 3-HTMT	1-Square root of the AVE values should be greater than the correlations among the latent constructs 2-Loading of each indicator was highest for their designated construct. 3-The value was less than 1	Achieved

**4.6 Assessment of Significance of the Structural (Inner) Model**

In this section the researcher presented the results of the structural model from two perspectives: the direct effect, and the moderation effect.

**4.6.1 Direct Effect of Predictors on Behavioral Intention**

The assessment of the structural model revealed the structural model path coefficients for the relationships of the current study. Specifically, path 1 proposed the relationship between predictors and behavioral intention. The findings presented in

Table 4.8 and Figure 4.3 disclose that out of five predictors, only four of them established a significant relationship with behavioral intention. Results in Table 4.8 indicate that perceived security ( $\beta = 0.218$ ,  $t = 2.178$ ,  $p < 0.05$ ), trust ( $\beta = 0.273$ ,  $t = 2.145$ ,  $p < 0.05$ ), effort expectancy ( $\beta = 0.254$ ,  $t = 2.424$ ,  $p < 0.05$ ), and performance expectancy ( $\beta = 0.170$ ,  $t = 1.984$ ,  $p < 0.05$ ) were the significant factors to m-banking adoption intention. Social influence was found to have an insignificant relationship with m-banking adoption intention ( $p > 0.05$ ).



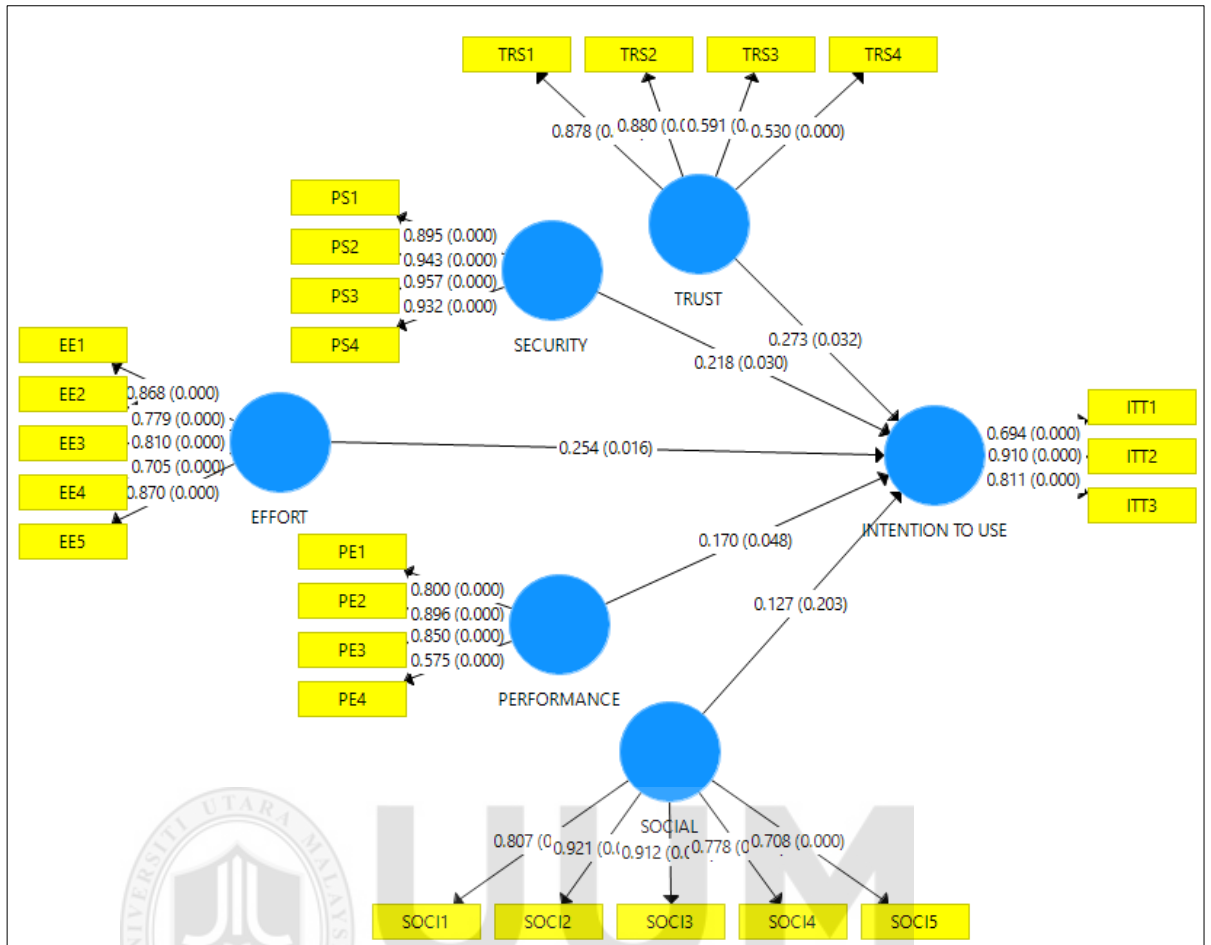


Figure 4.3: Assessment of Structural Model – Direct Effect

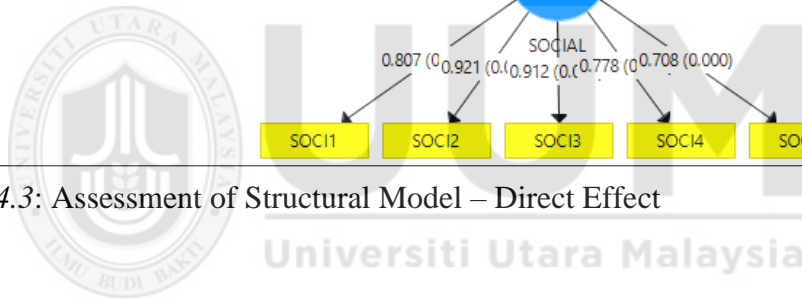


Table 4.8

*Assessment of Structural Model Direct Relationships on m-banking adoption intention*

<b>Construct</b>	<b>Original Sample (O)</b>	<b>Sample Mean (M)</b>	<b>Standard Deviation (SD)</b>	<b>T Statistics ((O/SD))</b>	<b>P Values</b>
Security→ Behavioral Intention	0.218	0.199	0.100	2.178	0.030
Trust→ Behavioral Intention	0.273	0.280	0.127	2.145	0.032
Effort→ Behavioral Intention	0.254	0.257	0.105	2.424	0.016
Performance → Behavioral Intention	0.170	0.169	0.086	1.984	0.048
Social→ Behavioral Intention	0.127	0.135	0.100	1.273	0.203

#### **4.6.2 Assessment of Variance Explained in the Endogenous Latent Variable**

After evaluating the structural model path coefficients (Hair et al., 2017; Hair et al., 2020; Henseler et al., 2009), the coefficient of determination, also known as R-square ( $R^2$  value), was used to assess the structural model. According to Hair et al. (2017) the R-square value is an important measure for representing the percentage of variance in the endogenous variable, which is the dependent variable, explained by the exogenous variables, which are the independent variables. However, determining acceptable R-squared values is complicated, as the values depend on the research model and discipline under consideration (Hair et al., 2017). In contrast, different authors suggested different acceptable values for R-square. For example, 0.10 or greater was

suggested by Falk and Miller (1992), and 0.67, 0.33, and 0.19 are suggested by Chin (1998), which can be measured as substantial, moderate, and weak in PLS-SEM.

Table 4.9

*Variance Explained in the Endogenous Latent Variable*

<b>Latent Variable</b>	<b>R Square</b>	<b>R Square Adjusted</b>
M-banking adoption intention	0.661	0.639

Table 4.9 depicts the R-squared value of the current research's endogenous latent variable. Table 4.9 shows that 66.1% is the level of variance in the m-banking adoption intention element. It means that five independent or exogenous variables of the current research with moderating variables reflect the 66.1% variance in m-banking adoption intention. Therefore, it can be concluded that the dependent variables have the capacity to depict the acceptable R-square value.

#### **4.6.3 Assessment of Predictive Relevance**

The current study depicts the predictive relevance by applying the Stone-Geisser test, that uses the blindfolding procedure with a particular value of  $Q^2$  (Geisser, 1975; Stone, 1974). The goodness of fit (GoF) is evaluated through Stone Geisser's predictive relevance in PLS-SEM (Duarte & Raposo, 2010). Additionally, predictive relevance also determines the strength of the model, which predicts the values of data related to omitted cases (Hair et al., 2017; Chin, 1998). The present research only determines the predictive relevance of one endogenous variable, i.e., m-banking adoption intention, with the facilitation of a reflective measurement model. In addition, the current study uses an omission distance of seven by following the

guidelines provided by Hair et al. (2017). According to Hair et al. (2017), the value of  $Q^2$  can be determined as relevant to a dependent or endogenous latent variable through a blindfolding procedure with a particular omission distance. Therefore, the current study determines the  $Q^2$  value by using the omission distance of seven.

Moreover, as per the teachings of Hair et al. (2017), the  $Q^2$  values can also be determined by using a cross-validated redundancy approach. The cross-validated redundancy approach estimates the predicted data's structural and measurement model by building a path model (Hair et al., 2017). The rationale of using the cross-redundancy approach is that the approach best fits with the PLS-SEM approach to determine the  $Q^2$  values. Besides, the path model predictive relevance is depicted by the  $Q^2$  value. When the  $Q^2$  value is more significant than zero for an endogenous latent variable, it means that the path model is predictive relevant (Henseler et al., 2009; Chin, 1998). Table 4.10 below depicts the values of cross-validated redundancy, i.e.,  $Q^2$  value relevant to the present research. The path model predictive relevance aligns with that of Henseler et al. (2009) and Chin (1998). Because the values of one endogenous latent variable are greater than zero, it means this is in alignment with previous research. Hence, this depicts the assessment of predictive relevance of the current study.

Table 4.10

*Construct Cross-Validated Redundancy*

<b>Total</b>	<b>SSO</b>	<b>SSE</b>	<b><math>Q^2</math> Statistics (1-SSE/SSO)</b>
M-banking adoption intention	249.000	159.633	0.359

Model predictive relevance effect of  $Q^2$  is referred to the observed change of  $q^2$  in predicting the relevance of the  $Q^2$  value that is the value after the exogenous variable removed from the model (Hair et al., 2022). This value translates as small (0.02), medium (0.15) and large (0.35) (Hair et al., 2017). The summary of the results is shown in Table 4.11 below.

Table 4.11

*Model predictive relevance effect of  $Q^2$*

Total	$Q^2$ included	$Q^2$ excluded	$q^2$
M-banking adoption intention	0.359	0.271	0.14

The result found that there is a small size of effect to the relationship of the variable m-banking adoption intention. While there is no prediction for other variables effect that occurs. The value of  $q^2$  calculated with the equation:

$$\text{Effect size } (q^2) = \frac{Q^2 \text{ Included} - Q^2 \text{ Excluded}}{1 - Q^2 \text{ Included}}$$

$$= \frac{0.359 - 0.271}{1 - 0.359}$$

$$= \frac{0.088}{0.641}$$

$$= 0.14$$

Since the effect size of  $q^2$  is 0.14, it can be concluded that the effect is translated as small (Hair et al, 2022).

#### 4.7 Testing of Moderation Effect

The last set of hypotheses of the current study leads to the determination of the moderating effects of perceived security by elaborating the association between independent and behavioral intention variables. It is a fact that moderator variables alter the level of strength of association between dependent and independent variables. The moderating variable can increase or decrease the strength of togetherness, or sometimes alter the direction of a beholding association between variables. Perceived security is the moderating factor of the current research study.

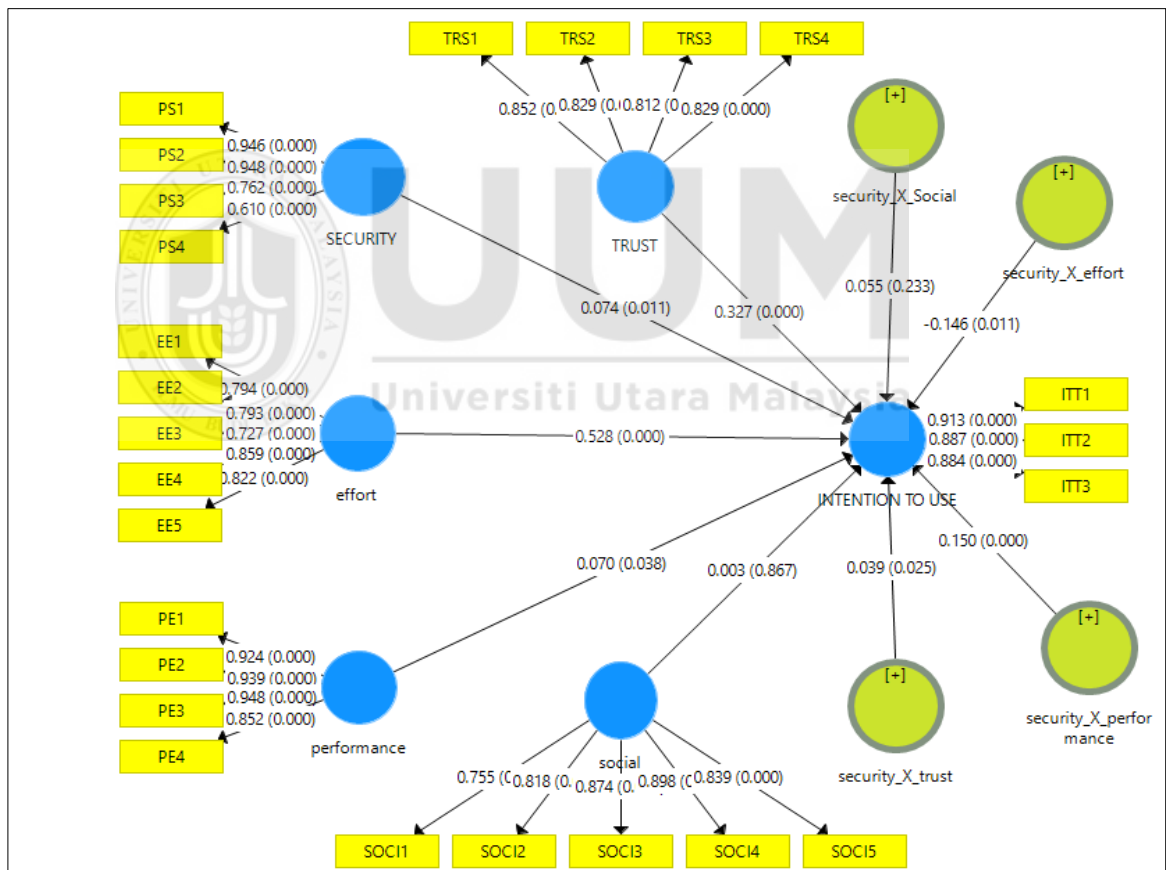


Figure 4.4: Assessment of Structural Model with Moderation Effect (Full-Model)

The result of the moderation effect is displayed in Figure 4.4 and listed in Table 4.12; as indicated, path coefficients of interaction of the three independent and moderation variables were significant, as follows: security X trust (B = 0.039, t = 2.253, p<0.05),

security X effort ( $B = -0.146$ ,  $t = 2.554$ ,  $p < 0.01$ ), and security X performance ( $B = 0.150$ ,  $t = 4.277$ ,  $p < 0.01$ ). Meanwhile, the interaction of perceived security and social influence (security X social) failed to establish the significant result. However, it is found that perceived security has significant influences on the relationship between effort expectancy and m-banking adoption intention. Similarly, the results indicate that perceived security is a significant moderator of the relationship between trust, effort expectancy, performance expectancy, and m-banking adoption intention.

Table 4.12

*Assessment of Structural Model of Moderation Effect of Perceived Security*

	<b>Original Sample (O)</b>	<b>Sample Mean (M)</b>	<b>Standard Deviation (SD)</b>	<b>T Statistics ( O/SD )</b>	<b>P Values</b>
security_X_Trust → ITT	0.039	0.038	0.017	2.253	0.025
security_X_effort → ITT	-0.146	-0.147	0.057	2.554	0.011
security_X_performance → ITT	0.15	0.154	0.035	4.277	0.000
security_X_social → ITT	0.055	0.053	0.046	1.194	0.233

Additionally, Cohen's (1988) guidelines are promising in assessing the strength level of moderating variables. The present study uses Cohen's guidelines to assess the strength level of the moderating effect, i.e., perceived security. The product indicator approach was applied to the research data to determine the influence of perceived security, i.e., moderating factors, on the relationship between independent and dependent variables, as shown in Table 4.12.

#### 4.8 Determining the Strength of the Moderating Effects (Assessment of the Moderating Effects Strength)

To evaluate the strength of the moderating effects of perceived security between endogenous latent variables and exogenous variables, the study uses Cohen's (1988) effect size approach. In determining the strength of moderating effects of perceived security, the main effect's coefficient of determination (R-squared value) is compared with full model R-squared value that includes dependent, independent, and moderating variables (Henseler & Fassott, 2010). As such, the strength of perceived security, i.e., the moderating factor effect, is determined by using the following formula (Cohen, 1988; Henseler & Fassott, 2010):

$$\text{Effect size} = (R^2 \text{ model with moderator} - R^2 \text{ model without moderator}) / (1 - R^2 \text{ Moderator}) \quad (4.1)$$

The effect size of moderator ( $f^2$ ) values such as 0.02, 0.15, and 0.35 are considered as weak, moderate, and strong, respectively. However, Chin *et al.* (2003) propounded that the meaning of weak moderating effects is not that the effect of moderating factors is non-essential in the model. "Even a small interaction can be meaningful under extreme moderating conditions; if the resulting beta changes are meaningful, it is important to consider these conditions" (Chin *et al.*, 2003). The moderating effect's strength of perceived security is shown in Table 4.12.

Table 4.13 determines the strength of the moderating effect by using the rule of thumb defined by Henseler and Fassott (2010) and Cohen (1988). Table 4.12 depicts that the moderating effect is strong, and so, the effect size value for m-banking adoption intention as a result of applying equation 4.1 is 0.621.

Table 4.13

*Strength of the Moderating Effects Based on Cohen's (1988) and Henseler and Fassott's (2010) Guidelines*

Endogenous Latent Variable	R-squared		Effect size
	Included	Excluded	
OPI	0.794	0.666	Strong

$Effect\ size = (R^2\ model\ with\ moderator - R^2\ Model\ without\ moderator) / (1 - R^2\ Moderator)$

$$= (0.794 - 0.666) / (1 - 0.794)$$

$$= 0.128 / 0.206$$

$$= 0.621$$

#### 4.9 Summary of Hypotheses Testing

This study developed nine (9) hypotheses to be tested. These nine hypotheses were successfully tested in Section 4.9 and Section 4.10. Table 4.14 shows the summary of the hypotheses testing. This study has successfully supported seven hypotheses. m-banking adoption intention showed the significant relationship with perceived security, trust, effort expectancy, and performance expectancy. Additionally, perceived security also played the moderation role in the relationship between trust, effort expectancy, and performance expectancy with m-banking adoption intention.

Table 4.14

*Summary of Hypotheses Testing*

	<b>Hypothesis Statement</b>	<b>P Values</b>	<b>Result</b>
H <sub>1</sub>	Performance Expectancy has a positive relationship on M-banking Adoption Intention.	0.048	Supported
H <sub>2</sub>	Effort Expectancy has a positive relationship on M-banking Adoption Intention.	0.016	Supported
H <sub>3</sub>	Social Influence has a positive relationship on M-banking Adoption Intention.	0.203	Not Supported
H <sub>4</sub>	Trust has a positive relationship on M-banking Adoption Intention.	0.032	Supported
H <sub>5</sub>	Perceived Security has a positive relationship on M-banking Adoption Intention.	0.030	Supported
H <sub>6a</sub>	Perceived Security has a positive moderating effect on Performance Expectancy and M-banking Adoption Intention relationship.	0.000	Supported
H <sub>6b</sub>	Perceived Security has a positive moderating effect on Effort Expectancy and M-banking Adoption Intention relationship.	0.011	Supported
H <sub>6c</sub>	Perceived Security has a positive moderating effect on Social Influence and M-banking Adoption Intention relationship.	0.233	Not Supported
H <sub>6d</sub>	Perceived Security has a positive moderating effect on Trust and M-banking Adoption Intention relationship.	0.025	Supported

Based on the analysis, it shows that m-banking adoption intention is influenced directly by performance expectancy ( $\beta=0.170$ ,  $t=0.169$ ,  $p=0.048$ ), effort expectancy ( $\beta=0.254$ ,  $t=2.424$ ,  $p=0.016$ ), trust ( $\beta=0.273$ ,  $t=2.145$ ,  $p=0.032$ ), and perceived security ( $\beta=0.218$ ,  $t=2.178$ ,  $p=0.030$ ). As a result, hypothesis H<sub>1</sub>, hypothesis H<sub>2</sub>, hypothesis H<sub>4</sub> and hypothesis H<sub>5</sub> are supported.

On the other hand, m-banking adoption intention is not influenced directly by social influence ( $\beta=0.127$ ,  $t=1.273$ ,  $p=0.203$ ). As a result, hypothesis H<sub>3</sub> is not supported.

In case of employing perceived security as a moderator the analysis showed that there is significant moderation influence in the relations between m-banking adoption intention and performance expectancy ( $\beta=0.15$ ,  $t=4.277$ ,  $p=0.000$ ), effort expectancy ( $\beta=-0.146$ ,  $t=2.554$ ,  $p=0.011$ ), and trust ( $\beta=0.038$ ,  $t=2.253$ ,  $p=0.025$ ). As a result, hypothesis H<sub>6a</sub>, hypothesis H<sub>6b</sub>, and hypothesis H<sub>6d</sub> are supported. However, for the relationship between m-banking adoption intention and social influence ( $\beta=0.055$ ,  $t=1.194$ ,  $p=0.233$ ) perceived security did not influence the relation and no effect of moderation on the relation, so hypothesis H<sub>6c</sub> is not supported.

#### **4.10 Chapter Summary**

This chapter discussed the statistical results and tests of the research hypotheses. SmartPLS is employed to investigate the moderation influence of perceived security on users' m-banking adoption intentions. Several observations can be concluded from the analyses conducted on the measurement and structural models.

The structural model showed acceptable reliability and validity measures. For internal consistency, all constructs scored composite reliability values above 0.7. The loading of all items was found to be higher than the minimum threshold point of 0.4. The measurement model showed adequate convergent and discriminant validity by scoring

an AVE value above 0.5. The validation of the structural model showed pleasing results. All the hypotheses are supported except for hypothesis H<sub>3</sub> and hypothesis H<sub>6c</sub>, highlighting that trust, effort expectancy, performance expectancy, and perceived security (in both models) have significant relationships with m-banking adoption intention of users; however, social influence is insignificant in the m-banking adoption intention. The next chapter discusses a brief summary of the key findings in conjunction with the theoretical constructs used in this thesis, and the results achieved.



# CHAPTER FIVE

## DISCUSSION

### 5.1 Introduction

This chapter provides a summary of the research hypotheses in context with the findings acquired from data analyses discussed in chapter four. The hypotheses discussion is presented in accordance with the three research questions that are outlined in chapter one. This section also analyzes the findings of the study in reference to the previous literature. Moreover, it also highlights the consistency and inconsistency of the findings with earlier literature.

### 5.2 Summary of the Main Findings

With the fast progress of digitization in UAE and the incremental usage of digital payment and financial transactions, the study attempted to discover the barriers to the adoption of m-banking, so as to eliminate them and motivate individuals to adopt m-banking. The study proposed a theoretical model to determine the factors that can predict m-banking adoption intention in the UAE after analysing evidence in the literature. This enabled the study to test the factors influencing behavioural intention to adopt m-banking from the consumer's perspective in the UAE. The factors studied in this research were performance expectancy, effort expectancy, social influence, trust, and perceived security. This study was also carried out to develop an extended UTAUT model incorporating perceived security and trust for m-banking adoption intention. Lastly, this study also attempted to examine whether perceived security moderates m-banking adoption intention. The data was collected from bank customers in United Arab Emirates (UAE). A total of 327 sets of questionnaires were filled in by the respondents, out of which 239 were suitable and employed for the analyses. The

PLS-SEM was used to determine the validity of the measures. The findings from the PLS-SEM measurements indicated that the outer loading values of the items ranged from 0.705 to 0.957.

The internal consistency and reliability values were used to measure the internal consistency of each variable. The coefficient alphas for all studied variables were above the acceptable level of 0.70 (Hair et al., 2017), ranging from a minimum of 0.729 to a maximum of 0.950. These results define the level of influence which has also fulfilled the objectives of this study. Altogether, there were nine (9) hypotheses that were tested using the PLS-SEM structural model. The results indicated that all the hypotheses were supported, except for hypothesis H<sub>3</sub> and hypothesis H<sub>6c</sub>.

The findings showed that m-banking adoption intention and social influence are in an insignificant relationship, and perceived security does not moderate the relationship between social influence and m-banking adoption intention. It is noted that social influence relationship is insignificant with m-banking adoption intention. On the other hand, performance expectancy, effort expectancy, and trust were found to be key factors of m-banking adoption intention, and a significant relationship was established when perceived security was used as a moderator construct. A positive relationship was found between performance expectancy, effort expectancy, trust, perceived security, and m-banking adoption intention in the direct relationship model.

### **5.3 Discussion**

The PLS-SEM structural modeling was utilized in data analyses to test the nine (9) hypotheses. Additionally, PLS-SEM was used because it can estimate the interactions between constructs or structural models and associations between indicators and their

corresponding latent constructs or measurement models concurrently, even though it is similar to conventional regression techniques (Chin, Barbara, & Peter, 2003; Henseler & Chin, 2010). Similarly, the objective of the study was to predict the role of selected predictors in influencing m-banking adoption intention. In order to fulfil this, the path modelling approach was used, since it has been recommended that, if the study does not test or compare theories, or is prediction-oriented, or an extension of an existing theory, PLS path modelling ought to be employed (Hair et al., 2020). The findings of the study are debated in the next discussions based on the hypotheses tested.

Although a limited amount of literature can be found in the past, the study has tried its best to incorporate the available empirical views. Similarly, the literature regarding m-banking adoption intention has expressed some views on the pros and cons of behavioral intention. Malaquias et al. (2018) revealed that locals and expatriates living in the UAE tend to be able to deal with their simple banking needs without having to talk to a financial adviser in person or over the phone. On the other hand, Sharma et al. (2017) thought that mobile applications have led to increasing fraud cases. Due to the conflicting findings, the researcher has attempted to study whether bank customers in the UAE have experienced any issues in their intentions to adopt m-banking.

### 5.3.1 Performance Expectancy

Performance expectancy refers to 'how much an individual agrees that the person in question will be enabled to achieve improvements in job performance by using the system' (Venkatesh et al., 1996). Based on the PLS-SEM structural modeling results in Chapter Four (Table 4.8 on page 134), the results indicated that performance expectancy has significantly influenced m-banking adoption intention. The results clearly indicate that the p-value is 0.048, which is less than 5%. Similarly, the T-Statistics of this impact is 1.984. Hence, this finding seems to be parallel as compared to the previous researchers' findings (i.e., Rahi et al., 2019; Ali & Kamran, 2017), which clearly illustrated that the consumers receive m-banking innovations, success expectancy affects market satisfaction, which in turn prompts consistent use of the applications. The papers emphasized identifying the behavioral intention and how it was influenced by the performance of the application. Interestingly, the papers concluded that behavioral intention to use m-banking applications was high when the performance of the application was high, such that the consumer seems to be secured by the high performance of the application.

The empirical evidence regards performance expectancy as a strong predictor in the UTAUT model. Performance expectancy is among the strongest predictors when predicting the intentions of individuals using mobile commerce based on the UTAUT model. Hence, from the evidence of the present study, along with the works of other authors cited, performance expectancy is established as the strongest predictor of m-banking related to financial transactions intention, and the result is regarded as consistent with the conceptual strength of the performance expectancy construct. Thus, to wrap the entire findings into a simpler version, it can be rightfully stated that the definition of performance expectancy in this regard can be explained as the belief

of individuals regarding the efficiency and usefulness of m-banking in performing tasks better while conceptually relating the predictor to a UTAUT construct.

The context of the study focuses on how performance expectancy improves the performance of m-banking transactions, as this is considered to be one of the main competitive advantages of m-banking applications in the competitive m-banking environment. The capacity of m-banking applications to allow users to perform and conduct transaction tasks is better than any other medium. As such, Hypothesis H<sub>1</sub> is accepted.

### **5.3.2 Effort Expectancy**

This thesis was also focused to determine the relationship between effort expectancy on m-banking adoption intention. Therefore, this thesis proposed that there is a significant relationship between effort expectancy and m-banking adoption intention. Similarly, the PLS-SEM structural modeling results in Table 4.8 revealed that effort expectancy was the highest factor to affect behavioral intention. The effort expectancy had an effect valued around 0.016. This finding was consistent with those of Sharma and Al-Muharrami (2018) and Shaikh et al. (2018). Sharma and Al-Muharrami (2018) argue that effort expectation has a rejuvenating effect on action expectation among understudies to accept mobile applications. Likewise, Shaikh et al. (2018) has also confirmed that effort expectancy impacted m-banking customers.

Additionally, effort expectancy is attributed to the ease of use and the elimination of difficulty experienced by individuals when using m-banking for their transactions (Vankatesh et al., 2012). The idea is conceptually rooted in the TAM concept of ease of use. However, there exists a little contradiction among researchers regarding the measurement of effort expectancy in this regard. This is why effort expectancy is

regarded as a relatively important effort measure when explaining behavioral intentions on using m-banking. The findings are in compliance with the findings of Davis (1989), who suggested that the perceived effect of ease of use becomes insignificant when the usefulness of the variable is controlled. Therefore, Hypothesis H<sub>2</sub> is accepted.

### **5.3.3 Social Influence**

Social influence was considered as a relevant factor of behavioral intention in past studies. Therefore, this thesis also examined its influence on the behavioral intention of consumers in the context of m-banking adoption intention. In other words, this study proposes that there is an insignificant relationship between behavioral intention and social influence in m-banking. Considering the responses of participants, the findings of this study revealed that social influence is not able to establish a significant relationship with m-banking adoption intention. This indicated that social influence failed to influence behavioural intention, especially in the m-banking adoption intention. Table 4.8 clearly indicates the p-value of social influence as 0.203, which is greater than 5%, and shows insignificance. Similarly, this result can be explained by the development of technology in the 21<sup>st</sup> century, where the majority of people are using mobile applications. In other words, the usage of mobile applications has been the new normal for most people.

Furthermore, most of the respondents were also adults, so they could make their own decisions without referring to the social group. The results might alter if the age group is changed. Hence, this study shows that social influence does not significantly influence consumer decisions in the intention to adopt m-banking. Similarly, this

finding also contradicted with the previous finding by Wang et al. (2017), Blaise et al. (2018), and Malik et al. (2017). These researchers have demonstrated that the social impact on the use of m-banking is immense in today's technology era, where most of the people are using internet and mobile phone. The usage of the internet and mobile phone are the needs of all in their daily life. Therefore, a mobile phone is the main tool in today's world for people to communicate, seek information, entertainment, and perform financial activities such as online shopping and m-banking. Hence, social influence is currently not a significant factor in using m-banking, as almost all the social members are using smart mobile phones. In brief, this thesis's findings clearly contradict with findings of previous studies found in in the literature.

Conceptually relating to the normative influence in the theory of planned behaviour (TPB) and theory of reasoned action (TRA) models of decision making, social influence is defined as the extent to which an individual believes that his or her adoption of an IT system is important to others (Vankatesh et al., 2012). According to research, social influence tends to have a positive impact on the attitude of the user towards e-commerce. It impacts how the user perceives an advanced technology could improve his status, image, and performance in the social structure (Safeena et al., 2018). Despite the equivocal findings, social influence in the present study has been found to have no influence on the m-banking adoption intention. However, the level of significance of the same remains low. As such, facilitating the impact of social influence on m-banking adoption, and its use in the transaction process would appear to provide a potential point of competitive advantage. Overall, the findings of this study are not aligned with some of the previous studies, indicating low effect of social influence. Therefore, the hypotheses H<sub>3</sub> and H<sub>6c</sub> are rejected.

### **5.3.4 Trust and Perceived Security**

There was a significant influence of trust on m-banking adoption intention among users. The results indicate a p-value of 0.032, which is less than 5%, and proves to be significant. The findings of this study indicated that trust in m-banking is an important independent factor to m-banking adoption intention. Numerically, the p-value of trust with and without moderating variables is 0.032 and 0.025, respectively. It clearly indicates that trust is one of the key factors of m-banking adoption intention. Simply, it also remains significant even when considered amongst other variables, such as social influence. Indeed, trust and perceived security were significantly correlated, suggesting that perceived security accounts somewhat for trust in predicting m-banking adoption intention. Therefore, this thesis concluded that findings of the study are aligned with the outcomes of previous researchers.

Conceptually, trust in m-banking applications and perceived security may be related to both reflecting the fact that users prefer systems that are hassle-free in terms of trust and ease of use. Nonetheless, the findings support the view that trust and perceived security in m-banking is a competitive advantage that facilitates m-banking adoption intention to a certain degree. So, Hypothesis H<sub>4</sub> and Hypothesis H<sub>5</sub> are accepted.

### **5.3.5 Perceived Security as the Moderating Factor**

This thesis has evaluated the impact of trust, effort, performance, and social influence on the behavioral intention for m-banking with and without perceived security as a moderating factor. It is one of the major objectives to investigate whether perceived security moderates m-banking adoption intention or not. Therefore, hypotheses H<sub>6a</sub>,

H<sub>6b</sub>, H<sub>6c</sub> and H<sub>6d</sub> were tested to achieve this objective in order to investigate whether perceived security moderates the relationship between the studied factors and m-banking adoption intention. PLS-SEM with the moderating factor was included in the structural model.

In general, these findings indicated that perceived security was the highest influencing factor on the relationship between independent variables and m-banking adoption intention variables. However, it is explained that perceived security did not moderate the relationship between social influence and m-banking adoption intention. This finding was in line with past researchers (Jebarajakirthy & Shankar, 2021; Singh et al. 2020), stating that findings on social influence differed depending on some situations like consumers` role as well as their surroundings, the type of products or applications. Besides that, the perceived security used in this study is more on social risk, not a full dimension that has been studied by Akturan and Tezcan (2012). Additionally, perceived security of society is not effective in use because m-banking has become a need for all consumers.

Moreover, perceived security has positively moderated the relationship between performance expectancy, effort expectancy, and trust with m-banking adoption intention. As a matter of fact, the p-value of this effect is below 0.05 for these three variables, which clearly indicates the significance of influence. Similarly, Chunxiang (2014) and Song et al., (2008) highlighted that the high degree of perceived security with high trust and performance expectancy values will enhance the behavioral intention to use m-banking. Furthermore, as compared to previous studies, perceived security has positively moderated the relationship between effort expectancy and behavioral intention to use m-banking. It is mainly because of the strong influence of these variables. It is also because the consumers assumed that effort expectancy or

ease of use would increase while using m-banking when they perceived that the security is high. The result contradicts with the finding that high security would cause the effort needed to use m-banking to be dropped (Alalwan et al. 2016). Hence, it is summarized that findings related to the previous researchers are not aligned with the researcher's findings in this study. As such, hypothesis H<sub>6a</sub>, hypothesis H<sub>6b</sub>, and hypothesis H<sub>6d</sub> are accepted.

#### **5.4 Chapter Summary**

This chapter has highlighted the summary of the key findings and the hypotheses tested in chapter four. The research questions and objectives are addressed and supported in light of previous literature. On the basis of the findings, it is observed that performance expectancy is the strongest predictor in terms of predicting the intention of an individual to use m-banking based on the UTAUT model. Additionally, effort expectancy is found to be an important measure related to m-banking adoption intention. It is noted that social influence is not correlated with consumer decision in m-banking adoption intention, while trust and perceived security are positively related. Moreover, perceived security is observed to have a moderating influence between performance expectancy, effort expectancy, and trust with m-banking adoption intention. Based on the results, hypotheses H<sub>3</sub> and H<sub>6c</sub> are not supported, while H<sub>1</sub>, H<sub>2</sub>, H<sub>4</sub>, H<sub>5</sub>, H<sub>6a</sub>, H<sub>6b</sub>, and H<sub>6d</sub> are supported for both, the direct relation model, and the model with a moderate relationship (measurement model).

## **CHAPTER SIX**

### **CONCLUSION**

#### **6.1 Introduction**

This chapter starts with summarizing and briefly highlighting key points discussed in the previous chapters. It illustrates a conclusion of how the three research questions are addressed in this study, followed by other sections that include academic and practical contributions figured out in this study. Furthermore, this chapter also discusses the limitations of the study, along with key recommendations and scope for future research. Finally, this chapter ends with concluding remarks, which marks the completion of this research.

#### **6.2 Summary of the Research**

This study begins with establishing the basis for the significance and motivation behind conducting the study. The overarching goal is to understand the moderating influence of perceived security on users' intentions to use m-banking in the UAE. The reason for this study is due to the lack of literature on the issue of m-banking adoption intention among the UAE population. While some studies have addressed this problem, it is reported that m-banking adoption intention is still in its early stages in the UAE.

The study identifies trust and perceived security as key factors contributing to m-banking adoption intention, in addition to other functional elements previously highlighted in research, such as performance and effort expectancy and social influence. This study provides a background on the banking sector, the adoption of m-banking in the industry, and how the sector has embraced m-banking applications. Additionally, it discusses the advantages of m-banking applications and their potential

to enhance customers' experiences in the banking sector. Prior studies are also examined to understand the usefulness of m-banking applications for financial transactions. This study explains the key variable, perceived security, and its relationship between technology and the banking sector.

The study also presents a problem statement section in which the research gap is identified along with the significance of m-banking. Additionally, an explanation is provided on how m-banking adoption can assist customers in accessing financial services anywhere and at any time. Research objectives and questions are also presented, highlighting the significance of the study and its contribution to the body of knowledge in the context of m-banking adoption intention. This study also discussed the limitations of the study and emphasizing that the findings are specific to the case of the UAE. Definitions of key terms are also provided.

The main objective of this study is to investigate and emphasise on the literature review to provide an understanding and overview of the patterns and content in previous studies for m-banking adoption intention that are relatable with the objective of this study. This study comprehensively discusses the key themes related to m-banking adoption intention, to provide an overview about the subject-matters in m-banking adoption intention, which needs to be further researched. The key themes discussed with the support of previous literature include m-banking, m-banking in the UAE, adoption of m-banking, perceived security, and trust concerns in m-banking adoption intention. Additionally, existing theories, frameworks, and models are also discussed, as these have aided the researcher in establishing the foundation to build the research conceptual framework and develop the hypotheses. This study also highlights the findings in the literature review.

Positivism was the employed paradigm in this study. Furthermore, research design and research process approach are also discussed. A quantitative approach is selected. The employed instrument development approach is discussed. Face and content validity is conducted to moderate the designed questionnaire items. Data collection technique is achieved through the use of a web survey to collect the data from bank customers. The survey authoring tool used is Microsoft Forms. A pilot study on fifty (50) respondents is conducted to assess the designed items in the questionnaire against their reliability, and the achieved value of Cronbach's Alpha is greater than 0.80. In terms of sampling technique, non-probability sampling is used. The study also highlights discussion on how the gathered data is analysed. For data analysis and findings, the collected data is analysed using statistical methods including SEM, and PLS-SEM. The measurement model is examined by assessing the internal consistency, convergent validity, indicator reliability, as well as discriminant validity. Assessment of outliers is also included.

The researcher presents the data analyses and findings to assess the reliabilities and validities of the proposed research framework alongside with the hypotheses. The findings of data analysis using SPSS (v.20) and Smart PLS (v.3.2.6) are presented. The key finding is that perceived security moderates the relationship between the construct's performance expectancy, effort expectancy, and trust significantly; and the m-banking adoption intention construct and perceived security has no effect on moderating the relationship between social influence and m-banking adoption intention. Variable analysis of the results is examined using PLS path modelling. Finally, the examined model shows that hypotheses H<sub>1</sub>, H<sub>2</sub>, H<sub>4</sub>, H<sub>5</sub>, H<sub>6a</sub>, H<sub>6b</sub> and H<sub>6d</sub> are supported, while H<sub>3</sub> and H<sub>6c</sub> are not supported.

The researcher discusses the summary of the research findings and results obtained and their relation and comparison with the other studies conducted prior to this study. A discussion about the assessment of the validity and reliability of the proposed model, and an evaluation of the hypotheses against the results obtained from data analyses also presented in this study.

Finally, a summary on the research findings in relation to the research questions. Hypotheses H<sub>1</sub>, H<sub>2</sub>, H<sub>4</sub>, H<sub>5</sub>, H<sub>6a</sub>, H<sub>6b</sub>, and H<sub>6d</sub> are supported by the results obtained, and hypotheses H<sub>3</sub> and H<sub>6c</sub> are not supported. The summary is discussed as below.

**Research Questions 1:** What are the important factors that have influence on user's m-banking adoption intention in the UAE?

Based on the literature analysis conducted in this study, a list of operationalized factors in m-banking adoption intention worldwide is identified. The identified factors are based on the findings of surveying 16 papers about m-banking adoption intention and looking at the suitability of these identified factors to help this study predict m-banking adoption in the UAE. From the analysis, this study found 46 suitable factors that might influence m-banking adoption. However, only five factors, namely, performance expectancy, effort expectancy, social influence, trust, and perceived security were selected in this study. The decision to select these variables is based on their suitability to be integrated with the underlying theoretical lens which is UTAUT. Additionally, most of the factors are an extension of the original factors identified in UTAUT. Based on the evaluation of the previous studies this study summarizes the factors identified during the literature analysis related to the adoption of m-banking, in Table 2.2 on page 54. For this study not all the factors employed in the proposed model because the focus of this study was on security related factors as the primary

focus was on security-related aspects. By narrowing the scope to these specific factors, the research aimed to provide a more in-depth analysis of how security influences the overall model. This targeted approach allows for a more detailed examination of security concerns, ensuring that the findings are relevant and meaningful in the context of the study.

**Research Question 2:** How do the identified factors influence user's m-banking adoption intention in the UAE?

The empirical evidence collected in the present study indicates that performance expectancy, effort expectancy, trust, and perceived security have a positive impact on m-banking adoption intention among UAE users. All the identified factors in the proposed model were found to be strong predictors when added as an independent variable with a direct relationship to m-banking adoption intention among UAE bank users, except for the social influence factor. The results showed that hypotheses H<sub>1</sub>, H<sub>2</sub>, H<sub>4</sub>, and H<sub>5</sub> are valid, and hypothesis H<sub>3</sub> is invalid. Furthermore, social influence is not a strong predictor. The findings also showed that this factor did not establish a significant relationship with m-banking adoption intention for UAE users.

**Research Question3:** How does perceived security moderate's user's m-banking adoption intention in the UAE?

The findings of this research also revealed that perceived security acts as a moderator, affecting the relationship between performance expectancy, effort expectancy from the native UTAUT model, and trust prediction in the extended model of the UTAUT. The results showed that hypotheses H<sub>6a</sub>, H<sub>6b</sub>, and H<sub>6d</sub> are valid, and hypothesis H<sub>6c</sub> is invalid. In conclusion, perceived security affected the performance expectancy and

effort expectancy predictors from the native UTAUT model but did not affect the social influence predictor in the native UTAUT model when perceived security was assessed as a moderating variable.

Lastly, the main contribution of this study is a proposed model to examine the intention to adopt m-banking in the UAE, the proposed model is an extension of UTAUT model along with perceived security as moderator factor and trust as independent factor.

### **6.3 Research Contributions**

Generally, this thesis has contributed to other research and the body of knowledge by understanding the general characteristics of m-banking adoption intention and the factors of this intention. Theoretical implications, drawn out of this study, are very important for future research. The study's findings have significant theoretical implications. Firstly, the conceptual framework developed in this study enhances our understanding of m-banking adoption intention by examining its characteristics. Information system adoption literature was utilized as the foundation for conceptualizing m-banking adoption intention, and the study found that the UTAUT model is a suitable theoretical lens for investigating this behavior. The extended UTAUT model proposed effort and performance expectancies, and social influence as the primary predictors of technology acceptance, but other studies have identified superior predictors across various domains. Despite this, given the UTAUT model's strong conceptual and predictive specificity, it is a suitable theoretical basis for investigating predictors of m-banking adoption intention.

The study also provides clarification on the facilitating conditions of the UTAUT model. According to the framework, facilitating conditions are not helpful in promoting or reducing barriers to using technology. However, previous studies (Afshan & Sharif, 2016; Baptista & Oliveira, 2015; Kwateng et al., 2018) found that the facilitating conditions of m-banking, such as performance expectancy, effort expectancy, trust, and perceived security, are not supportive enough to promote or remove barriers, respectively. These findings contribute to our theoretical understanding of the role of facilitating conditions in technology adoption.

When focusing on UAE, the literature shows that m-banking adoption intention is a pre-adoption behavior; and perceived security is conceptualized best as a standalone construct and as a moderator construct in the extended UTAUT model. It was also found that factors like performance expectancy, effort expectancy, trust, and perceived security emerged as good factors in the developed model.

The analysis also showed that the strongest significant predictors of m-banking intentions were effort expectancy, trust, and performance expectancy. In contrast, social influence was not a significant predictor of m-banking intentions. Altogether, the results of the study confirmed the relevance and predictive capacity of UTAUT regarding m-banking adoption intention.

The PLS-SEM analysis provided theoretical justification from the literature for the study's findings. The results indicated that trust, performance expectancy, effort expectancy, and perceived security were significant predictors of m-banking adoption intention, which is consistent with previous literature. Previous studies have shown that users who perceive m-banking as useful find it easier to adopt the service and have a significant association with the users' benefits and trust in the service (Lin et

al., 2014; Escobar-Rodriguez & Carvajal-Trujillo, 2013). However, social influence was not correlated with m-banking adoption intention, which contradicts with previous literature where social influence was found to impact users' intention to adopt m-banking (Joubert & Van Belle, 2013; Pavlou, 2003).

Therefore, based on the present findings and previous literature, this study has significant theoretical implications for future research, which can explore more comprehensive findings and users' intentions that detail how these factors are perceived by m-banking users. This thesis has contributed to developing an understanding of the factors that influence users' intentions to adopt m-banking.

M-banking has become an integral part of the financial landscape, offering convenience and accessibility to users both in the UAE and worldwide. Its continued evolution is likely to shape the future of banking, emphasizing digitalization, user experience, and technological innovation. Perceived security will remain an issue and a factor to be further studied for the individuals across the nations in order to understand its relationship and its significance to successfully adopt the m-banking.

#### **6.4 Practical Contributions**

The practical implications of the study are reflected by the reliability of its data. It shows the accuracy that facilitates the researchers to form decisions in real practices based on the research findings. The results demonstrated the competitive advantages of this research. This includes the way how the financial institutions can understand the psychological needs of their customers in terms of m-banking adoption, so that business strategies can be implemented to promote m-banking with consumers in mind. The present findings are useful from a practical perspective in that the performance expectancy, trust, perceived security, and effort expectancy predict the

intentions of users in the m-banking industry. It implies that both individuals and businesses can gain competitive advantages by developing positive intentions towards m-banking. It will further help the users make appropriate decisions about the banking transactions and build their confidence.

The study findings indicate a positive correlation between trust, effort, and performance expectancies, perceived security, and the user's intention to use m-banking. This demonstrates the significant impact of these factors on user intentions, as users perceive m-banking systems as error-free and feasible to use when such promoting factors are present (Venkatesh et al., 2012). Thus, the design of m-banking systems should prioritize trust and security between users and technology from a non-technical perspective (Mehri et al., 2019).

Understanding the relationship between research variables can help determine service user requirements. The results demonstrated that there is no substantial association between social influence and m-banking adoption intention, and that perceived security has no moderating effect on this relationship. It is observed that the association between social impact and the propensity to adopt m-banking is negligible. However, it was discovered that trust, performance expectancy, and effort expectancy were important factors of m-banking adoption intention. When perceived security was included as a moderator construct, a strong correlation was identified. In the direct relationship model, it was discovered that there was a positive correlation between m-banking adoption intention and performance expectancy, effort expectancy, trust, and perceived security.

The study found that mobile application characteristics such as user interface, performance, effort, security features, and response time are significant attributes that can improve the quality of m-banking. App developers should optimize the user

interface, reduce response time, and enhance security functions to achieve users' trust and perceived security. Developers must also consider users' literacy levels in interpreting and retrieving information from banks' databases to support m-banking functions.

Therefore, banking institutions should consider the factors studied in this research when designing, building, and testing their m-banking applications. They should also prioritize non-technical security aspects and customer-centric perspectives. Overall, this study can benefit the banking community and regulators governing financial institutions in the UAE and worldwide by providing access to its results.

Conclusively, both theoretical and practical implications are the inferences of this research. The amount of information available to support the study's findings, and the knowledge extracted from the relation between research variables, shows the significance of the research. The UTAUT model is a significant model for users' m-banking adoption intentions because it enables the researcher's model to investigate and understand some of the important factors that contribute to the m-banking adoption intention, and this can also help financial institutions to gain competitive advantages of m-banking adoption intentions thoroughly. The results further help with some strategic concepts, which suggest that promoters of users' intentions for m-banking are more important for consideration and implementation than the potential barriers that interfere with users' intentions. In this regard, intentions of m-banking applications by users will be frequent if the developers improve performance aspects of the applications, by employing efforts and security verifications. Finally, to summarize and conclude the practical implications of this study, the result found is beneficial for bank managers to take into account the factors that can compel m-banking adoption and increase the pick-up of their m-banking services.

## **6.5 Limitations and Suggestions for Future Research**

Apart from the theoretical and practical implications of the research, which mainly depicted the strengths, there are certain limitations as well that entail the opportunity for future research directions. Firstly, the study design and execution of this research is only limited to local bank customers in the UAE, as this study was not conducted on a large scale, as there is no existing sampling frame for this study. The samples are invited from a few local banks in the UAE, which may influence the generalization of the study results, because the chosen banks do not represent all operating banks in the UAE. The sample only covers the citizens and residents in metropolitan areas and has disregarded the rural population. In faraway areas, the response may not be positive since there are fewer bank branches. Furthermore, this study measured m-banking adoption intention in general and did not focus on certain types of m-banking services. Various types of m-banking services might have variations in adoption practices, so future studies can be conducted to extend the conclusion of this study, and this will aid to generalize the results and findings of this study.

This study contributed to the existing accessible knowledge on m-banking factors that can benefit behavioral intentions. Additionally, potential research can consider other areas like market orientation, and more focused evaluations from different views about effectively promoting m-banking.

The low sample size in this study limited the strength of the research findings. Among the major drawbacks of online based survey research are the self-selection biases, where the sampling seems more purposive (Wright, 2005). Even though the sample size was not large, it was reasonable to represent the population in UAE with regards to the consideration of gender, age, location, education, employment status, experience, and frequency in using m-banking and list of their banks.

The study has certain limitations that need to be addressed in future research. Firstly, the study's regression analysis cannot establish a cause-and-effect relationship between m-banking users' perceptions and intentions because the study is quantitative in nature. Longitudinal and experimental research is required to follow up on this correlational study Mbiti & Weil (2019). However, the study's correlational design provides practical benefits due to its ease of reliability in data collection.

Another limitation is that the study participants rated their behavioral intentions about the use of m-banking in a general way rather than specific experiences. Additionally, user intention ratings do not provide information about actual use of the services. However, previous research has shown a positive relationship between user intention and usage behaviors of applications (Alqahtani, 2019). Therefore, future research should investigate how users' intentions translate into their behavior of m-banking use. Additionally, researchers should explore how general perceptions affect specific m-banking application domains.

The study findings suggest that future research should deploy the UTAUT framework to develop knowledge relating to factors predicting m-banking intentions beyond technical perspectives. Future studies should also extend upon this study's findings to determine m-banking intentions with more varied participant sets from distinct cultures and backgrounds to improve the framework's generalizability.

The study findings also reveal the need for further research in the direction of facilitating conditions, which are constructed within the UTAUT framework as a strong predictor of m-banking adoption intention. Specifically, the facilitation conditions notion might be described strongly with the help of different factors reflecting a goal orientation's approach, rather than those oriented to remove barriers or emphasize avoidance goals.

Lastly, the study results suggest that intrinsic motivations and achievement goals, such as performance expectancy and trust, are stronger predictors of technology acceptance and significant barriers towards usage intentions. Future research should clarify the critical role of avoidance and approach goals and motivations behind m-banking intentions to develop competitive advantages within the banking system.

In conclusion, future research should employ experimental studies to manipulate effort and performance expectancies, social influence, and facilitating conditions to determine their individual impacts on m-banking intentions, security, trust, and other factors. Additionally, future studies should log the utilization of m-banking applications for a more extended period to examine changes in social influence, effort, performance expectancies, and trust over time. The knowledge developed from this research can provide essential competitive advantages in the constantly evolving m-banking market.

## **6.6 Concluding Remarks**

In the modern era, the awareness and usage of m-banking applications is increasing rapidly. As a response to this increasing trend, banks are intensively focusing on the launching and advancement of their m-banking services. Similarly, it remains very important for financial institutions to encourage the usage of their m-banking services. In order to understand what triggers consumers to use m-banking, and how their intentions are shaped, this research analyzed the situation. Additionally, the research identified the predictors of m-banking adoption intention of consumers towards m-banking.

Likewise, the research objectives are to contribute knowledge relating to the analysis of understanding the predictor of m-banking adoption intention which this study has

conducted. The application of m-banking is considered a solid domain to conduct the transactions of banking; however, there is a piece of limited knowledge regarding how the competitive advantage could be gained by the businesses by offering services of m-banking applications (Digital Banking Industry Trends and Observations, 2014). Drawing upon the framework of UTUAT technology adoption (Venkatesh et al., 2012; 2003), this particular study explored on what extent do effort as well as performance expectancies, trust, social influence, and perceived security have an influence on the usage of a m-banking application and its behavioral intentions.

The results of the study revealed that the effort and performance expectancies along with the trust in utilizing the behavioral intentions of m-banking while perceived security is a moderator, are at a statistically significant level, and they are considered robust predictors. However, it is also discovered that behavioral intention is not significantly impacted by social influence in the presence of perceived security as a moderator, and in its absence as well. In addition to that, the association between m-banking adoption intention and social influence is not primarily impacted by perceived security as a moderator.

To conclude, the research findings give support to the UTAUT model's efficacy to develop knowledge relating to the predictors of m-banking adoption intention. Additionally, with the help of the results, the facilitating conditions' clarification regarding the behavioral intention of m-banking are provided, which suggests that social influence is not a strong predictor for m-banking adoption intention. In spite of the fact that there are some limitations, the study findings offer substantial implications by providing sufficient information on the predictors that affect m-banking adoption in UAE, so banks in UAE can predict the possible barriers to using banking applications, and then banks provide the suitable improvements to motivate

m-banking customers in UAE and also the provide the knowledge concerning the predictors of behavioral intention in terms of m-banking adoption and how it could provide competitive advantages to the providers of m-banking. However, future studies could be conducted for developing knowledge regarding the relationship extent between the performance and effort expectancies, trust, and perceived security of m-banking adoption intention, as well as its implicit motivations. Furthermore, the development of this knowledge has the potential towards leveraging financial institutions that seek to attain a competitive advantage by using their domain experts for m-banking applications development.

### **6.7 Chapter Summary**

This chapter highlights the overall summary of this entire research. Chapter 6 also discusses both the theoretical and practical implications as well as the research limitations. Furthermore, it offers suggestions for future research directions. Finally, the chapter concludes by emphasizing on the rapid growth of mobile banking (m-banking) apps, prompting banks to prioritize the development and improvement of their m-banking services to encourage greater adoption among users.

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## Appendix A: Questionnaire



### Ph.D. Research Questionnaire

Title: **A MODEL TO EXAMINE THE INFLUENCE OF PERCEIVED SECURITY AND TRUST TO ADOPT MOBILE BANKING IN THE UNITED ARAB EMIRATES**

\* Required

Dear Sir/Madam,

I am conducting a study titled 'Understanding the moderating influence of perceived security on the user's intention to use mobile banking application in the UAE'. This study is a full requirement for the Doctorate Degree (Ph.D.) in Universiti Utara Malaysia (UUM). It is very much appreciated if you could fill this questionnaire using your own opinion. The information from this questionnaire will only be used for academic purposes (i.e., writing a report, published in an academic journal, etc.), and all of the responses will be treated as 'STRICTLY CONFIDENTIAL'.

Thank you for your cooperation and valuable time.

Yours Sincerely,

Mahmoud El Hendy

Student ID Number: 902477

Ph.D. Candidate, University Utara Malaysia (UUM)

Sintok, Kedah, Malaysia

Email: mahmoud.elhindy@gmail.com

1. What is your gender? \*

Male

Female

2. What is your age? \*

- Less Than 20
- 21 to 30
- 31 to 40
- 41 to 50
- 51 to 60
- Older than 60

3. In which emirate are you located? \*

- Abu Dhabi
- Dubai
- Sharjah
- Ajman
- Umm Al Quwain
- Ras Al Khaimah
- Fujairah

4. What is the highest degree or level of education you have completed? \*

- High School Degree
- Diploma
- Bachelor's degree
- Postgraduate degree
- Professional Qualification
- Other

5. What is your current employment status? \*

- Self-employed
- Government Sectors Employee
- Private Sectors Employee
- Multi-National Company Employee
- Semi-Government Employee
- Retired
- Unemployed



6. Are you currently using Mobile Banking Application(s)? \*

- Yes
- No

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\* Required

### Part B: Mobile Banking Experience

7. How long you have been using the Mobile Banking Application(s)? \*

- Less than 1 year
- Between 1 to 5 years
- Between 5 to 10 years
- More than 10 years

8. Select the name of the bank(s) that you are currently using their mobile banking application(s). (You can choose more than one Bank). \*

- EmiratesNBD/Emirates Islamic
- First Abu Dhabi Bank (FAB)
- Dubai Islamic Bank (DIB)
- Mashreq Bank
- Abu Dhabi Commercial Bank (ADCB)
- Abu Dhabi Islamic Bank (ADIB)
- Sharjah Islamic Bank
- Rash Al Khaimah Bank (RAK)
- HSBC Middle East
- Citibank
- Other

9. How often do you use mobile banking? \*

- Everyday
- Every week
- Every two weeks
- Every month

10. How many mobile device(s) do you have? \*

- One
- Two Devices
- More than 2 devices

11. Do you have a dedicated mobile device only for mobile banking application(s)? \*

- Yes
- No

12. Based on your personal user experience, which type of mobile devices you prefer to use for mobile banking application(s) to perform your banking transactions? (You can select more than one) \*

- Smartphone
- Tablet

13. We would like to hear your comments on the answer provided to Question 12 (Optional).

Enter your answer

14. Which mobile platform makes you feel more comfortable to perform your mobile banking transactions? \*

- Android
- iOS
- Both
- I don't mind using any OS

15. We would like to hear your comments on the answer provided to Question 14 (Optional).

Enter your answer

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\* Required

### Part C: Mobile banking Intention to Use (Behavioral Intention)

Adapted from Venkatesh et al. (2012)

16. I intend to use a mobile banking application. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. I predict that I would use the mobile banking application \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. I plan to use a mobile banking application. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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\* Required

### Part D: Perceived Security (adapted from Wakefield 2013)

19. Mobile banking application has enough safeguards to make me feel comfortable using it to make transactions. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. I feel assured that legal and technological structures adequately protect me from problems while using mobile banking application. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. I feel confident that encryption and other technological advances in mobile banking application are safe for me to make transactions. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. In general, the mobile banking application is a safe environment in which to make transactions. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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\* Required

### Part E: Trust (Adapted from Chandra et al. (2010))

23. I trust Mobile Banking Applications are reliable. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. I trust Mobile Banking Applications are secure. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

25. I believe Mobile Banking Applications are trustworthy. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. I trust Mobile Banking Applications. \*

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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\* Required

### Part F: Mobile Banking Adoption in Banking Services

Adapted from Venkatesh et al. (2012)

27. Performance Expectancy \*

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
Using a mobile banking application enables me to accomplish my online banking tasks more quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the mobile banking application improves the quality of the banking services I do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using a mobile banking application makes it easier to do my banking services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the mobile banking application enhances my effectiveness on performing my banking services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Effort Expectancy \*

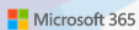
	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
I would find learning to operate the mobile banking application would be easy for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would find it easy to get the mobile banking application to do what I want it to do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My interaction with the mobile banking application would be clear and understandable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would find the mobile banking application system to be flexible to interact with.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It would be easy for me to become skillful at using the mobile banking application.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. Social Influence \*

	Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
People who influence my behavior think that I should use the mobile banking application.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People who are important to me think that I should use the mobile banking application.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People in my surrounding who use mobile banking application have more prestige than those who do not.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People in my surrounding who use the mobile banking application system have a high profile.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having a mobile banking application is a status symbol in my surrounding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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