CUSTOMERS' ATTITUDES TOWARD MOBILE BANKING APPLICATIONS

IN SAUDI ARABIA

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Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

August 2016

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Alshara, Mohammed Ali. *Customers' Attitudes toward Mobile Banking Applications in Saudi Arabia.* Doctor of Philosophy (Information Science), August 2016, 122 pp., 25 tables, 15 figures, references, 58 titles.

Mobile banking services have changed the design and delivery of financial services and the whole banking sector. Financial service companies employ mobile banking applications as new alternative channels to increase customers' convenience and to reduce costs and maintain profitability. The primary focus of this study was to explore the Saudi bank customers' perceptions about the adoption of mobile banking applications and to test the relationships between the factors that influence mobile banking adoption as independent variables and the action to adopt them as the dependent variable. Saudi customers' perceptions were tested based on the extended versions of IDT, TAM and other diffusion of innovation theories and frameworks to generate a model of constructs that can be used to study the use and the adoption of mobile technology by users. Koenig-Lewis, Palmer, & Moll's (2010) model was used to test its constructs of (1) perceived usefulness, (2) perceived ease of use, (3) perceived compatibility, (4) perceived credibility, (5) perceived trust, (6) perceived risk, and (7) perceived cost, and these were the independent variables in current study. This study revealed a high level of adoption that 82.7% of Saudis had adopted mobile banking applications. Also, the findings of this study identified a statistically significant relationship between all of demographic differences: gender, education level, monthly income, and profession and mobile banking services among adopters and non-adopters. Seven attributes relating to the adoption of mobile banking applications were evaluated in this study to assess which variables affected Saudi banks customers in

their adoption of mobile banking services. The findings indicated that the attributes that significantly affected the adoption of mobile banking applications among Saudis were perceived trust, perceived cost, and perceived risk. These three predictors, as a result, explained more than 60% of variance in intention to adopt mobile banking technology in Saudi Arabia. While the perceived trust variable was the strongest influencing factor in the adoption of mobile banking, perceived cost and perceived risk had a negative correlation, equally, with mobile banking adoption. Furthermore, perceived usefulness, perceived ease of use, and perceived compatibility had no significant correlation with mobile banking adoption.

ACKNOWLEDGEMENT

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CHAPTER 1

INTRODUCTION

Background of the Study

The Internet has had a great impact on social communication processes, and it has brought about significant changes in the business environment. Now the Internet allows the user to interact and communicate with others from any place and at any time. Also, it has been used by both companies and customers to communicate, to market, and to deliver services and products (Shaikh & Karjaluoto, 2015). In addition, Internet and portable devices have dramatically changed the business of delivering and using services. Recently, smart phones and tablets, for instance, have played a major role in the communication between people as well as in the provision of services by companies (Ulun Akturan, & Tezcan, 2012).

One significant element in the development of information technologies and communication networks is the new series of mobile banking services and applications. Smart phones and tablets now are the most widely used devices, and they have a significant effect on markets around the world because they make the world like a small village. The overall stability of mobile phones and communication technologies as well as their ease of use has made mobile solutions applicable for a variety of financial services and organizations. Mobile banking applications also are valued because they can save both customers and businesses time, effort, and cost (Mallat, Rossi, & Tuunainen, 2004). Banks provide services such as payments, banking, money transfer, and access to financial information and services through mobile banking applications (Ulun Akturan & Tezcan, 2012). The term mobile banking refers to an electronic system

allowing customers of financial institutions to conduct some financial transactions through mobile devices (Mobile Marketing Association, 2009).

Mobile banking services now are used by most types of financial organizations to market and deliver many of their services. Customers can use their smart phones and tablets to access their accounts in order to carry out many financial transactions or get information and answers related to their business or other needs. However, mobile banking had had low levels of permeation because many people are still skeptical about these emerging applications (Zhou, 2012). Customers' perceptions, technical challenges, and security concerns are the primary factors affecting the use of mobile banking (Ha, Canedoli, Baur, & Bick, 2012). Consequently, most studies on the topic have focused on public awareness of mobile banking services instead of understanding customers' intentions to use this type of new application (Yung-Cheng, Chun-Yao, Chia-Hsien, & Chih-Ting, 2010). In some developing countries, such as Saudi Arabia, many citizens have bank accounts, Internet access, and smart phones, so the use of mobile banking would promote beneficial social change and the use of new technology (Taleghani, Gilaninia, Rouhi, & Mousavian, 2011)

Today mobile banking applications are a new channel which can be used by both the bank and the user to conducting some financial activities, and they have changed the banking industry (Jaradat & Twassi, 2010). In Europe, for instance, more than 10 million individuals use mobile banking, and more than 85% of them use their smart phones more than tablets (Püschel, José Afonso Mazzon, & Hernandez, 2010).

Over the last 50 years, research on the acceptance of innovations and new technologies has become a well-developed stream because it is important to understand a society's adoption or failure to adopt any new innovation (Venkatesh, & Davis, 2000). Many theories, models, and frameworks have been designed to discover all significant aspects related to society's adopting or not adopting any new technology and to predict the outcome of technology acceptance (Moore, & Benbasat, 1991). Rogers' diffusion of innovations (DoI) theory, the technology acceptance model (TAM), the theory of reasoned action (TRA), and the unified theory of acceptance and use of technology (UTAUT) are some examples of approaches to studying the diffusion of innovations and technology acceptance (Shih, & Venkatesh, 2003).

The adoption of mobile banking has become a significant topic of research because of its importance to both financial service companies and their clients, particularly in contrast to strictly Internet banking, in terms of cost, efficiency, and convenience. Consequently, the study of the adoption of mobile banking provides an overview of the rate of adoption, the factors that influence the process of adopting these applications, and barriers to adopting mobile banking services and technologies in the social system (Ha et al., 2012).

Statement of the Problem

Saudi Arabia is the largest oil production country and is ranked as the largest exporter of petroleum; in addition, it is one of the biggest economic states in the Middle East. Saudi Arabia has an oil-based economy, and more than 60% of its Gross Domestic Product (GDP) comes from selling oil. The other 40% of GDP comes from the

private sector. More than 9 million foreigners work in Saudi Arabia, and less than 2% of them work in governmental jobs. Electricity, water supply, telecommunications, education, and health care are the key services in which local and international companies and investors are allowed to work. Saudi Arabia has been a member of the World Trade Organization since December 2005, and the capital invested by more than 584,000 licensed companies is estimated to total more than $55 billion (Saudi Central Department of Statistics and information, Saudi Arabia, 2014).

In the banking sector, there are twenty four registered commercial banks and money institutions providing services for their customers. In 2014, the population reached 29,994,272 with a growth rate of 2.15%. In the communication sector, the total number of mobile subscriptions had reached around 50 million by the end of the first quarter of 2014, with a penetration rate of 165.1%. Prepaid subscriptions constitute the majority (over 86.5%) of all mobile subscriptions. The 2013 CITC Annual Report stated that the total number of mobile broadband subscriptions reached approximately 20 million, representing a population penetration rate of 66% (Saudi Communications and Information Technology Commission "CITC" report, 2013). More than 60% of the population is under 33 years of age, which means the majority of the population is familiar with new technologies. According to Saudi Central Department of Statistics and Information, the General Census of Population and Housing Report (2014), there are 1.8 smart phones for each person in Saudi Arabia.

These numbers indicate that the possibility of accessing mobile banking applications is relatively high. Although many banks provide mobile applications, there is still no evidence regarding the nature and intention of the adoption of these

applications by Saudi users, possessing high numbers of smart phones, internet access, and bank accounts, and given the available applications. Although many studies such as Koenig-Lewis, Palmer, & Moll (2010), Ulun Akturan, & Tezcan (2012), and Püschel, José Afonso Mazzon, & Hernandez (2010) report on research in various societies, most of them have not focused on the factors affecting mobile banking acceptance among Saudi customers, who may have some cultural differences or other characteristics that influence adoption of mobile banking. Also, most of these efforts studied the adoption of mobile banking services and applications as marketing tools, not as a technological system that can be used to find and retrieve information and meet user needs. Exploring Saudi users' perceptions of mobile banking services would help to remedy the lack of scholarly research and provide helpful insights on the acceptance and use of a new technology within wealthy and growing society.

Purpose of the Study

The current study explores Saudi bank customers and their acceptance and use of mobile banking applications for meeting their information and financial needs. This quantitative study used Diffusion of Innovation models to discover the relationships between the factors that affect their use of mobile banking and their actions to adopt mobile banking services; at the same time, it explored four of these models to Saudi society. The detailed purposes of this study are to:

1. Investigate the awareness of mobile banking applications as perceived by Saudi bank customers.

2. Identify the potential rates of adoption of mobile banking services as a new technology within Saudi society.

3. Assess the impact of demographic characteristics of Saudis citizens on the adoption of mobile banking applications.

4. Determine the factors that affect Saudi bank customers' perceptions of the adoption of mobile banking services.

5. Discover the barriers to the use of mobile banking services and applications by Saudi bank customers.

Conceptual Framework

A theoretical foundation is necessary in quantitative research as a basis to enable better understanding and to facilitate the estimation of the extent of relationships among different variables (Creswell, 2014). Many theories, frameworks, and models have been used to investigate the factors influencing user adoption of new technology. Diffusion of Innovation Theory (DOI), the Theory of Reasoned Action (TRA), the Technology Acceptance Theory (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Theory of Planned Behavior are some examples of theories which were designed and developed to test and examine the level or the rate of adoption of new innovations or technology by a society (Shaikh, & Karjaluoto, 2014).

Koenig-Lewis, Palmer, & Moll (2010) developed a conceptual framework based on information technology adoption theories and models to examine the effects of perceived risk, compatibility, credibility, trust, and cost on using behavioral intention to

use information technology. This model was developed by integrating three earlier

models: the Technology Acceptance Theory (TAM), the Diffusion of Innovation Theory

(DOI), and the Theory of Reasoned Action (TRA). Koenig-Lewis, Palmer, & Moll's

model is promising for application in this study because it covers all aspects and factors

related to the adoption of mobile banking as a new technology by bank customers. The

following figure illustrates the research model that will be used in this study to discover

Saudi customers' perceptions of mobile banking.
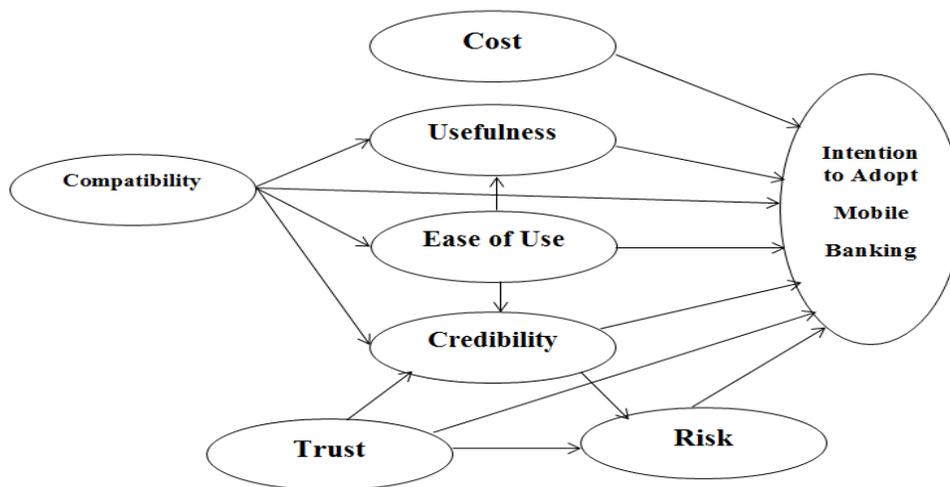
Figure 1. Conceptual Framework (Koenig-Lewis, Palmer, & Moll, 2010).

Significance of the Study

While innovations play a vital role in making our life easier, the process of the

adoption of these innovations by users is influenced by many factors such as

awareness, trustworthiness, and cost (Koenig-Lewis, Palmer, & Moll, 2010). Today,

modern technologies and their adoption by society are significant issues that need

additional study (Tobbin, 2012). In fact, telecommunication technology, including new

software and hardware, has made mobile devices more useful by creating huge numbers of applications and services, which are more common and available for users. Any person these days, for example, can easily use his/her smart phones to access many governmental or commercial services from any place and at any time, so mobile phones and portable devices such as tablets are now good tools for both the customer and organization/company (Lin, 2011). Furthermore, financial institutions are expanding mobile banking applications to bring banking transaction services to all users, bringing about two desirable outcomes. First, they deliver services to their customers that can reduce the number of tasks that must be performed and save time, cost, and effort. Second, banks use mobile banking to market their services to both potential and active customers, so they can increase the number of their customers in a competitive market (Ha et al., 2012).

Since this study investigates the acceptance and use of mobile banking services among bank customers in Saudi Arabia, it is significant for several reasons. Firstly, most published studies have focused on studying mobile banking as a marketing tool, not as information technology that is used to send and receive/retrieve information, functioning as a communication tool between the bank and the user. The results of this study will help to uncover the importance of mobile banking as an information resource in the social system. Secondly, this study is an attempt to determine the factors that influence the adoption of mobile banking applications in a unique society which has different demographic and social characteristics than societies previously studied. These factors need clarification because of the differences in demographic and social characteristics of the Saudi society. Thirdly, a study of the diffusion of mobile banking in Saudi Arabia

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can help banks and financial institutions to develop new services or improve existing services. The outcomes of this study can help governmental agencies, bank administrators, and policy makers to evaluate and improve all related legislation, strategies, services, and technologies. Fourthly, this study attempts to discover the obstacles to the adoption of mobile banking services; this will provide a clearer picture about the acceptance or rejection of this new technology in Saudi Arabia. Users and banks can benefit from this study's results. Users, for example, can improve their technical skills, while banks should focus on encouraging customers to use mobile banking applications in order to strengthen their relationship with customers.

In general, this study of diffusion of innovation will provide a significant contribution by demonstrating the value of mobile banking in the social system through an examination of the attributes of innovations that affect its diffusion in Saudi Arabian society.

Research Questions

This study aims to answer the following research questions in order to achieve its purpose:

1. To what extent do Saudi bank customers adopt mobile banking services?

2. What are the differences in demographic characteristics among mobile banking adopters and non-adopters in Saudi Arabia?

3. To what extent does perceived usefulness relate to mobile banking adoption among Saudi customers?

4. To what extent does perceived ease of use relate to mobile banking adoption among Saudi customers?

5. To what extent does perceived compatibility relate to mobile banking adoption among Saudi customers?

6. To what extent does perceived credibility relate to mobile banking adoption among Saudi customers?

7. To what extent does perceived trust relate to mobile banking adoption among Saudi customers?

8. To what extent does perceived risk relate to mobile banking adoption among Saudi customers?

9. To what extent does perceived cost relate to mobile banking adoption among Saudi customers?

10. What factors influence Saudis bank customers' adoption of mobile banking applications?

Definitions of Terms

The following are some important terms for this study:

Adoption: the decision to make full use of an innovation as the best course of action available (Rogers, 2003).

Diffusion: the process by which an innovation is communicated through certain channels over time in the social system (Rogers, 2003).

Innovation: an object, practice, or idea that is perceived as new by an individual or other unit of adoption (Rogers, 2003).

Smart phone: a mobile device that includes all capability to check and send e-mail, surf the Web, and run software/programs through its integrated system and wireless connection while also being able to make calls, send messages, display photos, and play videos (Tobbin, 2012).

Mobile application: a software application designed and developed to be used on small and wireless computing devices such as smart phones and tablets (Mobile Marketing Association, 2009).

Mobile banking: the services provided by any financial institution to allow customers to conduct some financial transactions remotely using a mobile device such as a smart phone or tablet (Koenig-Lewis, Palmer, & Moll, 2010; Ulun Akturan & Tezcan, 2012; Mobile Marketing Association, 2009; and Lin, 2011).

Rate of Adoption: the number of individuals in the society who begin to make use of a new technology in a defined period of time (Lin, 2011).

Perception of mobile banking: the awareness, feelings, impressions, and attitudes that a customer has regarding the use of mobile banking applications to carry out necessary transactions or find helpful information (Ulun Akturan & Tezcan, 2012).

Usefulness: the degree to which an innovation is perceived as providing more benefits than its predecessor.

Ease of use: the extent to which an innovation can be considered relatively easy to understand and use. Complexity is the opposite of ease of use.

Compatibility: the degree to which a service is perceived as consistent with users' existing values, beliefs, habits, and present and previous experiences (Ulun Akturan, & Tezcan, 2012).

Trust: the subjective probability to which consumers believe that a particular transaction will occur in a manner consistent with their confident expectations.

Credibility: the belief that a partner is trustworthy and has the required expertise to carry out transactions (including performance, financial, physical, social, psychological, and time transactions).

Risk: the degree of risk involved in using an innovation.

Cost: the perceived cost of acquisition and use (Koenig-Lewis, Palmer, & Moll, 2010).

CHAPTER 2

LITERATURE REVIEW

Introduction

Mobile banking is the newest channel for financial services. Mobile banking applications provide numerous services such as account information, transfer, bill payment, investment, and support services (Dewan, 2010). However, many customers resist using mobile banking services, so it is necessary to investigate the causes of this resistance (Koenig-Lewis, Palmer, & Moll, 2010). Although many studies have clearly demonstrated the advantages or benefits of mobile banking applications for both financial institution and customer, none has studied the factors affecting the adoption of mobile banking in Saudi Arabia by using scientific measurement tools that cover all attributes related to the use of this kind of new technology. This chapter discusses the most relevant published literature on the use of mobile banking and the factors affecting customers' acceptance of that technology.

This chapter is divided to five sections. The first section provides an overview of the issue of adopting technology within society. The second section focuses on reviewing the theoretical foundation and the diffusion of innovation theories, models, and frameworks. The third section includes a brief overview of banking services through history and the developments in technology that are related to electric/online banking and mobile banking. The fourth section addresses the establishment of banking in Saudi Arabia and mobile banking use and availability in that country. The focus of the

last section is to review the literature on discovering customers' perceptions regarding the adoption of mobile banking services.

Adoption of Technology

Information technology has progressed and evolved tremendously in the last 50 years, and the adoption of this technology by individuals and organizations has become an important field to be researched and studied. The study of the adoption of new technology has led to the development of several concepts, theories, and models. Studying the adoption of information technology helps to determine the rate of acceptance, the factors that influence acceptance, and the barriers users face in accepting this constantly evolving technology. Dillon and Morris (1996) discuss the acceptance of information technology, defining it as "the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support," while the rate of adoption is any new innovation's relative speed of acceptance by expected users in the society (Rogers, 2003). However, there are many factors that affect the rate of adoption, such as the innovation's economics and characteristics, as well as sociological, organizational, and psychological variables (Butler & Sellbom, 2002). Other researchers, including Davis, Bagozzi, and Warshaw (1989) and Shih and Venkatesh (2003), believe that the positive attitude toward the usage outcome or the consequences of technology is the main motivation in the process of its adoption. Moreover, social factors play an important role in encouraging users to adopt new technology (Malhotra & Galletta, 1999). For instance, an educated and developed society can accept new technology more easily than an uneducated society. Younger people today require less time and effort to learn and master a new technology, while

older men and women need more time and practice to be familiar with the same technology (Yang, 2009). Also, a social system's experiences with previous technologies might affect its adoption of new ones, so social factors play an important role in helping researchers understand, explain, and predict system usage and the behavior of acceptance. According to Rogers (2003) and Lin (2011), the rate of adoption can be defined as the relative speed of starting to use a new innovation or technology by the members of the society in a specific time.

Information need should also be considered. It can be defined as a person or group's desire to obtain information in order to satisfy a conscious or unconscious need (Case, 2012). According to Wilson (1997), information need as a concept is at the root of the problem of information-seeking behavior. There are three types of information need in general: that in which user needs information just to have new information, that in which the user wants to elucidate the information held, and that in which the user wishes to affirm information held (Wilson, 1997). Banks and other financial organizations provide a good example of the need for information, as they have faced many challenges with information technology, and adopting new strategies and technologies can help banks retain clientele. However, if banks want to create new services and use new technologies such as mobile applications, they should first study how clients will adopt these new tools and what barriers could occur while these technologies are being used (Ulun Akturan, & Tezcan, 2012). Most banks' customers, need basic services to be available anywhere and anytime—services which will allow them to check account details, view statements, pay bills, transfer money, and deposit checks. However, there are multiple types of information needs including those which

entail seeking and retrieving information as well as making decisions. Checking account details and viewing statements, for instance, can be considered a seeking then retrieving process (Mallat, Rossi, & Tuunainen, 2004). Moreover, studying the bank customer as a user who has information needs is an important step for developing effective mobile banking systems and applications to ensure banks can provide all services that meet —as far as possible—each bank customer's needs.

Theoretical Foundations

The diffusion of innovation has recently become a significant issue related to adoption of information and communication technologies. Diffusion is the process of acceptance and adoption of innovation by members of a certain community (Shih & Venkatesh, 2003); Rogers (2003) defined diffusion as the process of spreading information through communication channels over time within a community.

Information explosion and the fast growth of knowledge have led to increased technological innovation, so social systems are being studied in order to determine the extent of larger societal acceptance of these innovations. As a result, many theories and models have been developed to help in the study of user needs, or of the acceptance or rejection of technologies. Various scientists and researchers in several fields and disciplines (including information science) have published numerous studies using these theories and models to investigate all issues and aspects of the use of technology and the adoption of innovations.

The diffusion of innovation theories and models are most commonly used to provide a conceptual framework to be used in studying the process of diffusion globally

(Dillon & Morris, 1996). Rogers' (2003) diffusion of innovation theory (DOI), the technology acceptance model (TAM), the theory of reasoned action (TRA), and the unified theory of acceptance and use of technology (UTAUT) are the most popular theories, models, or frameworks in this field. According to Shaikh and Karjaluoto (2014), 71% of published literature regarding the adoption of mobile banking between 2005 and 2013 used one of these four theories and models. More specifically, 16% of the published works used innovation diffusion theory, and TAM was used if 42%, while UTAUT was used in 13% of the literature.

Diffusion of Innovation Theory (DOI)

This theory was developed by Everett M. Rogers in 1962, then elaborated in 1971, 1983, 1995 and 2003. The diffusion of innovation theory is one of the oldest social science theories. It is one of the most widely tested and applied models in many disciplines because it provides helpful guidance for accelerating the rate of adoption of an innovation, and it is an appropriate model for the social and economic issues relating to information and communication technologies in society (Minishi-Majanja & Kiplang'at, 2005). It originated in communication science to explain how an idea or product can be adopted or rejected over time through a social system. It predicts that the key to adoption is that the user must perceive the idea, behavior, or product as innovative. This model identifies four elements of diffusion of innovation: innovation, communication channels, time, and the social system.

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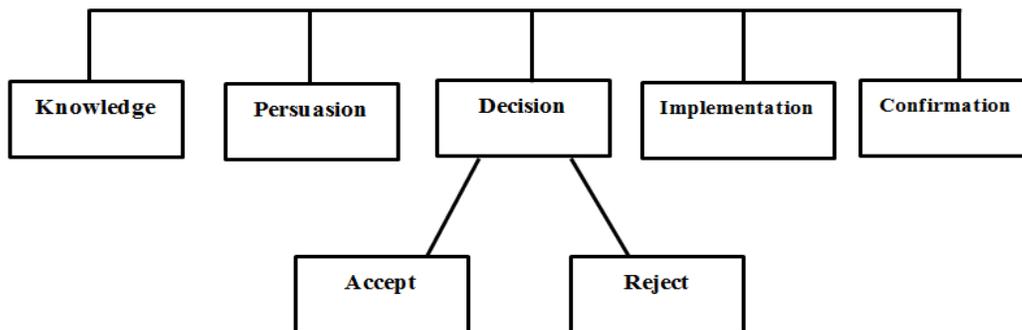
Figure 2. Rogers' diffusion of innovation model (Rogers, 2003, p. 170).

Rogers also modeled the innovation-decision process, which is a mix between information-seeking and information-processing, proceeding as they appear in the Figure 1 above: having knowledge or finding some initial data about the innovation, forming an attitude toward it, making a decision (to adopt or reject), implementing the new idea, and confirming the decision (Rogers, 2003).

The first two stages, knowledge and persuasion, involve information seeking processes, and the fourth is the decision-making process which is also related to information management and retrieval processes (Case, 2012). Moreover, Rogers (2003) confirmed that there are five characteristics of innovation that help determine the rate of adoption: relative advantage, compatibility, complexity, trialability, and observability. However, Rogers (2003) pointed out that there are other variables that might affect the rate of adoption, such as the nature of society, the nature of the communication channel, and the type of innovation decision that must be made.
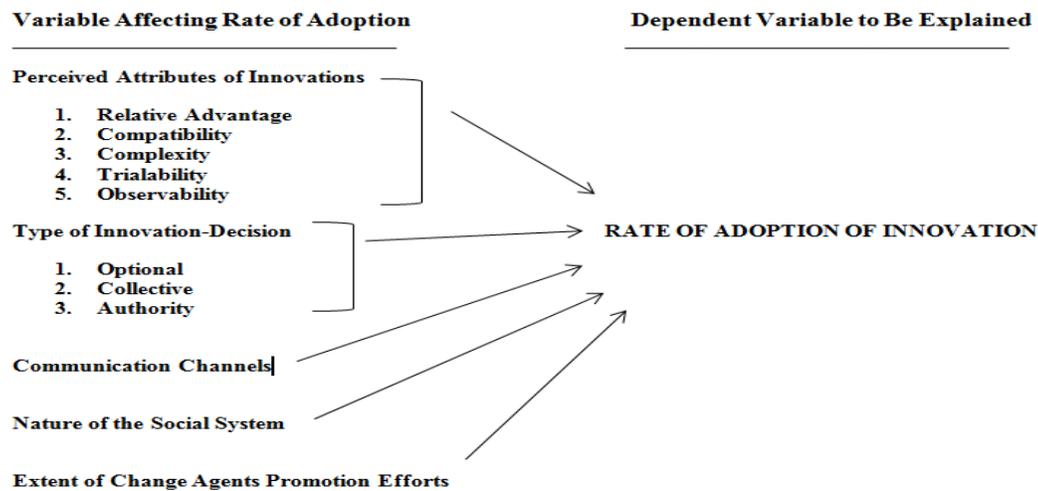
Figure 3. Diffusion of innovation theory variables (Rogers, 2003, p. 222).

Since Rogers' diffusion of innovation theory has been adopted in only 16% of the published literature (Shaikh & Karjaluoto, 2014) and all of the studies taking that approach are from a marketing science perspective, the adoption of mobile banking services and applications needs to be studied within the field of information sciences so that certain of its processes can be investigated, and so that the differences between marketing and information science processes can be discovered.

The Theory of Reasoned Action (TRA)

The theory of reasoned action (TRA), developed by Martin Fishbein and Icek Ajzen in 1975, is one of the most used theories in psychology and the communication sciences. It was developed from previous research efforts and attempts to explain the relationship between behaviors and attitudes as they relate to human action. Also, it was used to predict the person's behavior based on his/her pre-existing attitudes and behavioral intentions. In fact, it emphasized the notion that the person's decision is the

outcome of performing the behavior (Sheppard, Hartwick, & Warshaw, 1988). The theory's main emphasis was that the user would adopt the information system, or any other new technological device, only if he/she could experience a positive impact from it (Fishbein & Ajzen, 1975).
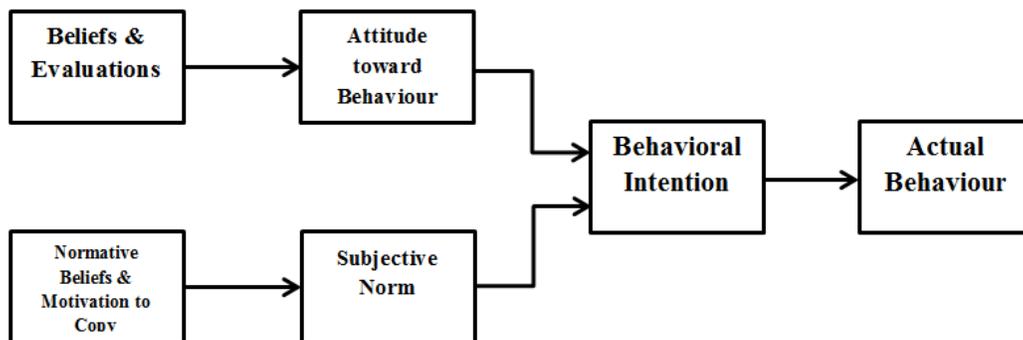
Figure 4. The theory of reasoned action (Fishbein & Ajzen, 1975).

According to the TRA, the attitude toward the behavior and the person's perception of social pressure are the factors that steer behavioral intentions (Fishbein & Ajzen, 1975). The process of adopting the technology, in addition, starts with beliefs which lead to attitudes and in turn drive intentions. The behavior of adopting or not adopting the technology consequently is the last step (Sheppard, Hartwick, & Warshaw, 1988).

The Technology Acceptance Model (TAM)

The technology acceptance model (TAM) is the second most widely used theory among all disciplines to measure the rate of adoption of new products, especially in the

area of technology. Davis (1989) developed this model from the theory of reasoned

action (TRA), which is used for predicting user acceptance of information systems or

tools, as well as for identifying design issues before innovations are made accessible to

the public (Davis, Bagozzi, & Warshaw, 1989). This model identifies the rate of

acceptance of a given information system by determining the user's attitude toward a

system's usefulness (U) and ease of use (EOU), with some other external factors that

may influence the process of adoption.
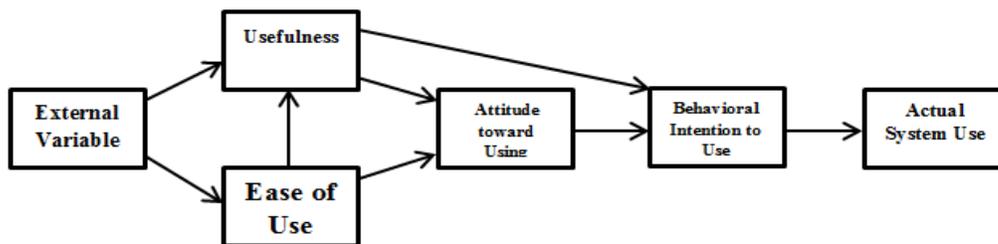
Figure 5. Technology acceptance model (TAM) (Davis et al., 1989, p. 985)

According to this model and taking into account Davis' stages, perceived

usefulness and perceived ease of use are the most important factors in measuring a

user's attitude toward using or interacting with new innovation or technology. The TAM,

nevertheless, has limited use for explaining user attitudes toward mobile service

adoption because it excludes demographic and economic factors and external variables

(Venkatesh & Davis, 2000).

The technology acceptance model (TAM) may be useful for studying the

acceptance of mobile banking applications as a new technology. It has been used in

more than 42% of the published studies so far. It still can be used in studying mobile banking use and adoption, but it would be more effective in combination with Rogers' diffusion of innovation theory or other theories to provide deferent results, solutions, and discussions regarding this phenomenon.

The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT is the fourth theory employed in studying the diffusion of innovation, and it was derived by Venkatesh, Morris, Davis, and Davis (2003) from eight different theories and models in order to assess the possibility of success for new technology and to make possible a better understanding of the barriers to adopting a new system. Performance expectancy, effort expectancy, social influence, and facilitating conditions are the four key constructs for this model, and gender, age, experience, and voluntariness of use are the most prominent factors that can moderate the impact of the model's key constructs. As a result, this theory focuses on the motivations for user behavior, but disregards cultural factors. According to Shaikh and Karjaluoto (2014), it has been used in 13% of studies that investigate the acceptance of mobile banking services since 2005, but most of them are exploratory studies.

In information and communication technology adoption research, there are many factors that affect and influence a user's decision to accept specific types of technology and the rate of this adoption, and each theory, model, and framework aims to measure the level of user acceptance of technology and identify external variables in the social system.

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Applying these theories and others has led to some helpful results that can be used to improve and develop both users' skills and mobile banking services and applications. However, the adoption of mobile banking still needs further study, especially within the context of Rogers' diffusion of innovation theory, which has been applied in few studies. The use of mobile banking in developing countries has not been researched enough to provide clear and comprehensive understanding of how citizens deal with these new technologies, how they adopt them, and at what level they do so.

Banking Services and Technologies

Advanced technology has changed many markets and products. As all organizations and companies have done since the 1950's, the banking sector uses new developments in technology to assist them to deliver their services to their customers. Also, many of the new technologies help banks like other organizations to reduce costs and effort and to increase the availability of their services. Telephone transactions, for instance, have made use of banks' audio systems for conducting transactions such as transferring money, paying bills, and obtaining information related to the account. Banks have also used SMS for the conducting of some kinds of financial transactions (Venkatesh, Morris, Davis, & Davis, 2003). Later, banks lunched websites that could be used for delivering the same services that used to be made available via telephones. Recently, the smartphone has replaced the traditional land and mobile phone, so banks are developing their systems and creating applications to be used with customers' smart phones (Mallat, Rossi, & Tuunainen, 2004).

In the 1960s and 1970s, banks and financial institutions used computers to process check transactions and to document other transactions (Dillon, & Morris, 1996).

After the 1980's, the revolution in information and telecommunication technologies had brought about big changes in the financial industry and had altered the processes and the relationships between customers and the bank. Personal computers (PCs), the Internet, and mobile technology have increased the usability and the accessibility of various ways of conducting many financial transactions. Moreover, the increase in the operation costs and the competition forced most financial institutions to invest in new channels to reduce costs and keep their customers, such as automated teller machines (ATMs) and internet banking (Püschel, Mazzon, & Hernandez, 2010). Electronic debit/credit cards and Automated Teller Machines (ATMs) are two of the most successful examples of the use of new technological innovations in the commercial sector, especially in banking (Iddris, 2013). Internet and smart phones have subsequently led to the new type of banking service called mobile banking.

Electronic Banking

The developments in the World Wide Web and in mobile phones have brought about great changes in the operation processes and the provision of services in the business sector. The World Wide Web allows all companies and organizations to build strong relationships with their customers, market all products and services, and reduce certain costs. The ability to connect with the service provider, from anywhere and at any time in the Internet environment, for carrying out any transactions or at least for obtaining some information is a great advantage for both the customer and the bank (Mallat, Rossi, & Tuunainen, 2004). The Internet has had an extraordinary impact on world trade because of its ability to connect the sellers/providers with customers, facilitate financial transactions, and extend trade internationally.

Internet banking has revolutionized the banking sector because it helps all banks to operate more effectively and attract more customers at lower cost (Yung-Cheng et al., 2010). All financial institutions started launching their websites in the 1990's, and they encouraged customers to use Internet banking services, called e-banking, because the Internet could save of the bank and customer's time, effort, and costs. In the U. S., for instance, 68% of American banks' customers engaged in Internet banking services in 2011 (The U. S. Federal Reserve Board of Governors, 2012). Also, banks have used all available features in designing websites to make internet banking services more attractive efficient for use by customers, such as using multimedia and offering connections with certain governmental and commercial organizations (Püschel, Mazzon, & Hernandez, 2010). Although some financial institutions failed to introduce Internet banking services to their customers, most customers, especially young customers, have become online users because most of them are familiar with new technologies than old people are (Ha, Canedoli, Baur, & Bick, 2012). However, much legislation and many regulations have been issued and modified by many countries regarding accessing and using online banking services to ensure the privacy and security of the customer (Ulun Akturan & Tezcan, 2012). Since many online businesses started to engage in electronic commerce over the Internet, customers have preferred to shop online rather than the traditional way of shopping, which has directly affected the use of online banking services (Lin, 2011).

Furthermore, Internet banking services reduce the cost and effort of transferring and exchanging data between financial institutions and merchants over secure networks. Stanford Federal Credit Union, for example, developed the first Internet

banking service, in October 1994, while Wells Fargo Bank became the first bank to run and make accessible Internet banking to customers in May of 1995 (Pearlson & Saunders, 2006).

The wide popularity and the availability of portable devices such as smart phones, tablets, and laptops, and new mobile telecommunications such as 2G and 3G have helped to expand the use of mobile trade as a new business phenomenon. This type of commerce indeed extends the use of mobile banking applications globally (Mallat, Rossi, & Tuunainen, 2004).

Mobile Banking

The wide accessibility and availability of smart phones, mobile applications, and Internet has led to their becoming important tools nowadays and to their facilitating our complex daily tasks and business. Also, most users of Internet services, such as online banking, have found using their smart phones to access the same services is better and easier, being familiar with both technologies (Samudra & Phadtare, 2012).

The term mobile banking refers to the services provided by a financial institution to allow customers to conduct some transactions remotely using a mobile device such as a smart phone or tablet (Koenig-Lewis, Palmer, & Moll, 2010), (Ulun Akturan & Tezcan, 2012), and (Lin, 2011). Ha et al. (2012) defined mobile banking as the process of using a smart phone to access a banking network through a Wireless Application Protocol (WAP), while the Mobile Marketing Association (2009) considers mobile banking to be a system that allows customers of banks and financial institutions to conduct some financial transactions through a mobile device such as a smart phone or tablet.

Mobile banking services are a major technological innovation for both customers and business institutions because they provide benefits such as efficiency, convenience, and cost saving. This type of service, in fact, has changed customers' interaction with banks, which have clearly changed the processes of selling and buying today (Ha et al., 2012). Furthermore, mobile technologies, especially Apple Corporation's products and Android smart phones based on Google's operating systems and developments, have helped to expand the use of mobile services such as banking services, GPS services, trading services, etc.

More specifically, mobile banking provides many features such as:

1. Allowing customers to connect remotely to the bank system easily and quickly.

2. Authorizing users to access banking services 24 hours a day through their smart phones (Mallat, Rossi, & Tuunainen, 2004).

3. Allowing customers to have certain information such as account details, stock markets prices, and statements.

4. Allowing customers to carry out many financial transactions activities anywhere and at any time without any limitations.

5. Offering more control of the customer's account by the customer (Ulun Akturan, & Tezcan, 2012).

Advances in mobile technologies have brought about many changes in the use of telecommunications. The change from cell phones to smart phones is one example that illustrates how developments bring about many changes in daily life tasks and activities.

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Mobile phone technology has recently begun to play the main role in allowing individuals to use many applications via a small device that anyone can carry anywhere; this affects both the user's behaviour and trading activities (Yang, 2009). Progressing from 1G to 4G (from the 1980's to now), smart phones have increased the reasons to carry the small device, and the smart phone now has become a most powerful computing device in use all over the world (Jaradat, & Twaissi, 2010).

According to Zhou (2012), the use and adoption of mobile banking services by customers is still relatively low compared with the usage of internet banking services internationally. There are some challenges to the use of mobile banking services by most customers. Not only technical barriers, but also social and psychological obstacles have been addressed by many studies (Ha et al., 2012).

Security, for instance, is one of the main issues of concern related to using and adopting many new technologies such as Internet or mobile banking (Taleghani et al., 2011). Many users fear that the Internet is not a secure environment and that their private information could be hacked. Thus, the adoption of mobile banking services might be affected by this factor (Hanafizadeh et al., 2012). In fact, many security threats have occurred in the past. In 2010, for example, a Trojan called Zeus attacked 12 banks in Spain, and all of them were paralyzed (English, 2011). Many financial institutions have made great efforts and spent a lot of money to deal with these threats in order to gain customers' trust and expand their banking market share (Samudra & Phadtare, 2012).

Banking in Saudi Arabia

Saudi Arabia is the biggest economy in the Middle East and it is largest oil production country. Banking is one of the most important sectors in the Saudi economy and represents approximately one-third of the total market capitalization of all companies listed in Saudi Arabia. Saudi Arabia is one of the world's fastest growing banking markets, and financial institutions play an important role in contributing to the country's economic development. The first Saudi currency law was passed in 1928, and the national currency, called Saudi Riyal (SAR), was introduced in 1960. The Banking Control Law was introduced in 1966 by the Saudi Arabian Monetary Agency (SAMA), established 1952, to regulate the banking sector. At the end of 1975, foreign banks started to open branches in the country; the first foreign bank was the Saudi Hollandi Bank.

Currently, there are twelve national banks and twelve international banks controlled and monitored by the central bank of the government, the Saudi Arabian Monetary Agency (SAMA). Most local and international banks started to grow after the explosions in oil prices in 1939 and then in 1973.

The 24 registered commercial banks in Saudi Arabia are:

1. The National Commercial Bank
2. The Saudi British Bank
3. Saudi Investment Bank
4. Alinma bank
5. Banque Saudi Fransi

6. Riyad Bank

7. Samba Financial Group (Samba)

8. Saudi Hollandi Bank

9. Al Rajhi Bank

10. Arab National Bank

11. Bank AlBilad

12. Bank AlJazira

13. Gulf International Bank(GIB)

14. Emirates NBD

15. National Bank of Bahrain (NBB)

16. National Bank of Kuwait (NBK)

17. Muscat Bank

18. Deutsche Bank

19. BNP Paribas

20. J.P. Morgan Chase N.A

21. National Bank Of Pakistan (NBP)

22. State Bank of India(SBI)

23. T.C.ZIRAAT BANKASI A.S.

24. Industrial and Commercial Bank of China (ICBC).

The following table shows the total assets and liabilities of commercial banks from 2010 to 2014.

Table 1

Consolidated Balance Sheet of Commercial Banks in Saudi Arabia (2010-2014)

					(Million Riyals)
	2010	**2011**	**2012**	**2013**	**2014**
Assets					
Reserves	159,313	179,174	217,455	200,366	213,073
Foreign assets	193,127	208,723	212,829	210,691	251,613
Claims on the public sector	94,200	79,385	82,076	93,755	98,949
Claims on the private sector	775,756	858,365	999,127	1,123,645	1,256,210
Claims on non-monetary financial institutions	1,946	1,694	2,737	2,740	2,254
Other assets	70,794	86,843	81,233	82,971	84,484
Total Assets/Liabilities	1,415,267	1,544,434	1,734,141	1,893,283	2,132,577
Liabilities					
Bank deposits	**984,850**	**1,103,634**	**1,260,608**	**1,401,980**	**1,575,579**
Foreign liabilities	94,706	75,450	79,396	74,405	92,277
Capital and reserves	178,025	190,140	209,494	225,855	248,111
Profits	26,120	30,919	33,508	35,692	40,159
Other liabilities	131,567	144,291	151,135	155,350	176,451

Source: Saudi Arabian Monetary Agency: Fifty-first Annual Reports (2015)

Mobile Banking in Saudi Arabia

Saudi Arabia also is the largest information technology market in the Middle East. According to the report of the Communications and Information Technology Commission (CITC) in Saudi Arabia, only one million Internet penetrations existed in 2001,while there are more than 15.8 million in 2013 because of the reduced cost of Internet access, the availability of smart phones and fiber networks, and the e-government applications. Mobile subscriptions also reached more than 50 million by the end of the first quarter of 2014, and each person in the country has more than 1 cellphone. Moreover, mobile services revenues increased to SAR 45 billion (more than USD 11 billion) in 2010, compared to 8 billion in 2001.

All national banks and most foreign banks have invested in mobile banking developments to meet their customers' needs, and all of them have launched mobile

banking applications for the most-used smart phone operating systems such as IOS, Android, Blackberry, and Windows. In fact, customers can fully access the most necessary services such as opening new accounts, making utility bill payments, transferring money, making credit installments, etc. Customers must register for services through the bank websites to be able to use mobile banking services, and then they must download the mobile banking applications to their smart phones. All customers can use all available services for free, except for the communication costs charged by the mobile company. All banks ensure the quality of mobile banking services, and they allow their customers to submit reports regarding any issue with using these applications. Also, Saudi banks have spent great effort and much money to ensure the security of using mobile banking services in order to protect their customers' privacy and data form any threats.

According to the SAMA report (2015), the number of transactions carried out by, for example, Saudi Payments Network (SPAN) increased 12.4 % to 627.3 million in 2014 as compared to a rise of only 4.7 % in 2013.

Although almost all Saudi banks provide mobile banking services for their customers, there are few regulations and laws and little legislation regarding the provision and use of mobile banking services. The Saudi Communications and Information Technology Commission (SCITC) released, passed and published the "Anti-Cyber Crime Law" in 2008, but there is only one Act related to financial transactions through Internet networks. The 4th Act of the Anti-Cyber Crime law states that accessing bank or credit data, or data pertaining to ownership of securities with the intention of obtaining data, information, funds, or services offered, is a cybercrime, and the penalty

for this crime is imprisonment for a period not exceeding three years and a fine not exceeding two million riyals. All ministries and organizations in Saudi Arabia should work hard together to develop and publish all necessary legislation related to using, accessing, providing, controlling, and administering mobile banking in order to limit all security threats that might happen.

<p style="text-align:center">Studies on Perceptions Regarding Mobile Banking Adoption</p>

Mobile banking applications and services have become a focus for many researchers and organizations as they attempt to assess the value of the use of these services by customers, to increase the revenues of banks, and to facilitate financial transactions for customers. Mobile banking is a new channel to deliver all services to users instead of expending cost and effort to perform the same services by other means, so all banks and other financial organizations encourage their customers to use mobile banking applications through their smart phones (Shaikh, & Karjaluoto, 2015). Also, banks and software houses work together to develop these applications in order to provide a high level of quality, to ensure the continual use of their services by customers, and to achieve their satisfaction (Ha, Canedoli, Baur, & Bick, 2012). Customer retention, operational efficiency, market share, and employment opportunities are some examples of the issues on which banks focus as they strive to improve and enhance the use of mobile technologies in the banking sector (Chitungo, & Munongo, 2013).

According to the International Telecommunication Union Report (2014), there are more than 3.6 billion of mobile subscriptions around the world, but only 15% of these

mobile subscriptions are for the use of mobile banking services. In fact, only 39% of U.S. mobile phones users with bank account stated that they use mobile banking services, and this percent is higher at 52 percent than the use in 2013 (Consumers and Mobile Financial Services Report, 2015).

All these findings and the significant growth of mobile banking have led to predictions regarding the ratio and the level of adoption of mobile banking services by customers in many societies. Also, such information suggests the need to investigate all impediments or issues facing customer who wish to download mobile banking applications and use them (Chitungo, & Munongo, 2013).

Many scholarly studies, therefore, have explored all potential attributes of mobile banking services as new technology by means of many research methods such quantitative, qualitative, and mixed methods. Factors affecting the adoption of mobile banking services and barriers to the use of mobile banking services also have been investigated because they are some of the important issues related to the adoption of any new innovation in the social system. Theories, models, and frameworks from many disciplines, furthermore, have been used to address the acceptance of mobile banking services worldwide (Shaikh, & Karjaluoto, 2014).

Despite the fact that there is a growing interest in exploring the adoption of mobile banking through the use of various diffusion of innovation and information systems research theories, most published research has focused on studying mobile banking as a marketing tool only (Püschel, José Afonso Mazzon, & Hernandez, 2010). Information needs and the information retrieval process in using mobile banking applications have been studied, and this work has yielded some valuable results for

assessing these issues, which are significant for understanding the use of any technology and evaluating the outcomes of this technology.

Shaikh and Karjaluoto (2014) reviewed the literature on the adoption of mobile banking services by customers in 33 marketing, information systems, and business administration journals and in databases such as Science Direct, IEEE, Emerland, etc. They found 55 relevant publications in the period from January 2005 to March 2014, and they made some important findings. First, a quantitative research method was used in 82% of the publications, and only 5% of the literature used a qualitative method. Second, the technology acceptance model (TAM) is the popular framework in the literature. It was used in 42% of the publications as a theoretical framework while innovation diffusion theory was used in 16%, and UTAUT was the theoretical model only in 13% of the publications. Third, perceived ease of use and usefulness are the most widely studied attributes, having been used in approximately one-third of the published studies. Finally, age, gender, and education are the most widely studied demographic factors affecting mobile banking adoption. This study is valuable for having gathered and analyzed the literature on mobile banking adoption and for giving some indicators about the use of theories and attributes in the literature.

Iddris (2013) quantitatively investigated the potential barriers to adopting mobile banking in Ghana. He found that most respondents had not used mobile banking services because of some reasons such as required knowledge and learning, costs of internet access, and the poor telecommunication networks in the country.

Ulun Akturn and Tezcan (2012) used the TAM model and questionnaires to explore customers' mobile banking adoption. They found that perceived usefulness and perceived social risk directly affected the adoption of mobile banking in the society.

Yang (2009) one of the earlier researchers studied the acceptance of mobile banking by developing special model from extending Rasch measurement model (IRT) with TAM model to identify the user's abilities to adopt mobile banking to do some transactions. The speed of transactions and services fees are the main factors affecting the use and adoption of mobile banking as this study found.

Koenig-Lewis, Palmer, and Moll (2010) studied the barriers to adoption of mobile banking services by creating a theoretical model. They merged the TAM and Rogers' Innovation diffusion theory and added certain other attributes pertaining to any new technology to assess the adoption of mobile technology by consumers. Koenig-Lewis et al.'s model consisted of: (1) perceived usefulness, (2) perceived ease of use, (3) perceived compatibility, (4) perceived credibility, (5) perceived trust, (6) perceived risk, and (7) perceived cost. By applying their framework, they found that compatibility, usefulness, and risk are the most significant attributes regarding adoption of mobile banking services, and trust and credibility could reduce the overall risk of mobile banking. The framework provided by this study is one of most widely used and cited because it covers all aspects related to adoption of new technology by social members. All seven of the above attributes are here discussed in detail, with reference to the literature, as they are the independent variables of this study:

(1) Perceived usefulness: this attribute was one of Davis' (1989) fundamental structures in the TAM, and Davis (1989) defined it as "the degree to which a

person believes that using a particular system would enhance his or her job performance" (p. 320).

(2) Perceived ease of use: this refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). This is the other fundamental attribute in Davis' structures.

Both perceived usefulness and perceived ease of use have been tested in many studies, and most of them found that both perceived usefulness and perceived ease of use had a direct impact on adoption of new technology. Daud et al. (2011), Singh et al. (2010), and Mburu (2012) found that perceived usefulness and perceived ease of use were the strongest factors affecting the adoption of mobile banking in Malaysia, India, and Kenya, respectively.

(3) Perceived compatibility: based on all diffusion of innovation theories, perceived compatibility may affect any acceptance of new technology. For instance, Wessels and Drennan (2010) emphasized that perceived compatibility had a positive relationship with the adoption of mobile banking in Australia, while Giovanis et al. (2012) found perceived compatibility to be the only factor affecting the adoption of internet banking.

(4) Perceived credibility: the notion of credibility in relation to the use of mobile banking applications means that the user believes that mobile banking activities are free of security and privacy threats. This factor has been found to be one of the most serious factors affecting any use of new technology. Daud et al. (2011), for instance, found that perceived credibility was one of the most influential factors affecting the adoption of mobile banking in Malaysia.

(5) Perceived trust: trust is important in the decision to use and accept any technology, especially when there is any chance of losing money or exposing any information (Mallat, Rossi, & Tuunainen, 2004). Many previous studies of adoption of mobile banking have found that trust plays a critical role in customers' perception toward mobile banking services (Shaikh, & Karjaluoto, 2015). Security is a serious issue in the Internet environment, and it would be expected to be so in the use of mobile phones and wireless networks to conduct certain financial transactions (Yung-Cheng et al., 2010). Dimitriadis and Kyrezis (2010), Kim, Shin, & Lee (2009), and Chung and Kwon (2009) found that initial trust is one of the main factors affecting the acceptance of mobile banking services in different societies. Even in some poor and developing countries with low availability of smart phones and limited infrastructure, trust affects the use of mobile banking applications (Tobbin, 2012).

(6) Perceived risk: the use of mobile banking by means of smart phones is very risky in many customers' perception because it is a process involving bank accounts and via the Internet, so this factor would be expected to affect the adoption of this technology (Yung-Cheng et al., 2010). Disclosure of personal information and hacking of bank accounts are serious risks that most users prefer to avoid when they using mobile banking services (Koenig-Lewis, Palmer, & Moll, 2010). Yung-Cheng et al. (2010), for example, found that perceived risk was an important predictor of mobile banking adoption because it had a negative relationship with the intention of acceptance of mobile banking in China.

(7) Perceived cost: the costs to have or adopt new technological innovation are often

   an impediment, so perceived costs paly vital role in mobile technology adoption.

   Yung-Cheng et al. (2010) found that both the cost and the benefit affected

   Taiwanese customers' decision to adopt mobile banking services. Also, Wessels

   and Drennan (2010) found that cost affected Australian customers' attitudes

   toward mobile banking along with perceived risk.

This study aimed to assess whether or not all of the previously mentioned attributes

of adopting mobile banking services were related to the adoption of mobile banking

among Saudi customers.

The use of Koenig-Lewis et al.'s (2010) research model and instruments would be

effective in determining the adoption level, influencing factors, and the barriers to the

use of mobile banking services in Saudi society. Further, this study is valuable in its

assessment of the process of the search for information and the use of it through mobile

banking applications to fill the gap in the literature relating to research on whether or not

mobile banking services help the user to find information and meet his/her needs.

CHAPTER 3

METHODOLOGY

Research Design

The main purpose of this quantitative exploratory study is to discover the relationships between the action to adopt mobile banking applications as the dependent variable and the factors that influence mobile banking adoption as independent variables. Research may be defined as an organized inquiry to solve problems by applying appropriate theory. There are many types of research, such as descriptive, exploratory, reporting, and predictive studies (Creswell, 2014). However, Babbie (2004) defined quantitative research as "the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect" (p. 94). Thus, a quantitative research strategy is a good way to gather and analyze numeric data in order to achieve valuable findings that can answer the research questions of the study.

Based on a review of the literature related to the topic of mobile banking services adoption, it is clear that there is not enough formal information about the adoption of mobile banking technologies in the Saudi social system. The survey, as a quantitative method, is an appropriate type of research to discover the relationships between the demographic variables and the dependent variable and to predict the adoption of mobile technologies and applications as new innovations within a society.

A survey is an appropriate research method for covering a large geographic area at minimal cost, is easily applied, and is efficient for both participants and researchers.

Studying the acceptance of new technology means collecting user/customer perceptions on opinions, attitudes, and experiences that are expressed with some freedom, so the questionnaire is a valid method to gather the necessary data. By contrast, data from interviews, for example, would take more time and effort to gather and analyze (Creswell, 2014).

The focus in this chapter is to discuss the research methodology that will be used to investigate the ratio of the adoption of mobile banking services among Saudis bank customers. This chapter describes, in the required detail, the target population, the sampling, the instrument, the variables, the data collection, and data analysis procedures.

Participants

This study aims to investigate the adoption of mobile banking services by Saudi bank customers. Thus, the target population consists of all Saudi citizens 18 years and older. The General Census of Population and Housing Report in Saudi Arabia (2014) estimates the Saudi population at 20,271,058. The target population includes people with Saudi nationality from different age groups, education levels, monthly income levels, occupations, and so forth.

According to the General Census of Population and Housing Report in Saudi Arabia (2014), 55.5% of Saudis citizens are male and 44.5% female. Also, more than 60% of them are under 33 years of age. The average monthly family income is USD 3,624.98; more than 3.25 million citizens work in the governmental sector, and only 1.25 million work in the private sector. However, more than 650,000 Saudis are unemployed.

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All Saudi bank customers are potential participants in a study whose purpose is to assess their perceptions of adoption of mobile banking services and the factors affecting their use and adoption. Therefore, 1,000 emails were sent with the link to the web-based questionnaire to customers of four Saudi banks, The National Commercial Bank, The Saudi British Bank, Alinma bank, and Bank AlJazira, who had consented to participate in the study. Out of 1000 distributed questionnaires, 548 questionnaires were returned. As a result, 502 questionnaires were completed, representing approximately 50% of the total.

Sampling

The sampling process is useful for obtaining a valid representative of the target population. It is not possible to survey more than 20 million people. Sampling is the most effective method to conduct research by means of selecting some elements in the target population (Creswell, 2014).

Random sampling was used to collect data for this study in order to ensure that each member of Saudi population had an equal chance of being selected. Random sampling is the procedure of collecting data by choosing an equally distributed subset from a larger population (Babbie, 2004). In addition to ensuring cost efficiency and speed in the collection of data, random sampling ensures that each member of the population has a chance of being chosen, which consequently ensures result accuracy. However, the sample size for the quantitative study has to be large enough to be representative of the population (Creswell, 2014).

According to Babbie (2004), an appropriate random sample size for a survey research can be calculated by using the following formula:

Formula*:*

n= p (1-*p*) (*Z/E*)²

Description:

n= required sample size

p= estimate of the population proportion

Z= confidence level at 95% (standard value of 1.96)

E= margin of error at 5% (standard value of 0.05)

When *p* is unknown, most researchers estimate it at 0.5. Thus, the sample size can be concluded at: *n*= 0.5(1-0.5) (1.96/.05)² = 0.25 x 1536.64 = 384.16 = 385 participants.

Consequently, the minimum sample size to represent the Saudi population for the study with a confidence level of 95% and margin of error at 5% was 385 participants.

<div align="center">Instrument</div>

A self–administered web–based questionnaire developed by a past research study was used to collect the data for this study (see Appendix A). The questionnaire is

a set of questions for obtaining information relating to feedback, attitudes, opinions, and experiences from a large population (Creswell, 2014).

Koenig-Lewis, Palmer, & Moll (2010) developed a model from the TAM model, the IDT and other models to cover all aspects relevant to investigating the adoption ratio for new technology within a social system. This model was developed on the basis of many previous studies and was published in their study entitled "Predicting Young Consumers' Take-up of Mobile Banking Services," and all of the questionnaire items have reliability and validity (Koenig-Lewis et al., 2010). This instrument has seven constructs: (1) perceived usefulness, (2) perceived ease of use, (3) perceived compatibility, (4) perceived credibility, (5) perceived trust, (6) perceived risk, and (7) perceived cost.

Koenig-Lewis et al. (2010) extended Davis' TAM (1989) model by including in addition to the elements or factors influencing the process of adopting new technology termed perceived usefulness and perceived ease of use other factors from other models of accepting technology or innovation by users such as perceived compatibility, perceived credibility, perceived trust, perceived risk, and perceived cost. Also, all added elements or constructs showed validity and reliability in former studies.

Furthermore, Koenig-Lewis et al.'s measurement has been tested by confirmatory factor analysis (CFA), and all factors were highly significant with a result of $p<001$; the standardized loadings were above 0.5. Thus, all factors effectively measured their corresponding constructs and supported convergent validity (Koenig-Lewis et al., 2010).

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Koenig-Lewis et al.'s (2010) instrument was appropriate for this study for two reasons. First, this instrument has been applied to the assessment of all perceived attributes of mobile banking applications as a new innovation, not only the characteristics of the technology. Second, it covers all perceived attributes of adopting mobile technology, such as trust, compatibility, cost, risk, and so on; these factors are strongly related to this innovation, but other models don't consider them.

The instrument of Koenig-Lewis et al. (2010) used a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) for all questions. The questionnaire had two parts.

The first part was about the demographic information of the participants and consisted of eight questions regarding gender, age, education level, income level, and current occupation. Also, this section asked about the participant's use of mobile banking, the usage frequency, and the experience with mobile banking in three closed-ended questions. The second part contained 17 closed-ended questions about participants' perceptions toward mobile banking for the purpose of identifying the relationships between mobile banking services and the seven constructs.

In order to meet the needs of the present study, the questionnaire was translated into Arabic (see Appendix B), which is the language spoken in Saudi Arabia, so that as much information as possible could be gathered from participants, especially those who did not speak English or at least could not understand the English version of the survey. The Arabic version was reviewed and compared to the English version by an Arabic

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language professor at the department of World Languages, Literatures, & Cultures at the University of North Texas to ensure the clarity and the accuracy of the language.

To ensure the protection of the respondents' rights in this study, the questionnaire reviewed and approved by the committee and the Institutional Review Board's (IRB) at the University of North Texas (see Appendix C).

This instrument was selected to be applied in present study because it includes many diffusion of innovation theories and models which cover all perceived attributes related to mobile banking service use and adoption.

Variables

The general purpose of the present study was to investigate Saudi bank customers' perceptions of mobile banking applications as a new innovation. Consequently, the dependent variable for this study was the action to adopt mobile banking services on the part of Saudi bank customers. The independent variables were the factors that influence mobile banking technology adoption. The seven constructs of Koenig-Lewis et al.'s (2010) model to assess the barriers to adoption of mobile banking services, perceived usefulness, perceived ease of use, perceived compatibility, perceived credibility, perceived trust, perceived risk, and perceived cost were the independent variables in the present study. Each construct has been defined and explained in detail in Chapter 2.

Finding the relationships between the dependent and independent variables was the main aim of this study. This was accomplished through the examination of certain

barriers and influencing factors in order to assess the adoption ratio of mobile banking services among Saudis.

Validity, Reliability and Pilot Study

Validity "is the extent that the measurement procedures accurately reflect the concept a researcher studies" (Case, 2012, p.198). In other words, validity refers to the question of whether the measure produces data on the variable of interest or the concept.

Reliability is the consistency of the responses provided by respondents. The concept is related to having the same results of measurement under the same conditions. Internal reliability is the most significant and widely used type of reliability (Creswell, 2014).

The questionnaire of the present study was designed based on Koenig-Lewis et al.'s theoretical model, which was designed based on many other validated theories and frameworks, so there was no need to test this instrument again. Koenig-Lewis et al.'s (2010) survey was used effectively in a prior peer-reviewed study. Moreover, they tested their instrument by confirmatory factor analysis (CFA), and they found that all factors were highly significant and effectively supported convergent validity and internal reliability (Koenig-Lewis et al, 2010). As a result, there was no need to test the instrument through a pilot study before beginning the process of data collection.

Data Collection

A questionnaire survey was the appropriate technique for gathering data from society to investigate Saudi banks customers' attitudes toward the acceptance and use of mobile banking services. After receiving official approvals from the committee, the Institutional Review Board (IRB) at the University of North Texas (Appendix C), and the Saudi Arabian Monetary Agency (SAMA) to distribute the present study instrument, four Saudi banks agreed to participate in the procedure of collecting the data. The customer care departments in these four banks helped to choose the random sample for the study, contact the participants, and send emails under the supervision and administration of the researcher and the committee chair. Each bank consented to select a sample of 250 customers, 1,000 customers in total, as the sample of the study. Therefore, 1,000 emails with the link to the study questionnaire were sent during different periods of time, morning and afternoon, by the customer care department in each bank. Both versions of the questionnaire, Arabic and English, were built and distributed using the Qualtrics Insight Platform website, which is private research software that helps users to create, edit, and distribute surveys online. All customers were informed about the objects of the study, the voluntariness of participation, and all survey instructions (Appendix D). Participants were allowed to respond to the questionnaire once, and they had the right to stop participating at any time.

Data Analysis Procedures

Data analysis is the last procedure in the process of answering the study questions related to the purposes of this study, assessing the acceptance of mobile

banking applications and the factors affecting the use and adoption of mobile banking by Saudi bank customers. This procedure was begun after the process of data collection was complete. Qualtrics software was used to collect the data and download it in many formats such as MS Excel, MS Access, SPSS, and XML. Data analysis included three steps: data cleaning, descriptive statistics analysis, and a multiple linear regression technique.

Data Cleaning

Questionnaire results for all items were downloaded and imported online from the Qualtrics software website into the Statistical Package for the Social Sciences (SPSS) to be cleaned and analyzed. After the process of participation in the survey was completed, 548 responses were downloaded. 46 survey responses were incomplete, so they were excluded.

Descriptive Statistics

Descriptive statistics analysis was used to analyze demographic data including gender, age, education level, average monthly income, and occupation. Statistical Package for the Social Sciences (SPSS) software was used. Frequency distribution for all questions was generated, and histograms also were created. The purpose of using descriptive statistics is to calculate the standard deviations and distribution range. In addition, questions 6 to 8 were designed to ask participants whether they used mobile banking applications or not, the frequency of their use of such applications, and their experiences with using mobile banking. Thus, question 6 was followed by four hypotheses focusing on the effect of four demographic variables: gender, age,

education level, and monthly income. A one-way ANOVA and a t-test were used to determine the statistical significance of all variables. The conventional 2-tailed 0.05 level was used throughout the present study.

Multiple Linear Regression Technique

Multiple linear regression is a statistical technique used to examine the relationships among a collection of predictor variables. Multiple linear regression allows the user to use more than one independent variable to predict a single dependent variable, or at least it shows how a set of independent variables helps to explain a proportion of the variance of a dependent variable.

Multiple linear regression was also used in current study to analyze the responses to the questions concerning the attributes of mobile banking applications as perceived by Saudi bank customers. These attributes are: usefulness (items 9-12), ease of use (items 13 and 14), credibility (items 15-17), trust (items 18 and 19), compatibility (items 20-22), risk (item 24), and cost (item 23). Moreover, to estimate the internal consistency reliability, Cronbach's alpha was calculated for each construct.

CHAPTER 4

RESULTS

Introduction

The focus of the current study was to explore the adoption of mobile banking among Saudi banks customers. The study sought to find some information that would be helpful for improving the use of mobile banking services and applications. This study was designed based on Koenig-Lewis et al.'s theoretical model.

This chapter reports the results of analyzing the data collected through the questionnaire in order to answer the following questions:

1. To what extent do Saudi bank customers adopt mobile banking services?

2. What are the differences in demographic characteristics among mobile banking adopters and non-adopters in Saudi Arabia?

3. To what extent does perceived usefulness relate to mobile banking adoption among Saudi customers?

4. To what extent does perceived ease of use relate to mobile banking adoption among Saudi customers?

5. To what extent does perceived compatibility relate to mobile banking adoption among Saudi customers?

6. To what extent does perceived credibility relate to mobile banking adoption among Saudi customers?

7. To what extent does perceived trust relate to mobile banking adoption among Saudi customers?

8. To what extent does perceived risk relate to mobile banking adoption among Saudi customers?

9. To what extent does perceived cost relate to mobile banking adoption among Saudi customers?

10. What factors influence Saudis bank customers' adoption of mobile banking applications?

Descriptive Statistics

The response rate for this study reached more than 50%: out of the 1000 questionnaires that were distributed to Saudi bank customers, 548 were returned. Five questions were asked in order to gather information on the following demographical characteristics of Saudi bank customers: gender, age, education level, average monthly income, and current occupation.

Statistics Relating to the Demographic Variables

Table 2 shows the statistics relating to all the demographic variables of the participants in this study. The mean scores in Table 2 were derived for the purpose of testing for differences and for descriptive purposes. Education level and monthly income had the highest mean scores.

Table 2

Statistics Relating to the Demographic Variables

Variable	Gender	Age	Education Level	Monthly Income	Profession
Mean	1.33	2.97	3.97	3.68	2.45
Median	1.00	3.00	4.00	4.00	2.00
Std. Deviation	.470	1.318	.994	1.383	1.355

For the gender variable, Table 3 shows that the participants included more males (67.2%) than females (32.8%).

Table 3

Gender Distribution of Participants

Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Gender				
Male	336	66.9	67.2	67.2
Female	166	33.1	32.8	100.0

The age distribution of the participants is presented in Table 4.The participants between the ages of 26-30 and 31-35 were the largest groups among the participants. People with the ages of 26-30 were 24.3% of the participants, while 23.9% of the participants had the ages of 31-35. People with the ages of 36-40 were the third highest

53

group of participants (19.3%), followed by those whose age was above 41 (16.7%).

Only 15.7% of the participants were between the ages of 18 and 25.

Table 4

Age Distribution of Participants

Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Age				
18-25	79	15.7	15.7	15.7
26-30	122	24.3	24.3	40.0
31-35	120	23.9	23.9	63.9
36-40	97	19.3	19.3	83.3
Above 41	84	16.7	16.7	100.0

Data were gathered from people of various education levels, as shown in Table

5. The largest group of the participants, 44.4% held a bachelor degree, while another

9.8% of them held a diploma from a community or technical college. The second largest

group of participants (33.1%) was that of postgraduates who held Master or Ph.D.

degrees. Participants with a high school certificate or equivalent constituted 11.8% of

participants, while only 1.0% of the total number of participants had less than a high

school certificate.

Table 5

Education Levels Distribution of Participants

Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Education				
Less than High School	5	1.0	1.0	1.0
High School or Equivalent	59	11.8	11.8	12.7
Diploma	49	9.8	9.8	22.5
Bachelor	223	44.4	44.4	66.9
Master or Ph.D.	166	33.1	33.1	100.0

As shown in Table 6, around 53% of participants had an income between SAR 5,000 and 14,999 (USD 1,333.49- 4,000.21) monthly. 28.1% of participants received between SAR 10,000 and 14,999 as a monthly income, and 24.9% of them had an income between SAR 5,000 and 9,999. Moreover, 17.1% of participants had an income between SAR 15,000 and 20,000, while 10.8% of participants received more than SAR 20,000 (USD 5333.97) as a monthly income. The lowest income group was that of people making under SAR 1000 monthly, with only 8% of participants.

Table 6

Monthly Income Distribution of Participants

Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Monthly Income				
Under SAR 1000	40	8.0	8.0	8.0
1,000-4,999	56	11.2	11.2	19.1
5,000-9,999	125	24.9	24.9	44.0
10,000-14,999	141	28.1	28.1	72.1
15,000-20,000	86	17.1	17.1	89.2
Over SAR 20,000	54	10.8	10.8	100.0

For the current profession, as shown in Table 7, the majority of participants were government employees (53.6%), followed by 18.1% who were students, and 12.7% who were private sector employees. 4.4% of the participants identified themselves as self-employed, and 3.4% of them were retired. Only 7.8% of the participants did not identify their job title with any occupation qualification listed in the questionnaire. Unemployed, soldier, manger, and housewife were some examples of terms participants used to identify their professions.

Table 7

Profession Distribution of Participants

Variable	Frequency	Percent	Valid Percent	Cumulative Percent
Profession				
Student	91	18.1	18.1	18.1
Government employee	269	53.6	53.6	71.7
Private sector employee	64	12.7	12.7	84.5
Self-employed	22	4.4	4.4	88.8
Retired	17	3.4	3.4	92.2
Other	39	7.8	7.8	100.0

Distribution of the Rate of Adoption

Q1. To what extent do Saudi bank customers adopt mobile banking services?

To determine the rate of adoption of mobile banking among Saudis, they were asked whether they used mobile banking services or not, thus indicating their awareness and use of mobile banking applications. As shown by the 502 responses, 82.7% of the participants used mobile banking services, and only 17.3% did not use them.

Table 8

Distribution of the Rate of Mobile Banking Adoption

	Frequency	Percent	Mean	*SD*
Adopt	415	82.7	1.17	.379
Not adopt	87	17.3		
Total	502	100.0		

Table 8 provides some significant statistical values related to the adoption of mobile banking services such as frequency, percent, mean, and standard deviation. Figure 4 shows the distribution of mobile banking adoption by the sample of the study in histogram form.
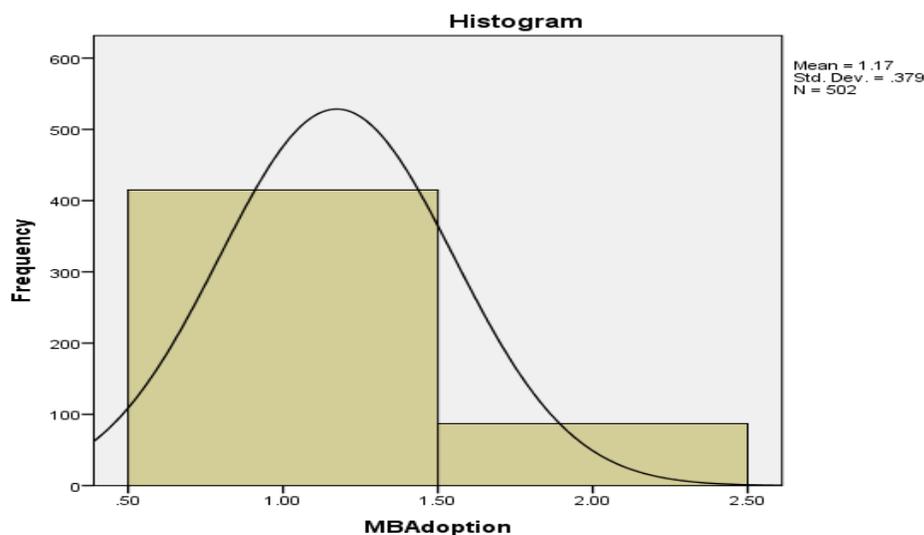
Figure 6. Distribution of the use of mobile banking In Saudi Arabia.

Regarding the frequency of the use of mobile banking applications, Table 9

shows that 29.5% of participants used mobile banking applications once a week, while

18.5% of them used them up to twice a month. Although 17.9% of the participants had

not used mobile banking, 17.1% of them used mobile banking every day. 16.9% of the

sample stated that they used mobile banking application at least three times a month.

Table 9

Frequency of Using Mobile Banking

Times	Frequency	Percent	Valid Percent	Cumulative Percent
Never	90	9.4	17.9	17.9
Every day	86	8.9	17.1	35.1
Once a week	148	15.4	29.5	64.5
Up to twice a month	93	9.7	18.5	83.1
At least 3 times a month	85	8.8	16.9	100.0
Total	502	52.2	100.0	
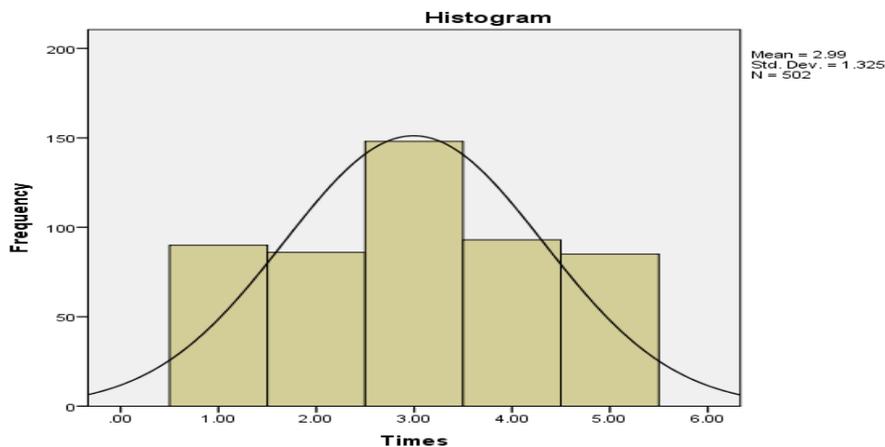
Figure 7. Distribution of frequency of using mobile banking.

Participants were also asked about their experiences in using mobile banking

services provided by their banks. 35.5% of participants had used mobile banking

applications for more than 3 years, and 30.9% of them had used them from between 1 to 3 years. Although 17.7% of participants did not use mobile banking services at all, 10.4% of participants had used mobile banking for 6 months to one year. Only 5.6% of the sample had mobile banking for less than 6 months prior to the study. Table 10 and Figure 6 illustrate the frequency distribution of the participants' experiences with mobile banking applications.

Table 10

The Distribution of the Experiences with Mobile Banking

Experience	Frequency	Percent	Valid Percent	Cumulative Percent
Not used at all	89	9.3	17.7	17.7
Less than 6 months	28	2.9	5.6	23.3
6 months to 1 year	52	5.4	10.4	33.7
1 to 3 years	155	16.1	30.9	64.5
More than 3 years	178	18.5	35.5	100.0
Total	502	52.2	100.0	
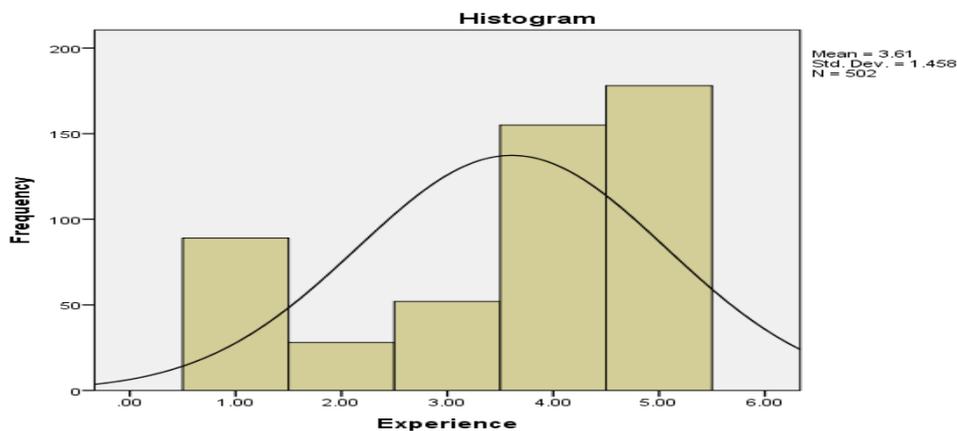
Figure 8. The distribution of participants' experiences with mobile banking.

Demographic Differences in Adopting Mobile Banking

Q2. What are the differences in demographic characteristics among mobile

banking adopters and non-adopters in Saudi Arabia?

To answer the above questions, it was necessary to find the differences between

adopters and non-adopters. Participants, as a result, were asked whether or not they

used mobile banking services. Participants whose responses were yes were considered

to be adopters, whereas the remaining were non-adopters. Figure 7 shows that the

majority of current study's participants were adopters (82.7% of the sample). This result

indicated that most Saudi banks customers are aware of mobile banking as a

technology, and they use this technology to contact banks and conduct many financial

transactions. This section presents the analysis procedure that tested the demographic

differences among the adopters and non-adopters of mobile banking applications in

Saudi Arabia.
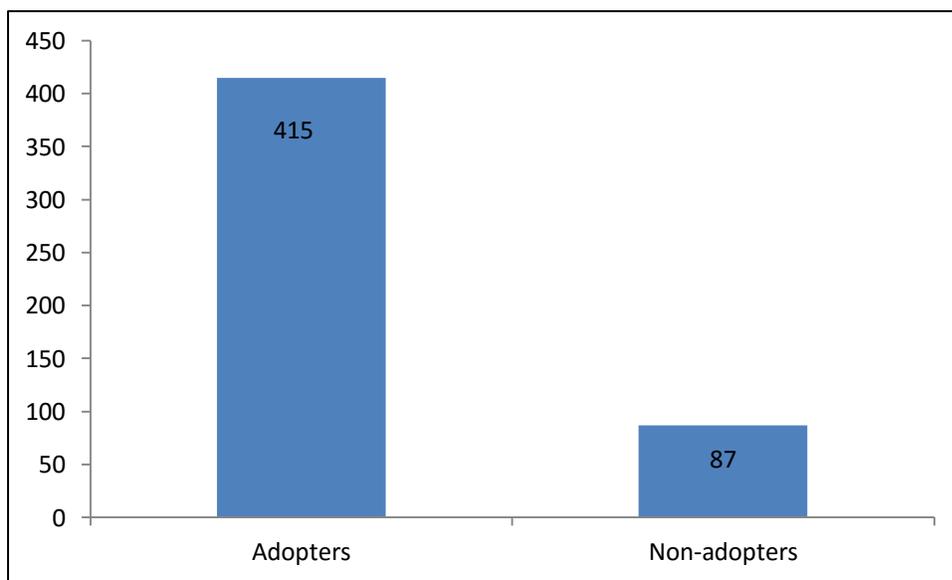
Figure 9. Total number of adopters and non-adopters.

Mobile Banking Adoption and Gender

The data collected indicated that out of 336 males, 89.0% (299) were mobile banking adopters, and 11.0% (37) were non-adopters. From the total number of females (164), 69.5% (114) of the participants were adopters, and 30.5% of them were non-adopters (see Figure 8).
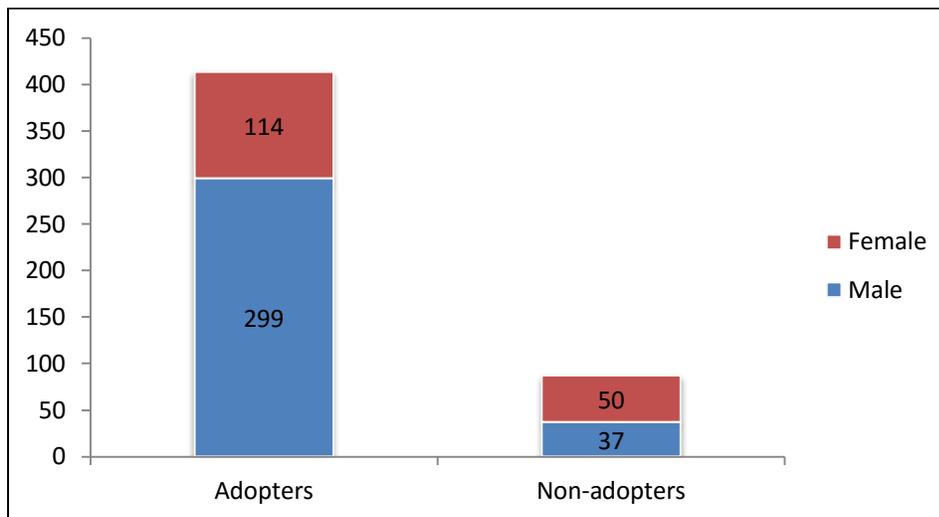
Figure 10. Adopters and non-adopters by gender.

A chi-square test was executed to determine the relationship between mobile banking adoption and gender. The relationship between mobile banking adoption and gender was significant, χ^2 (1, N=502) = 29.086, *p*=.00001<.05. Thus, there was a significant relationship between mobile banking adoption and gender (see Table 11).

Table 11

Relationship between Mobile Banking Adoption and Gender

Mobile Banking		Male	Female	χ^2	p
Adopters	Total number	299	114		
	% within gender	89.0	69.5		
	% within adoption	72.4	27.6	29.086	.00001
Non-adopters	Total number	37	50		
	% within gender	11.0	30.5		
	% within adoption	42.5	57.5		

Mobile Banking Adoption and Age

Participants were asked to choose from five groups to identify their ages: 18-25, 26-30, 31-35, 36-40, and above 41. According to the data, 209 (50.4%) of mobile banking adopters were in the 26-30 and 31-35 age groups, followed by the participants in the two age groups of 36-40 (19.5%) and above 41 (16.1%). Only 58 (14%) of participants were in the ages between 18 and 25 (see Figure 9).
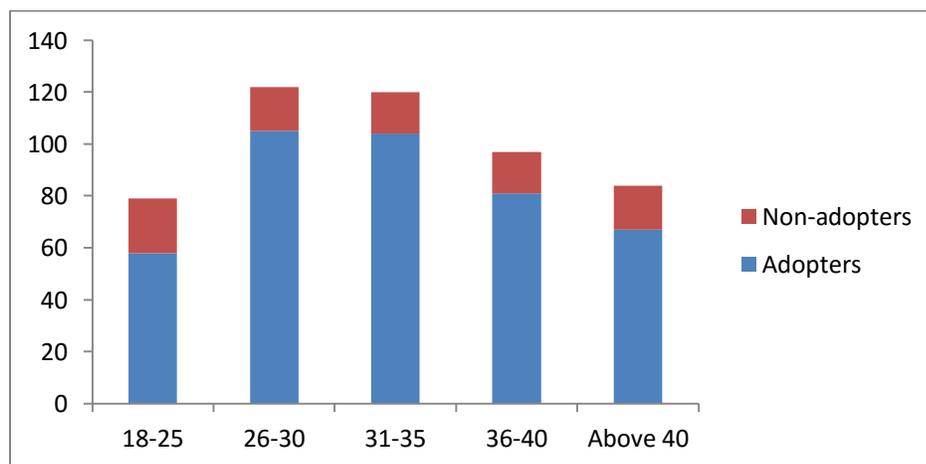
Figure 11. Adopters and non-adopters by age.

For examining the relationship between mobile banking adoption and age, a chi-square test was performed. The outcome of this examination showed that the relationship between participants' ages and the adoption of mobile banking services was not significant because of χ^2 (1, N=502) = 7.583, p= .108 > .05. Thus, this result indicates that the adoption of mobile banking was independent of age, which suggests that there is no relationship between age and the adoption of mobile banking in Saudi Arabia (see Table 12).

Table 12

Relationship Between Mobile Banking Adoption and Age

		Age Range						
		1	2	3	4	5		
Mobile Banking		18-25	26-30	31-35	36-40	Above 41	χ^2	p
Adopters	Total number	58	105	104	81	67		
	% within Age	73.4	86.1	86.7	83.5	79.8		
	% within adoption	14.0	25.3	25.1	19.5	16.1	7.583	.108
Non-adopters	Total number	21	17	16	16	17		
	% within Age	26.6	13.9	13.3	16.5	20.2		
	% within adoption	24.1	19.5	18.4	18.4	19.5		

Mobile Banking Adoption and Education Level

The education levels of participants' in this study were categorized into five groups: less than high school, high school or equivalent, diploma, bachelor, and post graduate (Master and Ph.D.). Participants were asked to identify their education degree. The adopters who held Bachelor (176) and Master and Ph.D. (151) degrees were the

largest groups in the sample. They were 78.8% of the adopters in total. While only three (0.7%) adopters of mobile banking had less than high school education level, adopters with high school graduates and diploma certificate holders were 20.5% of the adopters (see Figure 9).
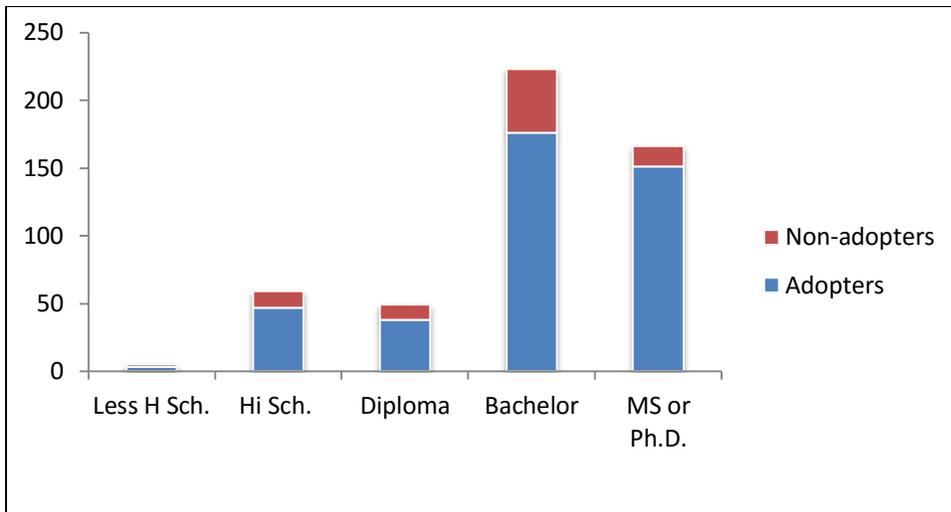
Figure 12. Adopters and non-adopters by education level.

A chi-square test was conducted to discover the relationship between mobile banking adoption and education level. The relationship between these two variables was significant, χ^2 (1, N=502) = 13.217, *p*= .0102 < .05. Thus, there was a significant relationship between education background and mobile banking adoption (see Table 13).

Table 13

Relationship between Mobile Banking Adoption and Education Level

		Education Level						
		1	2	3	4	5		
		Less				MAS/		
		Hi Sch.	Hi Sch.	Diploma	Bachelor	Ph.D.		
Mobile Banking							χ^2	*p*
Adopters	Total number	3	47	38	176	151		
	% within Education Level	60.0	79.7	77.6	78.9	91.0		
	% within adoption	.7	11.3	9.2	42.4	36.4	13.217	.0102
Non-adopters	Total number	2	12	11	47	15		
	% within Education Level	40.0	20.3	22.4	21.1	9.0		
	% within adoption	2.3	13.8	12.6	54.0	17.2		

Mobile Banking Adoption and Monthly Income

As Figure 11 shows, participants were divided into five groups according monthly income in Saudi Riyal (SAR 1= $ 0.27): those earning under 1000, 1,000-4,999, 5,000-9,999, 10,000-14,999, 15,000-20,000, and over 20,000.
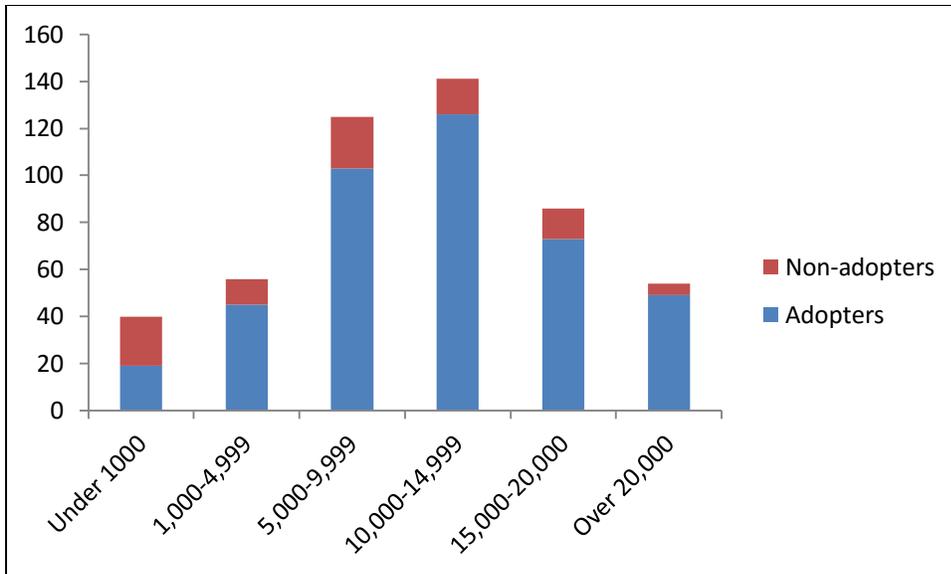
Figure 13. Adopters and non-adopters by monthly income.

The highest percentages of adopters were in two groups: those earning10,000-14,999 (30.4%) and 5,000-9,999 (24.8). Also, adopters who earned between SAR 15,000 and 20,000 were 17.6% of adopters, while only 4.6% of adopters earned less than SAR 1000 in monthly income (see Table 14).

Table 14

Relationship between Monthly Income and Mobile Banking Adoption

		Monthly Income							
		1	2	3	4	5	6		
		Under	1,000-	5,000-	10,000-	15,000-	Over		
Mobile Banking		1000	4,999	9,999	14,999	20,000	20,000	χ^2	*p*
Adopters	Total number	19	45	103	126	73	49		
	% within Monthly Income	47.5	80.4	82.4	89.4	84.9	90.7		
	% within adoption	4.6	10.8	24.8	30.4	17.6	11.8	41.905	.0102
Non-adopters	Total number	21	11	22	15	13	5		
	% within Monthly Income	52.5	19.6	17.6	10.6	15.1	9.3		
	% within adoption	24.1	12.6	25.3	17.2	14.9	10.8		

To check for a relationship between mobile banking adoption and the monthly income of participants, a chi-square test was performed. The relationship between these variables was significant, χ^2 (1, N=502) = 41.905, *p*=.00001<.05. Accordingly, there were significant differences in monthly income between adopters and non-adopters of mobile banking.

Mobile Banking Adoption and Profession

Six job title descriptions: student, government employee, private sector employee, self- employed, retired, and others, were available for participants in this study to determine their current profession. Out of the 415 adopters, 57.1% were

government employees, 17.8% were students, and 11.1% were from the private sector. While only 3.1% of adopters were retired, 4.6% of the total number of adopters defined themselves as self-employed. Twenty six (6.3%) adopters chose others in the profession question, and they provided other titles to describe their jobs such as unemployed, manager, housewife, etc. (see Figure 12).
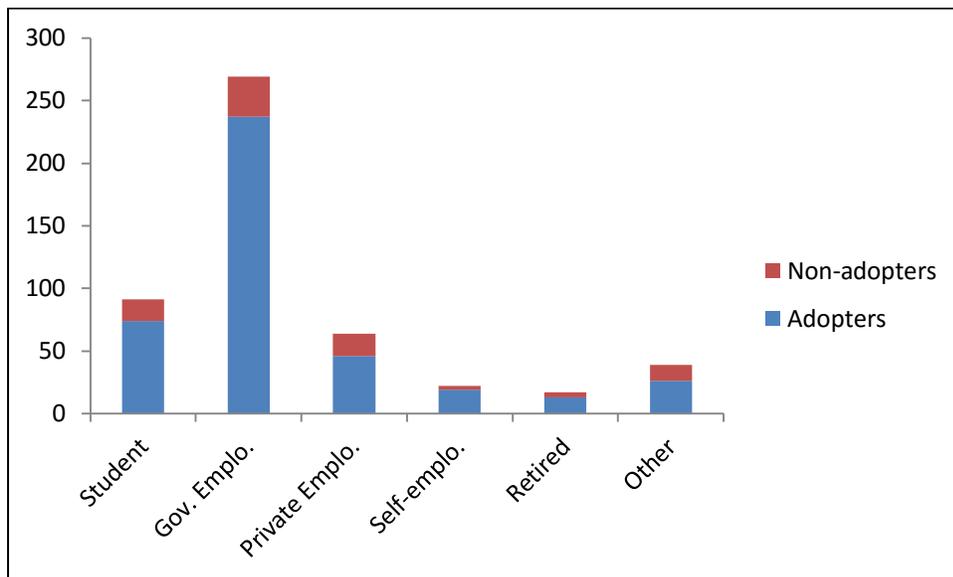


Figure 14. Adopters and non-adopters by profession.

A chi-square test was conducted to examine the relationship between the adoption of mobile banking services and profession. The relationship between profession and mobile banking adoption was significant, χ^2 (1, N=502) = 18.503, *p*=.002 <.05. Consequently, there was a significant relationship between these variables (see Table 15).

Table 15

Relationship between Profession and Mobile Banking Adoption

Mobile Banking		Job Title						χ^2	*p*
		1	2	3	4	5	6		
		Student	Gov. Emplo.	Private Emplo.	Self-emplo.	Retired	Other		
Adopters	Total number	74	237	46	19	13	26		
	% within Job Title	81.3	88.1	71.9	86.4	76.5	66.7		
	% within adoption	17.8	57.1	11.1	4.6	3.1	6.3	18.503	.002
Non-adopters	Total number	17	32	18	3	4	13		
	% within Job Title	18.7	11.9	28.1	13.6	23.5	33.3		
	% within adoption	19.5	36.8	20.7	3.4	4.6	14.9		

Customers' Attitudes Toward Mobile Banking Applications

One of the main purposes of the study was to determine the relationship between mobile banking applications adoption as a criterion variable and the seven factors of adopting mobile banking technology, developed by Koenig-Lewis, Palmer, & Moll (2010), as predictors: usefulness, ease of use, credibility, trust, compatibility, cost, and risk. A multiple regression analysis was conducted using SPSS version 22 in which each predictor was an independent variable and the adoption of mobile banking was the dependent variable. Applying this process was helpful in assessing the influence of each predictor of the adoption of mobile banking services as perceived by bank

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customers in Saudi Arabia. Table 16 shows the process of coding all items in the

questionnaire.

Table 16

Items Codes from the Questionnaire

Attributes	Item Number	Code
Usefulness		
	Item 2	EASIER
	Item 3	USEFUL
	Item 4	SEARCHABLE
	Item 5	INFORMED
Ease of Use		
	Item 6	EASY
	Item 7	SKILLFUL
Credibility	Item 8	UNCOVERED
	Item 9	SECURE
	Item 10	SAFE
Trust		
	Item 11	TRUSTB
	Item 12	TRUSTM
Compatibility		
	Item 13	APPROPRIATE
	Item 14	SUITABLE
	Item 15	COMPATIBLE
Cost		
	Item 16	COSTLY
Risk		
	Item 17	RISKY

The Validity of the Constructs

The validity of the construct refers to the ability of an instrument, such as a survey, test, etc., to measure effectively what it is supposed to measure. Construct validity, in fact, is primary piece of evidence to test the intended construct and make sure that the construct meets the aims of the theory or model. Moreover, construct validity helps in addressing the meaning of the measurement process (Messick, 1989).

According to (Messick, 1989), construct validity unifies ethics and science in the testing of hypotheses about the relationships between variables. Construct validity also represents the dynamic process between the validity and test use, and it provides an evidential basis for test interpretation.

To test the validity of current study's construct, principal components analysis (PCA) was conducted by using factor analysis test in SPSS version 22 and the correlation Varimax with Kaiser Normalization to assess the construct validity. According to Messick (1989), there are four groups of loadings in the validity values. Fair loadings are in excess of 0.45, those greater than 0.55 are good, those of 0.63 are very good, and those of 0.71 are excellent. As shown in Table 16, loadings on the factor analysis results were in the excellent range: 7 out of 16, very good: 5 out of 16, good: 2 out of 16, and fair: 1 out of 16. No weak loadings appeared as shown in Table 17.

Table 17

Factor Analysis for Construct Validity

Item	Factor						
	1	2	3	4	5	6	7
Easier	.655	.366	.007	-.135	.009	.304	-.089
Useful	.679	.332	.036	-.279	-.130	.160	-.044
Searchable	.618	.505	.047	-.188	.134	-.274	.042
Informed	.718	.383	.019	-.035	.066	-.164	.051
Easy	.747	.117	-.063	.278	-.410	-.091	-.037
Skillful	.683	.129	-.092	.228	-.218	.038	.082
Uncovered	.611	-.290	.193	-.098	-.033	.025	.141
Secure	.779	-.365	.273	-.144	-.118	.040	.168
Safe	.771	-.231	.244	-.085	-.009	-.090	-.143
TrustB	.757	-.308	.126	.004	.050	-.059	-.170
TrustM	.682	-.201	-.019	.118	.170	.001	-.021
Appropriate	.779	.010	-.113	.175	.238	.124	.097
Suitable	.734	-.001	-.129	.179	.276	.042	.022
Compatible	.648	-.076	-.204	.130	.009	-.019	-.087
Costly	-.229	.169	.582	.243	.090	.036	-.045
Risky	-.384	.359	.300	.224	.003	.047	.033

Reliability of the Constructs

A reliability test shows the degree to which an assessment tool produces stable and consistent results (Henson, 2001). Determining the reliability of the constructs is important because it measures how much impact each component has on the overall reliability of the research (Henson, 2001).

A reliability test was conducted on the obtained data to assess the reliability and internal consistency of the Saudi bank customers' perceptions of each construct in the questionnaire. First, five constructs of the model, usefulness, ease of use, credibility,

trust, and compatibility, were tested. The other two constructs, cost and risk, were excluded because they were represented only in one item for each construct in the study instrument and hence could not be tested. Also, Koenig-Lewis, Palmer, & Moll (2010) excluded them because they tested the constructs that had variance, so cost and risk were excluded.

Alpha values for the study, as shown in Table 18, ranged from .75 to .85, and the total alpha value was .86. These results indicated that all constructs of the model were reliable. The internal consistency of the instrument was therefore acceptable.

Table 18

Cronbach's Alpha Reliability of Constructs

Construct	Items	Alpha
Usefulness	4	.85
Ease of Use	2	.80
Credibility	3	.85
Trust	2	.75
Compatibility	3	.81

Assumption of Linearity

Linearity is the assumption that a straight line would be the best way to determine the nature of the relationship between the predictors and the criterion variable. These variables should be checked visually in order to have clear overview

about the relationship between the dependent variable and each predictor (Osborne, &

Waters, 2002).

After a review of normal P-P plots (Appendix G), there was not a clear

relationship between each predictor variable and the criterion variable.

Assumption of Normality

Normality of distribution is the other assumption of regression; it assumes that

variables have normal distributions. This assumption was tested by the constructing of a

histogram for the dependent and the residual variables. A histogram is a visual

technique allowing for data examination to decide whether the data are approximately in

the normal distribution or not. A line of normality was also used to show the shape of

distribution and how close to normal it was (Osborne & Waters, 2002).

The histogram in Figure 13 shows that the distribution of the data was near

normal with a skewed left distribution. According to Nimon, Lewis, Kane, & Haynes,

(2008), skewed left is one of the symmetric distributions and happens when the left tail

is much longer than the right tail because a few low scores tend to shift the mean to the

left.
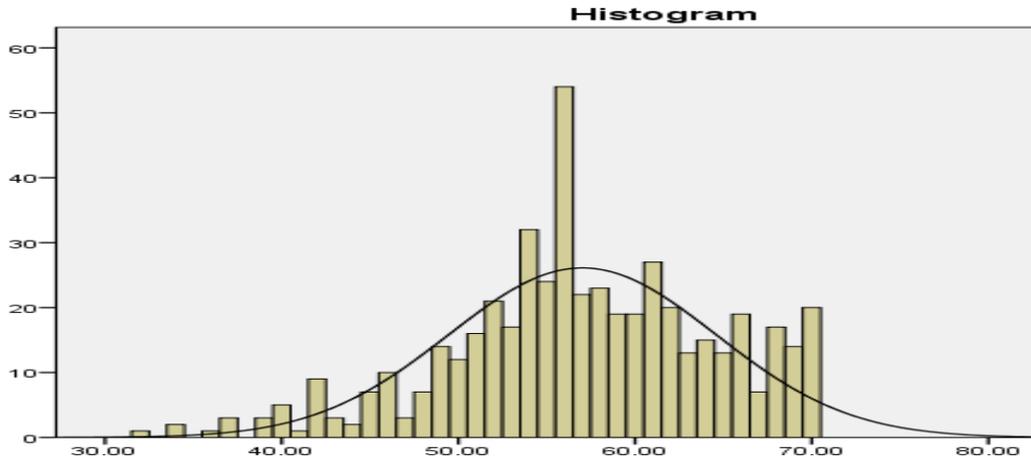
Figure 15. Distribution of mobile banking adoption.

In addition, the values of skewness and kurtosis were analyzed to confirm the results from the histogram. While skewness, a statistical assessment tool, aims to measure a shift from the center toward either side, kurtosis, another statistical assessment tool, aims to characterize the shape of the distribution curve in terms of whether it is taller or flatter. Table 19 shows the values of skewness and kurtosis for the distribution of the data.

Table 19

Skewness and Kurtosis for the Distribution of Data

Variable	M	*SD*	Skewness	Kurtosis
Mobile Banking Adoption	56.51	8.62	-1.168	3.324
Usefulness	16.8108	2.87290	-1.247	2.767
Ease of Use	8.3167	1.59630	-1.047	1.337
Credibility	11.3187	2.32705	-.672	.982
Trust	7.8347	1.56258	-1.003	1.866
Compatibility	12.2390	2.05965	-1.012	2.610
Cost	2.5316	1.12216	.504	-.603
Risk	2.8127	1.05762	.217	-.649

Communalities of Variables

A data reduction method in the principal axis factoring was used to reduce multicollinearity with variables. Table 20 shows both the initial and extraction values for all constructs of the study model.

Table 20

Communalities of Variables

	Initial	Extraction
Easier	.532	.540
Useful	.572	.548
Searchable	.561	.580
Informed	.626	.682
Easy	.593	.532
Skillful	.535	.473
Uncovered	.483	.457
Secure	.698	.700
Safe	.660	.641
TrustB	.640	.677
TrustM	.505	.510
Appropriate	.632	.595
Suitable	.581	.528
Compatible	.455	.424
Costly	.194	.059
Risky	.291	.238

Multicollinearity

The occurrence of high correlations between predictor variables in a multiple regression is called multicollinearity, and it is the other assumption. It is difficult to determine the reliability of each regression coefficient if there is multicollinearity

because the correlated variables measure the same construct (Kraha, Turner, Nimon, Zientek, & Henson, 2012).

Tolerance and variance inflation factor (VIF) tests were conducted to determine multicollinearity. The problem of multicollinearity occurs when tolerance is less than .20. Also, when VIF value is above 4, arbitrariness is indicated (Kraha, Turner, Nimon, Zientek, & Henson, 2012). As shown in Table 21, all independent variables had acceptable tolerance and variance inflation factor (VIF) values. Multicollinearity was not a problem in this study.

Table 21

Collinearity Diagnostics

Factor	Tolerance	VIF
Usefulness	.518	1.932
Ease of Use	.476	2.101
Credibility	.401	2.497
Trust	.350	2.859
Compatibility	.361	2.770
Cost	.827	1.209
Risk	.719	1.391

Kaiser-Meyer-Olkin Measure (KMO) and Bartlett's Test

A KMO and Bartlett's test was applied to assess the values of KMO of sampling adequacy as shown in Table 22. When the value of KMO is above than 0.5, the sample is adequate. The value of the Kaiser-Meyer-Olkin Measure of sampling adequacy and

Bartlett's test for the study sample was .925, which means that the dataset was

appropriate for factor analysis.

Table 22

Kaiser-Meyer-Olkin Measure (KMO) and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.925
Bartlett's Test of Sphericity	Approx. Chi-Square	4519.757
	df	120
	Sig.	.000

Regression Analysis

Four perceived attributes had a positive correlation with the adoption of mobile

banking technology in Saudi Arabia. Perceived ease of use had a coefficient value of

.332, perceived trust had .163, perceived usefulness had .097, and perceived credibility

had .056. However, three attributes had negative correlations with mobile banking, and

they were: perceived cost with -.021, perceived risk with -.059, and perceived

compatibility with -.061 (see Table 23).

Table 23

Standardized Regression Weights

Usage of Mobile banking Attribute	Value
Perceived Ease of Use	.332
Perceived Trust	.163
Perceived Usefulness	.097
Perceived Credibility	.056
Perceived Cost	-.021
Perceived Risk	-.059
Perceived Compatibility	-.061

Table 24, created by using SPSS 22 for the linear regression, shows the standardized and unstandardized coefficients of all perceived attributes of using and adopting mobile banking applications on the part of Saudi banks customers. This Table shows that there were some positive correlations and other negative correlations based on Beta value. While perceived ease of use with .075, perceived trust with .037, perceived usefulness with .012, and perceived credibility with .009 were positive correlations with mobile banking adoption, perceived cost with value of -.007, compatibility with value of -.011, and perceived risk with value of -.020 were negative correlations.

Table 24

Linear Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-.159	.124		-1.286	.199
Perceived Usefulness	.012	.007	.097	1.814	.070
Perceived Ease of Use	.075	.012	.332	6.013	.000
Perceived Credibility	.009	.009	.056	.914	.361
Perceived Trust	.037	.015	.163	2.468	.014
Perceived Compatibility	-.011	.011	-.061	-.936	.350
Perceived Cost	-.007	.014	-.021	-.483	.629
Perceived Risk	-.020	.016	-.059	-1.259	.209

The model summary in Table 25 shows calculations for all important values that can be used to provide a clear overview about the model of the study. Mobile banking adoption was the dependent variable, and the seven attributes of the adoption,

perceived usefulness, perceived ease of use, perceived credibility, perceived trust,

perceived compatibility, perceived cost, and perceived risk were the predictors. The

results were R^2= .197, Adjusted R^2= .197, and F-Value= 17.29.

Table 25

Model Summary

R	R Square	Adjusted R Square	Change Statistics				
			R Square Change	F Change	df1	df2	Sig. F Change
.444	.197	.185	.197	17.295	7	494	.000

CHAPTER 5

CONCLUSION AND DISCUSSION

Introduction

This study was conducted to explore the factors influencing the adoption of mobile banking applications and services in Saudi Arabia to fill the gap in the literature by applying diffusion of innovation theories and models to the data. Mobile technologies and networks significantly impact the environment of financial institutions, and they allow customers to access their available services 24 hours a day from anywhere. Also, advanced technology helps banks to reduce some costs and market their services and products widely.

This quantitative study aimed to explore the Saudi bank customers' perceptions about the adoption of mobile banking applications and to test the relationships between the factors that influence mobile banking adoption as independent variables and the action to adopt them as the dependent variable. Saudi customers' perceptions were tested based on the extended versions of IDT, TAM and other diffusion of innovation theories and frameworks to generate a model of constructs that can be used to study the use and the adoption of mobile technology by users. Koenig-Lewis, Palmer, & Moll's (2010) model was used to test its constructs of (1) perceived usefulness, (2) perceived ease of use, (3) perceived compatibility, (4) perceived credibility, (5) perceived trust, (6) perceived risk, and (7) perceived cost, and these were the independent variables in current study. This study research questions were:

1. To what extent do Saudi bank customers adopt mobile banking services?

2. What are the differences in demographic characteristics among mobile banking adopters and non-adopters in Saudi Arabia?

3. To what extent does perceived usefulness relate to mobile banking adoption among Saudi customers?

4. To what extent does perceived ease of use relate to mobile banking adoption among Saudi customers?

5. To what extent does perceived compatibility relate to mobile banking adoption among Saudi customers?

6. To what extent does perceived credibility relate to mobile banking adoption among Saudi customers?

7. To what extent does perceived trust relate to mobile banking adoption among Saudi customers?

8. To what extent does perceived risk relate to mobile banking adoption among Saudi customers?

9. To what extent does perceived cost relate to mobile banking adoption among Saudi customers?

10. What factors influence Saudis bank customers' adoption of mobile banking applications?

An online questionnaire developed by Koenig-Lewis et al. (2010) was used with some modifications to collect the data via emails. Participants in this study were

selected randomly from among Saudi banks customers to collect the needed data. Out of 584 returned responses, 502 responses were completed and used as data.

While 66% of participants were men, 33.1% of them were female. Among them, almost half of participants (48.2%) were between 26 and 35 years of age, and 44.4% of them had bachelor degrees. About 53.6% of participants were government employees. The complete demographic data are presented and analyzed in Chapter 4.

Rate of Adoption

First finding of this study was that most Saudi banks customers (82.7%) had adopted and were using mobile banking applications, while relatively few of them (17.3%) had not adopted this technology. These numbers indicated that the adoption of mobile banking applications is very high. This high level of adoption can be attributed to several factors. Rogers (2003), for instance, differentiated the factors affecting the adoption rate of an innovation as social factors, personal factors, and procedure factors. Also, the nature of communication channels, users' decisions, and the type of innovation affect the adoption of any new technology, according to Rogers.

Demographic Differences

The relationships between demographic variables: gender, age, education level, monthly income, and profession on one hand, and the adoption of mobile banking services on the other were tested to determine the influence of each variable on the decision to adopt mobile banking.

Findings from this study revealed there was a statistically significant relationship between the gender of adopters and non-adopters and the adoption of mobile banking.

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Most adopters of new communication innovation are typically younger than non-adopters because younger people find it easier to take on the adventure of trying new technology (Rogers, 2003). However, the present study did not find statistically significant differences between the adopters and non-adopters regarding their ages.

As for the relationship between the education level of adopters and non-adopters and mobile banking adoption, this study found a statistically significant relationship between these variables. Surprisingly, although adopters with Bachelor degrees were almost half of the total of adopters (42.4%), they were also more than half (54%) of the non-adopter group.

Monthly income was tested among adopters and non-adopters of mobile banking applications. The analysis indicated there are significant differences among adopters and non-adopters regarding their monthly income.

Lastly, the outcomes of this study also found a statistically significant relationship between adopters and non-adopters of mobile banking regarding their profession. While government employees, for instance, were the largest group of adopters (more than 57%), they also were more than 36% of the non-adopters.

In contrast to the findings of the few examples of published literature investigating the effects of demographic factors on the adoption of mobile banking applications, such as Iddris (2013), Yang, A. (2009), Hanafizadeh et al. (2014), Daud et al. (2011), and Jaradat, & Twaissi (2010), this study found gender and income were the most important demographic factors affecting adoption of mobile banking. However, this study found all of the investigated demographical variables have significant relationships to the adoption of mobile banking applications, except for the age variable.

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Customers' Perception of Mobile Banking Applications

RQ10: What factors influence Saudi bank customers' adoption of mobile banking applications?

This section discusses the answer to the research question about the factors influencing the adoption of mobile banking applications by Saudis.

All diffusion of innovation theories propose some attributes useful for predicting users' perceptions in relation to their decisions to adopt and not adopt any new innovation. Rogers' attributes, for instants, help to predict the level of adoption of, the awareness of, and the obstacles to the adoption of new technology by the social system's members and help to identify the factors influencing the use and the adoption of this new technology. Moreover, the TAM, TRA, and UTAUT models have suggested some other variables to assess the adoption level of new technology such as mobile banking applications. Koenig-Lewis, Palmer, & Moll (2010) extended the TAM in line with these theories and frameworks, and they created new model including seven attributes to study the adoption of mobile banking applications.

Seven attributes relating to the adoption of mobile banking applications were evaluated in this study to assess which variables affected Saudi banks customers in their adoption of mobile banking services. These variables were perceived usefulness, perceived ease of use, perceived compatibility, perceived credibility, perceived trust, perceived risk, and perceived cost. These variables were evaluated in the regression analysis in order to discover the relative contribution of each attribute and its overall predictive power.

The applied model revealed a significant relation of the attributes to the dependent variables of adoption. In fact, the outcomes showed that the perceived ease of use (β=.332, p > .05), perceived trust (β=.163, p= .03 < .05), perceived usefulness (β=.097, p > .05) and perceived credibility (β=.056, p > .05) variables were positively related to the adoption of mobile banking among Saudis. However, only perceived trust (β=.163, p= .03 < .05) was a significant factor affecting the adoption of mobile banking applications positively in Saudi Arabia. By contrast, the perceived cost (β=-.021, p= .012 < .05), perceived risk (β=-.059, p= .045 < .05), and perceived compatibility (β=-.061, p > .05) variables were negatively related to the adoption of mobile banking services among Saudi bank customers. However, both the perceived cost (β=-.021, p= .012 < .05) and perceived risk (β=-.059, p= .045 < .05) variables had negative correlation with mobile banking adoption in Saudi Arabia. In total, 60.26% of variance in the adoption of mobile banking applications was explained by these three predictors.

The findings indicated that the attributes that significantly affected the adoption of mobile banking applications among Saudis were perceived trust, perceived cost, and perceived risk. Perceived trust is defined as the level of trust that the customer has that another entity will implement expected activities securely, dependably, and reliably (Tobbin, 2012). The term perceived cost refers to the extent to which the customer believes that using any technology will cost money as a valuable product or just for using the service (Yung-Cheng et al., 2010). Ha et al. (2012) define perceived risk as customers' consideration of potential risks in the adoption of the online transactions system, such as losing personal data or identity theft (Ha et al., 2012).

The findings of current study are consistent with those of some previous studies focusing on the adoption of mobile banking applications. For instance, Dimitriadis and Kyrezis (2010), Kim, Shin, & Lee (2009), Namho, & Soon Jae (2009). and Chung and Kwon (2009) found that perceived trust was one of the main factors affecting the adoption of mobile banking services in many societies. According to Shaikh and Karjaluoto (2015), perceived trust was the third most common affective factor appearing in the literature on mobile banking adoption applications, and its frequency of occurrence was 16 times.

Hanafizadeh et al. (2014), Yung-Cheng et al. (2010), Koenig-Lewis et al. (2010), Chitungo and Munongo (2013), and Wessels and Drennan (2010) found that perceived risk was an important factor to predict the adoption of mobile banking. Similarity, this study found the perceived risk was the second strongest predictor of the adoption of mobile banking in Saudi Arabia.

Also, this study showed that perceived cost was one of the factors that affected the use and adoption of mobile banking applications in Saudi Arabia, which is in line with the results of previous research studies such as Shen, Huang, Chu, & Hsu, (2010), Yung-Cheng et al. (2010) in Taiwan, Wessels and Drennan (2010) in Australia, Hanafizadeh et al. (2014) in Iran, and Chitungo and Munongo (2013) in Zimbabwe.

Shaikh and Karjaluoto (2015), on the other hand, reviewed the published literature on the adoption of mobile banking between 2005 and 2014. They analyzed around 55 articles to discover the major theories used to predict customer intentions to adopt mobile banking. Also, they ranked 84 predictors for the adoption of mobile

banking applications. Their results showed that perceived trust, perceived cost, and perceived risk were among the top ten strong predictors, which is consistent with this study's findings. By contrast, perceived trust was the third predictor, perceived risk was the fifth predictor, and perceived cost was the ninth predictor out of 84 predictors in Shaikh and Karjaluoto's (2015) ranking. Ha et al. (2012) likewise reviewed the literature in the period of time between 2008 and 2011, using the TAM as the main theoretical framework to assess the adoption of mobile banking. They found the perceived usefulness, perceived compatibility, perceived risk, and perceived cost were the main factors affecting the adoption of mobile banking. The findings of this study indicated that perceived risk and perceived cost influenced the adoption of mobile banking in Saudi Arabia, and they were two of the main four factors that Ha et al. found in their study.

<center>Contributions and Limitations</center>

The current study aimed to contribute to the knowledge base to fill in the gaps in the scholarly research in assessing the adoption of mobile banking among Saudi banks customers. Although many studies have been published on the adoption and the acceptance of mobile banking applications, none had focused on using the entire frameworks from many of diffusion of innovation theories and models to determine the factors that affect the use and adoption of mobile banking applications in Saudi Arabia. This study provides evidence about the adoption of mobile banking in Saudi Arabia by testing some predictors and relationships based on IDT, the TAM, and other theories of technology adoption. However, the difference between the current study and those in the published literature is that prior studies focused on determining the factors affecting the adoption of mobile banking based on only one or two theories of technology

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acceptance, while this study used Koenig-Lewis et al.'s model (2010) with seven constructs. Despite that the TAM and IDT have been proven to be valid models to predict the adoption of any new technology, they are not comprehensive enough to assess the adoption or identify the influencing factors affecting the adoption of mobile banking. It is possible that other factors could be affect the adoption of mobile banking, but this study tested only the seven constructs developed by Koenig-Lewis et al. (2010).

Based on the review of the literature, the adoption of mobile banking applications is a complicated phenomenon. While many studies assess the adoption of mobile banking by using one or two models, this phenomenon requires many models to test all factors that might affect the adoption process. Therefore, the current study used Koenig-Lewis et al.'s model to study the phenomenon because their model was developed from more than three theories and frameworks. Although Koenig-Lewis et al.'s model helped in the testing of some factors affecting the adoption of mobile banking in Saudi Arabia, it is possible that other factors not tested in this study could affect its adoption.

In short, this study may help customers, banks, and the government in Saudi Arabia to have a clear and adequate overview of the use and adoption of mobile banking applications.

Recommendations

Based on the results of this study, one can make some recommendations for enhancing the adoption of mobile banking by Saudis. Most of the relevant literature used many theories and models from the Social Sciences to study the adoption of

mobile banking, and they used one or combined not more than two theories or models to assess the adoption of mobile banking within a social system. It is recommended that scholars develop an entire model covering all diffusion of innovation theories and models to test the acceptance of any technology by users in the future. Effort can be saved by the creation of a new, comprehensive and integral model that can be used by any researcher to test the adoption of any new technology. Combining as many theories and models as possible, such as theory of innovation diffusion theory, theory of planned behavior, decomposed theory of planned behavior, privacy calculus theory, UTAUT, and the TAM should help in accounting for all attitudes or perceptions toward mobile banking applications or any new technology in the future. Lastly, the causality between the customers' adoption and outcomes and demonstrating the long-term effects of mobile banking should be studied in future research.

The second recommendation is for the government of Saudi Arabia and Saudi banks. There are shortcomings in the legislations and regulations regarding the use of mobile banking applications that can affect bank customers' privacy and money. More rules and laws should be developed and enacted to ensure both customers' and banks' rights and reduce potential threats as much as possible. The findings of this study indicated that perceived trust and perceived risk were two out of three factors affecting the adoption of mobile baking among Saudis. Consequently, banks in Saudi Arabia and SAMA, the Saudi Central Bank, should pay attention to these factors in order to increase the use of mobile banking services and reduce the potential for cybercrimes.

Conclusion

Mobile banking services have changed the design and delivery of financial services and the whole banking sector. Financial service companies employ mobile banking applications as new alternative channels to increase customers' convenience and to reduce costs and maintain profitability. This study explores the influencing factors that affect the adoption of mobile banking applications in Saudi Arabia. Saudi banks customers were the target population of the study, and more than 500 customers participated in this study from a variety of genders, ages (above 18), education levels, professions, etc. The online questionnaire used to deliver the instrument of the study included more than 25 questions to collect the data for the study. The extended TAM with more than three theories and models was used as a theoretical framework.

The current study suggests that gender, education level, monthly income, and profession correlate with significant differences in the distribution of mobile banking service adoption and use among bank customers in Saudi Arabia. Demographic variables consequently were highly important for the rate of adoption, a finding which is consistent with other diffusion of innovation theories such as Rogers' IDT and others. Moreover, the outcomes of this study indicated that the Koenig-Lewis et al.'s model was valid for testing the adoption of mobile banking services in Saudi Arabia.

The current study found that perceived trust, perceived cost, and perceived risk variables significantly influence the adoption of mobile banking in Saudi Arabia. While the perceived trust variable was the strongest influencing factor in the adoption of mobile banking, perceived cost and perceived risk had a negative correlation, equally,

with mobile banking adoption. Furthermore, perceived usefulness, perceived ease of use, and perceived compatibility had no significant correlation with mobile banking adoption, the perceived credibility correlation was weak and did not influence the adoption of mobile banking in Saudi Arabia.

Mobile banking is now important for both banks and customers to stay connected from anywhere and at any time, and all banks find mobile banking the best channel to market their services and save costs and efforts. The current study investigated the use and the adoption of mobile banking applications in Saudi Arabia in order to determine the factors affecting the adoption of mobile banking. The findings of this study revealed that three predictors, perceived trust, perceived cost, and perceived risk, explain more than 60% of variance in intention to adopt mobile banking technology in Saudi Arabia.

APPENDIX A

THE ENGLISH VERSION OF THE QUESTIONNAIRE

PART I – DEMOGRAPHIC INFORMATION

1. Your Gender
   o Male
   o Female

2. What is your age?
   o 18-25
   o 26-30
   o 31-35
   o 36-40
   o Above 41

3. What is the Highest Level of Education you have completed?
   o Less than High School
   o High School or Equivalent
   o Diploma
   o Bachelor
   o Post Graduate (Master or Ph.D.)

4. What is your Approximate Average monthly Income?
   o Under 1000
   o 1,000-4,999
   o 5,000-9,999
   o 10,000-14,999
   o 15,000-20,000
   o Over 20,000

5. What is the job title for your current occupation?
   o Student
   o Government employee
   o Private sector employee

- o   Self-employed
- o   Retired
- o   Other

6. Do you use mobile banking applications?
   - o   Yes
   - o   No

7. How many times do you use mobile banking services?
   - o   Never
   - o   Every day
   - o   Once a week
   - o   Up to twice a month
   - o   At least three times a month

8. Experience in Using Mobile Banking:
   - o   Not used at all
   - o   Less than 6 months
   - o   6 months to 1 year
   - o   1 to 3 years
   - o   More than 3 years

PART II - QUESTIONS ON MOBILE BANKING

9. Using Mobile Banking would make it easier for me to conduct transactions, standing order, etc.

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

10. I would find mobile banking useful in conducting transactions, standing orders, etc.

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

11. Using mobile banking would make it easier for me to get information such as bank statements

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

12. I would find mobile banking useful in getting information such as bank statements

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

13. Learning to use mobile banking is easy for me

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

14. It would be easy for me to become skillful at using mobile banking

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

15. Using mobile banking would not divulge my personal information

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

16. I would find mobile banking secure in conducting my transactions

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

17. I would find mobile banking secure in requiring and receiving other information, e.g. bank statements

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

18. I would trust my bank to offer secure mobile banking

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

19. I would trust my mobile phone manufacturer to provide a mobile phone which is appropriate for conducting mobile banking.

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

20. I believe that using mobile banking will fit my lifestyle

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

21. I believe that using mobile banking is suitable to me

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

22. I believe that my mobile phone is compatible with mobile banking technology

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

23. It would cost a lot to use mobile banking (e.g. buy a new mobile phone)

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

24. I would find using mobile banking services through smartphone or tablet risky

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

25. In general, if I have access to mobile banking services, I would like to use it

Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	

APPENDIX B

THE ARABIC VERSION OF THE QUESTIONNAIRE

1. الجنس:

a. ذكر

b. أنثى

2. العمر:

a. 18- 25

b. 26 -30

c. 31- 35

d. 36- 40

e. أكبر من 40

3. المستوى التعليمي:

a. أقل من المرحلة الثانوية

b. المرحلة الثانوية أو ما يعادلها

c. الدبلوم

d. البكالوريوس

e. دراسات عليا (ماجستير أو دكتوراه)

4. ما هو متوسط الدخل الشهري؟

a. أقل من 1000 ريال

b. 1000- 4999 ريال

c. 5000- 9999 ريال

d. 10,000 -14,999 ريال

e. 15,000 -20,000 ريال

f. أكثر من 20,000 ريال

5. ما هو المسمى الوظيفي للمهنة التي تشغلها حاليا؟

   a. طالب

   b. موظف حكومي

   c. موظف قطاع خاص

   d. أعمال حرة

   e. متقاعد

   f. أخرى.... فضلاً أذكر.

6. هل تستخدم أي من تطبيقات البنوك على هاتفك الذكي أو الحاسوب اللوحي؟

   a. نعم

   b. لا

7. كم مرة تستخدم خدمات تطبيقات البنوك على هاتفك الذكي أو الحاسوب اللوحي؟

   a. لم أستخدمها من قبل أبداً

   b. كل يوم

   c. مرَة في الاسبوع

   d. مرّتان في الاسبوع

   e. على الاقل ثلاث مرات في الشهر

8. منذ متى تستخدمت خدمات تطبيقات البنوك على هاتفك الذكي أو الحاسوب اللوحي؟

   a. لم أستخدمها من قبل أبداً

   b. أقل من ستة أشهر

   c. من ستة أشهر إلى سنة

   d. من سنة إلى ثلاث سنوات

   e. أكثر من ثلاث سنوات

ثانياً: الاسئلة حول تطبيقات البنوك

9. أستخدام خدمات تطبيقات البنوك على الهاتف الذكي تساعدني على إتمام عملياتي المصرفية بيسر وسهولة بدلاً من زيارة البنك؟

غير موافق بشدة		غير موافق		محايد		موافق		موافق بشدة	

10.أجد خدمات تطبيقات البنوك على هاتفي الذكي مفيدة لاتمام العمليات المصرفية الخاصة بي ؟

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

11.تطبيقات البنوك على الهاتف الذكي تساعدني في الحصول على المعلومات التي أحتاجها من البنك مثل كشف الحساب وأسعار العملات بيسر وسهولة؟

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

12.أجد أن تطبيقات البنوك على الهاتف الذكي تساعدني في الحصول على كم واف من المعلومات التي أحتاجها من البنك مثل رصيد الحساب، كشف حساب موجز ..الخ.

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

13.تعلّم استخدام تطبيقات البنوك على الهاتف الذكي عملية سهلة بالنسبة لي؟

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

14.من السهل بالنسبة لي أن اصبح ماهراً في أستخدام تطبيقات البنوك على الهاتف الذكي أو جهاز الحاسوب اللوحي؟

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

15.أستخدام تطبيقات البنوك على هاتفي الذكي لن يسهم في الكشف عن معلوماتي الشخصية؟

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

16.أجد أن استخدام تطبيقات البنوك المقدمة لي أمنة في إتمام العمليات المصرفية التي أجريها؟

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

17.أجد خدمات تطبيقات البنوك أمنة في طلب والحصول على بعض المعلومات التي أحتاجها مثل رصيد الحساب وكشف حساب موجز؟

غير موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

18. أثق في البنك الذي أتعامل معه ويقدم لي خدمات آمنة من خلال التطبيق الخاص به على هاتفي الذكي؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

19. أثق أن هاتفي الذكي لديه كل الإمكانات التقنية التي تساعدني لاستخدام تطبيقات البنوك المقدمة لي بكفاءة وفعالية؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

20. أعتقد أن استخدام تطبيقات البنوك على هاتفي الذكي تناسب نمط حياتي؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

21. أعتقد أن استخدام تطبيقات البنوك على الهاتف الذكي ملائم لي؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

22. أعتقد أن هاتفي الذكي متوافق تقنياً مع تطبيقات البنوك المّحملة عليه؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

23. أستخدام تطبيقات البنوك على هاتفي الذكي يكلفني بعض النفقات كرسوم الاتصال بخدمات الانترنت وغيرها؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

24. أجد أستخدام تطبيقات البنوك على الهاتف الذكي محفوفة بالمخاطر؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

25. سأحرص على استخدام تطبيقات البنوك على هاتفي الذكي كلما اتيحت لي الفرصة لاستخدامها؟

	موافق بشدة		موافق		محايد		غير موافق		غير موافق بشدة

APPENDIX C

INSTITUTIONAL REVIEW BOARD BY UNIVERSITY OF NORTH TEXAS

UNT

A green light to greatness.

THE OFFICE OF RESEARCH INTEGRITY AND COMPLIANCE

September 16, 2015

Dr. Brian O'Connor
Student Investigator: Mohammed Ali Alshara
Department of Library and Information Sciences
University of North Texas
RE: Human Subjects Application No. 15-354

Dear Dr. O'Connor:

In accordance with 45 CFR Part 46 Section 46.101, your study titled "Customer Attitudes Toward Mobile Banking in Saudi Arabia" has been determined to qualify for an exemption from further review by the UNT Institutional Review Board (IRB).

Enclosed are the consent documents with stamped IRB approval. Please copy and **use this form only** for your study subjects.

No changes may be made to your study's procedures or forms without prior written approval from the UNT IRB. Please contact Jordan Harmon, Research Compliance Analyst, ext. 4643, if you wish to make any such changes. Any changes to your procedures or forms after 3 years will require completion of a new IRB application.

We wish you success with your study.

Sincerely,

Chad Trulson, Ph.D.
Professor
Chair, Institutional Review Board

CT:jh

APPENDIX D

INTRODUCTORY LETTER TO SAUDI BANKS CUSTOMERS

(ENGLISH AND ARABIC VERSIONS)

(ENGLISH VERSIONS)

Dear participant,

I am a doctoral student at University of North Texas in the United States. I would like to thank you for participating in this questionnaire focusing on the use of mobile banking services and applications among Saudi banks customers. This study aims is to explore Saudi banks customers and their attitudes of using mobile banking applications for meeting their needs and to discover the factors that affect their use by testing the Diffusion of Innovation Theory and Technology Acceptance Model (TAM). The awareness of mobile banking technology, level/rate of adoption, and influence factors are the main purposes of this study.

Your responses will be recorded anonymously and treated in a confidential manner. No personal identified information, such as account numbers or security codes, is requested in the questionnaire. Participation in filling out this this survey should not take more than 10 minutes. There are no foreseeable risks involved in this study. Any participation in a research study is completely voluntary. You are free to decline to participate for any reason. You may also discontinue participating at any time or refuse to answer any individual questions. Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company. Your participation in this online survey involves risks to confidentiality similar to a person's everyday use of the internet

This research study has been reviewed and approved by the UNT institutional Review Board (IRB). The UNT IRB can be contacted at (001- 940-565-3940) with any question regarding the rights of research subjects. If you have any question about the study, please feel free to contact me or my faculty advisor at the numbers listed below.

Thank you,

Sincerely,

Mohammed Ali Alshara
Phone# 0019405941913
Email: malshara1@gmail.com
Supervising Investigator: Brian O'Connor
Email: brian.oconnor@unt.edu
College of Information
University of North Texas

APPROVED BY THE UNT IRB

DATE: 9-16-15

(ARABIC VERSIONS)

السيد/ة المشارك

يطيب لك شكرك على المساهمة في الإجابة على اسئلة هذا الاستبيان الذي يهدف لجمع البيانات المتعلقة بإستخدام عملاء
البنوك في المملكة العربية السعودية للتطبيقات الإلكترونية لهذه البنوك وخدماتها. تهدف هذه الدراسة إلى دراسات توجهات
عملاء البنوك السعودية نحو استخدام التطبيقات الإلكترونية المستخدمة على أجهزة الهواتف الذكية والحواسيب اللوحية لتلبية
إحتياجاتهم من الخدمات المتاحة لهم من خلال هذه التطبيقات، وإلى استكشاف العوامل المؤثرة على استخدامهم لها.

الإجابة على اسئلة هذا الإستبيان لا يتطلب تقديم معلومات شخصية أو أي بيانات لها طابع شخصي أو سري كرقم الحساب أو
كلمات سرّية، ولا يستغرق أكثر من عشر دقائق من وقتك. أن المساهمة في هذا الإستبيان لا يتضمن أي أخطار شخصية أو
تقنية، وللمشارك كل الحق في عدم المشاركة أو التوقف عن الإجابة في أي وقت.

جزيل الشكر والإمتنان لوقتكم وقبول المشاركة في هذا الإستبيان، وأسعد بتقبل أي سؤال ذي علاقة بهذه الدراسة على بيانات
التواصل الموضحة أدناه. وتقبلوا فائق التقدير،،،

محمد بن علي الشرعا

جوال# 0019405941913

بريد إلكتروني: malshara1@gmail.com
College of Information
University of North Texas

APPENDIX E

APPROVAL LETTER TO USE THE INSTRUMENT

Permission to use questionnaire

Nicole Koenig-Lewis <Koenig-LewisN@cardiff.ac.uk>   Mon, May 25, 2015 at 2:54 PM
To: MOHAMMED ALSHARA <malshara1@gmail.com>

Hi Mohammed,

no problem. Of course you can use the questionnaire as long as you reference it in any publications. A number of the scales are from previously validated scales as outlined in the paper and should also be references.

Good luck with your resrearch.

Best wishes,

Nicole

Dr Nicole Koenig-Lewis

Lecturer in Marketing
Cardiff Business School
Cardiff University
Aberconway Building (Office D18),
Colum Drive, Cardiff, CF10 3EU
http://scholar.google.co.uk/citations?user=hIruGHoAAAAJ&hl=en
https://www.linkedin.com/in/koeniglewisn

From: MOHAMMED ALSHARA <malshara1@gmail.com>
Sent: 24 May 2015 07:48
To: Nicole Koenig-Lewis; N.Koenig-Lewis@swansea.ac.uk
Subject: Permission to use questionnaire

[Quoted text hidden]

APPENDIX F

THE NORMAL PROBABILITY PLOTS OF MOBILE BANKING ADOPTION

Normal P-P Plot of TotalModified
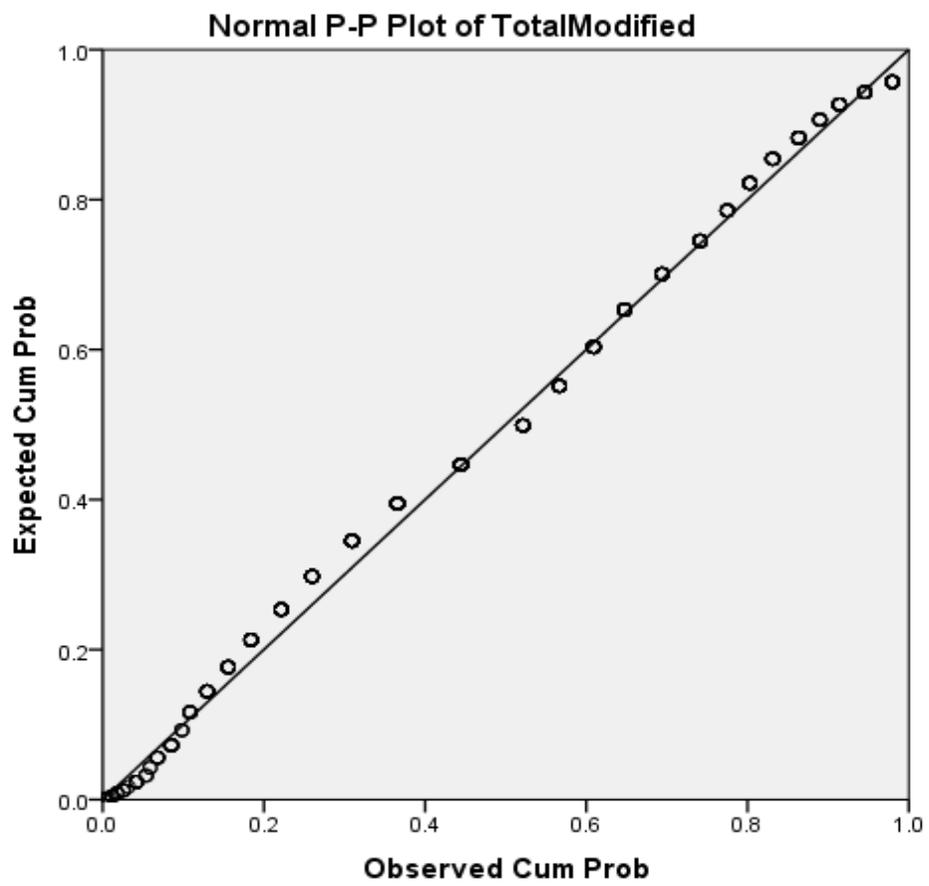
APPENDIX G

THE NORMAL PROBABILITY PLOTS OF THE SEVEN INFLUENCE FACTORS

Normal P-P Plot of F1

Normal P-P Plot of F2

Normal P-P Plot of F3

Normal P-P Plot of F4

115

Normal P-P Plot of F5

Normal P-P Plot of F6

116

Normal P-P Plot of F7
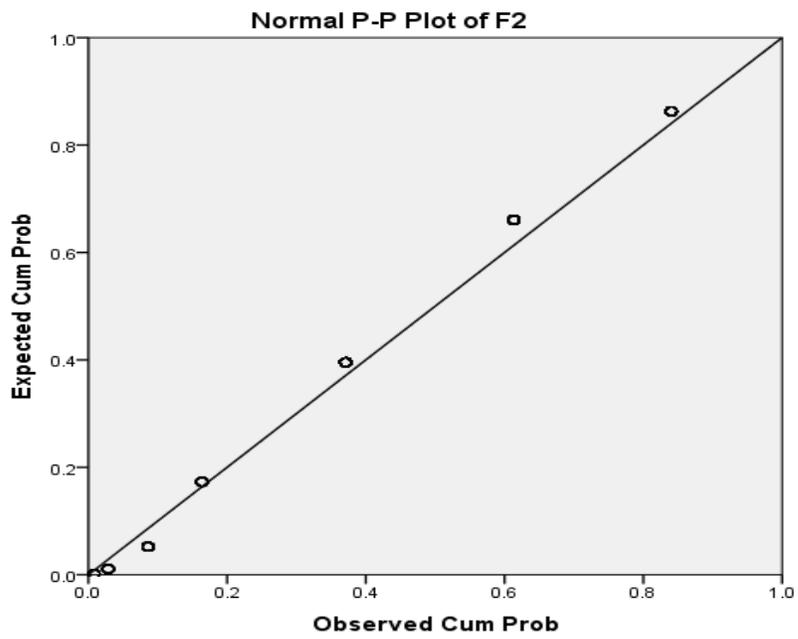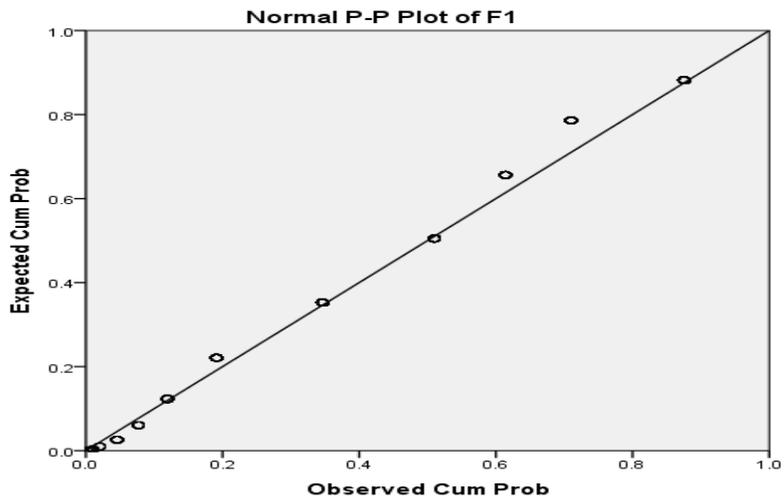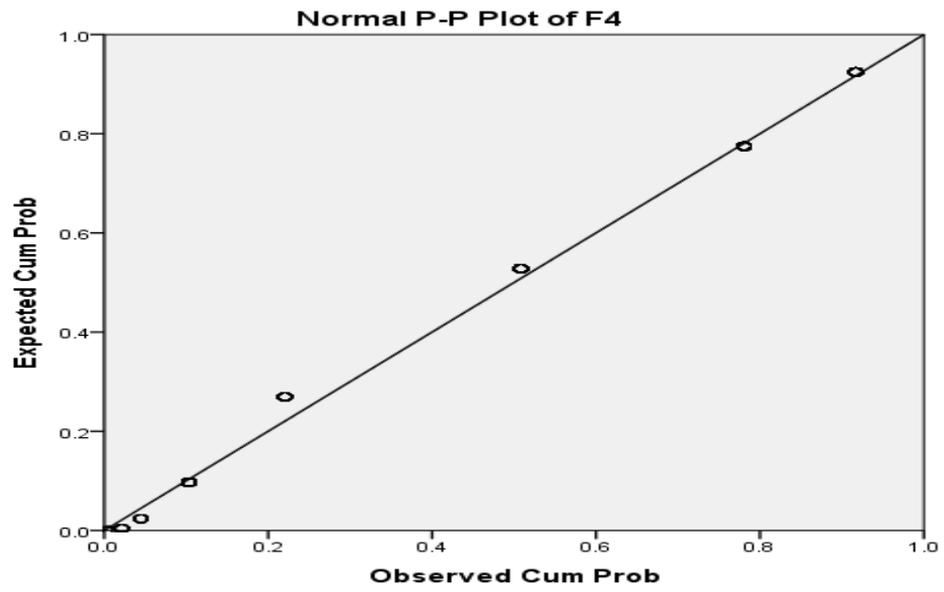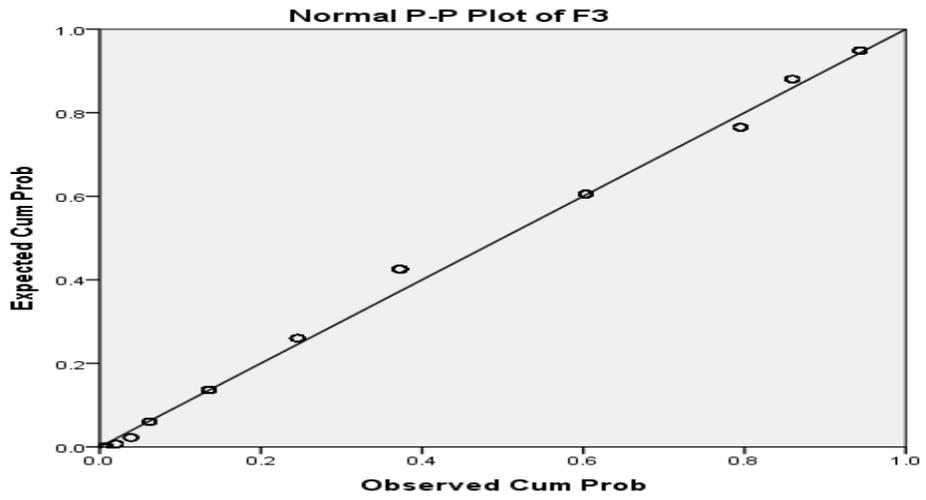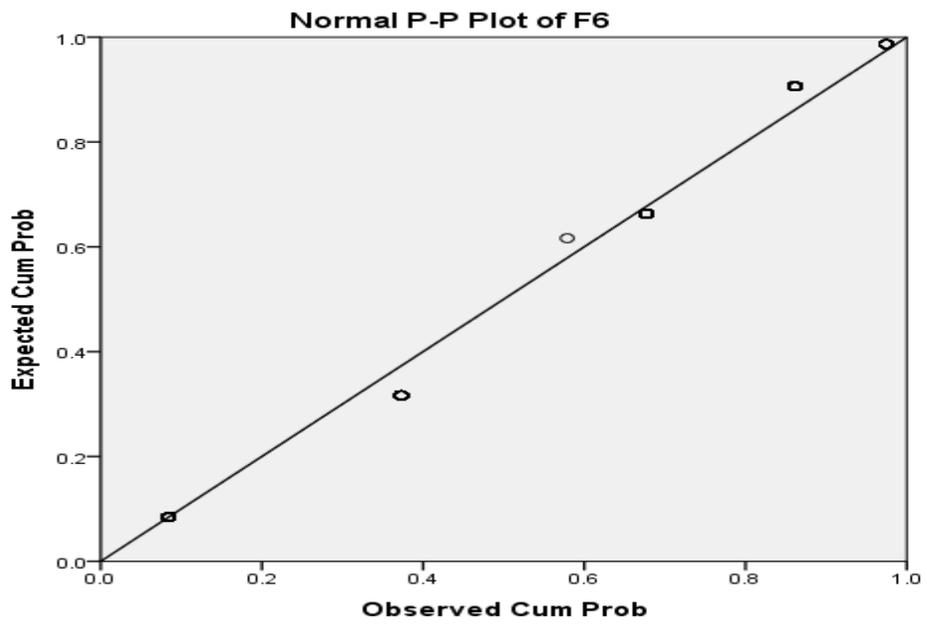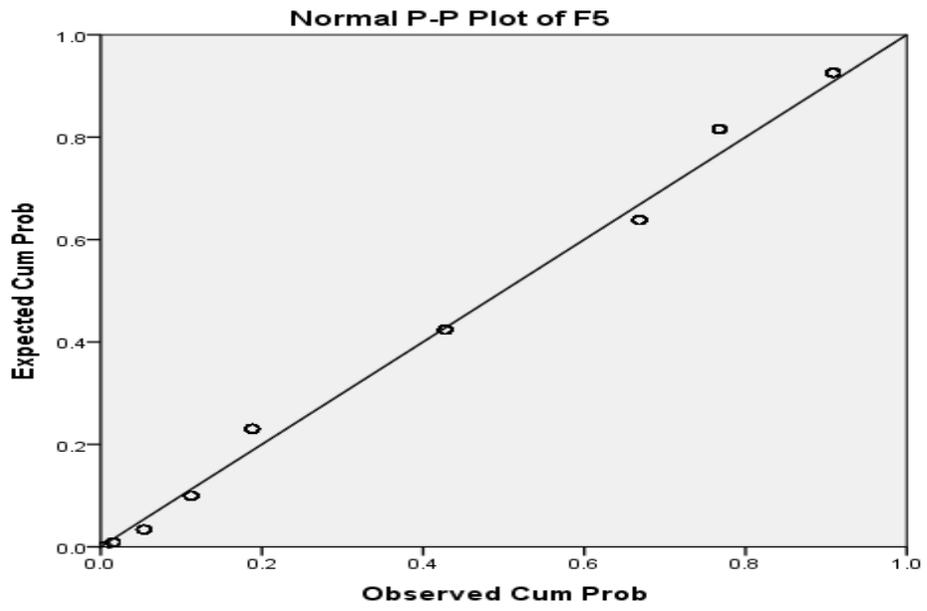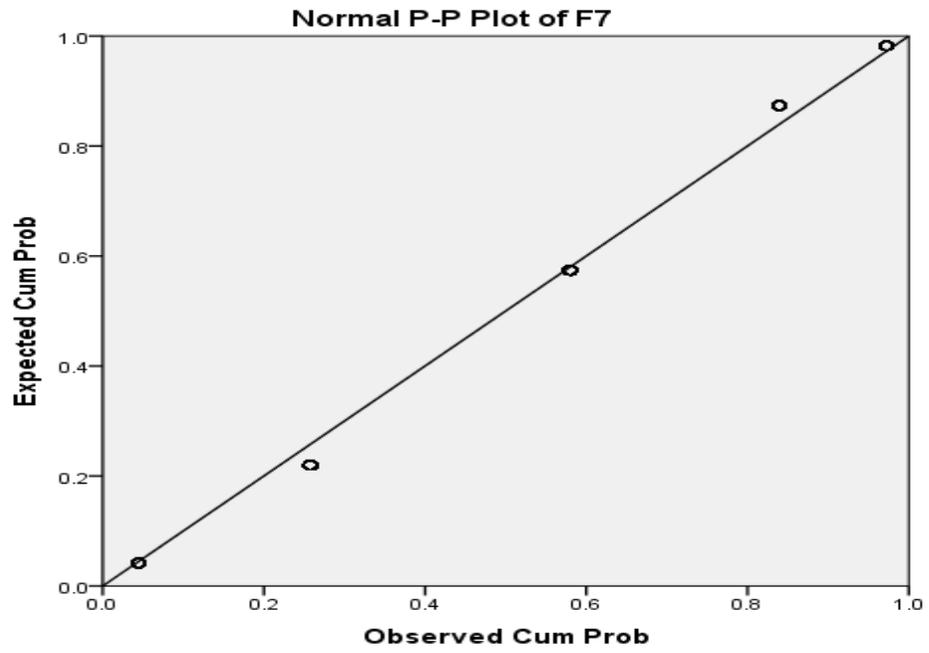
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