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USERS' PERCEPTION AND CONTINUED USAGE OF M-BANKING

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USERS' PERCEPTION AND CONTINUED USAGE OF M-BANKING

KULLANICILARIN MOBİL BANKACILIK ALGISI VE KULLANIM DEVAMLILIĞI

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LIST OF ABBREVIATIONS

IMF	International Monetary Fund
TAM	Technology Acceptance Model
ECM	Expectation Confirmation Model
ECT	Expectation Confirmation Theory
TTF	Task Technology Fit
TRA	Theory of Reasoned Action
SEM	Structural Equation Modeling
IS	Information Systems
PTTF	Perceived Task Technology Fit
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
PR	Perceived Risk
EC	Expectation Confirmation
SAT	Satisfaction
CI	Continuance Intention

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ABSTRACT

In this study, the determinants affecting the continuous usage of mobile banking were examined. Motivated by the need to understand the variables that success, sustenance, and long-term development of mobile banking depend on. The proposed research model is developed by the incorporation of Technology Acceptance Model, Task Technology Fit, and perceived risk into Expectation Confirmation Model and Structural Equation Modeling is used to test the research model with empirical data gathered by a survey from 154 mobile banking users who use m-banking services offered by banks in Turkey. The results show that continuance intention is affected by perceived task technology fit, perceived usefulness, perceived risk, and satisfaction, significantly. But the effect of perceived ease of use on continuance intention is insignificant. Besides, as the main predictors, perceived task technology fit, and expectation confirmation affect satisfaction. Moreover, perceived usefulness is determined by perceived task technology fit, perceived ease of use, and expectation confirmation. The results also indicate that gender significantly moderates the effect of perceived usefulness to continuance intention.

Keywords: M-banking, Structural Equation Modeling, Expectation Confirmation Model, Technology Acceptance Model, Task Technology Fit

ÖZET

Bu çalışmada, mobil bankacılığın kullanımının devamlılığını etkileyen faktörler incelenmiştir. Mobil bankacılığın başarısının, sürdürülebilirliğinin ve uzun vadeli gelişiminin bağlı olduğu değişkenleri anlama ihtiyacı bu çalışma için motive edici olmuştur. Önerilen araştırma modeli, Beklenti Uyum Modeline Teknoloji Kabul Modeli, İş Teknoloji Uyumu ve algılanan risk dahil edilerek geliştirilmiştir. Geliştirilen model, Türkiye'de faaliyet gösteren bankaların sunduğu uygulamalar aracılığı ile mobil bankacılık hizmetlerini kullanan 154 kişinin katıldığı anketle toplanan ampirik veriler kullanılarak Yapısal Eşitlik Modellemesi ile test edilmiştir. Sonuçlar kullanım devamlılığının algılanan iş teknoloji uyumu, algılanan fayda, algılanan risk ve memnuniyetten önemli ölçüde etkilendiğini göstermektedir. Bunlara ek olarak, algılanan kullanım kolaylığının kullanım devamlılığı üzerinde etkisiz olduğu da görülmüştür. Memnuniyeti etkileyen ana değişkenlerin ise algılanan iş teknoloji uyumu ve beklentinin doğrulanması olduğu sonuçlarına ulaşılmıştır. Kullanışlılık algısının, algılanan iş teknoloji uyumu, algılanan kullanım kolaylığı ve beklentinin doğrulanmasından etkilendiği belirlenmiştir. Elde edilen sonuçlar ayrıca kullanışlılık algısının kullanım devamlılığı üzerindeki etkisinin cinsiyete bağlı olarak önemli ölçüde değiştiğini de göstermiştir.

Anahtar Kelimeler: Mobil bankacılık, Yapısal Eşitlik Modellemesi, Beklenti Uyum Modeli, Teknoloji Kabul Modeli, İş Teknoloji Uyumu

CHAPTER ONE

INTRODUCTION

It is accepted that modern banking began with the Amsterdam Bank, which was founded in 1609. In the 20th century, modern banking has started its rapid development in parallel with the development of industry and trade. Modern banking in our country started after the declaration of the Tanzimat Edict in the Ottoman Empire.

1.1 DEVELOPMENT OF BANKING IN THE WORLD

The first banking services in history date back to the Sumerian and Babylonian Civilizations. In the 2000s before Christ, many rules regarding banking (such as debt transactions to be made in temples, interest rates to be taken and pledges, mortgages) were included in the Laws of Hammurabi. In ancient Greece, credit transactions were carried out by the bankers called Trapezitai (Coelho, 1999).

In medieval Europe, political impotence, the unrest caused by constant wars, and stagnation of commercial activities led to a decrease in credit (De Roover, 1942).

The diversity of the currencies in Europe and the unevenness of their settings created great difficulties in the exchange of currencies. Amsterdam Bank, which can be considered as the first modern bank, was established to overcome these difficulties.

In the new age, the policy of states to have new countries and colonies, the private sector to establish new production sites, and to open new mines revived the economic life. Venice Bank was established in 1637, the first banknote system was established in England, and the first central bank was established also in England.

Modern commercial banking in the USA started with the Bank of North America that financed the American Revolutionary War, was established in 1782. The financial crisis in the USA in 1929 affected the whole world and triggered the

abandonment of economic liberalism, increasing the role of central governments for national economies.

After World War II, development-related differences between countries became more pronounced and state-assisted banking came to the fore in underdeveloped economies.

After the oil crisis in the early 1970s, oil-producing countries invested their earnings in banks, and the Bretton Woods monetary system collapsed. Significant changes were experienced in banking by the spread of computers in the 1980s, online banking introduced by the spread of the internet in the 1990s, and retail banking services in the 2000s, etc.

Another milestone in the history of modern banking is that dozens of small banks faced the risk of bankruptcy as a result of the excessive depreciation of real estate in England between 1973 and 1975. Thus, the trend from small banks to large banks and international banks increased.

Today, one of the most important phenomena in banking is globalization. Financial globalization explains the increase in financial flows formed by the removal of barriers to capital. Organizations such as the International Monetary Fund (IMF) which works to foster global monetary cooperation and the World Bank are the most important factors in financial globalization with their policies.

Reasons such as the liberalization of financial policies and the development of information technologies are among the reasons for globalization in financial markets. The policies for financial liberalization include releasing interest rates, removing barriers to capital inflows, and increasing privatization activities in banks and the insurance sector.

To manage the increasing risk, new financial tools, methods, and strategies developed by banks triggered financial crises. In the 2000s, with the onset of rapid

social, technological, political, and economic developments, global financial crises began to occur at national and international levels.

1.2 DEVELOPMENT OF BANKING IN TURKEY

The historical development of banking in Turkey will be divided into two main stages: before the Republic was founded and after the foundation of the Republic.

1.2.1 Before the Republic

Until the Tanzimat Edict in the Ottoman Empire, there is very limited activity in banking. Foreigners did things mostly such as trade and money trading (Keskin et al., 2019). In the Ottoman Empire, state-owned money was protected in the imperial treasury (hazine-i hümayun) while the goods of the merchants were kept in chests in bazaars where valuable goods were bought and sold.

In the Ottoman Empire, the loan demands were met by the money-changers who are the dealers of gold and other precious metals. Money-changers, who made loans available to merchants through pledge or mortgage, had to turn the property they acquired into cash in return for their unreturned receivables.

Another mechanism that fulfilled the functions of the bank in the Ottoman Empire was mudaraba, the commercial partnership in shariah. Money foundations were working by lending money for interest, based on the management of money through mudaraba.

With the Tanzimat Edict, new rules were enacted to prevent budget regulation and extra-budgetary expenditures, and the Ministry of Finance was established in 1838 and the Treasury of Finance in 1840 (Revenue Administration, n.d.).

The first Ottoman banknotes were issued by Abdülmecit in 1840 under the name Kaime means paper replacing money. In a short period, significant amounts of Kaime were monetized to cover the ever-increasing budget deficits and this situation significantly reduced the value of Kaime against foreign currencies.

The British-capital Ottoman Bank was established in 1856 in order to increase the possibilities of using foreign debt and given the authority to monetize and control the state budget. But, failure in the issuance of Kaime prevented the acceptance of the paper money issued by the Ottoman Bank.

Along with the Ottoman Bank, the main activity of other banks with foreign capital was domestic and foreign debt management for the Ottoman Treasury. For this reason, banking is called debt banking. A large amount of foreign debt used to close the budget deficits could not be successful and the vicious circle created by this situation prevented the formation of healthy financial policies in the Ottoman Empire.

The main reason for the establishment of national banking was to ensure that the capital accumulated within the country was used to improve national trade and there were a few of them. These were Homeland Funds, Benefit Funds, Ziraat Bank, and İstanbul Emniyet Sandığı.

1.2.2 After the foundation of the Republic

In İzmir Economy Congress, 17 February – 04 March 1923, important decisions are taken for banking and after the foundation of the republic, banking has become more corporate and regularly structured.

The decisions taken at the Izmir Economic Congress are as follows; developing banking for economic development, supporting the private sector's insufficient capital accumulation by the state, getting rid of the pressure of foreign capital by establishing national banks, establishing a master commercial bank, and establishing an industrial bank with the participation of the state and private banks (Keskin et al., 2019).

It was agreed at the Izmir Economic Congress that economic development will be realized with national banks. Türkiye İş Bankası was established as a private sector bank in 1924, Türkiye Sınai ve Maadin Bankası (Industrial and Mining Bank of

Turkey) in 1925 and Emlak ve Eytam Bankası (Real Estate and Orphanage Bank) in 1927 (Keskin et al., 2019). Also, a large number of private banks with a single branch were established to meet the loan and other banking services of merchants by the influence of the decisions made. One of the most important developments in banking after the foundation of the Republic is the establishment of The Central Bank of the Republic of Turkey in 1931.

With the effect of the great crisis in 1929, an interventionist policy began to prevail in the world. Keynesian politics gained weight instead of the classical liberal economy approach, and the role of governments in national economies increased. This also changed the economic approach of the Republic of Turkey, and new methods were found for industrialization.

The main reason for the adoption of economic statism as an industrialization strategy in the early 1930s is that the private sector does not have the power to make investments that require a large capital. Investments that were necessary for industrialization but were not realized by the private sector due to low return were attempted to be realized by the state.

Under the conditions that started after World War II, the activities of the banking increased, new and private banks were needed. During the period after 1945, urbanization has begun to develop and increased industrial production with demand. Therefore, the need for money and loan has increased and the returns of private banks have also increased. Some of the banks established in this period are Yapı Kredi Bankası (1944), Akbank (1948), Demirbank (1953) and, Pamukbank (1955) (Keskin et al., 2019).

In this period when interest rates and commission rates were determined by the government, there was great competition among banks in collecting deposits and opening branches.

The high inflation and foreign debt problem experienced between 1953-1959 caused the value of the Turkish Lira to decrease and the state released the banks in their loan activities.

In Planned Period (1961-1980), an industrial policy aimed at ensuring the production of imported industrial goods domestically by realizing investments included in development plans through state-owned enterprises and the private sector was adopted (Keskin et al., 2019). It has been decided to act with five-year development plans and one-year development programs and in this planned period, except for special cases, the establishment of a new commercial bank was not allowed.

Some of the banks established in this period are T.C. Turizm Bankası (to support organizations operating in the tourism sector) (1962), Sınai Yatırım ve Kredi Bankası (to provide medium and long-term loans for the private sector) (1963), Devlet Yatırım Bankası (to provide loans to state-owned enterprises) (1964).

In this period, transfers were made from the treasury to make the investments planned, public borrowing, and Central Bank loans were used. These activities increased the money supply and created an inflation problem. Although rapid development was experienced with the decisions taken in this period, the development methods caused inflation and the absence of export of goods produced in an inflationary environment caused a shortage of foreign exchange.

The scarcity of foreign currency in the late 1970s made it necessary to adopt a new industrialization strategy. With the economic stability policy, the idea of the outward-looking reorganization of the economy has come to the fore. The decisions taken on January 24, 1980, were not only a stabilization program but also a strategy in which international capital was circulated through the World Bank and aimed the market freedom. To achieve these goals, flexible exchange rate and positive real interest rate policies have been implemented and regulations have been made for the liberalization of financial markets.

With the Banking Law in 1985, an international audit, surveillance, and banking standards were introduced to the banking system and bank balance sheets were subjected to external audit. The Central Bank started open market operations in 1987, the foreign exchange market was established in 1988, and foreign exchange transactions and capital movements were released in 1989. Liberalization of the markets caused domestic and foreign banks to enter the sector, and increased competition in the sector by liberalizing deposit and loan interest rates.

The high-interest domestic loans of the public sector and the predominance of foreign funds in banks' assets made the banking sector sensitive and vulnerable to internal and external shocks. Free interest rate and flexible exchange rate policies implemented during this period, promotion of exports, the release of import, allowing the establishment of new banks, the establishment of foreign exchange markets, the development in information and communications technology created an environment for the establishment of foreign banks

In November 2000, the banking sector has suffered a serious concussion and a major crisis has been experienced in Turkey in February 2001. The existing structural problems such as insufficient equity, the presence of high liquidity and interest risk due to its very short-term slider structure, maturity mismatch, and the presence of high exchange rate risk have come to light by these crises.

The restructuring programs, which were put into practice to restore a healthy structure to both the economy and the financial system, erased the impact of the crisis on the one hand and put it into a growth process on the other hand.

In 2002, infrastructure work was initiated to fulfill the requirements of the Turkish banking system introduced with Basel II. With the implementation of the restructuring program and in the process of privatization of banks seized by the Savings Deposit Insurance Fund of Turkey, the share of global capital in banking has continuously increased (Keskin et al., 2019).

In the global financial crisis that started in the USA in 2007 and lasted until the end of 2009, banks in Turkey were less affected than the banks of other countries. As a result of the decisive implementation of the restructuring program in the period of 2002-2007, the capital structure of banks in Turkey has been strengthened and the risks being lower than before played a major role in less impact.

1.3 MOBILE BANKING

Advancement in wireless technology causes a mass increment in the number of mobile device users. By virtue of rapid development and improvement in the accessibility of wireless infrastructure and mobile devices that reached great numbers, people's needs and requirements were changed (Singh et al., 2010).

A huge amount of information became accessible and users became able to easily send and receive information by higher data speed and always reachable technology by mobile devices that have become a part of our lives (Singh et al., 2010).

As a consequence of the widespread of the internet and mobile devices, an alternative service delivery channel emerged. That virtual channel is different from traditional and physical ones and changed the way how we interact (Kumar et al., 2012). We are using mobile technologies for shopping, entertainment, social networking, financial activities, etc. in our daily lives (Litvin et al., 2013).

As a subset of electronic commerce (e-commerce), mobile commerce (m-commerce) can be defined as the use of mobile devices to conduct e-commerce transactions like buying and selling of products and services via wireless networks without any restriction about time or location. M-commerce covers mobile marketing and advertising, in-app purchasing, shopping by mobile browsing, mobile brokerage, and mobile banking, etc.

Lee et al. (2003) defined mobile banking (m-banking) as one of the most value-added mobile commerce applications where it gives users the ability to conduct financial transactions at any time and location.

In Turkey, there are more than 55 million active mobile devices according to Veloxity's report How Mobile Is Your Bank: An Insight to Mobile Banking (2018) where Veloxity is a tech company that specialized in mobile marketing and there are nearly 40 million active users that using digital banking services which includes both internet and mobile banking services.

According to Digital, Internet and Mobile Banking Statistics of The Banks Association of Turkey (2018), the number of active m-banking customers in Turkey is more than 34 million which is the total number of retail banking and commercial banking customers. Moreover, the total number of registered customers that logged in to the m-banking app at least once in a 1-year period is above 42 million where the total number of registered customers that logged in at least once is nearly 53 million (The Banks Association of Turkey, 2018).

The total number of transactions made via m-banking apps was more than 333 thousand where the total volume of these transactions was over 857 billion Turkish liras for June 2018 (The Banks Association of Turkey, 2018). These transactions included money transfers, payments, investment transactions, credit card transactions, and other financial transactions.

Banking, which developed and changed dramatically in a few decades after its emergence, is now developing and transforming much faster in parallel with the ever-increasingly accelerating transformation of technology. Banking also responds to this transformation and becomes even more agile by improving its adaptability. Based on my role as Agility Consultant in my professional career, I have helped many banks operating in our country to increase their agility and it would not be wrong to say that banking is one of the sectors most eager to increase their agility to adapt to changing world. Both the needs of the customers have differentiated in accordance with changing paradigms. So, with the improvement of traditional operations, it is no longer possible to stay competitive and survive and the most valuable area where competition is most exciting cannot be thought of without technology.

I aimed to study a subject that excited me, which I care about very much both as a computer engineer and as a consultant. While there are many studies in the literature about customers starting to use online banking and the initial adoption of mobile banking, the number of studies examining continuous usage was relatively small and no such study was conducted for our country. So, I aimed to understand what affects users' continuous use of mobile banking applications and what banks should focus on. Therewithal, I hope this study will give an idea of not only how banks will transform their services, but what banking will turn into.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL BACKGROUND

2.1 USERS' ADOPTION AND POST-ADOPTION OF M-BANKING

Rapid developments in information systems result in radical changes in the behaviors and habits of people. Innovations in information and communication technologies also caused radical changes in user needs and requirements. Alternative Delivery Channels, ranging from Automated Teller Machines (ATM) to mobile banking applications, have emerged as a result of innovations and accommodate the demand for mobile banking services to manage time-intensive banking affairs from anywhere (Shaikh & Karjaluoto, 2015).

Alternative Delivery Channels refer to channels that expand the reach of banking and financial services. These channels serve as intermediaries between the banks and consumers. Mobile banking, as an innovative good of the mobile industry and one of these channels, is a service provided that lets customers reach and manage financial transactions by mobile devices. (Bidar et al., 2014). M-banking is also a cheaper alternative than traditional banking that requires relatively expensive setup costs.

Even if there are researches about users' initial adoption of mobile banking, relatively few studies investigate the determinants of continuous usage of mobile banking. (Yuan et al., 2016; Avornyo et al., 2019). However, the success and sustenance of an information system depend on not just the initial adoption of users but also the continuance usage intention of customers (Gumussoy, 2016; Shaikh et al., 2015; Zhou et al., 2010).

Zhou et al. (2010) verified that perceived enjoyment and performance expectancy have effects on the continuous usage of mobile internet services. Besides, the direct impact of perceived usefulness and satisfaction on the intention of m-banking continuous usage has been noted (Yuan et al., 2016; Zhou et al., 2010). Perceived

usability, channel preference, and perceived value are mentioned as three major determinants of m-banking usage sustainability in an empirical study that examines Korean users' intention of continuous usage of m-banking (Kang et al., 2012).

Gumussoy (2016) studied to identify determinants of users' decisions to use m-banking sustainably in Turkey. This study suggested a model that identifies the relationship among Task Technology Fit (TTF), satisfaction, flow, trust, E-S-QUAL, and continuous usage of m-banking. E-S-QUAL, developed by Parasuraman, Zeithaml & Malhotra (2005), is a multiple-item scale to measure the quality of customer service delivered by websites on which users shop online.

Yuan et al. (2016) focused on users' continuous intention to use m-banking in China and developed a research model by incorporating Technology Acceptance Model (TAM), Task Technology Fit (TTF), and perceived risk into Expectation-Confirmation Model (ECM). Yuan et al. (2016) assumed that perceived usefulness, perceived ease of use, perceived task technology fit, perceived risk, and satisfaction are key determinants where satisfaction is explained by confirmation, perceived usefulness, and perceived risk.

This study, like Gumussoy (2016), also examines the continuous intention to use m-banking in Turkey. However, the research model for this study is similar to Yuan et al. (2016) to focus on the determinants not mentioned for continuous usage of m-banking in Turkey e.g., perceived usefulness and confirmation as main determinants of satisfaction, perceived ease of use, perceived risk. Hence, TAM, TTF, and perceived risk are incorporated into ECM to conduct a new empirical study for m-banking in Turkey.

2.2 EXPECTATION CONFIRMATION MODEL

Bhattacherjee (2001) proposed the Expectation Confirmation Model (ECM) from Expectation-Confirmation Theory (ECT) widely used in the literature on consumer behavior to study satisfaction, service marketing, and post-purchase behavior.

ECM indicates that satisfaction is the major predictor of continuous usage intention of IS while confirmation and perceived usefulness are the main determinants of satisfaction. ECM focuses on continuous usage of IS, so it can be used to understand users' intentions in the post-adoption stage. Bhattacherjee (2001) slightly modified ECT for shortcomings by arguing that ECT ignores the change in users' expectations in post-adoption. ECM suggested that users' expectations will differ after initial adoption and perceived usefulness to be the surrogate for post-adoption expectation. The pre-adoption expectation is typically based on opinions or just information but in the post-adoption stage, expectation takes shape by the users' own experience.

Many studies employed ECM to examine users' continuous intention to use IS e.g., online, online banking, online healthcare services, electronic commerce, and IPTV (Lee, 2010, Zhu et al., 2020).

2.3 TECHNOLOGY ACCEPTANCE MODEL

Technology Acceptance Model (TAM) is adapted from the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975) and is introduced by Davis (1989). Davis (1989) indicates that users' adoption of information technology is dependent on the users' behavioral intention which depends on perceived usefulness and perceived ease of use.

Davis (1989) conducted a lab study and concluded that both perceived usefulness and ease of use are determinants of users' attitudes toward IS. In the meantime, perceived usefulness is found more strongly linked to usage. Perceived usefulness directly impacts behavioral intention while perceived ease of use significantly impacts perceived usefulness. Figure 1 presents the Technology Acceptance Model.

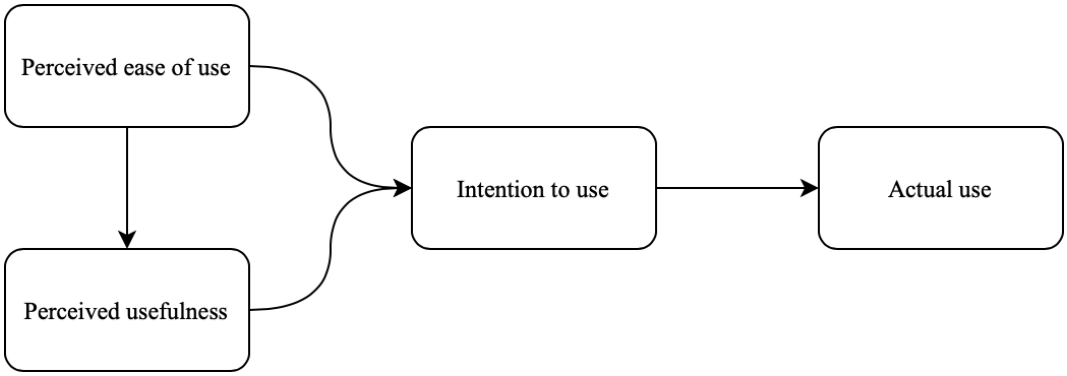

Figure 1. Technology Acceptance Model

TAM is a famous and valid theoretical model that provides useful information about the acceptance of computer-based information systems. Even if TAM was originally formulated to help in examining the users' initial adoption of information systems, it has been extended and used to examine the factors that affect users' continuance intention to use IS (Yuan et al., 2016).

TAM is also used in many studies that examine the continuous usage of mobile banking or users' intention to use in the post-adoption stage (Yuan et al., 2016). Although TAM provides a widely accepted framework to study users' initial adoption and post-adoption perceptions of a system, it may not fully explain all the facets of users' behavior toward m-banking adoption (Mutahar et al., 2018).

Several studies extended TAM by combining it with other models and theories (Zhou et al., 2010; Chong, 2013). Yuan et al. (2016) employed TAM by incorporating perceived ease of use with ECM to investigate users' continuance intention towards m-banking.

2.4 TASK TECHNOLOGY FIT

Task Technology Fit is a theoretical foundation that focuses on the relation between capabilities and functionality of IS and users' requirements and also their impact on utilization. TTF suggests that the degree of fit between tasks and technology characteristics will impact technology utilization and performance. If the provided

functionality and features of IS are met with users' needs and requirements of the task, then a positive impact occurs on users' performance (Yuan et al., 2016). Figure 2 presents the Task Technology Fit.

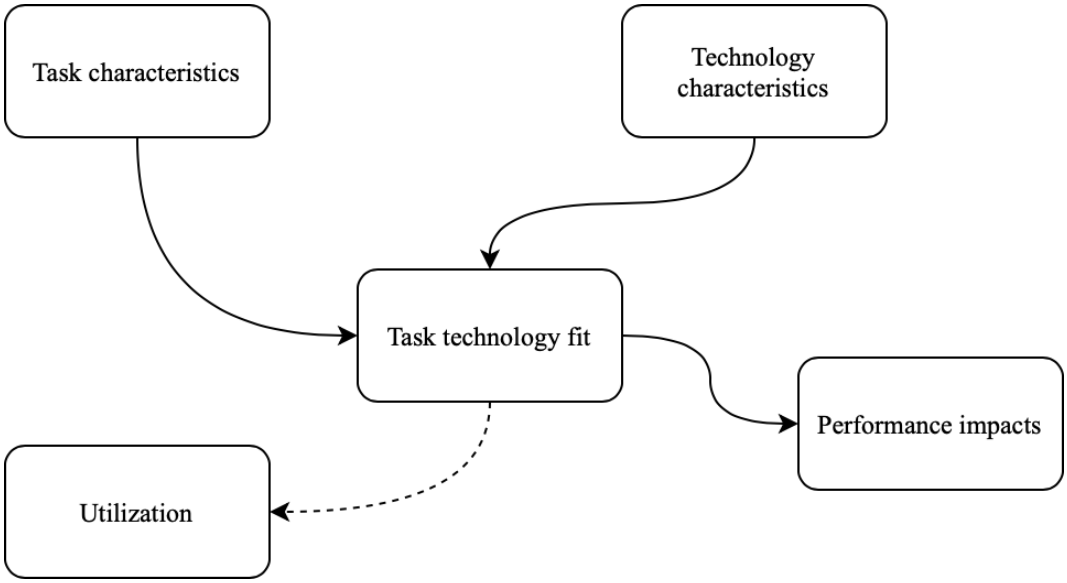

Figure 2. Task Technology Fit

There are several studies made for several IS that employed TTF to research user adoption and continuous intentions to use IS e.g., Vanduhe et al. (2020) examine continuous intention to use gamification for training in higher education by integrating TTF with other models. Zhou et al. (2010) used TTF by combining it with the Unified Theory of Acceptance and Use of Technology (UTAUT) to explain m-banking user adoption in Eastern China. Yuan et al. (2016) investigated users' continuance intention towards m-banking in China by fitting into perceived task technology fit into ECM.

CHAPTER THREE

HYPOTHESES AND RESEARCH METHODOLOGY

3.1 HYPOTHESES

Bhattacherjee (2001) argued that the Expectation Confirmation Theory (ECT) is not sufficient to examine users' continuous intention because that ECT ignores the change in users' expectations after first adoption and experience with IS. Hence, to cover this gap, Bhattacherjee (2001) proposed ECM.

ECM suggested and empirically validated that confirmation and perceived usefulness are the major determinants for satisfaction while satisfaction is the proposed main predictor of users' continuous intention (Bhattacherjee, 2001).

While ECM explains users' continuous intention, there may be other factors that affect continuous intention positively or negatively. To cover other determinants, TAM and TTF are used to extend ECM. TAM and TTF are proper complementaries to ECM to examine the continuous intention of m-banking that is validated with empirical study (Yuan et al., 2016).

One of the main hypotheses in ECM is that satisfaction directly affects continuance intention. Satisfaction, in this context, is an emotional-based result that states the user's perception of value received from IS (Lam et al., 2004). Hence, we expect that customer satisfaction positively affects the continuous intention of m-banking.

H1: Satisfaction positively affects continuance intention.

ECM asserts that two determinants of satisfaction are the gap between pre-adoption expectations and the user's experience with IS in the post-adoption stage and the user's post-adoption expectations from IS.

Users' initial expectations are edited in time by the experience from the actual usage of IS. While m-banking's performance fits initial expectations then post-adoption

stage expectations are confirmed. Otherwise, the user's expectations in the post-adoption stage are not confirmed. And, the confirmation level affects the level of satisfaction.

The other determinant of satisfaction is post-adoption expectations which are generally represented by perceived usefulness (Yuan et al., 2016). The ECM presumed that perceived usefulness is a determinant and satisfaction is the major factor that affects continuous usage of IS. Figure 3 presents the Expectation Confirmation Model.

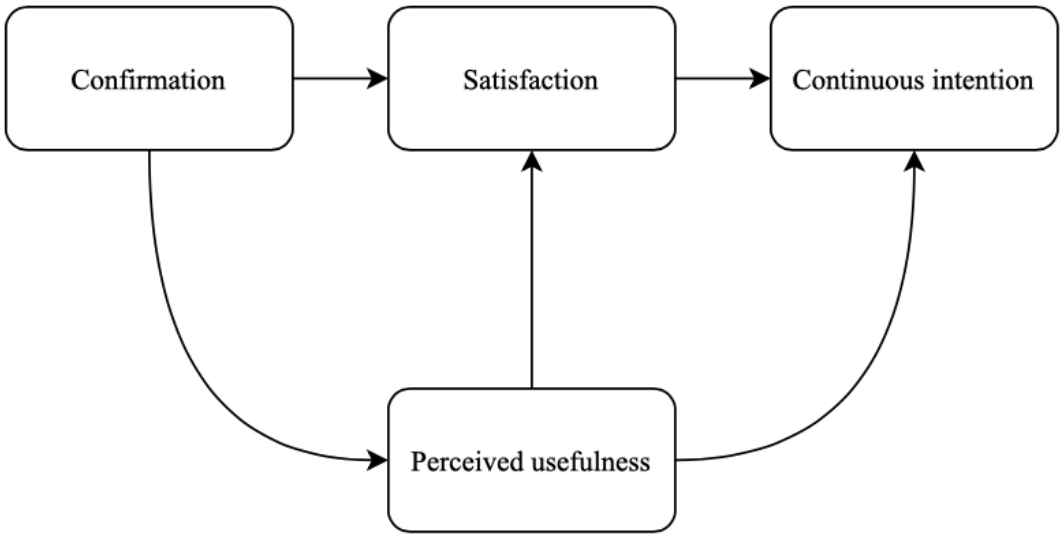

Figure 3. Expectation Confirmation Model

Bhattacherjee (2001) also suggested that the confirmation of pre-adoption expectations by users' experience positively affects perceived usefulness which can be defined as "the degree to which a person believes that using a particular system would enhance his/her job performance" (Davis, 1989). Thus, it can be assumed that perceived usefulness could be edited in time by confirmation experience because the user's initial expectation about IS is not concrete and based on just beliefs and thoughts with no experience. According to these assumptions, we can propose the following hypotheses:

H2: Perceived usefulness positively affects continuance intention.

H3: Perceived usefulness positively affects satisfaction.

H4: Confirmation positively affects satisfaction.

H5: Confirmation positively affects perceived usefulness.

TAM suggests that the user's behavioral intention affects acceptance of IS and the user's behavioral intention depends on two factors; perceived usefulness and perceived ease of use. Perceived ease of use, in this context, can be defined as the user's belief about the degree of freeness from physical or mental effort to use IS (Davis, 1989; Lee, 2010).

While perceived usefulness has a direct impact on behavioral intention, perceived ease of use has a significant impact on perceived usefulness. There are many empirical studies that validated that perceived ease of use is significantly linked to intention because of its significant effect on perceived usefulness (Chong, 2013).

Mobile devices that serve as the terminals to use m-banking applications have still some constraints e.g., lightness, hardware with lower capacity than other technological interface units, relatively small area for input and output, and so limited source for a better user interface (UI) and user experience (UX). However, users do not take notice of limitations and lack of ease-of-use still be a problem for m-banking users (Yuan et al., 2016).

To reduce physical and mental effort to conduct m-banking transactions and to affect perceived usefulness positively, m-banking systems should offer a satisfying UI and hence a good UX. Therefore, we propose the following hypotheses:

H6: Perceived ease of use positively affects continuance intention.

H7: Perceived ease of use positively affects perceived usefulness.

Goodhue and Thompson (1995) asserted with TTF that an IS will be adopted if IS match the task requirements of the user via its functionality and non-functional

capability. TTF was employed not to examine just users' initial adoption to IS but also continuous intention (Yuan et al., 2016).

M-banking, as described, is an Alternative Delivery Channel that commits to serving as a service to conduct banking transactions from anywhere at any time. So, if users enjoy m-banking as a channel with their mobile devices on behalf of traditional banking, then a positive impact on satisfaction will emerge and users' continuous usage intention of m-banking also improve (Yuan et al., 2016). Thus, we propose the following hypotheses:

H8: Perceived task technology fit positively affects continuance.

H9: Perceived task technology fit positively affects satisfaction.

In addition, perceived usefulness and perceived task technology fit are correlated and this correlation has been validated by Zhou et al. (2010) and Yuan et al. (2016). Yuan et al. (2016) argued that while the characteristics of m-banking fit requirements and needs then users' perception of usefulness will improve. So, we propose the following:

H10: Perceived task technology fit positively affects perceived usefulness.

Perceived risk can be clarified as the behavioral fact that is led by undesirable consequences that may arise because of users' actions (Thusi et al., 2019). Many studies mentioned that increase in perceived risk for m-banking is a blocker for acceptance and use of m-banking (Gu et al., 2010; Alalwan et al., 2016).

Wessels & Drennan (2010) investigated acceptance of m-banking in Australia via web-based survey and concluded that perceived risk is one of the primary determinants; a significant negative effect was founded on the intention to use m-banking. In another context, Chauhan et al. (2019) adopted TAM with additional factors e.g., perceived risk, to examine users' internet banking adoption, and also

this study found perceived risk has a significant negative influence on users' intention.

Even if some other studies claimed that perceived risk has no significant effect on m-banking (Kang et al., 2012) we propose the following hypotheses:

H11: Perceived risk negatively affects continuance intention.

H12: Perceived risk negatively affects satisfaction.

Gender is one of the inexpensively identifiable characteristics for individuals (Glavee-Geo, 2017) and is assumed as one of the fundamental sources of difference among individuals (Venkatesh et al., 2010). According to another assumption, decision-making processes may differ by gender difference (Glavee-Geo, 2017).

Venkataesh et al. (2010) empirically validated that the effect of performance expectancy on behavioral intention was significantly moderated by gender. For m-banking, another study found that men gender significantly moderated the effects of performance expectancy and perceived financial cost to behavioral intention while the other three constructs, effort expectancy, social influence, and perceived credibility, were not significantly moderated by gender (Yu, 2012).

Karjaluoto et al. (2010) discussed the moderating effects of gender on adoption and usage of m-banking and found that gender has a moderated effect on perceived ease of use and usefulness. In addition, Yuan et al. (2016) concluded that the effect of perceived risk to continuance intention to m-banking is significantly moderated by gender. Hence, we propose that the effects of antecedents to continuance intention are moderated by gender:

H13a: The effect of satisfaction to continuance intention is moderated by gender.

H13b: The effect of perceived usefulness to continuance intention is moderated by gender.

H13c: The effect of perceived ease of use to continuance intention is moderated by gender.

H13d: The effect of perceived task technology fit to continuance intention is moderated by gender.

H13e: The effect of perceived risk to continuance intention is moderated by gender.

The theoretical model with all the hypotheses mentioned above is figured out in Figure 4.

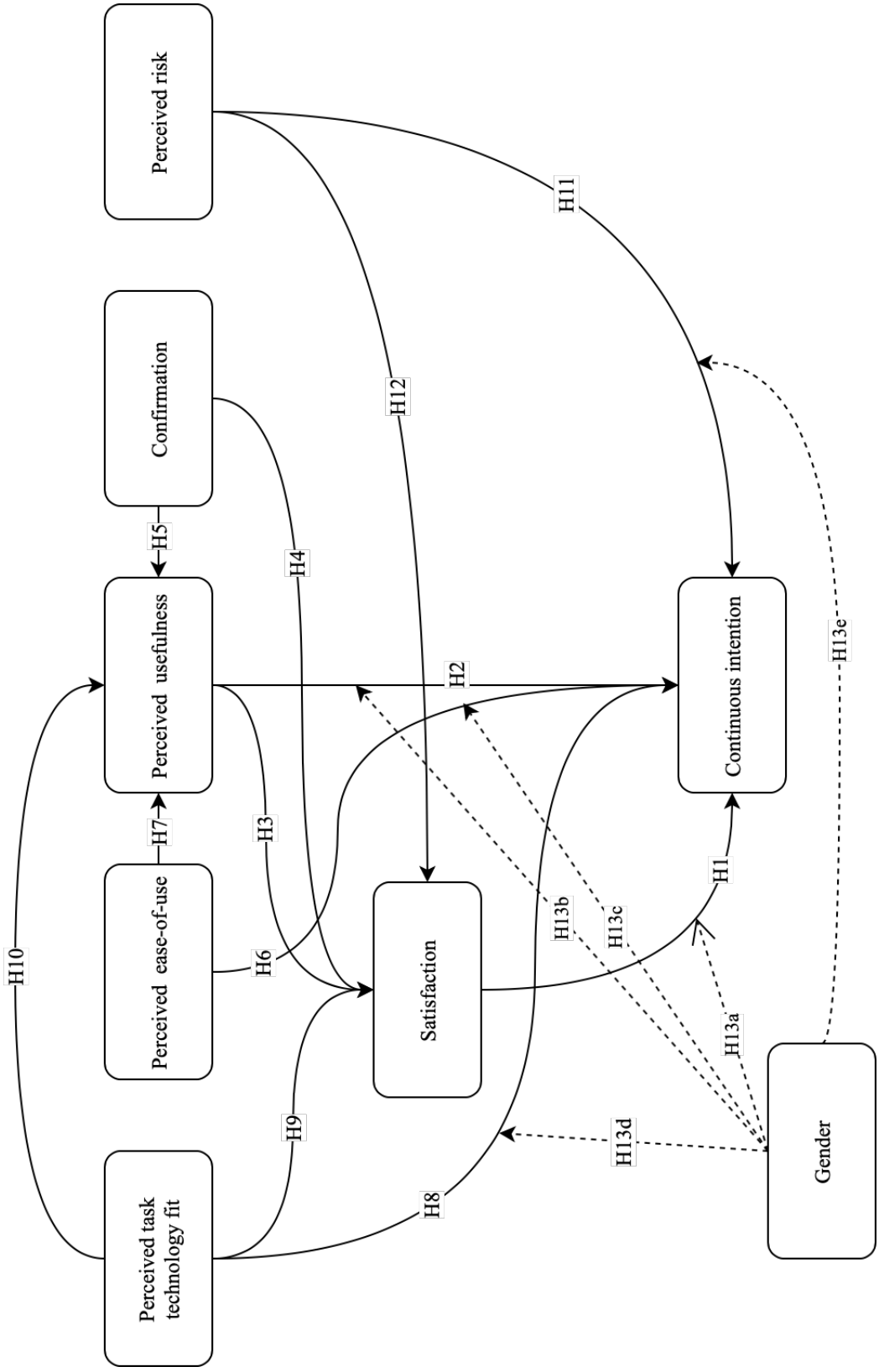

Figure 4. Research model and hypotheses.

3.2 RESEARCH METHODOLOGY

3.2.1 Survey

A survey was used to gather data from m-banking users. The survey was designed as a two-part online survey. The first part of the survey contained questions that measure the constructs in the model. The second part focused on the demographic information of the respondents.

Questions in the first part of the survey were compiled and rephrased from related and validated studies. Questions for perceived task technology fit were compiled from Goodhue & Thompson (1995) and Yuan et al. (2016). Questions that measure perceived ease of use are framed from Davis (1989) and Yuan et al. (2016). Perceived usefulness, confirmation, satisfaction, and continuance intention were measured with questions which are compiled from Bhattacherjee (2001) and Yuan et al., (2016). For perceived risk, questions were framed from Kang et al. (2012) and Yuan et al., (2016).

Our survey was in Turkish; all questions that framed from related studies were translated. In addition, our sample consisted of just users of Turkish banks' m-banking services to ensure locality.

Users were asked to respond to questions for m-banking service which they use more frequently if they use more than one m-banking services.

All questions in the first part of the survey that measures the construct in the model were assessed by 7 Point Likert Scale. Likert Scale is a rating scale used to represent attitudes or opinions that ranges from one extreme to another. In our context, it ranges from Strongly Disagree to Strongly Agree.

3.2.2 Data gathered

The survey that can be accessed from any mobile device or PC is sent to m-banking users in Turkey to gather data to test our hypotheses. For social science researches,

the sample size is suggested as at least a number of predictors multiplied by 15. So, for our study that is equal to 90 where we have 6 predictors. We had 154 total respondents with an 87% completion rate which states the percentage rate of survey takers that completed the entire survey.

To remove bias, the survey is sent via multiple channels, and respondents were asked to voluntarily respond according to their m-banking experiences.

The survey was available from June 2019 to November 2019 and we had 4 minutes 12 seconds as the average time for respondents to complete the entire survey.

134 respondents out of 154 specified their gender; the rest of them skipped the question. Among the responses, 63,43 percent were male and 36,57 percent were female. Details are given in Table 1.

Table 1. Gender of the sample

Gender		Responses
Female	36,57%	49
Male	63,43%	85

76,87 percent of the sample was the age of 25-39, among 134 out of 154 total respondents. 20 respondents skipped the question about age. Besides, there was not any respondent under 20. Details about the age of the sample are presented in Table 2.

Table 2. Age of the sample

Age		Responses
Over 45	4,48%	6
40 - 44	7,46%	10
35 - 39	21,64%	29
30 -34	30,60%	41
25 - 29	24,63%	33
20 - 24	11,19%	15
Under 20	0,00%	0

I got also the education level of the sample. Details are in Table 3.

Table 3. The education level of the sample

Education Level		Responses
High school	8,96%	12
Associate's degree	10,45%	14
Bachelor's degree	52,99%	71
Master's degree	25,37%	34
Doctoral degree	2,24%	3

In the survey, there was also a question about financial literacy. While 1 equals extremely bad and 7 equals extremely good for 7 Point Likert Scale, the weighted

average of financial literacy of the sample was 4,78. All details are presented in Table 4.

Table 4. Financial literacy of the sample

Financial literacy	Responses	
Extremely bad	2,24%	3
Very bad	6,72%	9
Bad	11,19%	15
Acceptable	20,90%	28
Good	22,39%	30
Very good	22,39%	30
Extremely good	14,18%	19

As a part of the demographics of the respondents, household income is asked. Details are given in Table 5.

Table 5. The income of the sample

Income (₺)	Responses	
Under 5000	26,12%	35
5001 - 11000	37,31%	50
11001 - 30000	32,09%	43
Over 30000	4,48%	6

The m-banking service provider was asked to respondents; 6 of Turkey's largest 10 banks by assets according to The Banks Association of Turkey were listed with the *Other* option. There were 153 responses out of 154 respondents and most of the respondents, 46,40 percent, were most frequently using m-banking services that are provided by Garanti Bankası, İş Bankası, Ziraat Bankası. These three banks have more than 5 million monthly apps installed customers according to Veloxity's report How Mobile Is Your Bank?: An Insight to Mobile Banking (2018).

30,07 percent of respondents noted that they are using the m-banking service of other banks then listed in the survey. All details about m-banking service providers are given in Table 5.

Table 6. M-banking service provider of the sample

M-banking service provider		Responses
DenizBank	7,84%	12
İş Bankası	15,03%	23
Garanti Bankası	18,95%	29
Akbank	6,54%	10
Ziraat Bankası	12,42%	19
Yapı Kredi	9,15%	14
Other	30,07%	46

Perceived Task Technology Fit (PTTF)

PTTF is the independent variable to test Hypothesis 8, 9, 10, 13d, and generated by factor analysis with the answers to questions PTTF1, PTTF2, and PTTF3 in Table 7.

Perceived Ease-of-Use (PEOU)

PEOU is the independent variable to test Hypothesis 6, 7, 13c, and generated by factor analysis with the answers to questions PEOU1, PEOU2, and PEOU3 in Table 7.

Perceived Usefulness (PU)

PU is the independent variable to test Hypothesis 2, 3, 13b and is also the dependent variable to test Hypothesis 5, 7, 10. PU is generated by factor analysis with the answers to questions PU1, PU2, PU3, and PU4 in Table 7.

Perceived Risk (PR)

PR is the independent variable to test Hypothesis 11, 12, 13e, and generated by factor analysis with the answers to questions PR1, PR2, and PR3 in Table 7.

Expectation - Confirmation (EC)

EC is the independent variable to test Hypothesis 4, 5, and generated by factor analysis with the answers to questions EC1, EC2, and EC3 in Table 7.

Satisfaction (SAT)

SAT is the independent variable to test Hypothesis 1, 13a, and is also the dependent variable to test Hypothesis 3, 4, 9, 12. SAT is generated by factor analysis with the answers to questions SAT1, SAT2, SAT3, and SAT4 in Table 7.

Continuance Intention (CI)

CI is the dependent variable to test Hypothesis 1, 2, 6, 8, 11, 13a, 13b, 13c, 13d, 13e and generated by factor analysis with the answers to questions CI1, CI2, and CI3 in Table 7.

Other Variables

Hypothesis 13a, 13b, 13c, 13d, 13e claims that GENDER moderating the effects from PTTF, PEOU, PU, PR and SAT on CI.

In SPSS, we analyzed descriptives by using PTTF, PEOU, PU, PR, SAT, and CI to get standardized values as variables. ZPTTF, ZPEOU, ZPU, ZPR, and ZSAT are generated and saved to the dataset. Z as a part of the name of new variables stands for Z-score that also be called standard score. The calculation for standardization is as follows where $\boldsymbol{Z}$ is the standard score, $\boldsymbol{\chi}$ is the observed value, $\boldsymbol{\mu}$ is the mean of the sample and $\boldsymbol{\sigma}$ is the standard deviation.

$$\mathrm{Z} = \frac{\chi - \mu}{\sigma}$$

PTTF_X_GENDER, PEOU_X_GENDER, PU_X_GENDER, PR_X_GENDER, and SAT_X_GENDER are generated by using SPSS to test if GENDER moderates the interactions between PTTF, PEOU, PU, PR, SAT, and dependent variable Continuance Intention.

All Z-scores are pulled in GENDER and saved as new variables in the dataset. These generated variables are used as independent variables in the Structural Equation Model to test Hypothesis 13a, 13b, 13c, 13d, 13e as shown in Figure 9.

Table 7. Items in the Questionnaire

Item ID	Questionnaire Item in English
PTTF1	The functions of m-banking are enough to help manage my personal finances.
PTTF2	The functions of m-banking are appropriate to help manage my personal finances.
PTTF3	In general, the functions of m-banking fully meet my needs of finance management.
PEOU1	Learning to operate m-banking is easy for me.
PEOU2	It is easy to use m-banking to accomplish banking transactions.
PEOU3	Interaction with m-banking does not require a lot of mental effort.
PU1	M-banking improves efficiency in managing my personal finances.
PU2	M-banking improves convenience in managing my personal finances.
PU3	M-banking lets me manage my personal finances more quickly.
PU4	Overall, m-banking is useful in managing my personal finances.
PR1	I am confidently aware of the risks associated with m-banking.
PR2	M-banking is dangerous for me to use.
PR3	There is a considerable risk involved in participating in m-banking rather than other modes of banking services (e.g. traditional banking, online banking)
EC1	My experience with using m-banking was better than what I expected.
EC2	The functions provided by m-baking were more than what I expected.
EC3	Overall, most of my expectations from using m-banking were confirmed.
SAT1	How do you feel about your overall experience of m-banking use: Very dissatisfied/Very satisfied.
SAT2	How do you feel about your overall experience of m-banking use: Very displeased/Very pleased.
SAT3	How do you feel about your overall experience of m-banking use: Very frustrated/Very contented.
SAT4	How do you feel about your overall experience of m-banking use: Absolutely terrible/Absolutely delighted.
CI1	I intend to continue using m-banking rather than discontinue its use.
CI2	My intention is to continue using m-banking than use any alternative means (traditional banking or online banking).
CI3	If I could, I would like to discontinue my use of m-banking (reverse coded).

CHAPTER FOUR

RESULTS

I used STATA to test my hypotheses and SPSS to generate variables needed to test if gender moderates the relations in hypotheses. I use Structural Equation Modeling to test all hypotheses together at once instead of testing all relations or effects separately and also to see both direct and indirect relations between variables. Structural Equation Modeling also let us to test the effect of moderation of gender and to take measurement errors into account. In addition, I use logistic regression analysis to check and compare the results, understand the differences between logit and SEM, and also to see the isolated effects of variables on each other.

4.1 LOGISTIC REGRESSION ANALYSIS

I use the logistic regression analysis to investigate the hypothesis as my dependent variables are binary. Like all regression analysis, logistic regression is a predictive analysis and it models the probability of a positive outcome given a set of regressors.

Logistic regression is used to describe data and explain the relationship between one dependent binary variable and one or more nominal, ordinal, or interval independent variables (Sperandei, 2014). The response variable in logistic regression is binomial. This is the only difference between logistic regression and multiple linear regression.

Logistic regression was proposed as an alternative in the late 1960s and early 1970s (Cabrera, 1994). With the increase in the processing capacity of personal computers and the spread and accessibility of advanced statistical software in parallel, the use of logistic regression increased.

The central mathematical concept that underlies logistic regression is the logit-the natural logarithm of an odds ratio (Peng et al., 2002). The form of the simple logistic model is given by Peng et al. (2002) as below.

$$logit(Y) = natural\log(odds) = \ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta X$$

Logistic regression seeks to model the probability of an event occurring depending on the values of the independent variables, which can be categorical or numerical. Also, it seeks to estimate the probability that an event occurs for randomly selected observation versus the probability that the event does not occur.

Logistic regression helps to predict the effect of a series of variables on a binary response variable. It classifies observations by estimating the probability that an observation is in a particular category.

In this study, logistic regression was used to test the hypotheses by seeking how dependent variables are affected by the independent variables. To test the proposed hypotheses, I first run a logistic regression that incorporates a single explanatory variable. Then, to check the robustness of these variables to each other. I construct another specification in which all variables that are of interest are included in the regression equation as explanatory variables. Finally, to check the robustness of the effect of these variables to the inclusion of a wider set of variables, I construct a specification where a wide set of demographic variables are used as control variables.

4.1.1 Results for Hypothesis 5, 7 and 10

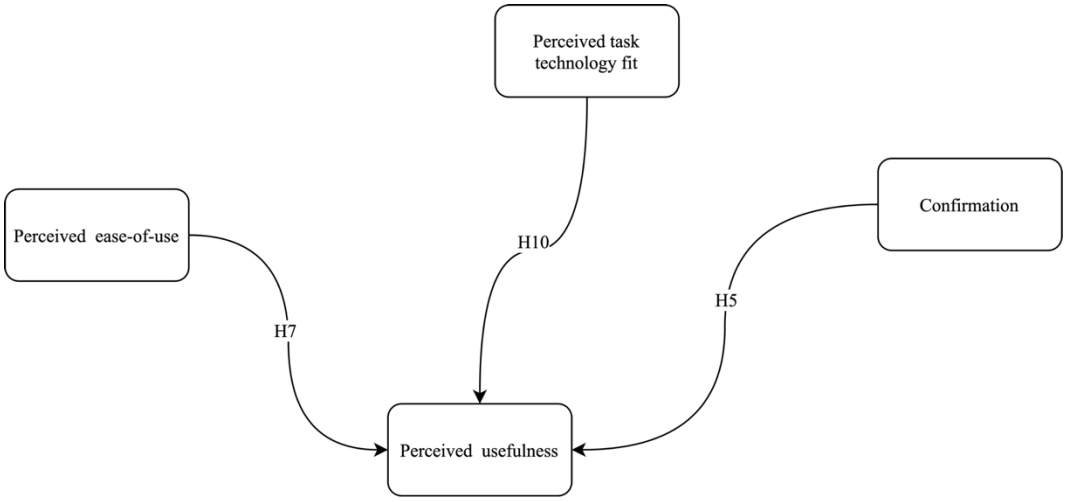

Figure 5. Hypothesis 5, 7, 10.

Perceived usefulness is the dependent variable, perceived task technology fit, perceived ease of use and confirmation are independent variables to test the following hypotheses.

H5: Confirmation positively affects perceived usefulness.

H7: Perceived ease of use positively affects perceived usefulness.

H10: Perceived task technology fit positively affects perceived usefulness.

To test my hypotheses namely H5, H7, and H10 I construct the following specification:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + +\beta_2 X_2 + \beta_3 X_3$$

Where P stands for the probability that perceived usefulness is equal to 1, X_1 stands for the perceived task technology fit, X_2 stands for the perceived ease of use and finally X_3 stands for the expectation confirmation. This is the fourth specification in Table 9.

To observe the individual correlations, I also specified logit regression equations where there is only one independent variable at interest such as:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1$$

Where X_1 stands for the perceived task technology fit in the first specification in Table 8, perceived ease of use in the second specification, and expectation confirmation for the third specification.

Finally, to check whether the coefficients of the variables PTTF, PEOU, and EC are robust to the inclusion of various control variables, I construct another specification where I add demographic variables such as:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + +\beta_2 X_2 + \beta_3 X_3 + \beta_4 Z$$

Where Z represents the demographic variables such as gender, age, marital status, education income, and financial literacy. The last column in Table 8 represents this specification.

Table 8. Logistic regression results of H5, H7, H10

	(1) dPU	(2) dPU	(3) dPU	(4) dPU	(5) dPU
PTTF	2.600***			2.140***	2.051***
	(5.87)			(4.23)	(3.77)
PEOU		2.017***		1.179***	1.166***
		(5.89)		(3.09)	(2.86)
EC			1.503***	1.577***	1.742***
			(5.08)	(3.50)	(3.38)
GENDER					0.404
					(0.60)
AGE					-0.0485
					(-0.76)
MARRIED					-0.274
					(-0.33)
EDU					0.00868
					(0.02)
INCOME					0.185
					(0.83)
FLITERACY					-0.0508
					(-0.21)
Constant	0.674***	0.662***	0.473**	0.797***	1.498
	(2.73)	(2.88)	(2.27)	(2.59)	(0.67)
R-sqr	0.429	0.355	0.221	0.595	0.599
N	141	141	137	137	130

t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

In general, results documented in Table 8 shows that we fail to reject hypotheses 5, 7, and 10. Hence we can say that perceived usefulness is positively and significantly

affected by the variables PTTF, PEOU, and EC. In the rest of this section, I will explain the results documented in Table 8.

The first specification in Table 8 shows the isolated effect of perceived task technology fit on perceived usefulness. According to that specification, perceived task technology fit has a positive and significant effect on perceived usefulness (coefficient=2.600, p<0.000).

Similarly, the isolated effects of perceived ease of use and expectation confirmation on perceived usefulness are positive and significant at 1% significance level (coefficients are 2.017 and 1.503 respectively, p values are smaller than 0.000 for both variables).

The result of the fourth specification in Table 8 shows that the effects of PTTF, PEOU, and EC remain positive and significant even though we add them together into the logit regression meaning that their effects are robust to each other. In detail, the effect of perceived task technology fit (β_1) on PU is 2.140441 and p<0.000. Hence, we observe that there is a positive and significant relationship between PU and PTTF. Similarly, the effect of perceived ease of use (β_2) on perceived usefulness is 1.1792 and p<0.002. Hence again we observe a positive and significant correlation between perceived usefulness and perceived ease of use.

In the last specification, we see that the effects of perceived task technology fit, perceived ease of use, and expectation confirmation remain positive and significant in the presence of demographic variables in the logit regression equation namely gender, marital status, age, education, income, and financial literacy. I find no significant effect on all of the demographic variables that I add to the model. However, the addition of these variables shows that the variables that are of interest are robust to the inclusion of the demographic variables and they remained positive and significant at 1% significance level.

In conclusion, according to the results documented by Table 8, I fail to reject the hypothesis 5, 7 and 10 as I document that perceived ease of use, expectation

confirmation and perceived task technology fit is positively and significantly related to the perceived usefulness.

4.1.2 Results for H3, H4, H9, and H12

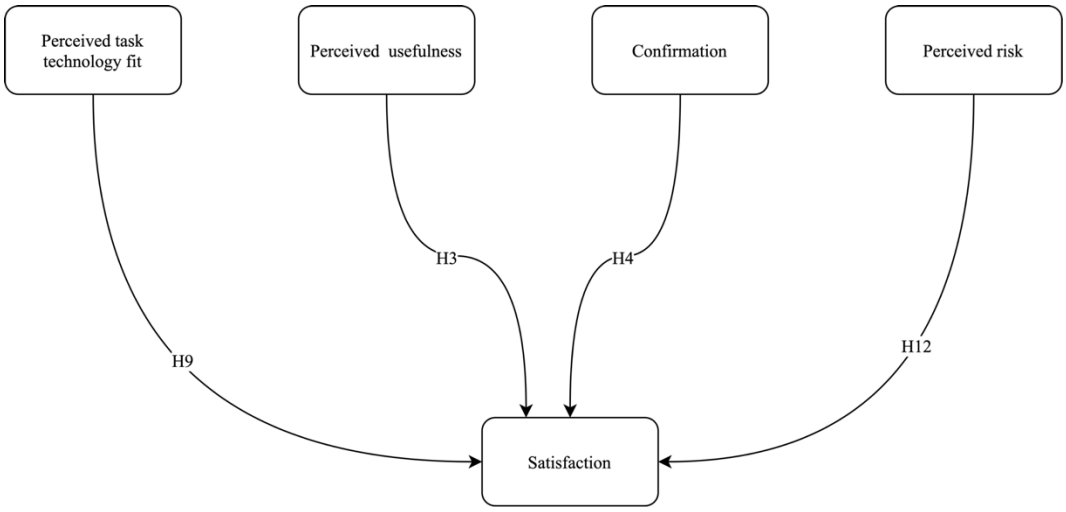

Figure 6. Hypothesis 3, 4, 9, 12.

Satisfaction is the dependent variable, perceived task technology fit, perceived usefulness, expectation confirmation, and perceived risk are independent variables to test the following hypotheses.

H3: Perceived usefulness positively affects satisfaction.

H4: Confirmation positively affects satisfaction.

H9: Perceived task technology fit positively affects satisfaction.

H12: Perceived risk negatively affects satisfaction.

In order to test the hypotheses namely H3, H4, H9, and H12 I construct the following specification:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + +\beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$$

Where P stands for the probability that satisfaction is equal to 1, X_1 stands for the perceived task technology fit, X_2 stands for the perceived usefulness, X_3 stands for expectation confirmation and X_4 stands for the perceived risk. This is the fifth specification in Table 9.

To observe the individual correlations, I also specified logit regression equations where there is only one independent variable at interest such as:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1$$

Where X_1 stands for the PTTF in the first specification in Table 9, PU in the second specification, EC in the third specification, and PR for the fourth specification.

Finally, to check whether the coefficients of the variables PTTF, PEOU, and EC is robust to the inclusion of various control variables, I construct another specification where I add demographic variables such as:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + +\beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 Z$$

Where Z represents the demographic variables such as gender, age, marital status, education income, and financial literacy. The last column in Table 9 represents this specification.

Table 9. Logistic regression results of H3, H4, H9, H12

	(1) dSAT	(2) dSAT	(3) dSAT	(4) dSAT	(5) dSAT	(6) dSAT
PTTF	1.725***				1.067***	1.064**
	(5.32)				(2.65)	(2.56)
PU		1.875***			0.809*	1.027***
		(5.32)			(1.71)	(1.95)
EC			1.204***		0.683*	0,592
			(4,04)		(1,77)	(1,27)
PR				-0,280	-0,115	-0,162
				(1,56)	(0,46)	(0,59)
GENDER						-0,726
						(1,36)
AGE						0,00569
						(0,13)
MARRIED						0,391
						(0,63)
EDU						-0,0769
						(0,24)
INCOME						-0,123
						(0,72)
FLITERACY						-0,0490
						(0,29)
Constant	-0,205	-0,343	-0,181	-0,0166	-0,383	0,653
	(0,93)	(1,44)	(0,88)	(0,09)	(1,52)	(0,39)
R-sqr	0,264	0,273	0,136	0,014	0,334	0,369
N	131	131	130	131	130	123

t statistics in parentheses; ∗ p<0.10, ∗∗ p<0.05, ∗∗∗ p<0.01

Table 9 shows the results of these specifications. The first specification shows the effect of PTTF on satisfaction. According to results where there are no other control variables, the effect of PTTF on satisfaction is positive and significant at 1% significance level (coefficient=1.725, $p<0.000$).

The second specification in Table 9 shows the effect of PU on satisfaction without other control variables. According to the results, PU has a positive and significant effect on satisfaction as the coefficient is equal to 1.875 and $p<0.000$.

Third and fourth specifications in Table 9 exhibit the results for the effects of ECT and PR on satisfaction. We observe that the effect of EC on satisfaction is positive and significant (coefficient=1.204 and $p<0.000$). But for PR has a negative and insignificant effect on satisfaction (coefficient=-0.280).

The fifth specification in Table 9 shows the effect of PTTF, PU, EC, and PR on satisfaction in the same regression equation. When we check the results, we observe that the positive and significant effect of perceived task technology fit on satisfaction remains positive and significant at 1% to the inclusion of other variables. On the other hand, for variables perceived usefulness and expectation confirmation, even though the relationship remains positive, the significance level drops to 10%.

Finally, in the sixth specification, when we add a set of demographic variables to the specification, we observe that the effect of PTTF on satisfaction remains positive and significant at 1% significance level and the PU is again found to be significant at 10%. On the other hand, the effect of the EC becomes insignificant even though the relationship is still positive. I found no significant effect of PR on satisfaction but the sign of the relationship remains negative.

In conclusion, according to the results documented by Table 9, I fail to reject the hypothesis 3, 4, and 9. On the other hand, pursuant to H12 I find that the effect of perceived risk is negative on satisfaction but this effect is not significant so I reject H12.

4.1.3 Results for H1, H2, H6, H8, and H11

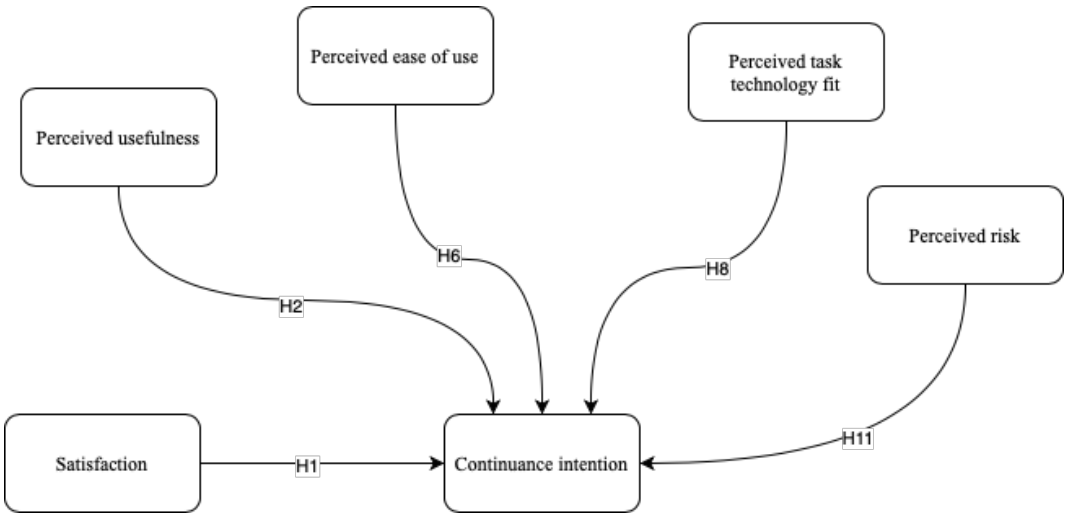

Figure 7. Hypothesis 1, 2, 6, 8, 11

Continuance intention is the dependent variable, perceived task technology fit, perceived ease of use, perceived usefulness, satisfaction, and perceived risk are independent variables to test the following hypotheses.

H1: Satisfaction positively affects continuance intention.

H2: Perceived usefulness positively affects continuance intention.

H6: Perceived ease of use positively affects continuance intention.

H8: Perceived task technology fit positively affects continuance.

H11: Perceived risk negatively affects continuance intention.

In order to test the hypotheses namely H1, H2, H6, H8, and H11, I construct the following specification:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + +\beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

Where P stands for the probability that continuance intention is equal to 1, X_1 stands for the perceived task technology fit, X_2 stands for the perceived usefulness, X_3 stands for perceived ease of use, X_4 stands for the satisfaction and X_5 stands for the perceived risk. This is the sixth specification in Table 10.

To observe the individual correlations, I also specified logit regression equations where there is only one independent variable at interest such as:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1$$

Where X_1 stands for the perceived task technology fit in the first specification, perceived ease of use for the second specification, perceived usefulness in the third specification, satisfaction for the fourth specification, and perceived risk for the fifth specification.

Finally, to check whether the coefficients of the variables PTTF, PEOU, PU, PR, and SAT is robust to the inclusion of various control variables, I construct another specification where I add demographic variables such as:

$$\left(Ln\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + +\beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + +\beta_5 X_5 + \beta_6 Z$$

Where Z represents the demographic variables such as gender, age, marital status, education income, and financial literacy. The last column in Table 10 represents this specification.

Table 10. Logistic regression results of H1, H2, H6, H8, H11

	(1) dCI	(2) dCI	(3) dCI	(4) dCI	(5) dCI	(6) dCI	(7) dCI
PTTF	0.548***					-1.161**	-1.019**
	(2.90)					(-2.51)	(-2.12)
PEOU		0.625***				-0,120	-0,0248
		(3,25)				(0,35)	(0,06)
PU			1.268***			1.931***	1.752***
			(4.98)			(4.15)	(3.67)
SAT				0.904***		0.726**	0.746*
				(3.98)		(1.98)	(1.78)
PR					-0,229	-0,138	-0,113
					(1,30)	(0,59)	(0,42)
GENDER							-0,456
							(0,89)
AGE							-0,0492
							(1,12)
MARRIED							1.234**
							(2.05)
EDU							-0.568*
							(-1.75)
INCOME							0,00557
							(0,03)
FLITERACY							0,209
							(1,29)
Constant	0.390**	0.395**	0.379*	0.442**	0.378**	0.371*	2,318
	(2,16)	(2,17)	(1,90)	(2,27)	(2,16)	(1,70)	(1,38)
R-sqr	0,050	0,064	0,191	0,116	0,009	0,260	0,321
N	137	137	137	130	137	130	123

t statistics in parentheses; ∗ p<0.10, ∗∗ p<0.05, ∗∗∗ p<0.01

In the first specification of Table 10, we observe that when isolated in the regression equation, PTTF has a positive and significant effect on CI as the coefficient is 0.548 and $p<0.000$. Moreover, in the second third, and fourth specifications, we observe that isolated effects of PEOU (coefficient=0.625, $p<0.000$), PU (coefficient=1.268, $p<0.000$), and SAT (coefficient=0.904, $p<0.000$) has a positive and significant effect on CI. However, although I find that the effect of PR on CI is negative (coefficient=-0.229), I find that the isolated effect of PR on CI is not significant.

In the sixth specification, I conduct a regression that includes PTTF, PEOU, PU, SAT, and PR as independent variables. According to the results, I observe that the sign of the coefficient of the PTTF changes from positive to negative. Moreover, the significance level decreases from 1% to 5%. Similarly, the sign of the coefficient of the PEOU changes from positive to negative as well but its significance completely vanishes. The effect of PU on CI remains robust to the inclusion of other variables as its coefficient still has a positive sign and is significant at the 1% level. Similarly, the effect of SAT on CI remains robust to the inclusion of other variables as its coefficient still has a positive sign but the significance level decreases to 5%. Finally, for PR, I find no significant effect but the sign of its coefficient is still negative.

When I add the demographic variables to the regression, I observe that PTTF still has a negative and significant effect on CI at 5%, PEOU has no significant effect on CI and PU has a positive and significant effect on CI at 1% significance level. Similarly, the effect of SAT on CI remains positive and significant at 5% significance level and I find no significant effect for PR.

According to these results, I fail to reject hypotheses 1 and 2 as I document a positive and significant effect on CI for both PU and SAT and these results are robust to the inclusion of control variables. For hypotheses 6 and 8, again as I document a positive and significant result for the isolated effects of PTTF and PEOU, I fail to reject both hypotheses. However, I need to say that results for H6

and H8 are not robust to the inclusion of control variables due to the multicollinearity between explanatory variables.

4.2 STRUCTURAL EQUATION MODELING

Structural Equation Modeling is a collection of techniques from statistics and an analysis technique that provides a systematic and comprehensive approach to complex research problems in a single process by modeling the relationships between many dependent and independent variables (Anderson & Gerbing, 1988). The ability to investigate multiple relationships and analyze them with computer programs has expanded the usage areas of Structural Equation Modeling and made it widely preferred in many fields (Yılmaz & Çelik, 2009).

There may be multiple dependent variables and also one or more independent variables that are related somehow and Structural Equation Modeling allows to test the set of relationships between these dependent and independent variables whether these variables are continuous or discrete (Ullman et al., 2003).

Structural Equation Modeling is not a single technique as such ordinary least square regression or logistic regression and integrates different techniques as a one model fitting framework. It is a multivariate method that combines analyzes such as variance, covariance analysis, factor analysis, and multiple regression to estimate relationships. It is a technique used to test models in which the causal relationships and correlations between observed variables and latent variables and are used especially in sciences such as psychology and marketing, to evaluate the relationships between variables and to test models (Tüfekçi et al., 2006).

Structural Equation Modeling is used in the testing of many theories and in the process of developing new models, as it is particularly successful in testing complex models, makes many analyzes at once, recommends new arrangements for the network of relationships in the model under consideration, makes it easier to examine the effects of mediation and moderation, and takes measurement errors into account (Dursun & Kocagöz, 2010).

In a multi-step model in which there are indirect relations as well as direct relationships between the dependent variable and the independent variables, direct effects can be determined by regression analysis, while the indirect effects of the variables are ignored. Therefore, considering the relationships between dependent and independent variables at a single level in traditional methods such as linear regression, and evaluating each relationship level simultaneously in Structural Equation Modeling is only one of the differences between these methods.

Although a model analyzed by Structural Equation Modeling can also be performed with traditional regression analysis methods, but regression analysis is required for each relationship. On the other hand, all relationships determined between variables can be revealed with a single analysis, and also, the error caused by measurement can be eliminated in path analysis. Eliminating the error is one of the most important advantages of all analysis methods based on Structural Equation Modeling.

The most critical issue in the application of Structural Equation Modeling is that the method formed has a very solid theoretical infrastructure. The main feature of the method is that it is based entirely on theory and it accepts that there is a causality structure among the set of implicit variables (Yilmaz, 2004).

The structural equation model was first developed by Sewell Wright, a geneticist. Wright's first article in 1918 was about modern factor analysis that predicts and formulates a model of the size components of bone measurements. The developments provided by Anderson and Rubin (1956) and later Jöreskog (1969) and many other researchers paved the way for the methodology of confirmatory factor analysis which allows the testing of hypotheses based on weighting patterns. It is necessary to consider the historical development of Structural Equation Modeling in historical order by means of some statistical concepts. These analyzes are regression analysis, path analysis, Confirmatory Factor Analysis (CFA-Confirmatory Factor Analysis) and finally Structural Equation Modeling (Schumacker & Lomax, 2004).

Structural Equation Modeling can be defined as path analysis using latent variables. Social scientific concepts maybe not observable directly, e.g. perceived risk, the practicability of a mobile application. It is very impossible to put some standard unit of measure like meters and get a direct reading of people's level of perceived risk or usefulness. So, this makes these concepts hypothetical or latent as referred. They are latent within people at some level and that drive attitudes and behavior but they cannot be actually or directly measurable. These concepts are not measurable but some approaches can be used which measure these latent variables using observable indicators, variables that can be measured directly that are to be caused by the underlying latent variables.

It is inevitable to get answers with variance across the individuals in the sample and all variability is not only caused by people's level of risk perception or perceived usefulness for mobile banking applications. It is very possible that some of the variability exists because of other factors like the temperature in the room while the respondent answers the survey or her computer's speed that is used to complete the survey.

These all other factors that we are not interested in what we are trying to measure which is risk perception or usefulness. So, some of the variability is to do with risk perception the latent construct but some of the variability is due to other factors, error, and unique variance that mentioned.

A survey item, in the survey administered to a sample of people like we did for this study, would be an observable indicator of a latent construct such as perceived risk or usefulness. These are questions like the one that asked people how they are happy with their lives. For those, the usual decomposition of the measured score is summarized by the following equation where X is the measured score, δ is the true score and ϵ is the error of measurement (Wiley et al., 1970).

$$X = \delta + \varepsilon$$

Error in this equation comprises two components. The first one is the systematic error. That is the bias where the question is phrased in a way that makes people give different answers than actual ones. This may be caused by the administration by an interviewer. People may want to seem better than they are if they think the actual answer is socially undesirable. The second one that error in this equation comprises is random error. It would be the one where the answers are just as likely overrated as underrated.

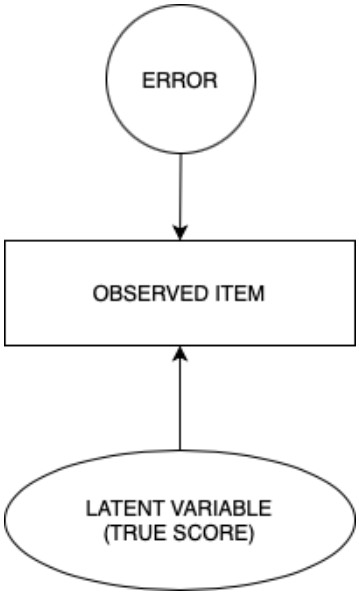

Figure 8. Path diagram of true score equation

This diagram indicates that the observed score is caused by both the latent variable (true score) and by the other factors, the error. This simple path diagram encapsulates all the things we mentioned up to here to explain what Structural Equation Modeling is.

It would be clearer if we could implement this equation as a statistical model. Unfortunately, when we have only one indicator of the latent variable such as perceived usefulness of a mobile app or perceived task technology fit, this equation is unidentified. $\boldsymbol{X}$ is the measured part in the equation and that is the known part of it. There are more unknown pieces that are estimated; the $\boldsymbol{\delta}$ and the $\boldsymbol{\varepsilon}$. There are

two unknowns and one known. So, we can't solve that equation uniquely, it is unidentified with one indicator.

As we mentioned before that Structural Equation Modeling can be defined as path analysis using latent variables and got an insight about latent variables. The other aspect of this characterization is path analysis that can be defined as an analysis that shows the partial effects of independent variables on dependent variables with standardized regression coefficients.

It is known that path analysis was first developed by biometrician Wright (Lleras, 2005). With this method, Wright designed to explain the direct and indirect relationships of the different color samples in the subjects with inheritance. With these studies, he obtained a path diagram in which the color samples of the subjects were used as existing drafts.

Path analysis is used to establish models based on cause-effect relationships between variables. On the other hand, path models use regression analysis and correlation coefficients to model complex relationships between observed variables.

SEM be particularly suitable for addressing research questions that involve complex, multi-faceted constructs that are measured with error. One of the useful aspects of SEM is its ability to make corrections of errors of measurement. Other kinds of research questions that suited to ones that specify systems of relationships rather than a dependent variable and a set of predictors. Structural Equation Models may have numerous different outcomes or dependent variables each of which is affecting other dependent variables in a more complex environment.

Structural Equation Models are also suitable to examine mediated variables that directly affect other variables. Many research questions are interested in the direct effect of one variable on other variables. But, in many research contexts, and this is one of them, interested in more complex kinds of relationships where one variable influences another one which has a second effect on a third variable. And, Structural

Equation Models are suitable to focus on those kinds of mediated research questions.

In this study, we have a complex model to test our hypotheses and we want to see both direct and indirect relations between our variables. Structural Equation Modeling let us test our hypotheses and analyze our model at once instead of testing all relations or effects separately. Also, we want to test the effect of moderation of gender. Another reason why we used SEM is to take measurement errors into account.

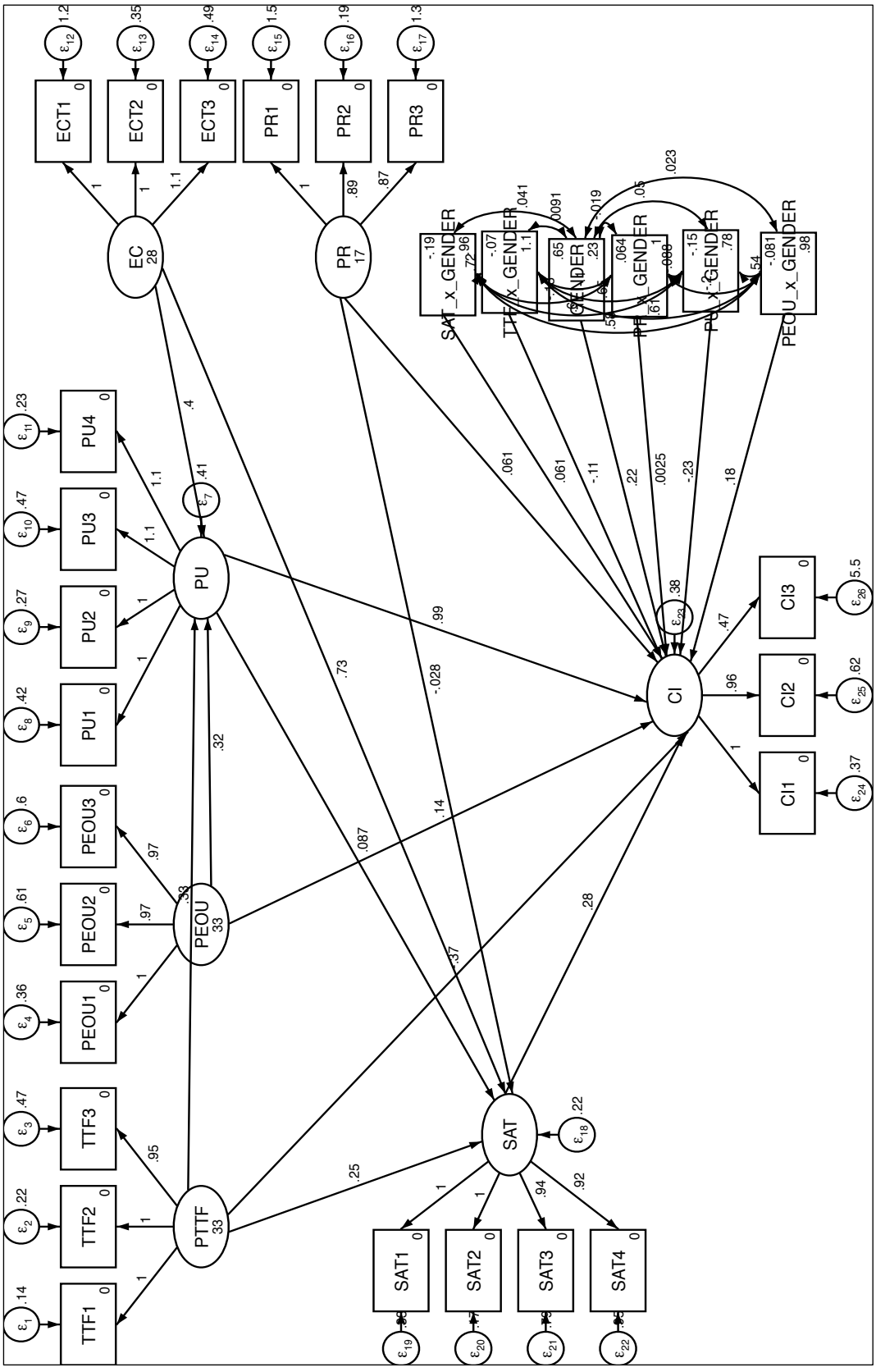

Figure 9. Structural Equation Model

Table 11. SEM results of hypotheses

	(1) PU	(2) SAT	(3) CI
PTTF	0.329*** (4.39)	0.250*** (3.46)	-0.368*** (-3.34)
PEOU	0.324*** (4.63)		0.137 (1.38)
PU		0.0872 (0.94)	0.993*** (7.24)
PR		-0.0282 (-1.12)	0.0608* (1.76)
EC	0.400*** (4.70)	0.734*** (8.22)	
SAT			0.276** (2.35)
GENDER			0.217 (1.43)
PTTF_x_GENDER			-0.113 (-0.90)
PEOU_x_GENDER			0.175 (1.59)
PU_x_GENDER			-0.233* (-1.65)
PR_x_GENDER			0.00251 (0.03)
SAT_x_GENDER			0.0608 (0.48)

t statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

In the first specification of Table 11, PTTF has a positive and significant effect on both PU (coefficient=0.329, p<0.000) and SAT (coefficient=0.250, p<0.000) and I fail to reject hypothesis 10 and 9. The results that we got by logical regression given

in Table 8 and Table 9 also showed that the effects of PTTF on PU and SAT were positive and are significant at the 1% level. PTTF has a significant and negative effect on CI (coefficient=-0.368, $p<0.000$) while hypothesis 8 claims that PTTF positively affects CI. Logical regression conducted to test hypothesis 8 that includes PTTF, PEOU, PU, SAT and PR as independent variables also showed a negative effect at 5% significance level. On the contrary, when PTTF is isolated in the logical regression, PTTF has a positive effect on CI that is significant at the 1% level that is given in Table 10.

According to the second specification of Table 11, I fail to reject hypothesis 7. We observe that PEOU has a positive and significant effect on PU (coefficient=0.324, $p<0.000$). The results of the logical regression conducted before and given in Table 8 also showed a positive effect of PEOU on PU at 1% significance level. I also fail to reject hypothesis 6 that claims that PEOU affects CI positively. According to Table 11, PEOU has a positive but insignificant effect on CI (coefficient=0.137) while logical regression conducted with PTTF, PEOU, PU, SAT and PR as independent variables showed an insignificant negative effect of PEOU on CI in Table 10.

According to the third specification, I fail to reject hypothesis 3 as I observe that PU has positively affect SAT (coefficient=0.0872) and the effect is insignificant. On the contrary, I found that the isolated effect of PU on SAT is positive and significant according to the results shown in Table 9. I also fail to reject hypothesis 2 that claims PU positively affects CI. According to Table 11, PU has a positive and significant effect on CI (coefficient=0.993, $p<0.000$).

In the fourth specification of Table 11, PR negatively affects SAT (coefficient=-0.0282) and the effect is insignificant. PR has a positive effect on CI (coefficient=0.0608) at a significance level of 10%. Thus, I fail to reject hypothesis 12 but I can reject hypothesis 11 that claims a negative effect of PR on CI. The isolated effect of PR on SAT, according to logical regression results shown in Table 9, is also founded negative and insignificant. On the contrary to the result given in

Table 11, we got a result by the logit that shows PR has an insignificant but negative effect on CI which is given in Table 10.

According to the fifth specification of Table 11, I fail to reject hypotheses 5 and 4 as I document EC has a positive and significant effect on PU (coefficient=0.400, $p<0.000$) and on SAT (coefficient=0.734, $p<0.000$).

At the sixth specification, SAT positively affects CI (coefficient=0.276) at the significance level 5%. I fail to reject hypothesis 1 according to this result. Also, the isolated effect of SAT on CI found by logit and shown in Table 10 is positive significantly at level 5%.

Table 11 also declares the moderation of GENDER which is represented as 0 for females and 1 for males on the effects of PTTF, PEOU, PU, PR, and SAT on CI. As a part of this study, logical regression was made to test hypotheses to see if there is a dramatic difference between the results got by SEM but moderation cannot be tested by logit and this is one of the reasons why SEM is preferred. The results in Table 11 declare that the effects of PTTF (coefficient=-0.113), PEOU (coefficient=0.175), PR (coefficient=0.00251), and SAT (coefficient=0.0608) on CI is not significantly moderated by GENDER. Conversely, GENDER moderates the effect of PU on CI (coefficient=-0.233) at a significance level of 10%. According to the results, the influence of PU on CI is stronger among females than males.

CHAPTER FIVE

CONCLUSION

Structural Equation Modeling and also logical regression analysis was used in this study, which emerged from the motivation to better understand the factors affecting the continuous use of mobile banking instead of initial adoption of mobile banking by users. The study builds upon the Expectation Confirmation Model, Technology Acceptance Model, and Task Technology Fit, and focuses on perceived task technology fit, perceived ease of use, perceived usefulness, perceived risk, expectation confirmation, and satisfaction as main predictors of continuance intention towards mobile banking.

Hypotheses tested with the empirical data gathered from 154 users of the mobile banking application offered by banks in turkey. The survey conducted by an online tool and users who used mobile banking at least once were asked to respond.

Logistic regression analysis was used to check and compare the results, understand the differences between logit and SEM, and also to see the isolated effects of variables on each other. According to results got by logit, PU is affected by PTTF, PEOU, and EC. SAT is explained by PTTF, PU, and EC but not PR. And, PTTF, PEOU, PU, and SAT affects CI significantly but there is no significant relation between PR and CI.

Structural Equation Modeling was chosen to be able to test the proposed model at once and to examine both direct and indirect effects of the independent variables on continuance intention. Another reason was to verify hypotheses that claims that gender moderates the effects of PTTF, PEOU, PU, PR, and SAT on continuous use of mobile banking. PU is explained by PTTF, PEOU, and EC. SAT is affected by PTTF and EC but not PU and PR. PU was a driver for SAT according to logit.

In addition, CI is driven by PTTF, PU, PR, and SAT. Contrary to what SEM results show, according to logit, the isolated effect of PR on CI was significant. Unlike the

results we obtained with logit and as mentioned before, the results indicate that PEOU affects PU significantly and PU affects CI at significance level 1% but the relation between PEOU and CI is insignificant. In addition to all these, even if we got logit results that indicate there is no significant relation between gender and PU or CI, according to the results that we obtained by SEM, the effect of PU on CI is moderated by gender. The influence of PU on CI is stronger among females than males, but moderation of gender is not significant on other relations in the research model.

REFERENCES

Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological bulletin*, *82*(2), 261.

Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., & Williams, M. D. (2016). Consumer adoption of mobile banking in Jordan. *Journal of Enterprise Information Management*.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, *103*(3), 411.

Anderson, T. W., & Rubin, H. (1956). Statistical inference in factor analysis. In *Proceedings of the third Berkeley symposium on mathematical statistics and probability* (Vol. 5, pp. 111-150).

Avornyo, P., Fang, J., Odai, R. O., Vondee, J. B., & Nartey, M. N. (2019). Factors Affecting Continuous Usage Intention of Mobile Banking in Tema and Kumasi. *International Journal of Business and Social Science*, *10*(3).

Bhattacherjee, A. (2001). Understanding information systems continuance: an expectation-confirmation model. *MIS quarterly*, 351-370.

Bidar, R., Fard, M. B., Salman, Y. B., Tunga, M. A., & Cheng, H. I. (2014, February). Factors affecting the adoption of mobile banking: sample of Turkey. In *16th international conference on advanced communication technology* (pp. 1278-1282). IEEE.

Cabrera, A. F. (1994). Logistic regression analysis in higher education: An applied perspective. *Higher education: Handbook of theory and research*, *10*, 225-256.

Chauhan, V., Yadav, R., & Choudhary, V. (2019). Analyzing the impact of consumer innovativeness and perceived risk in internet banking adoption. *International Journal of Bank Marketing*.

Chong, A. Y. L. (2013). Understanding mobile commerce continuance intentions: an empirical analysis of Chinese consumers. *Journal of Computer Information Systems*, *53*(4), 22-30.

Coelho, P. R. (1999). Athenian Economy and Society. By Edward E. Cohen. Princeton, NJ: Princeton University Press, 1992. Pp. xviii, 288. $45.00, cloth; $16.95, paper. *The Journal of Economic History*, *59*(1), 205-206.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

De Roover, R. (1942). Money, banking, and credit in medieval Bruges. *The Journal of Economic History*, *2*(S1), 52-65.

Dursun, Y., & Kocagöz, E. (2010). Yapisal Eşitlik Modellemesi Ve Regresyon: Karşilaştirmali Bir Analiz. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, (35), 1-17.

Glavee-Geo, R., Shaikh, A. A., & Karjaluoto, H. (2017). Mobile banking services adoption in Pakistan: are there gender differences?. *International Journal of Bank Marketing*.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS quarterly*, 213-236.

Gu, J. C., Lee, S. C., & Suh, Y. H. (2009). Determinants of behavioral intention to mobile banking. *Expert Systems with Applications*, *36*(9), 11605-11616.

Gumussoy, C. A. (2016). Factors affecting users' decision to continue using mobile banking in Turkey. *International Journal of Mobile Communications*, *14*(4), 411-430.

Jöreskog, K. G. (1969). A general approach to confirmatory maximum likelihood factor analysis. *Psychometrika*, *34*(2), 183-202.

Kang, H., Lee, M. J., & Lee, J. K. (2012). Are you still with us? A study of the post-adoption determinants of sustained use of mobile-banking services. *Journal of Organizational Computing and Electronic Commerce*, *22*(2), 132-159.

Karjaluoto, H., Riquelme, H. E., & Rios, R. E. (2010). The moderating effect of gender in the adoption of mobile banking. *International Journal of bank marketing*.

Keskin, E., İnan, E. A., Ünsal, Ü., Data, S., Kılınç, G., Özaktan, A., & Coşkun, A. (2019). 60th Year of Banks Association of Turkey and Banking System in Turkey.

Kumar, M., & Mishra, R. (2012). An overview of MANET: History, challenges and applications. *Indian Journal of Computer Science and Engineering (IJCSE)*, *3*(1), 121-125.

Lam, S. Y., Shankar, V., Erramilli, M. K., & Murthy, B. (2004). Customer value, satisfaction, loyalty, and switching costs: an illustration from a business-to-business service context. *Journal of the academy of marketing science*, *32*(3), 293-311.

Lee, M. C. (2010). Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation–confirmation model. *Computers & Education*, *54*(2), 506-516.

Lee, M. S., McGoldrick, P. J., Keeling, K. A., & Doherty, J. (2003). Using ZMET to explore barriers to the adoption of 3G mobile banking services. *International Journal of Retail & Distribution Management*.

Litvin, E. B., Abrantes, A. M., & Brown, R. A. (2013). Computer and mobile technology-based interventions for substance use disorders: an organizing framework. *Addictive behaviors*, *38*(3), 1747-1756.

Lleras, C. (2005). Path analysis. *Encyclopedia of social measurement*, *3*(1), 25-30.

Mutahar, A. M., Daud, N. M., Ramayah, T., Isaac, O., & Aldholay, A. H. (2018). The effect of awareness and perceived risk on the technology acceptance model (TAM): mobile banking in Yemen. *International Journal of Services and Standards*, *12*(2), 180-204.

Parasuraman, A., Zeithaml, V. A., & Malhotra, A. (2005). ES-QUAL: A multiple-item scale for assessing electronic service quality. *Journal of service research*, *7*(3), 213-233.

Peng, C. Y. J., Lee, K. L., & Ingersoll, G. M. (2002). An introduction to logistic regression analysis and reporting. *The journal of educational research*, *96*(1), 3-14.

Revenue Administration. (n.d.). *Gelir İdaresi Başkanlığı Tarihsel Gelişimi*. https://www.gib.gov.tr/kurumsal/gelir-idaresi-baskanliginin-tarihi-gelisimi

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. psychology press.

Singh, S., Srivastava, V., & Srivastava, R. K. (2010). Customer acceptance of mobile banking: A conceptual framework. *Sies journal of management*, *7*(1).

Shaikh, A. A., & Karjaluoto, H. (2015). Mobile banking adoption: A literature review. *Telematics and informatics*, *32*(1), 129-142.

Sperandei, S. (2014). Understanding logistic regression analysis. *Biochemia medica: Biochemia medica*, *24*(1), 12-18.

The Banks Association of Turkey (2018). *Digital, Internet and Mobile Banking Statistics.* https://www.tbb.org.tr/Content/Upload/istatistikiraporlar/

Thusi, P., & Maduku, D. K. (2019, October). Dimensions of perceived risk of mobile banking apps: An empirical investigation of South African retail banking customers. In *Proceedings of 4th International Conference on the* (Vol. 12, pp. 342-356).

Tüfekçi, N., & Tüfekçi, K. (2006). BANKACILIK SEKTÖRÜNDE FARKLI OLMA ÜSTÜNLÜĞÜNÜN VE MÜŞTERİ SADAKATİNİN YARATTIĞI DEĞER: ISPARTA İLİNDE BİR UYGULAMA. *Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (4), 170-183.

Ullman, J. B., & Bentler, P. M. (2003). Structural equation modeling. *Handbook of psychology*, 607-634.

Wessels, L., & Drennan, J. (2010). An investigation of consumer acceptance of M-banking. *International Journal of bank marketing*.

Wiley, D. E., & Wiley, J. A. (1970). The estimation of measurement error in panel data. *American Sociological Review*, *35*(1), 112-117.

Vanduhe, V. Z., Nat, M., & Hasan, H. F. (2020). Continuance Intentions to Use Gamification for Training in Higher Education: Integrating the Technology Acceptance Model (TAM), Social Motivation, and Task Technology Fit (TTF). *IEEE Access*, *8*, 21473-21484.

Veloxity (2018). *How Mobile Is Your Banking?: An Insight to Mobile Banking.* https://www.veloxity.net/white-papers

Venkatesh, V., & Zhang, X. (2010). Unified theory of acceptance and use of technology: US vs. China. *Journal of global information technology management*, *13*(1), 5-27.

YILMAZ, V., Çelik, H. E., & YAĞIZER, C. (2009). Çevresel duyarlılık ve çevresel davranışın ekolojik ürün satın alma davranışına etkilerinin yapısal eşitlik modeliyle araştırılması. *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, *9*(2), 1-14.

Yilmaz, V. (2004). Consumer behavior in shopping center choice. *Social Behavior and Personality: an international journal*, *32*(8), 783-790.

Yu, C. S. (2012). Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model. *Journal of electronic commerce research*, *13*(2), 104.

Yuan, S., Liu, Y., Yao, R., & Liu, J. (2016). An investigation of users' continuance intention towards mobile banking in China. *Information Development*, *32*(1), 20-34.

Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in human behavior*, *26*(4), 760-767.

Zhu, Y., Zhang, J. H., Au, W., & Yates, G. (2020). University students' online learning attitudes and continuous intention to undertake online courses: a self-regulated learning perspective. *Educational Technology Research and Development*, 1-35.