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THE RELATIVE IMPORTANCE OF QUALITY
FACTORS IN MOBILE BANKING APPLICATIONS

MASTER'S THESIS

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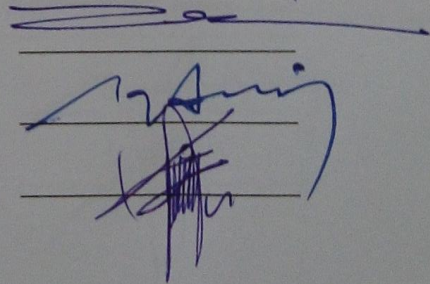
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The Relative Importance of Quality Factors in Mobile Banking Applications

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bildirir, aksi bir durumda aleyhime doğabilecek tüm hak kayıplarını kabullendiğimi beyan ederim.

Arzu AKŞAHİN

ÖZ

MOBİL BANKACILIK UYGULAMALARINDA KALİTE FAKTÖRLERİNİN GÖRELİ ÖNEMİ

AKŞAHİN, Arzu
Yüksek Lisans Tezi, İşletme ABD
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Bu çalışmanın amacı Türkiye’de mobil bankacılık uygulamalarının kalite faktörlerinin kullanıcılar açısından önemlilik derecelerini belirlemektir. Bu doğrultuda, farklı bankaların 150 mobil bankacılık uygulaması kullanıcılarından veri toplanmıştır. Verilerin toplanmasında anket yöntemi kullanılmıştır. Elde edilen veriler, Tek Yönlü Varyans Analizi (ANOVA) ve Analitik Hiyerarşi Prosesi yöntemleri ile analiz edilmiştir. Yapılan analizler sonucunda, uygulamaların kullanıcılarına göre, işlevselliğin en önemli faktör olduğu, ardından sırayla içerik, müşteri hizmeti ve arayüz tasarımı faktörlerinin geldiği tespit edilmiştir.

Anahtar kelimeler: Mobil Bankacılık Uygulamaları, Kalite Faktörleri, Analitik Hiyerarşi Proses

ABSTRACT**THE RELATIVE IMPORTANCE OF QUALITY FACTORS IN
MOBILE BANKING APPLICATIONS**

AKŞAHİN, Arzu

M. A. Thesis, Department of Business Administration

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The aim of this study is to determine the relative importance of mobile banking applications quality factors for the users in Turkey. For this purpose, data were collected from 150 users of mobile banking applications. A questionnaire was used to collect the data. The collected data were analyzed using One-Way Analysis of Variance (ANOVA) and Analytic Hierarchy Process methods. As a result of analyses, it was found out that functionality is the most important quality factor, followed in order by content, customer service and interface design.

Key words: Mobile Banking Applications, Quality Factors, Analytic Hierarchy Process

ÖNSÖZ

Konu seçimi başta olmak üzere çalışmanın gerçekleşme aşamasında titiz, özenli ve değerli katkılarından dolayı, kıymetli zamanımı benimle paylaşan danışman hocam Doç. Dr. İbrahim Halil SEYREK'e teşekkürlerimi sunarım. Anketlerin toplanma aşamasında yardımcı olan tüm arkadaşlarıma ve tez sürecim boyunca bana sabırla en büyük desteği veren çok kıymetli abim Mehmet POLAT'a teşekkürlerimi sunarım. Hayatım boyunca bana maddi ve manevi destek olan, bugünlere gelmemde büyük emeği olan babam Murat AKŞAHİN, annem Naciye AKŞAHİN ve sevgili kardeşlerim Sibel AKŞAHİN POLAT ile İbrahim Murat AKŞAHİN'e minnettar olduğumu ifade etmek isterim.

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SECTION ONE INTRODUCTION

1.1. INTRODUCTION

Important public research programs were initiated on the occasion of the Second World War. Military programs oriented towards chemical, nuclear, aviation, calculation methods and electronics were at the center of these programs. These researches gave an unprecedented impetus to the industry. This dynamic of contributions allowed a significant development of technologies (Grange and Roche, 1998).

In this context of war, the first computer Z3 was designed in 1941 by a German engineer, Konrad Zuse, in order to break the codes of the Nazi army (Bilgisayarların Tarihi!, *Milliyet*, 10.03.2011). It was also in the 1940's that the first mobile phone, called radiotelephone, appeared by the combination of the classical phone and radio properties. Later, during the late 1980's emerged a gigantic worldwide network of computers, in other terms the Internet (Cavendish, 2008).

Nowadays, these inventions that have affected the course of human history have become an ordinary part of everyday life. By the end of 2015, throughout the world, 3.2 billion people have been using the Internet (2 billion of those are from developing countries) while there are more than 7 billion mobile cellular subscriptions (International Telecommunication Union, 2015).

The contemporary cell phone is more than a device for voice communication; it is a real entertainment device that holds individuals during a large part of their everyday life. On the other hand, this device allows individuals to access easily to large knowledges bases of information (Popowicz, 2009). So that today we no longer talk about mobile phones but rather about smartphones. These smartphones allow us to realize many tasks especially by means of using mobile applications. Mobile applications, in addition of being used in almost every area, they are also used in

banking area. Along with the advances of these technologies, the banking sector has also grown rapidly. Banks want to keep up with the competition and provide their customers with higher level of electronic services (Bayoğlu, 2010). That is the reason why evaluating their quality and effectiveness is crucial for service providers. Literature provides access to some studies on quality factors of m-banking applications. However, the analysis of the weights of m-banking quality factors remains an issue rarely discussed in the literature. By realizing this gap, this study tries to provide some guidelines and strategies for banks involved in m-banking.

The aim of this thesis is to determine the importance of Turkish banks m-banking quality factors. With this purpose, a questionnaire developed by Lin (Lin, 2013) was conducted. This questionnaire takes in consideration four main quality criteria for mobile banking applications: functionality, content, customer service and interface design. The questionnaires were distributed to 150 mobile banking customers of Turkish banks. The collected data are analyzed using descriptive statistics, One-Way ANOVA and Analytic Hierarchy Process (AHP) method.

The study comprises of four sections: the introduction section; the literature review related to the subject of the study, the literature review explains the concept of mobile banking, finds out quality factors in the mobile banking sector and resumes previous studies concerning m-banking and its quality factors; the third section where materials and methods used are described and analytic hierarchy process method is detailed; the fourth section which describes the analyses and the results obtained based on those analyses; finally the conclusion summarizes the findings acquired in the study and the related recommendations.

SECTION TWO LITERATURE REVIEW

2.1. MOBILE BANKING

In the competitive circumstances of the financial service industry, technology has become an increasingly essential factor. A completely new service concept and service environment was created due to the recent developments. Technology has transformed the actual nature of selling and buying financial services. Innovations in telecommunication have resulted in the use of mobile devices in banking industry (Suoranta and Mattila, 2004). The banking industry is one of the leading sectors concerning adopting and utilizing the Internet and mobile technology, such as mobile banking (Laukkanen, 2005).

2.1.1. Emergence of the Mobile Banking Concept

Banks have always invested in information technologies enabling to accomplish banking operations electronically. This is how systems such as ATMs and phone banking have been developed and used successfully for several years. With the advent of Internet in the 1990s, the electronic banking has boomed, accepted among the most succeeded business-to-consumer (B2C) applications in e-commerce (Luo et al., 2010). The advance of electronic banking services via multiple electronic channels has induced a new kind of added value. The business of retail banks discloses a dramatic change in regards to cost reduction and increased advantages for the customer (Laukkanen and Lauronen, 2005). Thanks to electronic banking, users were able to check their balances, perform fund transfers across accounts or banks, make several types of payments, carry out investment operations. Nevertheless, it is fact that internet banking suppressed the time limitation but being computer dependent, the place limitation remained present (Çetin, 2014). The technological developments have generated new opportunities for service consumption. Customers wanted to drop visiting traditional

branches; they have become less loyal, more open to new electronic channels; and awaited better service quality, such as availability anytime anywhere (Laukkanen, 2005). Meanwhile, mobile phones started to spread throughout the world. Many people began to possess mobile phones (Ratten, 2009). Advances in mobile phones has provided development in terms of mobile telecommunications technology generation (2.5G, 2.75G and 3G) (Luo et al., 2010). This situation has given another way to services and contents, one of which is mobile commerce (Çetin, 2014). Mobile commerce is specified as “the ability to purchase goods anywhere through a wireless Internet-enabled device” (Clarke III, 2001). Mobile commerce has grown rapidly due to the rapid growth of mobile internet (Kim et al., 2007).

These innovative technologies have also infiltrated into the financial services sector. With the spread of Internet-enabled mobile phones, electronic banking has started to go through an evolution. Banks have sought constantly for improving the capabilities of their services in order to sustain and eventually create a competitive advantage. Accordingly, financial institutions concentrated on the next technological frontier: mobile access. A timeline as it follows resumes the important dates affecting the history of the banking services technologies.

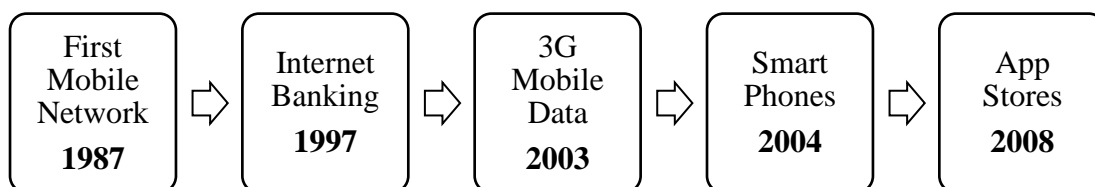


Figure 2.1. Timeline of Banking Service Technologies (Kazancı, 2013)

Thus, mobile banking has emerged as a result of this newly-arising channel for offering banking operations and services at anytime and anywhere via mobile devices (Luo et al., 2010). The literature includes several definitions of mobile banking. According to Barnes and Corbitt (2003), mobile banking can be defined “as channel whereby the customer interacts with a bank via a mobile device such as a mobile phone or personal digital assistant (PDA)”. Chung and Known (2009) describes mobile banking as being “for people on the move who want to access their bank accounts and transfer funds anytime, anywhere through their phones without visiting banks in person”. Yu and Fang (2009) define it as a subset of banking as it

allows everyone easy access to their banking activities via mobile handsets. Many different researchers have shared similar definitions (Suoranta and Mattila, 2004; Kim et al., 2009; Laukkanen and Kiviniemi, 2010; Zhou, 2012; Bidar, 2013; Lin H.-F., 2013; Lin and Shih, 2013).

The services offered by mobile banking can be enumerated as follows (Çetin, 2014):

1. Operations and services related with account management
 - Checking statements or account history
 - Account activity alerts with predefined rules
 - Checking term deposits
 - Checking loan statements
 - Checking card statements or equity statements
 - Equity statements
 - Pension plan management
2. Operations and services related with money transfers and payments
 - Money transfers between own accounts
 - Money transfers to other banks
 - Bill, tax, and other payments
3. Operations and services related with investments
 - Stock prices query
 - Portfolio management
4. Operations and services related with applications
 - Apply bank products like credit card or credits
 - Apply or query current campaigns for banks' products and services
 - Check for credit card or credit application status
5. Operations and services related with banking services
 - Query nearest branch or ATM location info
 - Query for help through online texts
 - Submit problems or questions to online help desks

2.1.2. Mobile Banking Types

Different types of mobile banking exist; these types are grouped in two main categories: mobile info services and mobile banking services. Mobile info services are

one-way information deliveries and mobile banking services are two-way services bank to customer and customer to bank.

Mobile info services give access to basic account information that banks provide to their customers, such as balance alerts, bill paying dates, transaction confirmations, etc. Customers have the possibility to choose the situations they want to be alerted and information comes automatically by SMS (Short Message Service). One-way mobile banking has a diversity of advantages, it is easy to use for the customer, easy to implement for the banks and it has low costs. It is clearly the most basic and the oldest kind of mobile services (Çakıcı, 2008).

On the other hand, mobile banking services are gathered in three groups: SMS banking, mobile Web banking and banking via a downloaded application. SMS banking, which is the simplest form of mobile banking, enable the customers to receive information on their account balances by SMS (Mallat et al., 2004). This kind of services are delivered via the SMS capability of mobile devices, which are typically transaction based. Different SMS messages are necessary to complete different bank transaction (Cheng et al., 2007). Each transaction has a precise short code (5-6 digit number) that the bank communicate with their customers. The customer, who generates and sends a request SMS including the precise code to request information (e.g. ATM location), will in return receive a SMS with the appropriate information (Mobile Banking Association, 2009). The services offered by SMS banking are mainly; money transfer, mobile top-up, paying credit card bill, balance control and warming messages.

Mobile Web banking, also named WAP (Wireless Application Protocol) banking, represents the second kind of mobile banking services. Banks customers have access to their banks' mobile site over the WAP browser of their mobiles phones. WAP banking sites existed for several years but WAP enabled devices were not common until 2006. Today most of the phones have WAP banking access and customers have more knowledge about mobile phone services. WAP banking offers the capacity to make most of transactions from mobile device without time and space limitations. The services available via Web banking are mainly; account transactions, investment transactions, money transfers, bill pays, credit card transactions and apply for credit (Çakıcı, 2008).

Mobile banking application, which is especially the focus of this thesis, is the last type of mobile banking services. Customers receive mobile banking services by

using the one-time downloaded application of related bank on the mobile device (Bidar, 2013). Users feel more comfortable, more secure and it is easier to use the mobile application as compared to the web sites. With a login, users have access to almost all transactions (Çakıcı, 2008).

2.1.3. Mobile Banking Use

“For the fact is that one day, in most of the world’s emerging markets, more people will use mobile telephones than use fixed telephone lines. Businesses that are based on mobile financial services will thus be a natural fit for these economies.”

Those early predictions of Datta et al. (2001) have been a direct hit for the mobile banking sector. Nowadays, mobile banking, offering great deal of advantages, has spread phenomenally across the world.

2.1.3.1. Mobile banking in the world

More than 1 billion mobile phone users have used their devices for banking purposes by the end of 2015. This number was approximately 600 million in 2013 and 800 million in 2014. The forecasts pointed 1 billion for 2017 and 1,8 billion for 2019. However, the number anticipated for 2017 has been reached by the end of 2015. The adoption of mobile banking is clearly faster than what it was expected. And by 2020, it is predicted that this global user base will reach 2 billion, by which time it will represent 37% of the global adult population (Juniper Research, 2015).

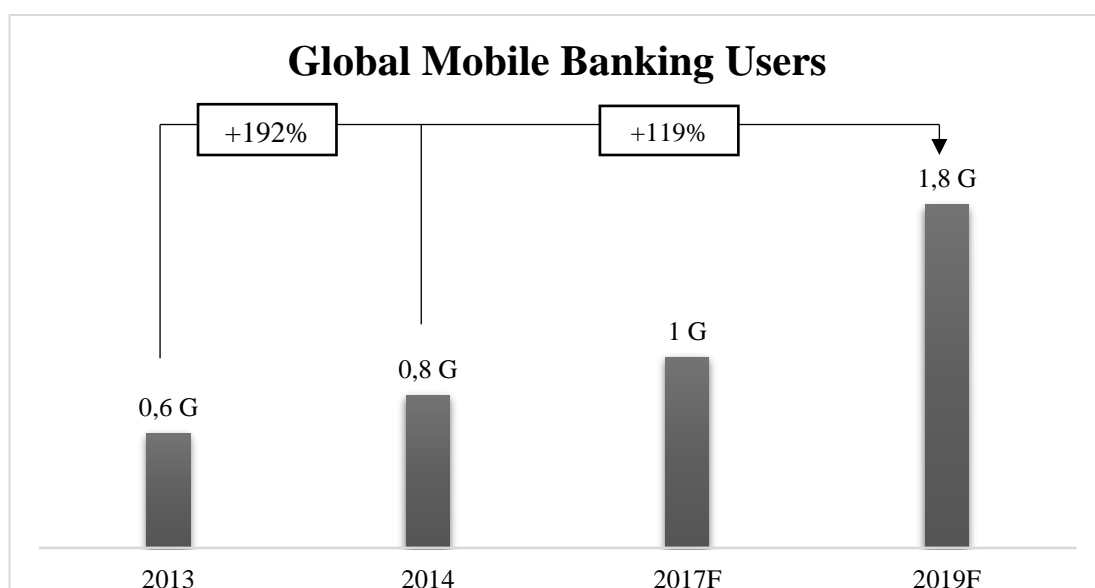


Figure 2.2. Mobile Banking Users Across the World (KPMG, 2015)

The research of Bain and Company (2014) provides access to mobile banking penetration across the world in the last quarter of 2014. In the context of this research, 84 414 customers from banks all over the world have been surveyed (cf, Figure 2.3.). Over the world, 45% of customers had mobile banking interactions in last quarter of 2014. Countries of the Asia-Pacific Region ranks considerably on the top on use of mobile banking services: Indonesia 77%, China 73%, Thailand 64%, India 59%, Singapore 58%, Malaysia 54%, Hong Kong 49%, Australia 47%. Only Japan is situated among the lasts with 19%. Behind the Asia-Pacific Region come countries of Americas (Mexico 45%, United States 43%, Brazil 39%, Canada 34%) and countries of Europe (Poland 58%, Spain 44%, Italy 42%, United Kingdom 41%, Portugal 31%, France 30%, Belgium 27%, Germany 21%). However, European countries are predominantly at the end of the classification. Poland (58%) nevertheless makes the difference and seems to be as the “bellwether” for the rest of Europe.

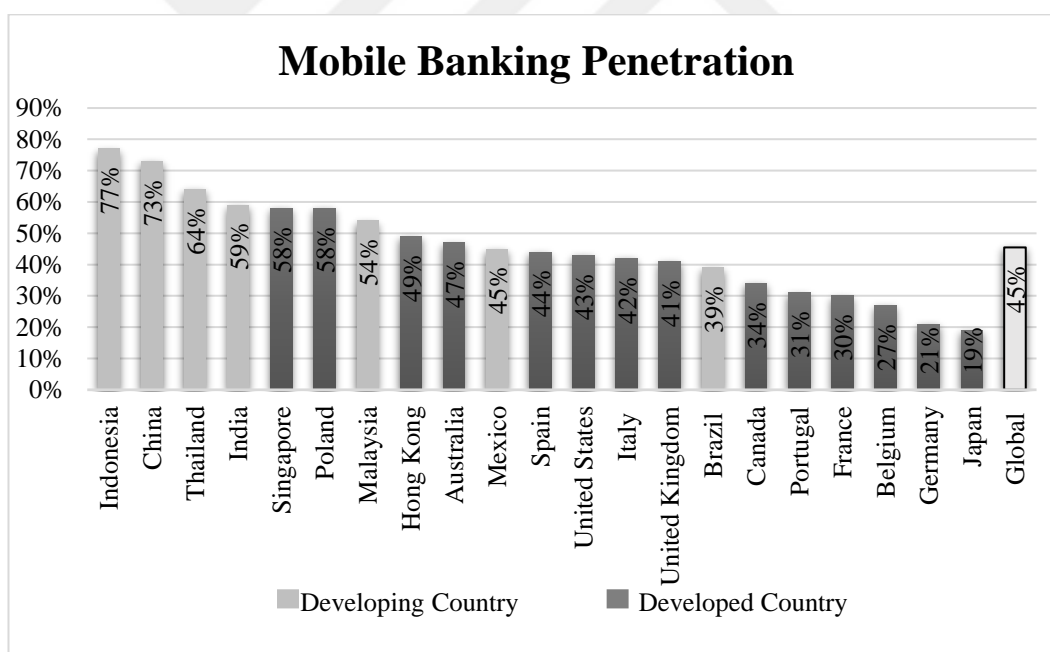


Figure 2.3. Mobile Banking Penetration by Country in Last Quarter of 2014 (Bain and Company, 2014)

Furthermore, Bain and Company doesn't mention the region of Africa. It is important to note that African countries have a predominant role in the mobile banking utilization. In that case, utilization of mobile banking appears ascendant in developing countries. This situation is attributable to the fact that most of people still have limited

access to financial services, if not are unbanked in those less developed countries (Khraim et al., 2011). Worldwide, 2 billion people remain unbanked. The Asia-Pacific region especially account for more than half of the world's unbanked people (55%) and Africa home around a fifth (17%) (Demirgüç-Kunt et al., 2014). In most of these regions, only big cities give access to branches and customers have to travel a long road to the nearest branch (Khraim et al., 2011). In addition to the difficulty of access, bureaucratic delays are also among the challenges poor people face to access banking services in developing economy contexts (Hinson, 2011). So, customers in developing countries have a tendency to see mobile financial services more attractive than do their counterparts in developed countries, as they have fewer alternatives (Datta et al., 2001). Facing these harsh circumstances, entrepreneurs in countries as Iran, Guatemala, Kenya, Pakistan, India, Brazil tried to find a solution in mobile banking (Khraim et al., 2011). For example, in India, an entrepreneur has launched a mobile banking system in coordination with State Bank of India (Friedman, 2010). In some countries of Africa, such as Tunisia, some phone operators take charge of giving access to financial services. Thus, mobile banking doesn't spread only in banks context (Ziadi, 2012; All Africa New Agency , 2010).

And, it looks that mobile banking will not cease to expand. According to the study "Mobil Bankacılık: Finansal Hizmetler Elektronik Cüzdan'la Buluşuyor" of EY (2014) in cooperation with Knowledge@Wharton (the online business analysis journal of the Wharton School of the University of Pennsylvania), from 2017 the number of people using their smartphones for banking transactions will reach 1 billion, the amount of payments made via mobile phone annually will attain 1.3 trillion dollars. Their report points out that around the world 1.8 billion people without bank accounts have a mobile phone; this situation is an important opportunity for the development of mobile banking market. EY indicates that only one mobile payment system was present in 2001, whereas 150 mobile payment systems are available today and more than 90 are being developed.

2.1.3.2. Mobile banking in Turkey

Mobile banking in Turkey commenced in 2003 by the first banking website of Türkiye İş Bankası. The next move came from Türkiye Garanti Bank in 2004, the first in the world, it launched SMS banking concept. Later, in 2005, Akbank started saving consumer loan applications by SMS. Türkiye Garanti Bank in 2007 has

developed a mobile banking site using WAP technology. Following this event, Akbank launched in the strict sense the mobile banking application (Çetin, 2014). Actually, The Banks Association of Turkey listed 19 banks offering a mobile banking application. The list of banks possessing mobile banking application is as follows:

- | | |
|---|---|
| 1. Akbank T.A.Ş. | 11. Odea Bank A.Ş. |
| 2. Aktif Yatırım Bankası A.Ş. | 12. Şekerbank T.A.Ş. |
| 3. Alternatif Bank A.Ş. | 13. Türk Ekonomi Bankası A.Ş. |
| 4. BankPozitif Kredi ve Kalkınma Bankası A.Ş. | 14. Türkiye Cumhuriyeti Ziraat Bankası A.Ş. |
| 5. Citibank A.Ş. | 15. Türkiye Garanti Bankası A.Ş. |
| 6. Denizbank A.Ş. | 16. Türkiye Halk Bankası A.Ş. |
| 7. Fibabanka A.Ş. | 17. Türkiye İş Bankası A.Ş. |
| 8. Finans Bank A.Ş. | 18. Türkiye Vakıflar Bankası T.A.O |
| 9. HSBC Bank A.Ş. | 19. Yapı ve Kredi Bankası A.Ş. |
| 10. ING Bank A.Ş. | |

Approximately 17 million customers in Turkey as of December 2015 is registered in the system and have completed a login process at least one time in order to use mobile banking application. The Figure 2.4. points out that the number of users has increased phenomenally, that is to say of around 1762% since March 2011.

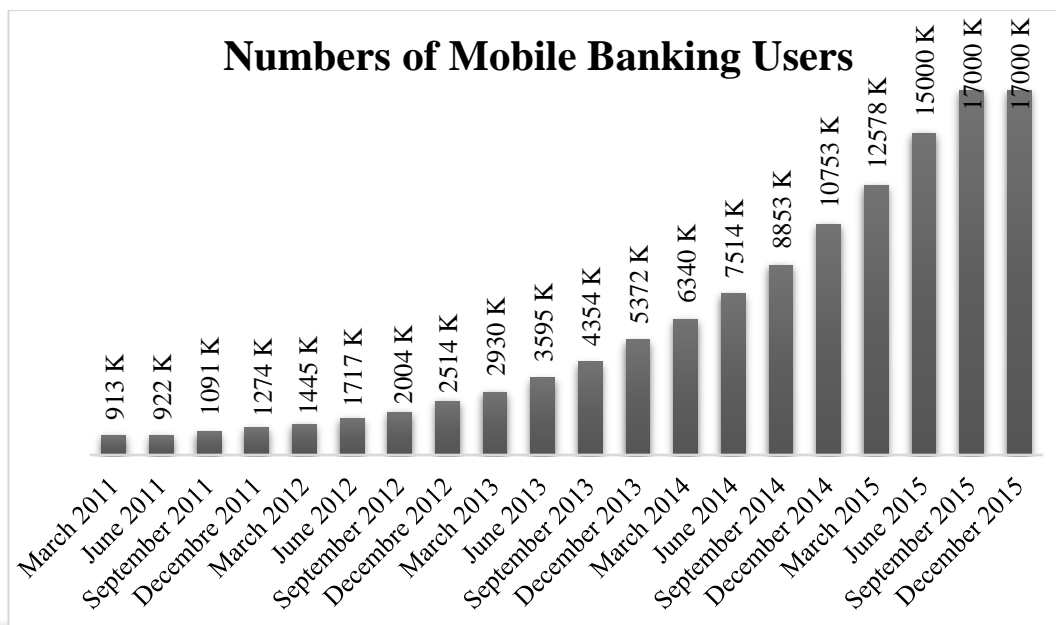


Figure 2.4. Numbers of Mobile Banking Penetration by Country in Last Quarter of 2014 (Türkiye Bankalar Birliği, 2011-2015)

When taking account of 2015, 10 million 435 thousand of the 17 million users (i.e. 63%) have logged at least once in the October-December period of time. Regarding the number of mobile banking customers who logged at least once in the past one year, it is 19 million 12 thousand. During October-December 2015, around 1 million non-financial transactions (credit card application, credit application, bill payment instruction, regular payment instruction) carried out with the application. As of October to December, the amount of around 87 million 500 thousand financial transactions using the application is 174 billion TL. By examining the transactions during this period of time (Table 2.1.), we can notice that the financial transactions achieved most commonly are the money transfers (37 million) and the payments (30 million) which represent 77% of the financial transactions. The credit card transactions form 14% of the financial transactions with an amount of 12 million. The transactions less frequently accomplished are the investment transactions (5 million) and other transactions (2,5 million) which account for only 9% of the financial transactions.

Table 2.1. Distribution of Financial Transactions Numbers (Türkiye Bankalar Birliği , 2015)

Financial Transaction	Numbers of Transaction (in thousand)	Percent
Money Transfers	37 162	42,5
Payments	30 258	34,6
Credit Card Transactions	12 354	14,1
Investment Transactions	5 124	5,9
Other	2 564	2,9
Total	87 462	100,0

Table 2.2. illustrates those financial transactions in terms of amounts (in Turkish Lira). Concerning the amounts, the largest portions is overrun again by the money transfers (104 billion TL) but also although lesser by the investment transactions (49 billion TL). Those two types of transactions constitute almost 90% of financial transactions in terms of amounts. The other types of transactions are reduced to slightly more than 10% (a total of 20 billion TL).

Table 2.2. Distribution of Financial Transactions Amounts (Türkiye Bankalar Birliği , 2015)

Financial Transaction	Amounts of Transaction (in million TL)	Percent
Money Transfers	104 032	59,9
Investment Transactions	48 855	28,1
Credit Card Transactions	10 351	6,0
Other	6 422	3,7
Payments	4 133	2,3
Total	173 793	100,0

Table 2.3. Amounts and Numbers of Financial Transactions with Highest Amounts (Türkiye Bankalar Birliği , 2015)

Financial Transaction	Amounts of Transaction (in million TL)	Numbers of Transaction (in thousand)
EFT	58 638	17 414
Remittance	45 242	19 743
Foreign Exchange Transactions	16 069	1 858
Term Accounts	13 295	413
Equity Shares	10 077	1 780
Card Debt Payments	9 164	11 080
Investment Funds	5 972	893
Futures and Options Markets Transactions	2 483	30

Table 2.3. resumes the eight sub-financial transactions with highest amounts with the numbers of those transactions. The electronic Fund Transfers (EFT) and the remittance seems taking the lead considering the sub-financial transactions amounts: approximately 104 billion TL. Taking account of the number of the transactions the EFT and the remittances appears again on the top (a total of 37 million of transactions) but card debt payments occupy a considerable place within those transactions (11 million) (Türkiye Bankalar Birliği , 2015).

The above figures indicate how the Turkish mobile banking sector is under development. ING Bank conducted a survey on the same issue including 15 countries with a total sample size of 11 816 respondents. The results of this survey indicates Turkey as a future “hotspot” for mobile banking. Turkey owns the largest share of internet users using mobile banking. 65% of respondents in Turkey have already use mobile banking and 20% of them expect to use it in the next 12 months. This situation drives to think that the usage in Turkey has a potential to grow quickly (ING International Survey, 2015).

Those findings are supported by EY. According to the report of EY, mobile banking is a rising trend in Turkey. Figures show that mobile banking stops being an

alternative channel. Turkish banks have high growth opportunities by means of targeting the young segment with the innovative products they develop. The rapid increase in the number of people benefiting from mobile banking in Turkey will lead to an increase in investments regarding this area (EY, 2014).

Besides, Turkish banks have been deemed worthy of prizes at the international scale for their mobile banking applications. In 2014, during the Global Mobile Awards, the “World’s Best Smartphone App” prize presented to Akbank for its Akbank Direkt Mobile application (Direkt Bankacılık Ödülleri). In the same year, Yapı ve Kredi Bankası awarded the Gold Prize in the banking field at Stevie International Business Awards and Forrester gives the first row to Garanti Bank among 32 banks for its mobile banking application functionality (Ödüllerimiz ve Başarılarımız; Wannemacher and Walker, 2014). The next year, Yapı ve Kredi Bankası received the “Best Mobile Banking in Europe” award by Global Finance (Ödüllerimiz ve Başarılarımız). This year, in 2016, Global Banking & Finance Review offered the award of “Best Mobile Banking Application” to Odeabank (Odeabank'a Üç Ödül Birden!).

2.2. QUALITY FACTORS IN THE M-BANKING CONTEXT

Given the fact that the diversity of mobile applications and services rises, preserving mobile banking users and attracting new ones is far from easy (Gu et al., 2009). Higher quality is requested by the users. Receiving services quickly, reliably, securely and spending as little time and effort as possible seem to be unavoidable in current circumstances. The fulfillment of these characteristics provide high quality, while high quality of mobile applications give rise to user satisfaction and especially long-term customer loyalty (Andreou et al., 2005).

2.2.1. Concepts of Quality and Service Quality

2.2.1.1. Concept of quality

In general terms, in the Psychology dictionary of Chaplin, quality is specified as “the level of goodness or excellence of anything” (Teas, 1993). In the market context, until the 1980’s, the concept of quality was not taken into consideration. The idea that quality costs was predominant. With the increase of competition, customers,

having a lot of alternatives, became exacting and sought after better quality. Three important people constitute the foundation of the concept of quality based on the Japan model: Crosby, Deming and Juran. Crosby defines quality as “conformance to requirements”. Rather than based on experience or opinions, quality is based on tangible, sc. clear and measurable, objectives. Deming doesn’t specify quality concretely because it is a relative term. He emphasizes that quality may change according to customers’ needs and so expectations. To Juran, quality means “fitness for use”. A balance between product (which includes goods as well as services according to Juran) features and products free from deficiencies are accentuated. Just like Deming, Juran pays special attention to customers’ expectations. However, the term of customer encompasses external customers, those who deal with finished product, but also internal customer, those who deal with the product during the development stages (Suarez, 1992).

After the basis of quality was brought to light, various studies have been performed on this field. Actually, the literature gathers several definitions of quality from different points of view. To Kotler and Armstrong (2012), quality implies “the characteristics of a product or a service that bear on its ability to satisfy stated or implied customer needs”. Zeglal et al. (2008) introduce a definition of quality with three dimensions: “quality as excellence; quality as value; and quality as meeting or exceeding expectations”. The recurring point among those definitions is the fact that, quality is evaluated on the user side. Quality is determined by the level of how much good and service features meet the buyers’ expectations (Sürmeli, 2002).

2.2.1.2. Concept of service quality

The ever-increasing competition forced service enterprises, as the other enterprises, to strive for more profitable ways in terms of differentiation. Nowadays, the current business environment detains features as increasing international competition, markets which have reached saturation and with slow growth pace. One of the strategies developed to achieve success in these conditions is to offer high quality services to customers (Sürmeli, 2002).

Service quality being a difficult term to define in a few words, Morlevi (2008) classifies the definition into two groups: those relying on the service structure and those based on service attributes.

a. Service quality definition relying on the service structure

The first case represents definitions that rely on the service structure. In this situation, the definition is not based on specific attributes but on the service structure, its various components, in order to define and measure quality for each of those components. Some of these approaches are as follows. In 1976, Swan and Comb identified two important dimensions of service: the physical aspects of the service that are the practical dimension and the abstract and psychological aspects of service that are the “expressive” dimension (Morlevi, 2008).

Grönroos (1984) explains service quality by two different dimensions: technical quality and functional quality. Technical quality answers the question of what the customer gets; on the other hand, functional quality is related of how he gets it.

In 1987, Eiglier and Langeard consider that the quality of a service should be evaluated on three different dimensions: the output, the elements of servuction and the process itself. The output means the result of the service. Its quality is assessed by reference to customer expectations. The elements of the servuction are the elements of the physical system that are in contact with the customer: material components, employees but also other customers. The process refers to “all the interactions necessary for the manufacture of the service” (Morlevi, 2008).

b. Service quality definitions based on service attributes

In this case, the quality of service is defined by a list of service attributes (or features), which are supposed to represent the customer’s relevant appreciation criteria. Two research schools have proposed lists of attributes (Morlevi, 2008). The first research school is the American team of Parasuraman, Zeithaml and Berry. According to them, service quality is the comparison between the customer’s expectations and perceptions of the service (Parasuraman et al., 1985b). Thereby, they developed the GAP model pointing to the gap between expectations and perceptions (Seth et al., 2005). They define ten “determinants of service quality”: access, communication, competence, courtesy, credibility, reliability, responsiveness, security, tangibles and understanding/knowing the customer. Those determinants come down to five “dimensions of service”: tangibles, reliability, responsiveness, assurance and empathy (Parasuramam et al., 1991b). Over time, the definition of the

five main dimensions and the twenty-two items necessary for their measurement has changed somewhat (Morlevi, 2008).

The second research school, the British team, including Fitzgerald, Brignall, Johnston, Silvestro and Voss (1991), defines twelve service quality factors: reliability, responsiveness, aesthetics/appearance, cleanliness/tidiness, comfort, friendliness, communication, courtesy, competence, access, availability, security (Morlevi, 2008). This thesis will focus on this type of definition; services attributes of mobile banking applications will be taken into consideration in the following parts.

2.2.2. Service Quality Measurement Models

Good quality can be measured objectively by indicators (eg: durability or number of defects). However, contrary to goods, three particular features of services are causing the fact that service quality is an abstract concept: intangibility, heterogeneity, and inseparability of production and consumption. Objectives measures being absent, evaluating consumers' perceptions of quality may be a relevant approach in order to assess the quality of a service enterprise (Parasuraman et al., 1988b).

Many models have been performed since 1980's in order to measure the quality of services. Generally, the models are gathered around two main groups. The first group suggests the possibility to measure service quality by comparing the expectations with the perceptions of the customers. The second group argues that it is unnecessary and ineffective to take into account the customer expectations in service quality measurement. They propose to focus only on customer perceptions (Kuş, 2011). The most common models in the literature are certainly the model of SERVQUAL for the first group and the model of SERVPERF for the second one.

2.2.2.1. The Gap theory and the model of SERVQUAL

Parasuraman et al. (1985a; 1985b; 1988a; 1988b; 1988c; 1991a; 1991b; 1994a; 1994b; 1996) did several researches related to service quality. They are the most popular researchers in the field of service quality. At first, they tried to define service quality and the factors that affect it. In 1985, as observed in Figure 2.5. they performed a general conceptual model of service quality. In this direction, they invented the Gap theory: it reveals that service quality is measured based on the difference between expected quality and perceived quality. At the same time, in order

to make the service quality measurable, they exposed ten factors determining the service quality perceived by the customers: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding/knowing the customer and tangibles (Parasuraman et al., 1985b). In 1988, they finally reduced these ten criteria to five: tangibles, reliability, responsiveness, assurance and empathy; and they invented the SERVQUAL model (Parasuraman et al., 1988b).

According to the SERVQUAL model, perceived service quality reposes on the difference between the expectations of the customers from a service and their perceptions of the company performance offering the service. Therefore, the model consists of two main phases, so the data are collected in two successive separate questionnaires. The expectations are measured in the first part while the perceptions (performance) are in the second. Then, quality score is calculated by subtracting the perceived score of the expected score. As a result, if the received service is equal or superior to the expectations, in that case the service is considered of high quality. Otherwise, in other words if it is below the expectations, dissatisfaction takes place (Kuş, 2011).

In 1994, Parasuraman et al. did arrangements on the model. In addition to the comparison of perceived and expected services, they included in the model the comparison of the perceived and the adequate services.

2.2.2.2. The model of SERVPERF

Despite of the widespread use and the popularity of the SERVQUAL model, it has been subject to severe criticisms (Kuş, 2011). Cronin & Taylor launched an antithesis to the model of SERVQUAL. They argued that the conceptualization and the operationalization of this model is not appropriate. According to them, the Gap theory is not supported by sufficient empirical and theoretical evidences. Instead of the “expectations-performance gap based” theory, they developed a “performance based” model that they called the SERVPERF model (Cronin and Taylor, 1992; 1994). This model is based on the five dimensions of the SERVQUAL model and it measures only the customer’s perceptions. Instead of finding out the customer expectations as in the Gap theory, this model takes customer satisfaction into considerations and correlates it with quality. The fact that this model measures only the customer perceptions has led to the support of several researchers because of its practical and

easy applicability. Despite the differences, both of these two models have been used until today and continue to be used by several researches (Kuş, 2011).

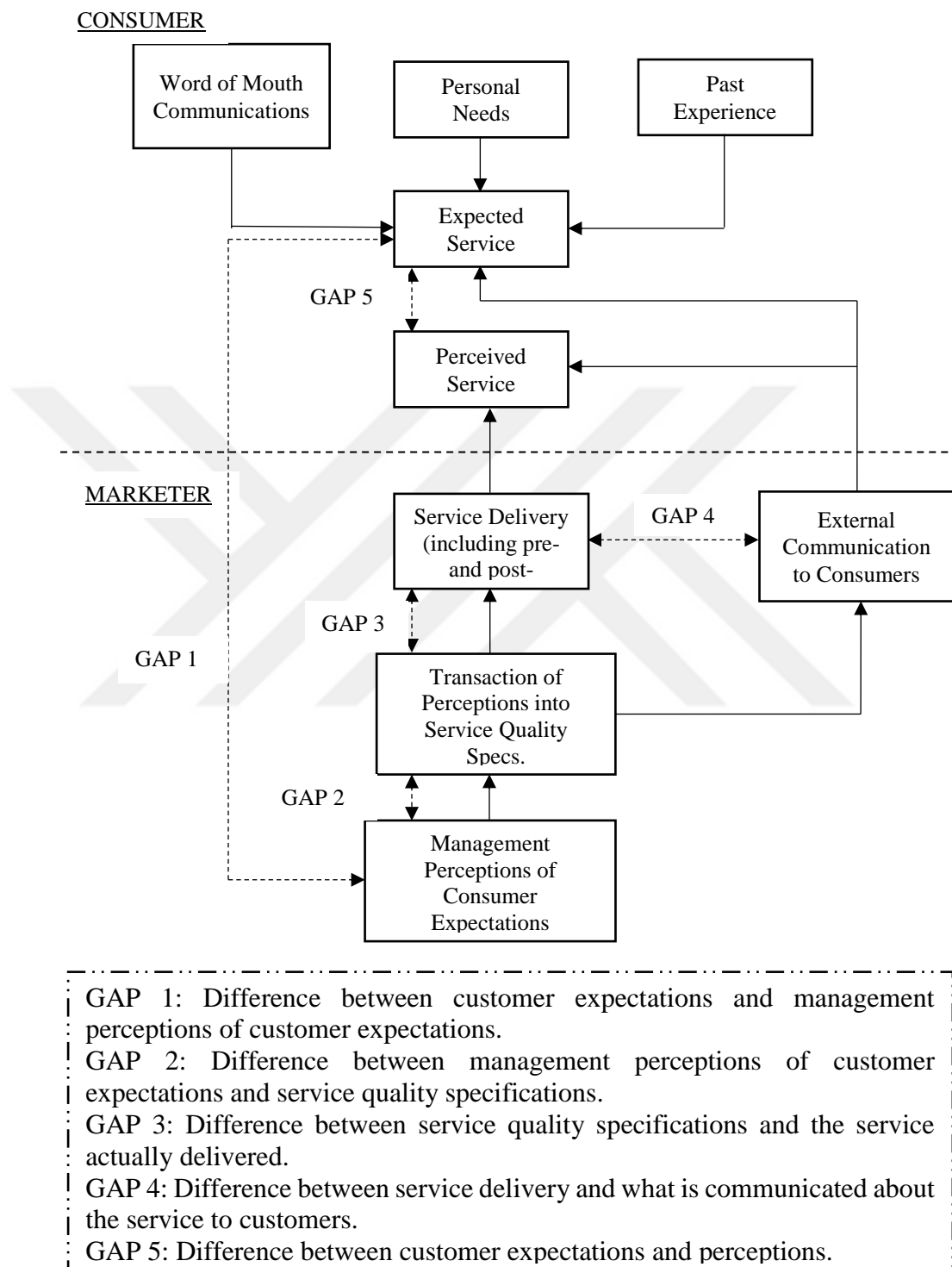


Figure 2.5. Conceptual Model of Service Quality (Parasuraman et al., 1991a)

2.2.3. Mobile Services Quality

On the basis of the American and the British schools' studies related to service quality, several studies examining quality based on service attributes in the field of mobile services carried out.

2.2.3.1. Mobile services quality factors

The literature includes several researches concerning quality factors from different types of mobile services. Some of these studies are as follows. One of the first detailed researches on this subject was conducted by Santos (2003). She carried out a study in order to understand the detailed determinants in e-service quality and their impact on consumer attitude. Various determinants resulted under two different dimensions: incubative and active dimensions. The incubative dimension consists of the following determinants: ease of use, appearance, linkage, structure and layout and content. The active dimension embraces reliability, efficiency, support, communication, security, and incentives.

Jun et al. (2004) implemented a research on customers' perceptions of online retailing service quality and their satisfaction. According to this study, key online retailing service quality dimensions, as perceived by online customers are: reliable/prompt responses, access, ease of use, attentiveness, security and credibility. Other researchers took also an interest in online shopping quality factors. Bauer et al. (2006) mentioned functionality/design, enjoyment, process, reliability and responsiveness; Yomnak (2005) put forth reliability, accuracy, access, flexibility, ease of navigation, efficiency, assurance/trust, security/privacy, price knowledge, site aesthetics and customization/personalization; Bai et al. introduced web site design, ease of use, reliability and customer service; Kandulapati and Bellamkonda (2014) cited efficiency and fulfillment; and Blut et al. (2015) shared website design, fulfillment, customer service and security; as online shopping quality factors.

Quality factors derived from the study of Tsang et al. (2010) related to online travel agencies services are website functionality, information content and quality, fulfillment and responsiveness, safety and security, appearance and presentation, customer relationship.

Choi et al. (2008) and Vlachos and Vrechopoulos (2008) approached mobile services quality by concentrating on digital music services. Choi et al. identified content reliability, availability, transaction process, perceived price level of using m-Internet and customer service as critical factors, whereas Vlachos and Vrechopoulos noticed content quality, contextual quality, device quality, connection quality and privacy concerns.

Examining quality factors in the context of mobile information and entertainment services, Tan and Chou (2008) considered the following determinants: perceived usefulness, perceived ease of use, content, variety, feedback, experimentation, personalization, perceived technology compatibility and perceived playfulness.

Lu et al. (2009), who focused their research on mobile telecommunication services, summarized the quality determinants under three dimensions: interaction quality (attitude, expertise, problem solving and information), environment quality (equipment, design and location) and outcome quality (punctuality, tangibles and valence).

Finally, Yeh and Li (2009) and Stiakakis and Georgiadis (2011) did not define a particular mobile services sector but conducted their research on mobile commerce quality factors in general. Yeh and Li used three different dimensions in order to list the quality determinants: vendor's web site quality (interactivity and customization), mobile technology quality (ease-of-use) and vendor quality (responsiveness and brand image). According to Stiakakis and Georgiadis, the mobile services quality factors are also classified under three sections: interaction quality (expertise, problem solving, information, security/privacy and customization/personalization), environment quality (equipment design and context) and outcome quality (reliability, tangibles and valence).

2.2.3.2. Mobile banking application quality factors

Studies related to mobile banking are not as common as for the other mobile services. However, the quality factors of mobile banking are quite similar to other mobile services quality factors. The reference study of this thesis is Lin's (2013) research. Lin gathered the attributes under four dimensions: functionality (accessibility, response time, mobility and security), content (accuracy, currency, relevance and completeness), customer service (reliability, responsiveness, trust and

empathy) and interface design (multimedia capability, format, understandability and navigability). These factors are explained in Table 2.1.

Earlier, Kim et al. (2009) studied usage intention of mobile banking. They proposed five dimensions: relative benefits (transaction mobility, transaction convenience, transaction efficiency and effectiveness in account management), trust propensity (avoidance of using new ITs, avoidance of using new ITs for financial transactions and caution in transactions), structural assurances (protection against financial loss, protection of personal info, client protection policy and transaction dependability), firm reputation (firm reputation, firm recognition and service quality) and initial trust in mobile banking (service accuracy, service safety and service reliability).

Yu and Fang (2009) analyzed the post-adoption customer perception of mobile banking services. For this purpose, they proposed six dimensions which included a long list of determinants: security services (secured service, user information privacy, safety transactions and reliable service), interactivity (speed of service delivery, timeliness, completeness and richness), relative advantage (increased productivity, effectiveness and task completion), ease of use (ease of use and interface clarity/understandability), interface creativity (imaginativeness, inventiveness and spontaneity) and customer satisfaction (pleasantness).

Sharma and Malviya (2011) explored the dimensions of mobile banking service quality. Their article provided mobile banking reliability and responsiveness, assurance and security, convenience in banking, efficiency and easiness to operate as dimensions.

Zhou (2012) focused his research on three items: information quality, service quality and system quality. Information relevancy, sufficiency, accuracy and timeliness measured information quality. Service reliability, responsiveness, assurance and personalization reflected service quality. System quality regrouped access speed, ease-of-use, navigation and visual appeal.

The determinants derived from the study of Aghdaie and Faghani (2012) are as follow: tangibles, reliability, responsiveness, assurance and empathy.

Finally, Sagib and Zapan (2014) identified five in order to measure mobile banking quality and thereby customer satisfaction and loyalty: reliability and responsiveness, assurance and security, convenience in banking, mobile banking efficiency and easiness to operate.

All these studies are summarized in Table 2.2. based on the factors derived from the reference research of Lin.

Table 2.4. Explanations of Mobile Banking Quality Factors (Lin H.-F. , 2013)

<p>Functionality</p> <p>Accessibility: M-banking makes banking transactions easy to access.</p> <p>Response Time: The waiting time for loading m-banking transactions is reasonable.</p> <p>Mobility: M-banking is accessible at anytime and anywhere.</p> <p>Security: M-banking provides enough security to conduct banking transactions.</p>
<p>Content</p> <p>Accuracy: Information provided by m-banking is accurate.</p> <p>Currency: Information provided by m-banking is always up to date.</p> <p>Relevance: M-banking provides relevant information about banking transactions.</p> <p>Completeness: M-banking provides customers with a complete set of information.</p>
<p>Customer Service</p> <p>Reliability: M-banking provides the right solution to customer requests.</p> <p>Responsiveness: M-banking is responsive to customer inquiries.</p> <p>Trust: Using mobile devices in banking transactions is trustworthy.</p> <p>Empathy: According to customer transaction history, m-banking provides individual attention to customers.</p>
<p>Interface Design</p> <p>Multimedia Capability: M-banking provides an appropriate multimedia (such as graphic and image) presentation.</p> <p>Format: The contents of m-banking transactions (such as range, depth and structure) are clearly presented on the screen.</p> <p>Understandability: The presentation style of m-banking is easy to understand.</p> <p>Navigability: M-banking has an easy navigation to find information.</p>

Table 2.5. Summary of Quality Factors in Mobile Banking Studies

Quality Factors	References						
	Lin	Kim et al.	Yu & Fang	Sharma & Malviya	Zhou	Aghdaie & Faghani	Sagib & Zapan
Response Time	✓		✓				
Mobility	✓	✓		✓			✓
Security	✓	✓	✓	✓	✓	✓	✓
Reliability	✓	✓	✓	✓	✓	✓	✓
Responsiveness	✓		✓	✓		✓	✓
Completeness	✓		✓				
Trust	✓	✓				✓	✓
Multimedia Capability	✓		✓		✓		
Accessibility	✓	✓					
Accuracy	✓	✓			✓		
Currency	✓		✓		✓		
Relevance	✓				✓		
Understandability	✓		✓	✓			✓
Navigability	✓				✓		
Empathy	✓				✓	✓	
Format	✓		✓				

SECTION THREE MATERIAL AND METHOD

Important points from the relevant literature have been mentioned in the previous section. For this purpose, theses, articles, books about the subject, reports of the Banks Association of Turkey, reports of important companies, Turkish banks websites and journals were examined. In this section, data used and way of obtaining, analyzing those data are explained.

3.1. MATERIAL

While reviewing the literatures, we have come across several studies on mobile banking application quality and satisfaction. However, there is not adequate research about the importance attached by users to the different quality factors of mobile banking. For this reason, this study is done in order to measure satisfaction of users regarding quality of mobile banking applications in Turkey, to determine the relative importance of different quality factors for those applications and to suggest solutions to problems encountered.

For this purpose, based on Lin's study (2013) a questionnaire is prepared and applied in order to determine the relative importance of mobile banking application quality factors for the users. The survey form is available in the annexes part (ANNEX 1). The survey includes three sections. The first section is composed of two parts: 4 questions related to respondents' demographic information (gender, age, education level, and job) and 6 questions about respondents' mobile phones and mobile banking application usage (mobile phone brand, mobile phone operating system, preferences for performing bank transaction, mobile banking application use duration, transactions performed with mobile banking application and respondents' bank name). The second section is composed of 16 questions using a five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) in order to determine the satisfaction level of users related to mobile banking application quality. The third section consists of 6

questions with a conventional Analytic Hierarchy Process (AHP) questionnaire format (nine-point rating scale) which indicates the relative importance of each criterion in the same hierarchy. The aim of this last part is to determine the importance for users of each mobile banking application quality factors.

The population of this study is composed of Turkish mobile banking applications users and the sample consists 150 of them. First of all, a pilot study is conducted to 30 users. Based on the feedback of pilot study, some minor modifications have been made to the questionnaire and the final form of the questionnaire was used to collect data from 150 persons. Data are collected via face to face interviews. Gathered data are analyzed using the statistical package program SPSS 22.0 and a web based Analytic Hierarchy Process application (Goepel, 2013).

3.2. METHOD

In order to summarize raw data, several descriptive statistics are calculated such as frequency distributions, arithmetic mean and standard deviation. Moreover, One-Way Analysis of Variance (ANOVA) is performed with the aim of comparing quality satisfaction of users between different banks. Finally, Analytic Hierarchy Process (AHP) method is used to determine the importance for users of each mobile banking application quality factors. Before giving details of the findings of the analyses, it is important to clear up the essential steps of the AHP method.

3.2.1. Essential Steps of Analytic Hierarchy Process

Analytic Hierarchy Process (AHP) is in general terms a theory of measurement. It is one of the multi-criteria decision making methods. This method is implemented by Saaty (1977) and developed over the years (Saaty, 1990; 1994; 2003; 2006). Analytic Hierarchy Process models the decision problem, the aim, the criteria, possible sub-criteria and alternatives in a hierarchical structure. It ensures the selection of the most appropriate decision (Kadak, 2006).

AHP method is a mathematical method whose most important characteristic is that it may involve objective and subjective ideas at the same time (which mean quantitative and qualitative variables) in the decision process. In other words, AHP is a method that assembles knowledge, experience, individual's thoughts and intuitions in a logical way (Kuruüzüm and Atsan, 2001). Likewise, this method pays attention to

individual one by one but it has also application in group decision making (Dağdeviren, 2007; Saaty and Peniwati, 2013).

AHP has been applied in various situations: choice, prioritization/evaluation, resource allocation, benchmarking and quality management. Furthermore, countless domains have witnessed many applications of the AHP: healthcare, defense, project planning, technological forecasting, marketing, new product pricing, economic forecasting, policy evaluation, social sciences, conflict analysis, military operations research, regional and urban planning, R&D management and space exploration, etc. AHP is clearly one of the most accepted methodology by researchers and decision makers in decision-making. It has improved over the years and used combined with other mathematical modeling and analysis techniques (Bhushan and Rai, 2004).

3.2.2. Analytic Hierarchy Process Application Steps

The AHP method is realized by the following three steps:

- Creation of the hierarchical structure
- Construction of pairwise comparison matrix
- Synthesis.

3.2.2.1. Creation of the hierarchical structure

The first step of the AHP method intends to provide easier understandability of the study problem. This step is the formation of the hierarchical structure by putting forth the aim, the criteria, the sub-criteria and the alternatives. The model of hierarchical structure in AHP is as it follows (Figure 3.1.). Creating a hierarchical structure brings an analytical overview to the problem (Kadak, 2006).

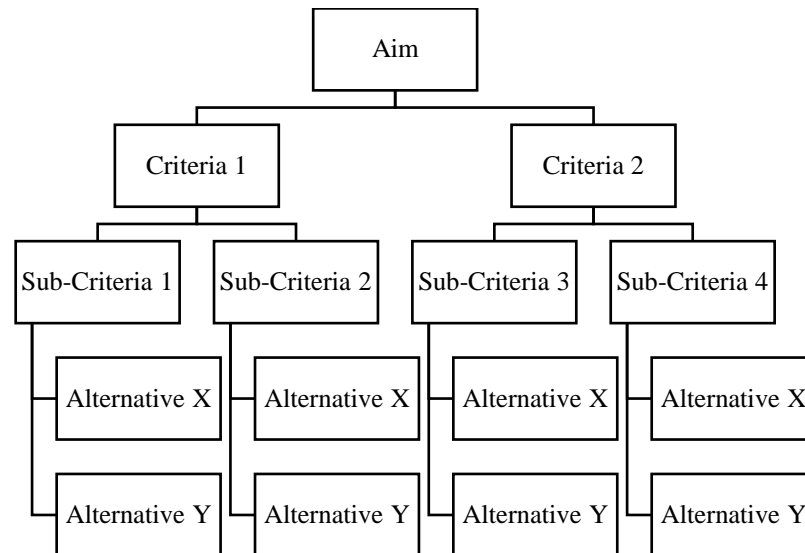


Figure 3.1. Model of Analytic Hierarchy (Kadak, 2006)

According to the complexity of the problem, criteria, sub-criteria or alternatives may be incorporated or suppressed. In this study, four criteria are taken into consideration with four sub-criteria for each, whereas alternatives are not taken in charge (cf. Figure 3.2.).

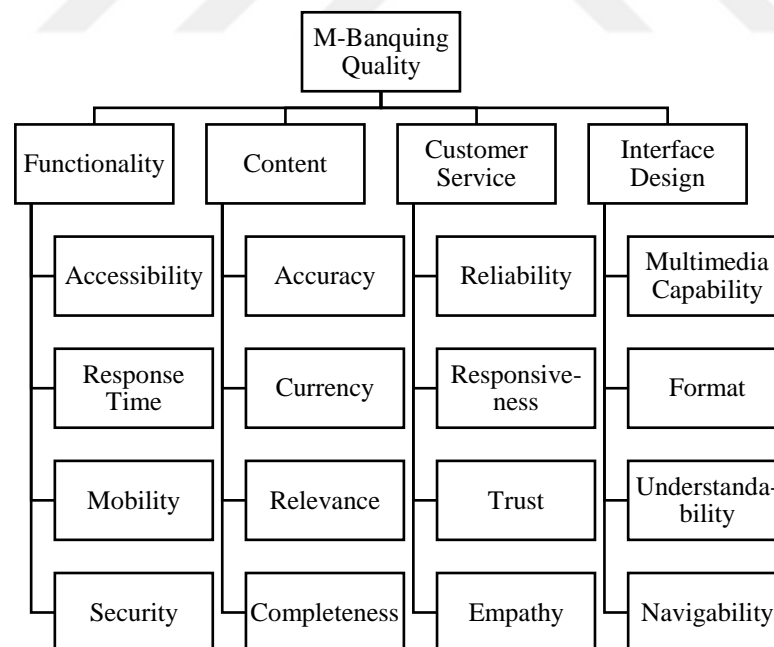


Figure 3.2. AHP Model of M-Banking Applications Quality Factors

3.2.2.2. Construction of pairwise comparison matrix

At this stage, all the judgments related to the elements of the hierarchical structure will be converted into a matrix. AHP method indicates the relative importance of each element compared to other by doing pairwise comparisons. Suppose we are interested in a total of n criteria from an exemplary hierarchy; a matrix named A is created with a $n \times n$ pairwise comparison reflecting the relative importance of each criterion (Figure 3.3.)(Kadak, 2006).

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdot & a_{1n} \\ a_{21} & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ a_{n1} & \cdot & \cdot & a_{nn} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} & \cdot & a_{1n} \\ 1/a_{12} & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ 1/a_{1n} & \cdot & \cdot & a_{nn} \end{bmatrix}$$

Figure3.3. Pairwise Comparison Matrix ($n \times n$) (Kadak, 2006)

Pairwise comparison is realized by grading criteria on line i ($i = 1, 2, \dots, n$) depending on each criterion represented with n columns. The AHP recommends a scale from 1 to 9 in order to realize this comparison (Table 3.1.). If i and j are equally important, $a_{ij} = 1$; if i is strongly more important than j , $a_{ij} = 5$ and if i is extremely more important than j , $a_{ij} = 9$. Values 2, 4, 6, 8 do not ensure absolute judgment and they are used when intermediate values are necessary. Moreover, due to the reciprocity in the matrix, if $a_{ij} = k$, then $a_{ji} = 1/k$. Finally, all diagonal elements of the matrix are equal to 1 as these elements rank a criterion with itself.

Generally, in analytic hierarchy process, the decision-maker may face a problem when trying to do the rating. This problem is due to the scale and the measurement technique. When the knowledge of the decision-maker related to the problem increase, it may be expected that the problem may modeled more coherently. Sharing as much information as possible about the problem may provide to increase consistency (Kadak, 2006).

Table 3.1. Fundamental Scale of AHP Method (Saaty, 2008)

Intensity of Importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective.
2	Weak or slight	
3	Moderate importance	Experience and judgment slightly favor one activity over another.
4	Moderate plus	
5	Strong importance	Experience and judgment strongly favor one activity over another.
6	Strong plus	
7	Very strong or demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice.
8	Very, very strong	
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation.
1.1-1.9	When activities are very close a decimal is added to 1 to show their differences as appropriate.	A better alternative way to assigning the small decimals is to compare two close activities with other widely contrasting ones, favoring the larger one a little over the smaller one when using the 1–9 values.
Reciprocals of above	If activity I has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i.	A logical assumption
Measurements ratio scales		When it is desired to use such numbers in physical applications. Alternatively, often one estimates the ratios of such magnitudes by using judgment.

3.2.2.3. Synthesis

In the synthesis step, after having established pairwise comparison matrixes, the relative importance weights are calculated for each criterion. This step comprises the calculation of the maximum eigenvalue, the calculation and the normalization of the corresponding eigenvector. For this purpose, various methods are available but the most commonly normalization method used in the literature is the division of each element by the sum of the matrix column in which this element is situated. Then, calculation of the average of each matrix line provides the weight vectors.

After calculating relative importance of the criteria (weight vectors), the consistency of the matrix is tested using those weight vectors. It is clearly difficult to be consistent for all of the pairwise comparison matrixes. Overall, these matrixes are based on human judgments and inconsistency may be expected to a certain degree. This inconsistency may be tolerated as long as it remains below a certain limit. This limit is 10% according to Saaty (Kadak, 2006).

Let us show all the steps of consistency calculation with an example. The following matrix is prepared with the data of the first survey of this research.

S1	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	5
Content	1	1	1/2	4
Customer Service	1	2	1	4
Interface Design	1/5	1/4	1/4	1

1- The sum of each column of the matrix is calculated.

S1	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	5
Content	1	1	1/2	4
Customer Service	1	2	1	4
Interface Design	1/5	1/4	1/4	1
Sum	3,2	4,25	2,75	14

2- Each value is divided by the sum of the column in which it is located. Thereby normalized matrix is obtained.

S1	Functionality	Content	Customer Service	Interface Design
Functionality	0,31	0,24	0,36	0,36
Content	0,31	0,24	0,18	0,29
Customer Service	0,31	0,47	0,36	0,29
Interface Design	0,06	0,06	0,09	0,07

3- The average of each line gives the relative importance weights (W) for each criteria.

S1	Functionality	Content	Customer Service	Interface Design	W
Functionality	0,31	0,24	0,36	0,36	0,32
Content	0,31	0,24	0,18	0,29	0,25
Customer Service	0,31	0,47	0,36	0,29	0,36
Interface Design	0,06	0,06	0,09	0,07	0,07

4- The non-normalized matrix situated in the first step (1-) is multiplied with the weights (W) and the S1xW matrix is obtained.

S1	Functionality	Content	Customer Service	Interface Design	W
Functionality	1	1	1	5	0,32
Content	1	1	1/2	4	0,25
Customer Service	1	2	1	4	0,36
Interface Design	1/5	1/4	1/4	1	0,07

×

5- The values of the S1xW matrix are divided by the weights. Then, the average of the new matrix provides the maximum eigenvalue vector λ_{max} .

S1xW	(S1xW)/W
1,28	4
1,03	4,12
1,46	4,06
0,29	4,14

Average: $\lambda_{max} = 4,08$

$$6- \quad \mathbf{CR=CI / RI} \quad [3.1]$$

CR: Consistency Ratio

CI: Consistency Index: $CI = (\lambda_{max} - n) / (n - 1)$

RI: Random Consistency Index (from the Table 3.1. considering the number of criteria n)

Saaty suggested that the acceptable upper limit for the consistency ratio is 10%. If the calculated consistency ratio is below 10%, the judgments are assumed consistent and the evaluation may continue. If this value is higher than 10%, the situation is considered inconsistent and the quality of judgments must be ameliorated. Consistency ratio may be reduced by revising the judgments. However, if this amelioration process is not realized successfully, the process must be entirely repeated and the problem must be re-established more correctly (Kadak, 2006).

Table 3.2. Consistency Indexes (Kadak, 2006)

n	1	2	3	4	5	6	7	8	9	10
RI	0,0	0,0	0,52	0,89	1,11	1,25	1,35	1,40	1,45	1,49

As in the matrix n=4;

$$CI = (\lambda_{max} - n) / (n - 1) = (4,08 - 4) / 3 \approx 0,0267$$

$$RI = 0,89$$

$$CR = CI/RI = 0,0267 / 0,89 \approx 0,03 = 3\%$$

We conclude that the consistency ratio is acceptable as it is below 10% as specified by Saaty.

SECTION FOUR FINDINGS AND DISCUSSION

On this section of the study, findings obtained from the analyses will be given and discussed. First of all, descriptive statistics concerning the respondents of the survey will be shown. Secondly, the results of the Analysis of Variance test will be given in order to compare respondents' satisfaction related to different banks mobile banking application quality factors. Finally, by the results of Analytic Hierarchy Process test, the relative importance of mobile banking quality factors according to the respondents will be exposed.

4.1. DESCRIPTIVE STATISTICS

Descriptive statistics about genders, ages, education levels, jobs, mobile phone brands, mobile phone operating systems, preferences for performing bank transaction, mobile banking application use durations, transactions performed with mobile banking application and bank names distributions of mobile banking application users who responded to the survey are as described in the following tables.

Table 4.1. Distribution of Respondents by Gender

Gender	Frequency	Percent
Females	60	40,0
Males	87	58,0
Missing	3	2,0
Total	150	100,0

Table 4.1. gives information related to the gender of respondents. Based on those information, 40% of respondents are females and 58% of them are males while 2% did not indicate their gender.

Table 4.2. Distribution of Respondents by Age

Age	Frequency	Percent
≤ 25	45	30,0
26-35	63	42,0
36-45	29	19,3
46-55	6	4,0
$56 \geq$	3	2,0
Missing	4	2,7
Total	150	100,0

Table 4.2. exposes information concerning respondents age. This information points out that 30% of respondents are younger than 25 years old, 42% are between 26-35 years old and 19,3% are between 36-45 years old.

Table 4.3. Distribution of Respondents by Education Level

Education Level	Frequency	Percent
Primary	3	2,0
Secondary	31	20,7
Undergraduate	90	60,0
Master	24	16,0
Doctorate	0	0,0
Missing	2	1,3
Total	150	100,0

Table 4.3. discloses information about education level of respondents. 20,7% of respondents are secondary school graduates, 60% are university graduates whereas 16% have masters' degrees.

Table 4.4. Distribution of Respondents by Job

Job	Frequency	Percent
Public Sector Employee	69	46,0
Private Sector Employee	41	27,3
Freelancer	12	8,0
Unemployed	19	12,7
Other	9	6,0
Missing	0	0,0
Total	150	100,0

According to Table 4.4. revealing respondents' job, 46% of respondents are public sector employees, 27.3% are employees of private sector, 8% are freelancers while 12,7% of them are unemployed. 6% of respondents indicated they belong to another category.

Table 4.5. Distribution of Respondents' Mobile Phone Brand

Mobile Phone Brand	Frequency	Percent
IPhone	60	40,0
Samsung	58	38,7
LG	9	6,0
HTC	6	4,0
Sony	5	3,3
Asus	4	2,7
Other	7	4,7
Missing	1	0,7
Total	150	100,0

Table 4.5. gives information related to mobile phone brand of respondents. These information report that the respondents possess predominantly IPhone and Samsung-branded mobile phones. 40% of respondents declared possessing an IPhone and 38,7% a Samsung-branded mobile phone.

Table 4.6. Distribution of Respondents' Mobile Phone Operating System

Mobile Phone Operating System	Frequency	Percent
Android	90	60,0
IOS	59	39,3
Windows Mobile	1	0,7
Missing	0	0,0
Total	150	100,0

Depending on Table 4.6. expressing mobile phone operating system of respondents, 60% of respondents own an Android mobile phone while 39,3% of them have an IOS mobile phone.

Table 4.7. Distribution of Respondents' Preferences for Performing Bank Transaction

Preferences for Performing Bank Transaction	Frequency	Percent
Mobile Banking Application	78	52,0
Mobile Banking Web Site	10	6,7
Both	60	40,0
Missing	2	1,3
Total	150	100,0

Table 4.7. mentions preferences of respondents when performing bank transaction. 52% of respondents shared they mainly use mobile banking application when performing their bank transactions, only 6,7% indicated they mostly use mobile banking web site and 40% express they use both of these.

Table 4.8. Distribution of Respondents' Mobile Banking Application Use Duration

Mobile Banking Application Use Duration	Frequency	Percent
≤ 1 year	35	23,3
2-5 years	96	64,0
6-9 years	9	6,0
10 years ≥	8	5,3
Missing	2	1,3
Total	150	100,0

Table 4.8. states information about mobile banking use duration of respondents. According these information, 23,3% of respondents use mobile banking application for one year or less and 64% of them use the application for between 2-5 years.

Table 4.9. Distribution of Respondents' Transactions Performed with Mobile Banking Application

Transactions Performed with Mobile Banking Application	Frequency	Percent
Checking Account Information	135	90,0
Money Transfer	132	88,0
Credit Card Transaction	127	84,7
Following Recent Transaction	126	84
Bill Payment Transaction	126	84
Other Payment Transaction	118	78,7
Investment Transaction	103	68,7
Account-Related Warning Message	97	64,7
Following Daily Currency Rate Information	90	40
Foreign Currency/Gold Purchase and Sale Transaction	88	58,7
Nearest Branch and ATM Addresses, Map and Direction	85	56,7
Missing	7	4,7

Table 4.9. exposes information related to the transactions performed by the respondents using mobile banking application. 90% of respondents indicated that they check account information, 88% that they transfer money, 84,7% that they realize credit card transaction, 84% that they follow recent transaction and 84% that they carry out bill payment transaction.

Table 4.10. Distribution of Respondents' Bank

Bank Name	Frequency	Percent
İş Bankası	47	31,3
Garanti Bankası	31	20,7
Ziraat Bankası	22	14,7
Akbank	14	9,3
Finansbank	10	6,7
Vakıfbank	9	6,0
TEB	4	2,7
Halkbank	3	2,0
Yapı Kredi Bankası	3	2,0
Albaraka Türk Bankası	1	0,7
Missing	6	4,0
Total	150	100,0

Finally, Table 4.10. gives information about banks of respondents. 31,3% of the respondents are clients of İş Bankası, 20,7% are clients of Garanti Bankası, 14,7% are clients of Ziraat Bankası and 9,3% are clients of Akbank.

4.2. ANALYSIS OF VARIANCE (ANOVA)

In order to compare mobile banking applications according to quality criteria of functionality, content, customer service and interface design, several ANOVA analyses were performed. Since the number of customers are very low for some banks, only first four banks were considered in these analyses.

First of all, Table 4.11. gives information about users' satisfaction concerning quality factors. Users seem generally satisfied by the quality of mobile banking applications. The means of quality factors satisfaction range from 3,75 to 4,30, which, in other words, is a high level of satisfaction. Functionality ($x=4,30$) seems the most satisfying quality factor, followed by content ($x=4,14$), interface design ($x=3,99$) and customer service ($x=3,75$).

Table 4.11. Mean and Standard Deviation of Users Quality Satisfaction

Factors	Mean	Std. Deviation	Frequency
Functionality	4,3004	0,68374	114
Content	4,1360	0,74513	114
Interface Design	3,9927	0,69027	114
Customer Service	3,7471	0,81014	114

Table 4.12. compares mobile banking applications according to functionality. The mean values of functionality satisfaction for listed mobile banking applications are close to each other.

Table 4.12. Mean and Standard Deviation of Functionality

Banks	Mean	Std. Deviation	Frequency
İş Bankası	4,4628	0,52498	47
Garanti Bankası	4,3306	0,56784	31
Ziraat Bankası	4,2273	0,64045	22
Akbank	3,8036	1,14429	14
Total	4,3004	0,68374	114

Examination of the Homogeneity of Variance test (Table 4.13.) reveals a lack of homogeneity, as the significance value is $0,003 < 0,05$. In this context, ANOVA test is inappropriate, Robust Tests of Equality of Means are performed.

Table 4.13. Homogeneity of Variances Test

Levene Statistic	df1	df2	Significance
4,812	3	110	0,003

Table 4.14. exposes the results of Robust Tests of Equality of Means. The significance value for Welch test is 0,133 and for Brown-Forsythe test is 0,071. As these values are both greater than 0,05, it is assumed that there is no significant difference concerning functionality satisfaction between mobile banking applications.

Table 4.14. Robust Tests: Mobile Banking Applications- Functionality

Robust Tests	Statistic	df1	df2	Significance
Welch	1,977	3	39,258	0,133
Brown-Forsythe	2,580	3	32,268	0,071

Table 4.15. compares mobile banking applications according to content. The mean values of content satisfaction for listed mobile banking applications are close to each other.

Table 4.15. Mean and Standard Deviation of Content

Banks	Mean	Std. Deviation	Frequency
İş Bankası	4,3511	0,52559	47
Garanti Bankası	4,0995	0,81633	31
Ziraat Bankası	4,0341	0,76101	22
Akbank	3,6548	0,96844	14
Total	4,1360	0,74513	114

Examination of the Homogeneity of Variance test (Table 4.16.) reveals a lack of homogeneity, as the significance value is $0,044 < 0,05$. In this context, ANOVA test is inappropriate, Robust Tests of Equality of Means are performed.

Table 4.16. Homogeneity of Variances Test

Levene Statistic	df1	df2	Significance
2,786	3	110	0,044

Table 4.17. exposes the results of Robust Tests of Equality of Means. The significance value for Welch test is 0,037 and for Brown-Forsythe test is 0,042. However, these values are both less than 0,05, it is assumed that there is a significant difference concerning content satisfaction between mobile banking applications.

Table 4.17. Robust Tests: Mobile Banking Applications- Content

Robust Tests	Statistic	df1	df2	Significance
Welch	3,117	3	38,591	0,037
Brown-Forsythe	2,935	3	52,963	0,042

Scheffe test is performed in order to find out between which mobile banking applications a significant difference is present. According to the results (Table 4.18.), there is a significant difference between Akbank and İş Bankası mobile banking applications according to content satisfaction. Content satisfaction mean value for Akbank ($x=3,6548$) is inferior to mean value for İş Bankası ($x=4,3511$).

Table 4.18. Scheffe Test: Mobile Banking Applications- Content

Banks		Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Akbank	Garanti	-0,44470	0,23190	0,304	-1,1031	0,2137
	İş Bankası	-0,69630*	0,21928	0,021	-1,3189	-0,0737
	Ziraat	-0,37933	0,24622	0,501	-1,0784	0,3198
Garanti	Akbank	0,44470	0,23190	0,304	-0,2137	1,1031
	İş Bankası	-0,25160	0,16663	0,519	-0,7247	0,2215
	Ziraat	0,06537	0,20077	0,991	-0,5047	0,6354
İş Bankası	Akbank	0,69630*	0,21928	0,021	0,0737	1,3189
	Garanti	0,25160	0,16663	0,519	-0,2215	0,7247
	Ziraat	0,31697	0,18604	0,411	-0,2112	0,8452
Ziraat	Akbank	0,37933	0,24622	0,501	-0,3198	1,0784
	Garanti	-0,06537	0,20077	0,991	-0,6354	0,5047
	İş Bankası	-0,31697	0,18604	0,411	-0,8452	0,2112

*. The mean difference is significant at the 0.05 level.

However, as the variances are not homogeneous, it is preferable to use Games-Howell test. According to the results (Table 4.19.), there is not a significant difference between Akbank and İş Bankası mobile banking applications at 0,05 level. The difference is significant only at the 0,10 level.

Table 4.19. Games- Howell Test: Mobile Banking Applications- Content

Banks		Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Akbank	Garanti	-0,44470	0,29747	0,457	-1,2716	0,3822
	İş Bankası	-0,69630	0,26994	0,086	-1,4722	0,0796
	Ziraat	-0,37933	0,30548	0,608	-1,2246	0,4660
Garanti	Akbank	0,44470	0,29747	0,457	-0,3822	1,2716
	İş Bankası	-0,25160	0,16545	0,434	-0,6925	0,1893
	Ziraat	0,06537	0,21868	0,991	-0,5169	0,6477
İş Bankası	Akbank	0,69630	0,26994	0,086	0,0796	1,4722
	Garanti	0,25160	0,16545	0,434	-0,1893	0,6925
	Ziraat	0,31697	0,17945	0,308	-0,1703	0,8043
Ziraat	Akbank	0,37933	0,30548	0,608	-0,4660	1,2246
	Garanti	-0,06537	0,21868	0,991	-0,6477	0,5169
	İş Bankası	-0,31697	0,17945	0,308	-0,8043	0,1703

*. The mean difference is significant at the 0.05 level.

Table 4.20. compares mobile banking applications according to interface design. The mean values of interface design satisfaction for listed mobile banking applications are close to each other. ANOVA test is performed in order to find out if there is a significant difference between those means. The results are exposed in Table 4.22.

Table 4.20. Mean and Standard Deviation of Interface Design

Banks	Mean	Std. Deviation	Frequency
İş Bankası	4,1294	0,65612	47
Garanti Bankası	4,0565	0,69735	31
Ziraat Bankası	3,8295	0,61907	22
Akbank	3,6488	0,79204	14
Total	3,9927	0,69027	114

When examining the Homogeneity of Variance test, it is assumed that variances are equal across groups as the significance value is $0,715 > 0,05$.

Table 4.21. Homogeneity of Variances Test

Levene Statistic	df1	df2	Significance
0,454	3	110	0,715

Table 4.22. exposes the results of ANOVA test. The significance value is 0,076. This value being greater than 0,05, it is assumed that there is no significant difference concerning interface design satisfaction between mobile banking applications.

Table 4.22. ANOVA Test: Mobile Banking Applications- Interface Design

Source of Variance	Sum of Squares	df	Mean Square	F	Significance
Between Groups	3,246	3	1,082	2,352	0,076
Within Groups	50,595	110	0,460		
Total	53,841	113			

Table 4.23. compares mobile banking applications according to customer service. The mean values of customer service satisfaction for listed mobile banking applications are close to each other. ANOVA test is performed in order to find out if there is a significant difference between those means. The results are exposed in Table 4.25.

Table 4.23. Mean and Standard Deviation of Customer Service

Banks	Mean	Std. Deviation	Frequency
İş Bankası	3,8865	0,74645	47
Garanti Bankası	3,8737	0,94963	31
Akbank	3,5536	0,81558	14
Ziraat Bankası	3,3939	0,62318	22
Total	3,7471	0,81014	114

When examining the Homogeneity of Variance test, it is assumed that variances are equal across groups as the significance value is $0,316 > 0,05$.

Table 4.24. Homogeneity of Variances Test

Levene Statistic	df1	df2	Significance
1,192	3	110	0,316

Table 4.25. exposes the results of ANOVA test. The significance value is 0,066. This value being greater than 0,05, it is assumed that there is no significant difference concerning customer service satisfaction between mobile banking applications.

Table 4.25. ANOVA Test: Mobile Banking Applications- Customer Service

Source of Variance	Sum of Squares	df	Mean Square	F	Significance
Between Groups	4,678	3	1,559	2,469	0,066
Within Groups	69,487	110	0,632		
Total	74,166	113			

4.3. ANALYTIC HIERARCHY PROCESS (AHP)

The application of the AHP method in order to conclude which quality factor is more important compared to the others for the users of mobile banking application is the core of this study. With this purpose, a web based Analytic Hierarchy Process application was used (Goepel, 2016). This online AHP system was developed based on an academic research (Goepel, 2013).

First of all, we registered as new user on the website. Then we created a new hierarchy based on the research model (Figure 3.2). After submitted this hierarchy, we started to enter one by one data received via surveys. The system calculated the consistency ratio for each respondent answer. If this ratio was below 10%, as specified by Saaty, we included that survey in the analysis. If it was larger than this value, we did not take the survey into consideration. At the end, we selected a total of 28 surveys which have acceptable consistency ratio among 150 surveys. In the annex part, data of those selected surveys are available in the form of AHP tables (Annex 2). After submitting the data of those consistent surveys, the system provided the following table (Table 4.26.). This table lists the percentage of importance attributed to each mobile banking quality factor for each of respondents.

Based on those results, the system delivered a consolidated result, in other terms the group result (Table 4.27.). According to the respondents, when considering the quality of a mobile banking application, the functionality is the most important factor with 35,44% of importance. It is followed by content with 31%. Customer service takes the third place with 19,12%, while interface design occupies the last place with 14,44%. In other words, Turkish mobile banking application users consider functionality and content as more critical factors than customer service and interface design in terms of quality factors. The consistency ratio is 0,06% which means almost a perfect consistency. The whole respondents' answers seem mostly in harmony with those results as the group consensus is 86,3%.

Table 4.26. AHP Test Results

	Functionality	Content	Customer Service	Interface Design	Consistency Ratio
Survey 1	0,315349	0,253682	0,360351	0,070618	0,024515
Survey 6	0,321387	0,321387	0,309473	0,047754	0,001090
Survey 18	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 23	0,342648	0,396459	0,150090	0,110803	0,043223
Survey 25	0,246264	0,289365	0,175005	0,289365	0,022228
Survey 29	0,443773	0,408385	0,038441	0,109400	0,065661
Survey 31	0,302078	0,368533	0,058200	0,271189	0,029707
Survey 35	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 41	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 44	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 54	0,506962	0,277405	0,146759	0,068874	0,069406
Survey 67	0,312017	0,280367	0,280367	0,127250	0,007558
Survey 76	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 80	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 81	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 87	0,321947	0,187330	0,419207	0,071515	0,048465
Survey 91	0,284423	0,411109	0,217967	0,086501	0,045489
Survey 96	0,440409	0,416259	0,049805	0,093526	0,045469
Survey 113	0,250000	0,250000	0,250000	0,250000	0,000000
Survey 117	0,445956	0,411717	0,051495	0,090831	0,057668
Survey 118	0,401859	0,450266	0,092849	0,055026	0,070188
Survey 119	0,673334	0,109392	0,168132	0,049142	0,075175
Survey 120	0,453114	0,344996	0,156414	0,045476	0,095690
Survey 125	0,176032	0,280974	0,245430	0,297564	0,067995
Survey 133	0,629741	0,144940	0,147428	0,077891	0,065238
Survey 140	0,300000	0,300000	0,100000	0,300000	0,000000
Survey 145	0,324858	0,324858	0,299610	0,050673	0,005199
Survey 147	0,250000	0,250000	0,250000	0,250000	0,000000

Table 4.27. Consolidated AHP Test Results

Criteria	Group Result
Functionality	0,354356
Content	0,310043
Customer Service	0,191182
Interface Design	0,144420
Consistency Ratio	0,000606
Group Consensus	0,863



CONCLUSION AND SUGGESTIONS

For many years, banks have served customers through branches. However, with technological developments in the last century, the use of Internet has phenomenally spread. Therefore, the banking sector offers now services via mobile banking channels. Mobile banking channels offer opportunities for users to access banking transactions wherever and whenever they want with ease and low costs.

Intense competition has always dominated the banking sector. In order to survive this competition, banks should pay attention to the quality factor which is one of the most important factors in banking system. With the spread of mobile banking, researches about quality are conducted not only in the traditional banking services but also in this new banking channel. Due to being a relatively new banking channel, studies in mobile banking are limited compared with traditional banking channels. This study intended to evaluate service quality satisfaction of Turkish mobile banking applications' users and to determine the relative importance of m-banking factors that affect service quality.

In epitome, having introduced the subject in the introduction, the literature discussed the concept of mobile banking, how it emerged, its different types and its use in the world and in Turkey. The literature considered also the notions of quality and service quality, the service quality measurement models, the quality factors in mobile services and in mobile banking applications. The methodology section resumed the Analytic Hierarchy Process and its application steps. The material section gave information about the survey and the sample of the study. The survey was applied to 150 Turkish mobile banking applications users. Data gathered throughout these surveys are analyzed using SPSS and a web based Analytic Hierarchy Process application. Findings obtained from the analyses are given and discussed in the next section.

Breakdown of participants' demographic characteristics for this study is as follows, the sample included 40% females and 58% males; 30% younger than 25 years old, 42% between 26-35 years old and 19,3% between 36-45 years old; 20,7% secondary school graduates, 60% university graduates and 16% master's degree graduates; 46% public sector employees, 27,3% employees of private sector, 8% freelancers and 12,7% unemployed people; 40% iPhone users and 38,7% Samsung-branded mobile phone users.

Majority of respondents indicated they mainly use mobile banking application when performing their bank transactions and more than half of the respondents shared they have been utilizing the application for 2 to 5 years. The most performed transaction by the respondents is checking account information, followed by money transfer, credit card transaction, following recent transaction and bill payment transaction. Respondents are predominantly clients of İş Bankası, Garanti Bankası, Ziraat Bankası and Akbank.

Users seemed generally satisfied by the quality of mobile banking applications. The means of quality factors satisfaction ranged from 3,75 to 4,30, which means a high level of satisfaction. Functionality seemed the most satisfying quality factor, followed in order by content, interface design and customer service. In order to compare mobile banking applications according to quality criteria of functionality, content, customer service and interface design, several ANOVA analyses were performed. There is no significant difference concerning content, functionality, interface design and customer service satisfaction between mobile banking applications.

The application of the AHP method has shown which quality factor is more important compared with the others for the users of mobile banking application. According to the respondents, the functionality is the most important factor with 35,44% of importance. It is followed by content, customer service and interface design with 31%, 19,12% and 14,44% respectively. In other words, Turkish mobile banking application users consider functionality and content as more critical factors than customer service and interface design in terms of quality factors. These results are in accordance with Lin's research (2013).

The results obtained from this AHP method paralleled to the results of the respondents' satisfaction in terms of quality for the first two criteria: functionality and content. However, the ranking is different for the last two criteria. Respondents seems

more satisfied by interface design than customer service whereas they pay more attention to customer service than interface design. It can be an issue for banks which may need to improve their services in terms of customer service.

Several limitations to this study require further examination and additional researches. First of all, the sample is mainly composed of young customers; only a small amount of respondents is elderly. Similarly, highly educated respondents are predominant; almost 80% of respondents are university graduates or postgraduates. Future researchers may study with more proportionally distributed samples. Secondly, the respondents of the survey are mainly based in Gaziantep. Future researches may be conducted in several parts of Turkey and including rural areas which could lead to different issues. Thirdly, since the number of respondents are very low for some banks, only first four bank respondents were considered eligible in the ANOVA test analyses. Next studies may analyze evenly distributed samples. In this way, more banks could have ideas about their customers' satisfaction to whom they attach importance. Finally, the last but most important limitation is the criteria limitation. The evaluation factors of m-banking quality were acquired from the literature review. This study was limited to four main criteria. Instead of limiting the eventual answers, future researches may experiment different methodology as focus groups and interviews to identify other quality factors of m-banking.

Although it was not a subject of this study, during the execution of the questionnaires, most of mobile banking application non-users explained the main reason as to not using these applications as a lack of trust. Banks may improve security precautions if necessary and develop marketing strategies in order to break down this negative perception.

This research is among the few studies analyzing the relative importance of mobile banking quality factors with Analytic Hierarchy Process method and the first one in Turkey. It is expected that this study provides guidance to banks but also to academics in further studies.

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ANNEXES

ANNEX 1. QUESTIONNAIRE



GAZİANTEP ÜNİVERSİTESİ



Değerli Katılımcı,

Bu anket çalışması, Gaziantep Üniversitesi İİBF İşletme Bölümünde sürdürülen bir yüksek lisans tezinde kullanılmak üzere hazırlanmıştır. Anketin amacı, mobil bankacılık uygulamaları hakkında kullanıcı görüşlerini tespit etmektir. Anketimize vermiş olduğunuz cevaplar sadece analiz amacıyla kullanılacak ve yapılan tüm yayın ve sunumlarda kişisel bilgileriniz korunacaktır. Çalışmamıza vermiş olduğunuz değerli katkılarınız için teşekkürlerimizi sunarız.

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1.BÖLÜM

Lütfen sizinle ilgili aşağıdaki bilgileri paylaşınız.

Cinsiyetiniz: Kadın Erkek

Yaşınız:

Eğitim durumunuz (En son tamamladığınız derece): İlköğretim Lise Üniversite Yüksek lisans Doktora**İşiniz:** Kamuda çalışıyorum Özel sektörde çalışıyorum Kendi işimde çalışıyorum Çalışmıyorum Diğer

Mobil bankacılık uygulaması kullanıyor musunuz: Evet Hayır

Hangi bankanın mobil uygulamasını kullanıyorsunuz: (Eğer birden çok mobil bankacılık uygulaması kullanıyorsanız, **sadece en çok kullandığınız uygulamayı** yazınız):.....

Mobil bankacılık uygulamasını kaç yıldır kullanıyorsunuz:

Telefonunuzla banka işlemlerinizi gerçekleştirmek istediğinizde, bankanın mobil web sitesini mi yoksa bankanın mobil uygulamasını mı kullanıyorsunuz:

Mobil Web sitesi Mobil Uygulama Her ikisini

Telefonunuzun markası nedir:

Telefonunuzun işletim sistemi nedir: iOS Android Windows
Diğer

Mobil bankacılık uygulamanızda var olan ve kullandığınız özellikleri seçiniz:

Özellik	Var	Kullanıyorum
Hesap bilgilerini kontrol etme		
Son yapılan işlemleri takip etme		
Para transfer etme		
Kredi kartı işlemleri		
Fatura ödeme işlemleri		
Diğer ödeme işlemleri		
Yatırım işlemleri		
Günlük döviz kuru bilgilerini takip etme		
En yakın şube ve ATM adresleri, haritaları ve yol tarifleri		
Hesapla ilgili uyarı mesajları (yapılan işlemlerle ilgili, vb)		
Döviz/altın alış-satış işlemleri		

2.BÖLÜM

Lütfen aşağıdaki mobil bankacılık uygulaması ile ilgili ifadelere ne ölçüde katıldığınızı belirten sayıyı işaretleyiniz.

1=Kesinlikle katılmıyorum 2=Katılmıyorum 3=Kararsızım 4=Katılıyorum 5=Kesinlikle katılıyorum

M-bankacılık uygulaması banka işlemlerine erişimi kolaylaştırıyor.	1	2	3	4	5
M-bankacılık işlemleri makul bir sürede yükleniyor.	1	2	3	4	5
M-bankacılık uygulamasına her zaman ve her yerde ulaşıyor.	1	2	3	4	5
M-bankacılık uygulaması banka işlemlerini gerçekleştirmek için yeterli güvenliği sağlıyor.	1	2	3	4	5
M-bankacılık uygulaması tarafından sağlanan bilgiler doğrudur.	1	2	3	4	5
M-bankacılık uygulaması tarafından sağlanan bilgiler her zaman günceldir.	1	2	3	4	5
M-bankacılık uygulaması banka işlemleri hakkında uygun bilgileri veriyor.	1	2	3	4	5
M-bankacılık uygulaması bilgileri eksiksiz bir şekilde sunuyor.	1	2	3	4	5
M-bankacılık uygulaması müşterilerin isteklerine doğru çözümü sağlıyor.	1	2	3	4	5
M-bankacılık uygulaması müşteri sorularına duyarlıdır.	1	2	3	4	5
Banka işlemlerinde mobil cihaz kullanmak güvenilirdir.	1	2	3	4	5
M-bankacılık müşterilere bireysel ilgi gösteriyor.	1	2	3	4	5
M-bankacılık uygulaması uygun multimedya (grafik ve resim gibi) sunuyor.	1	2	3	4	5
M-bankacılık işlemlerinin içeriği (aralık, derinlik ve yapı gibi) ekranda net bir şekilde sunuluyor.	1	2	3	4	5
M-bankacılık uygulamasının sunum şekli kolay anlaşılıyor.	1	2	3	4	5
M-bankacılık uygulaması bilgilere kolayca ulaştıracak bir gezinim sağlıyor.	1	2	3	4	5

3.BÖLÜM

İşlevsellik mobil bankacılık uygulamasında, banka işlemlerine erişim kolaylığı, erişim süresi, her yerden ve her zaman erişim imkânı, güvenli erişim gibi özellikleri ifade ediyor.

İçerik mobil bankacılık uygulamasında, doğru, güncel ve uygun bilgilerin sağlanması ve eksiksiz bir şekilde sunulması gibi özellikleri ifade ediyor.

Müşteri Hizmetleri mobil bankacılık uygulamasında, müşterilerin isteklerine doğru çözümün sağlanması, müşteri sorularına duyarlılık, müşterilere bireysel ilgi gösterilmesi gibi özellikleri ifade ediyor.

Arayüz Tasarımı mobil bankacılık uygulamasında, uygun grafik ve resimlerin sunulması, işlemlerin içeriği ekranda net sunulması, sunum şeklinin kolay anlaşılması, bilgilere kolayca ulaştıracak bir gezinim sağlanması gibi özellikleri ifade ediyor.

Lütfen yukarıdaki tanımlar doğrultusunda, mobil bankacılık uygulamasının farklı kalite boyutlarını (İşlevsellik, İçerik, Müşteri Hizmetleri ve Arayüz Tasarımı) önemleri açısından karşılaştırınız.

Karşılaştırma yaparken aşağıdaki tabloyu kullanınız:

1: Eşit öneme sahip	
-3: Biraz daha önemsiz	3: Biraz daha önemli
-5: Oldukça önemsiz	5: Oldukça önemli
-7: Çok önemsiz	7: Çok önemli
-9: Son derece önemsiz	9: Son derece önemli
-2,-4,-6 ve -8 ara değerler	
2,4,6 ve 8 ara değerler	

Örneğin 1. soruda, size göre uygulamanın işlevselliği arayüz tasarımına göre **Çok önemli** ise 7'yi **Oldukça önemsiz** ise -5'i işaretleyiniz. Uygun ara değerleri de seçebilirsiniz (2 veya -6 gibi). Her ikisinin eşit öneme sahip olduğunu düşünüyorsanız, 1'i işaretleyiniz.

1. İşlevsellik, Arayüz Tasarımına göre ne derece önemlidir?

Önemsiz								Eşit öneme sahip	Önemli							
-9	-8	-7	-6	-5	-4	-3	-2	1	2	3	4	5	6	7	8	9

2. İşlevsellik, Müşteri Hizmetlerine göre ne derece önemlidir?

Önemsiz								Eşit öneme sahip	Önemli							
-9	-8	-7	-6	-5	-4	-3	-2	1	2	3	4	5	6	7	8	9

3. İşlevsellik, İçeriğe göre ne derece önemlidir?

Önemsiz								Eşit öneme sahip		Önemli							
-9	-8	-7	-6	-5	-4	-3	-2	1	2	3	4	5	6	7	8	9	

4. İçerik, Müşteri Hizmetlerine göre ne derece önemlidir?

Önemsiz								Eşit öneme sahip		Önemli							
-9	-8	-7	-6	-5	-4	-3	-2	1	2	3	4	5	6	7	8	9	

5. İçerik, Arayüz Tasarımına göre ne derece önemlidir?

Önemsiz								Eşit öneme sahip		Önemli							
-9	-8	-7	-6	-5	-4	-3	-2	1	2	3	4	5	6	7	8	9	

6. Müşteri Hizmetleri, Arayüz Tasarımına göre ne derece önemlidir?

Önemsiz								Eşit öneme sahip		Önemli							
-9	-8	-7	-6	-5	-4	-3	-2	1	2	3	4	5	6	7	8	9	

ANNEX 2. AHP TABLES

Survey 1	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	5
Content	1	1	1/2	4
Customer Service	1	2	1	4
Interface Design	1/5	1/4	1/4	1

Survey 6	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	7
Content	1	1	1	7
Customer Service	1	1	1	6
Interface Design	1/7	1/7	1/6	1

Survey 18	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 23	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	3	2
Content	1	1	3	4
Customer Service	1/3	1/3	1	2
Interface Design	1/2	1/4	1/2	1

Survey 25	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	2	1
Customer Service	1	1/2	1	1/2
Interface Design	1	1	2	1

Survey 29	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	9	6
Content	1	1	8	5
Customer Service	1/9	1/8	1	1/5
Interface Design	1/6	1/5	5	1

Survey 31	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	5	1
Content	1	1	5	2
Customer Service	1/5	1/5	1	1/6
Interface Design	1	1/2	6	1

Survey 35	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 41	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 44	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 54	Functionality	Content	Customer Service	Interface Design
Functionality	1	3	3	5
Content	1/3	1	3	4
Customer Service	1/3	1/3	1	3
Interface Design	1/5	1/4	1/3	1

Survey 67	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	3
Content	1	1	1	2
Customer Service	1	1	1	2
Interface Design	1/3	1/2	1/2	1

Survey 76	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 80	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 81	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 87	Functionality	Content	Customer Service	Interface Design
Functionality	1	2	1	3
Content	1/2	1	1/3	4
Customer Service	1	3	1	6
Interface Design	1/3	1/4	1/6	1

Survey 91	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	3
Content	1	1	3	4
Customer Service	1	1/3	1	3
Interface Design	1/3	1/4	1/3	1

Survey 96	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	8	6
Content	1	1	6	6
Customer Service	1/8	1/6	1	1/3
Interface Design	1/6	1/6	3	1

Survey 113	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

Survey 117	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	7	7
Content	1	1	6	6
Customer Service	1/7	1/6	1	1/3
Interface Design	1/7	1/6	3	1

Survey 118	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	6	5
Content	1	1	7	7
Customer Service	1/6	1/7	1	3
Interface Design	1/5	1/7	1/3	1

Survey 119	Functionality	Content	Customer Service	Interface Design
Functionality	1	8	5	9
Content	1/8	1	1	2
Customer Service	1/5	1	1	6
Interface Design	1/9	1/2	1/6	1

Survey 120	Functionality	Content	Customer Service	Interface Design
Functionality	1	2	3	7
Content	1/2	1	4	6
Customer Service	1/3	1/4	1	6
Interface Design	1/7	1/6	1/6	1

Survey 125	Functionality	Content	Customer Service	Interface Design
Functionality	1	1/2	1/2	1
Content	2	1	1	1
Customer Service	2	1	1	1/2
Interface Design	1	1	2	1

Survey 133	Functionality	Content	Customer Service	Interface Design
Functionality	1	4	7	5
Content	1/4	1	1	2
Customer Service	1/7	1	1	3
Interface Design	1/5	1/2	1/3	1

Survey 140	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	3	1
Content	1	1	3	1
Customer Service	1/3	1/3	1	1/3
Interface Design	1	1	3	1

Survey 145	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	7
Content	1	1	1	7
Customer Service	1	1	1	5
Interface Design	1/7	1/7	1/5	1

Survey 147	Functionality	Content	Customer Service	Interface Design
Functionality	1	1	1	1
Content	1	1	1	1
Customer Service	1	1	1	1
Interface Design	1	1	1	1

ÖZGEÇMİŞ

Arzu Akşahin 1990 yılında Fransa’da doğdu. İlk ve orta öğrenimini Fransa’da tamamladı. Gaziantep Üniversitesi İktisadi ve İdari Bilimler Fakültesi İşletme Bölümü’nden 2014 yılında mezun oldu. 2014 yılında Gaziantep Üniversitesi Sosyal Bilimler Enstitüsü İşletme Ana Bilim Dalı’nda İngilizce yüksek lisans eğitimine başladı. Arzu Akşahin’in ikinci anadili Fransızca olmak üzere, ileri derecede de İngilizce bilmektedir.

VITAE

Arzu Akşahin was born in France in 1990. She completed her primary education in France. She graduated from the Department of Business Administration Faculty of Economic and Administrative Sciences at Gaziantep University in 2014. She has begun the Master of Business Administration in English at Gaziantep University. Her second native language is French and she knows English in advanced degree.