Process of Using Technology and Innovation in Banking System in Turkey: A Closer Look to The Mobile Banking Applications

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ABSTRACT

This paper mainly focuses on Turkish people's changing habits on using ATMs, especially after digital banking technologies are improved, which are composed of improvements of internet banking and mobile banking. The main hypothesis of the paper is saying that people are using ATMs less when their usage is compared with the period before the technological improvements of digital banking came into the stage. In addition, the usage of ATMs will continue to reduce in the long run, according to the paper. In order to prove the hypothesis given in the paper is true, the paper includes different types of information and data. By taking information from literature, and data from Turkish Bank Association (TBB) and Interbank Card Center (BKM), academic and numerical data is observed and discussed in the coming parts. Also, thanks to surveys and interviews, the paper provides that data from a random sample is also consistent with the literature and historical numerical data and the hypothesis given in the paper.

INTRODUCTION

With the advent of the internet in the 2000s, it has become an integral part of our everyday lives (Çelik & Mangır, 2020). The fast advancements in mobile technology, according to Gumussoy, created a huge opportunity for mobile banking in the banking sector (Gumussoy, 2016). The world has become increasingly digitized, and both the financial sector and customers have adjusted to this new reality (Çelik & Mangır, 2020). All traditional banking operations and program services that were previously only physically available within a bank branch have been digitized. Depositing, withdrawing, and transferring money, managing checking and savings accounts, registering for financial products, credit management, paying bills, and account service are all examples of these services. Customers may profit from the mobile banking system in a variety of ways. These advantages include ease of use, the capacity to respond quickly, and rapid access to financial services.

As we concluded from our literature analysis, the digital transformation of the banking sector is beneficial to both consumers and banks in terms of improving the quality of services supplied by the banking sector. The primary benefits that banks receive are customer behavior analysis, transaction monitoring, customer identification and segmentation, fraud management, banking services personification, risk assessment and regulatory compliance, customer response analysis, process automation, financial advice, investment decision-making, trade facilitation, syndicated loan services, and P2P transfers (Melnychenko, Volosovych, & Baraniuk, 2020). The cost of transaction payments decreases as a result of these benefits, and bank customer service improves. As a result, their consumer base expands, and their revenue increases. Customers also benefit from user-friendly application interfaces, contactless payment options, fund transfer convenience, and new products. Furthermore, mobile banking applications are available 24 hours a day, seven days a week, to help customers manage their daily financial operations, such as bill and invoice payments.

The process of adopting the mobile banking application digitalization by the customers is affected by some factors. These factors can be listed as banking hours, cost-effectiveness, convenience, fund transfers, credibility, brand image, viewing transaction history, accessibility, mobility, the standard of living, convenient shopping, and utility bill payment. From the Turkish customers' perspective, according to a study we mentioned in our literature review part, these factors are compatibility, perceived usefulness, and social influence (Bidar, Fard, Salman, Tunga, & Cheng, 2014).

Our aim in this study is to show the gradual change in the banking system with new technology and innovations. With the aim of demonstrating our thoughts about our topic, we will collect comparable data from BKM and demonstrate the positive relationship between new technology and the use of mobile banking. On top of that, we will indicate the negative relationship between the number of ATMs and the development of the new technology in mobile banking. We will also conduct some surveys with people of different groups of ages to see how their perspectives on mobile banking differ. Through these surveys, we will observe the change in perspectives towards ATMs. Our expectation on these surveys is that younger people think using mobile banking instead of traditional banking is more efficient, so they prefer mobile banking more. On the other hand, older people gradually transform from traditional banking systems to mobile banking systems, and they start to adapt to mobile banking over time.

LITERATURE REVIEW

The internet has become an essential part of our daily life with the use of the internet in the 2000s (Çelik & Mangır, 2020). In Turkey, the usage of the internet is becoming more popular as a developing market (Aktan, Teker, & Ersoy, 2009). According to Gumussoy, the rapid developments in mobile technology presented a great opportunity for mobile banking in the banking sector (Gumussoy, 2016). After these developments in mobile technology, paperwork is replaced by digital banking (Melnychenko, Volosovych, & Baraniuk, 2020).

When looking at the research, a significant transformation has been experienced in the banking sector since the establishment of the first ATM in 1982, which is considered the beginning of digitalization in Turkey (Çelik & Mangır, 2020). The digital era, which has increased with globalization, has experienced a rapid transformation both on the basis of technological products and with the usage demands of the customers (Çelik & Mangır, 2020). Digitalization in the world has developed very seriously, and both the banking sector and the consumers have adapted themselves to this period (Çelik & Mangır, 2020). In addition, digital transformation in the banking sector caused two things: first, the invention of new financial instruments, and second the gradual process of universalization of banking activities (Melnychenko, Volosovych, & Baraniuk, 2020).

According to Melnychenko, Volosovych, and Baraniuk (2020), there are three stages of the evolution of digital banking. The first stage is the introduction of ATMs and call centers into the banking activities, and thanks to their banks' customer services are improved. The second phase started after cointegrating cloud technologies, social networks, analytics, and mobile access were applied, which allowed banking institutions. After the second phase, banks started personalizing their banking services. The third stage can be said as the phase of using artificial intelligence, blockchain, programming interfaces, robotization of individual business processes (Melnychenko, Volosovych, & Baraniuk, 2020).

With digitalization, classical banking habits have changed, and more mobile applications have been used in banking services. At the same time, with the transformation of digitalization, the number of internet and mobile banking users in the banking sector is increasing rapidly. As a result, digital banking has started to play a key role when customer preferences are examined (Çelik & Mangır, 2020). According to Celik and Mangir's research (2020), the number of people employed in the banking system increased rapidly from 32 thousand in 1961 to 154 thousand in 1990 at the beginning. Because of digitalization in the banking sector, as a result of the decrease in the rate of branching, the number of employees

was 144 thousand in 1995, and when it reached 188 thousand people in 2020 (Çelik & Mangır, 2020).

Digital banking is the digitization of all traditional banking activities and program services that were historically only physically available inside a bank branch. These services can be listed as depositing, withdrawing, and transferring money, checking and saving account management, applying for financial products, credit management, paying bills, and account service. Digital banking service aims to be easier and faster than traditional banking service (Çelik & Mangır, 2020). After the year 1990, banks started using technological developments in the sector. The main advantages of the usage of technology in mobile banking are low cost, convenience, easy accessibility, and high value-added services (Laukkanen, 2007). The level of adaptation of banks to innovative banking products and technologies decides the bank's reliability, financial firmness, the efficiency of the bank's operation, and its competitiveness in the market (Rysin, Fediuk, 2017).

As people started using financial technologies and mobile banking applications, banks are in a better position in terms of customer behavior analysis, transaction monitoring, customer identification and segmentation, fraud management, banking services personification, risk assessment and regulatory compliance, customer response analysis, process automation, financial advice, investment decision-making, trade facilitation, syndicated loan services, and P2P transfers (Melnychenko, Volosovych, & Baraniuk, 2020).

On the one hand, developed today's computer technology has provided banks to decrease the cost of bank transactions since the banks can make their customer interactions with an e-banking service in preference to with humans (Aktan, Teker, & Ersoy, 2009). In addition to this, technological advances in financial services allow adding new sections to the organization chart of banks, standardizing the information flow system in banks, making them more efficient and preventing erroneous transactions, providing more services in a shorter time, and providing low cost and integration with the outside world (Çelik & Mangır, 2020). Thanks to alternative distribution channels provided by technology for banks, it is provided for banks with new and diversified selling services, such as making cross-selling and reduction in the fixed cost of physical branches, marketing, and labor force (Altinirmak, Okoth, Ergun, & Karamasa, 2017).

Strengthening the interaction between regulators, banks, and financial technology companies, the increased use of biometrics, the development of neo-banking and open banking

services are the main objectives that banks are trying to improve in their applications (Melnychenko, Volosovych, & Baraniuk, 2020). According to a study done by Zhuo and Li, in China, banks are providing five main criteria for their mobile applications. These criteria are system quality, information quality, interface design quality, brand quality, and fees and privilege (Zhuo and Li, 2010). Mobile banking is a complementary tool to branches and internet banking channels. (Onay & Öztaş, 2018). It can be said that usage of technology in the banking sector is the most significant factor in terms of competition between different banks (Melnychenko, Volosovych, & Baraniuk, 2020). The financial technology market is still expanding and diversifying (Melnychenko, Volosovych, & Baraniuk, 2020).

While digital banking has benefits for banks, it also has benefits for customers. If there is a decrease in the number of customers using traditional banking, this may reduce the costs related to customer services (Gumussoy, 2016). It can be said that digital banking is a win-win situation for both customers and banks. Digital banking is a new paradigm of customer-bank interaction because it is the area of information and technology which embraces innovation in financial services for IT customers in solutions (Hontar, 2017). Thanks to digital banking, banks are able to segment customers, reduce the cost of transaction payments, improve customer service as quickly as possible, expand the customer base, maximize revenue in certain business segments (Melnychenko, Volosovych, & Baraniuk, 2020). In terms of shaping customer trust while adopting mobile banking, structural assurances, trust propensity, and relative benefits are three main features that directly affect customer trust (Kim, Shin, and Lee, 2009).

The mobile banking system offers many benefits to its customers. These benefits are easy and convenient usage, the ability to take immediate actions, and immediate access to financial services. For these reasons, mobile banking systems are more convenient for customers than traditional banking systems (Gumussoy, 2016). Additionally, the banking sector has basically been based on customer and corporate customer services from its beginning to today (Aktan, Teker, & Ersoy, 2009). Customers have the ability to access their personalized banking services online, anywhere around the clock (Melnychenko, Volosovych, & Baraniuk, 2020). From the customer perspective, interfaces of applications are user-friendly, credit opportunities are dynamic, payment systems are contactless, fund transfers are easier, and innovative products are offered. Applications are available 24/7 for bill and invoice payments, sale transactions, accessing bank statements and debt accounts at anytime and anywhere customers want (Derbent, 2011). According to Gumussoy, user satisfaction is the system users' feeling about the difference between system performance and user expectation. Generally, if the customer is satisfied with the system they are using, there is no reason to stop using that

system. Therefore, it is considered that a customer who is satisfied with the mobile banking system will continue to use the system (Gumussoy, 2016).

Some authors did some studies about the main features customers demand from a mobile banking application. According to the model by Yu and Fang, there are six main features of mobile banking applications that are demanded by customers. These features are security service, interactivity, relative advantage, ease of use, interface creativity, and customer satisfaction (Yu and Fang, 2009). Padmanaban and Joseph listed factors that had an impact on customers' adoption of mobile banking services. These factors are banking hours, cost-effectiveness, convenience, fund transfers, credibility, brand image, viewing transaction history, accessibility, mobility, standard of living, convenient shopping, and utility bill payment (Padmanaban and Joseph, 2014).

In terms of Turkish customers' demand, Bidar, Fard, Salman, Tunga, and Cheng did research on it. According to this research, there are seven factors that are affecting Turkish customers while adopting mobile banking applications. These severe factors are perceived usefulness, perceived ease of use, security and privacy, compatibility, social influence, facilitating conditions, and perceived cost. As the result of the study, authors found out that three out of seven factors have a significant effect on the acceptance of mobile banking applications in Turkey, and these three factors are: compatibility, perceived usefulness, and social influence (Bidar, Fard, Salman, Tunga, & Cheng, 2014). According to the model presented by Altınırmak, Okoth, Ergun, and Karamasa, Denizbank in Turkey, the response time is the most important criterion for customers to use mobile banking applications. According to the study, response time is followed by accessibility, accuracy, and reliability of mobile banking applications. Furthermore, the study says that the understandability of applications is the least significant criterion (Altinirmak, Okoth, Ergun, & Karamasa, 2017).

In the study done by Hajiyev and Chang, Gen Y members' mobile banking adoption intention and actual use in Turkey are examined. According to the study, it is found that in 2015, Gen Y members constituted 33% of the population in Turkey while active internet users were 42.681 million (53.7%) (Hajiyev & Chang, 2017). Turkish young customers prefer using mobile banking applications because they think that using these applications improves their life qualities thanks to ease of use, trust, compatibility with lifestyle, and online customer service provided by applications (Hajiyev & Chang, 2017). According to Hajiyev and Chang (2017), the design and context of websites are also important features for the young generation to decide whether this application is successful or not in terms of electronic commerce. Additionally,

customers define website quality as the level of customers' satisfying needs and overall excellence of the website. The authors have some hypotheses about social features of the website, trust, compatibility with lifestyle, and online customer service have a positive impact on Gen Y members' adoption intention of mobile banking in Turkey. As the result of the study, the author found out that all of these features have positive effects on Gen Y members' adoption intention of mobile banking in Turkey (Hajiyev & Chang, 2017).

When we think more about the Turkish case, there is a study on banks' success in this field. According to the study done by Altınırmak, Okoth, Ergun, and Karamasa, Denizbank is the bank whose customers are experiencing the most successful mobile banking application. Additionally, according to the study, ING and TEB are the other most successful banks in the mobile banking stage (Altinirmak, Okoth, Ergun, & Karamasa, 2017).

However, customers cannot totally adopt this transformation, and according to different authors, there are different reasons for this adaptation problem. For example, the security concerns of the customers are the biggest barriers in the process of adopting technological usage in the banking sector (Laforet and Li, 2005). Past experiences of customers with information and technology and the lack of awareness of the benefits of mobile banking are the other barriers (Laforet and Li, 2005). In terms of shaping customer trust while adopting mobile banking, structural assurances, trust propensity, and relative benefits are three main features that directly affect customer trust (Kim, Shin, and Lee, 2009).

Fortunately, there are users who prefer using mobile banking applications. We found some studies on the data about the change in mobile banking application usage. According to the paper by Celik and Mangir, while the number of global internet users was 1.024 billion in 2005, this number reached 4.57 billion by 2020 (Celik and Mangir, 2020). Throughout the years, the prevalence of the internet has increased. In this way, people started to do most of their work online, and daily banking activities are one of these works done online. According to Arslan and Yavuzaslan, the number of individual customers actively using internet banking has increased by more than 100% compared to 2009 (Arslan and Yavuzaslan,2019). The number of customers who are registered to the internet banking system and who are online at least once in, 59 million 403 thousand people in September 2018 (Arslan and Yavuzaslan,2019). Research shows that the number of people who registered in the mobile banking system has increased over the years. While this number was 2.9 million in March 2013, it increased to 12.6 million in March 2015 (Gümüşsoy, 2016). It can be seen that over the years, people started to use mobile banking services with the spreading of internet usage. When we

look at the study done by Çelik and Mangır, the number of customers using internet banking between 2006 and 2020 in Turkey, the number of customers registered in the system to do internet banking increased from 3.3 million in the period of December 2006 to 13.2 million reached the person in June 2020(Çelik & Mangır, 2020).

Kahveci and Wolfs have conducted research about digital banking and its effects by questioning the profitability and efficiency of investing in digital banking and IT services (Kahveci & Wolfs, 2018). They have measured the performance of banks by using Data Envelopment Analysis (DEA) to contribute a new understanding of this argument. A two-stage DEA model has been created to demonstrate the effects of digital banking. In the first stage model, the number of POSs, number of ATMs, digital banking market share, and the number of credit cards (digital banking channels) were excluded from the inputs (Kahveci & Wolfs, 2018). The only inputs used in the first stage were the number of branches, employees, and total assets. In the second stage, they have included what was excluded in the first stage. Output variables were the same in both stages: asset growth rate, total deposits, total credits, and net profit. In that way, they were able to analyze banks' performance and efficiency to the extent of the digital banking service channel (Kahveci & Wolfs, 2018). Thus, the impact of digital banking services has been measured on the bank's efficiency points. Data demonstrated the increase in internet and digital banking services while the number of bank branches was not increasing at the momentum of digital banking services. In other words, banks have found new channels to satisfy consumer needs through digital banking. The research showed that five out of seven banks were efficient in both stages, which can be said to have a competitive advantage (Kahveci & Wolfs, 2018). They have invested in digital banking services adequately to sustain their high performance. In other words, if they had not invested in digital banking services as they did, they would not have this efficiency level. It can be said that banks invest in digital banking services because they see it as a necessity since the banking industry is very competitive. Otherwise, they would be left out in the competition. By investing in digital banking services, banks secure their strategic advantage. The results of the two-stage DEA showed that digital banking services have no adverse effect on banks' performance and efficiency. It can be concluded that digital banking services are necessities to keep the bank's performance and efficiency level sustainable (Kahveci & Wolfs, 2018).

In conclusion to our research, throughout the historical process, technological developments have affected some sectors. One of these sectors is the banking sector. Due to the changes in the digital environment in recent years, there has been a shift to the digital environment in the banking sector. With the transformation in the banking sector, classical

banking studies have been left behind, and mobile banking applications have become popular. Research also shows that digital banking has positive effects on both the customer and the bank. Digital banking is faster, easier, and more accessible than traditional banking systems. As such, it creates an environment where the customer can receive banking services free of problems. Along with digital developments, the costs of the banks decreased, as the customer services of the banks were replaced by e-banking services instead of people. Therefore, the number of people who are using mobile banking applications is increasing day by day.

HISTORICAL PERSPECTIVE

SMS banking was one of the first mobile banking services to emerge. When smartphones were available in 1999, allowing for mobile web browsing, several of the first European banks began to offer mobile banking to their customers on this platform. Prior to 2010, most digital banking was done via SMS or mobile web.

With the rise of the internet in the 2000s, it has become an integral component of our daily lives (Çelik & Mangır, 2020). As a rising market, Turkey's use of the internet is growing in popularity (Aktan, Teker, & Ersoy, 2009). The rapid advancements in mobile technology, according to Gumussoy, created a huge opportunity for mobile banking in the banking sector (Gumussoy, 2016). Paperwork is being replaced by digital banking because of these advancements in mobile technology (Melnychenko, Volosovych, & Baraniuk, 2020).

When we talk about Turkey, as can be said that internet banking, which is one of Turkey's digital banking distribution methods, was launched in 1997. After this, the mobile banking system has started in 2007 in Turkey. İşbank started the first internet banking service in Turkey in 1997. This practice was followed by Garanti Bank in the same year. In addition, the first internet branch in our country was put into service by Türkiye İş Bankası in 1998.

Mobile banking is a service offered by a bank or other fiscal institution. It allows its guests to make fiscal deals ever using a mobile device similar to a smartphone or tablet computer. Unlike internet banking, it uses applications and software handed by the financial institution for this purpose. Mobile banking is generally open 24 hours per day.

DATA ANALYSIS

In the data analysis part of our paper, we are going to examine data taken from Turkish Bank Association (TBB) and Interbank Card Center (BKM). We analyzed data of the number of active digital banking customers, number of ATMs, number of money transfers, payments, investment transactions, non-financial transactions, and bank workers in Turkey. We also did a survey with one hundred people and interviews with fifty people. We analyzed the results of surveys and interviews in the data analysis part.

BKM & TBB Data Analysis

Figure 1 gives information about the number of people using the internet and mobile banking from 2005 to 2019.
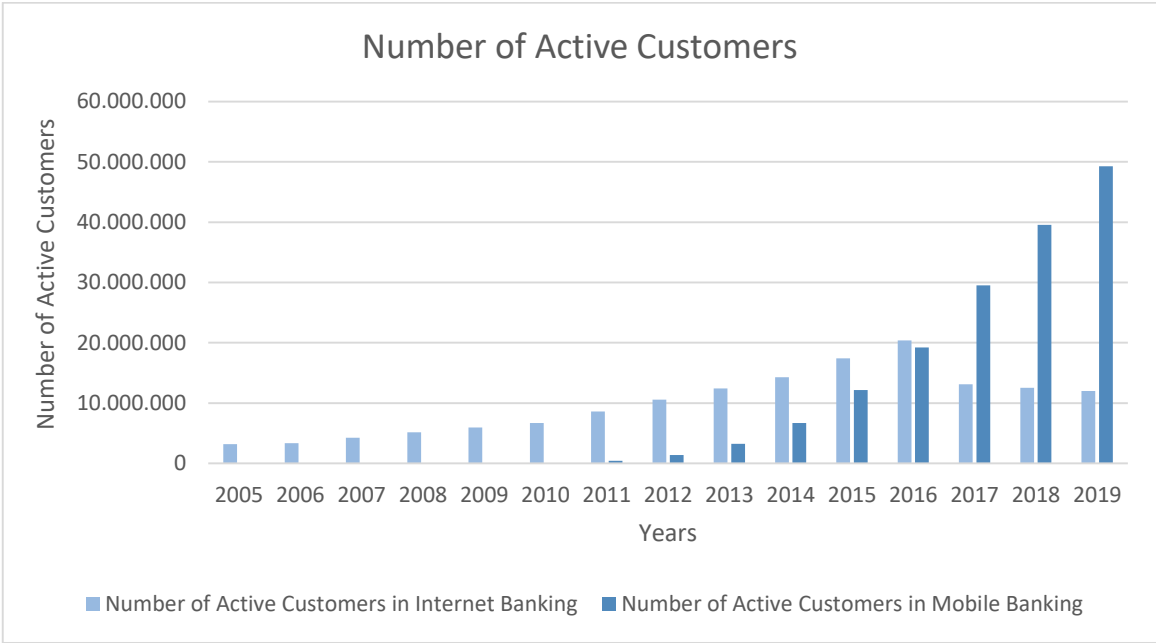
Figure 1: Number of Active Customers in Internet Banking and Mobile Banking Systems Between 2005 and 2019

(tbb.org, 2021)

From 2005 to 2011, there was no mobile banking available, and the number of people who were using internet banking showed a slight increase. However, after 2011, with the everyday use of smartphones, mobile banking applications have emerged, and people started to use mobile banking 2011. At first, the number of people using mobile banking was only about 450 thousand, while internet banking was 8.6 million. Until 2016, they both continued to increase, and the number of people who were using internet banking was always more significant than the number of people who were using mobile banking.

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However, after 2016 this situation has changed, and the number of users in mobile banking has increased drastically while the number of users in internet banking was experiencing a downward trend. The gap between them widened for the next three years, internet banking users continued to decrease, and mobile banking users kept increasing. At the end of the period, the number of mobile banking users was about 50 million, outracing the number of users in internet banking which was slightly above 10 million. It can be said that mobile banking replaced the internet banking sector.

Age \ Year	December 2017	December 2018	December 2019	December 2020
0-17	178	226	246	230
18-25	7,542	9,570	11,080	12,431
26-35	11,117	13,329	15,361	18,204
36-55	12,273	16,003	19,785	25,237
56-65	1,692	2,419	3,375	4,884
66+	572	741	1,167	1,841

Table 1: Number of Active Digital Banking Customers by Age Groups in Thousands of People Between December 2017 and December 2020

(tbb.org, 2021)

After Figure 1, we analyzed Table 1. According to TBB data, Table 1 demonstrates the number of active digital banking customers by age groups in thousands of people. When looking at the table, there is a general increase in every age group between December 2017 and December 2020.

It can be seen that from 2017 to 2020, the number of active digital banking customers increased significantly. In addition, the number of active digital banking customers is the most between the age of 36 and 55. On the other hand, the most increase is in the age of 66+ by nearly tripled during the periods, and the least increase is in the age of 0-17. This situation can be interpreted with the customer transformation to a digital banking system.
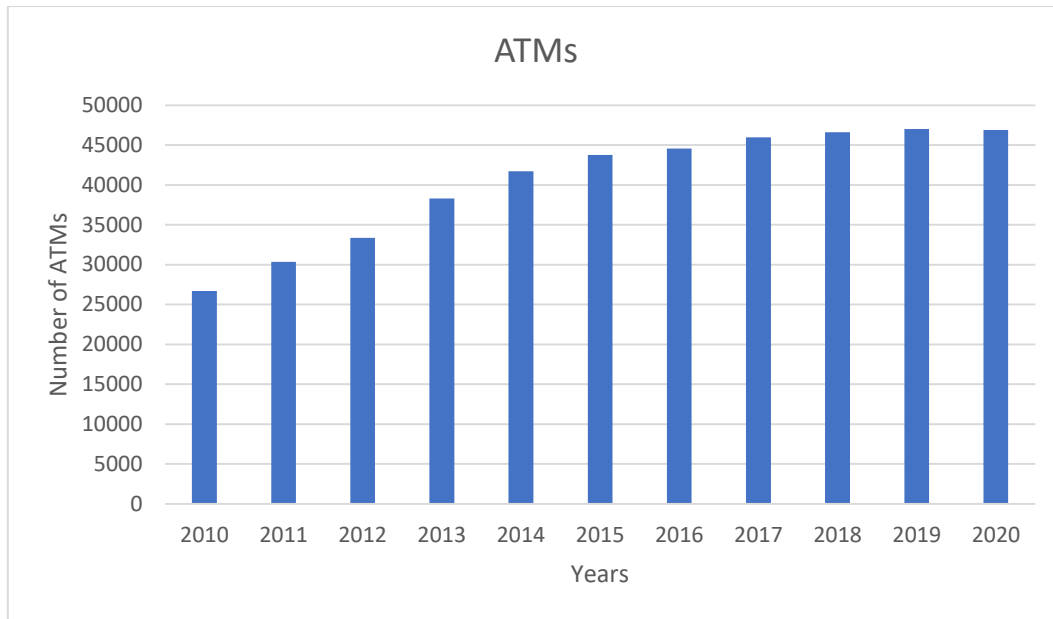
Figure 2: Number of ATMs Between 2010 and 2020

(bkm.org, 2021)

Figure 2 demonstrates the number of ATMs in Turkey from 2010 to 2020. Overall, the number of ATMs has shown an upward trend with the exception of last year. It can be seen that, while the number of ATMs was increasing considerably from 2010 to 2015, the increase rate has decreased, and for the next five years, it only rose slightly.

In 2010, the total number was about 27 thousand, and at the end of 2015, this number was nearly 44 thousand. At the end of the period, this number has only increased to almost 47 thousand. In addition, it is important to keep in mind that, after 2019, this continuing upward trend experienced a slight decrease. The emergence of mobile banking can explain this decline since people's need for cash decreased, and the existence of mobile applications lowered the demand for ATMs.
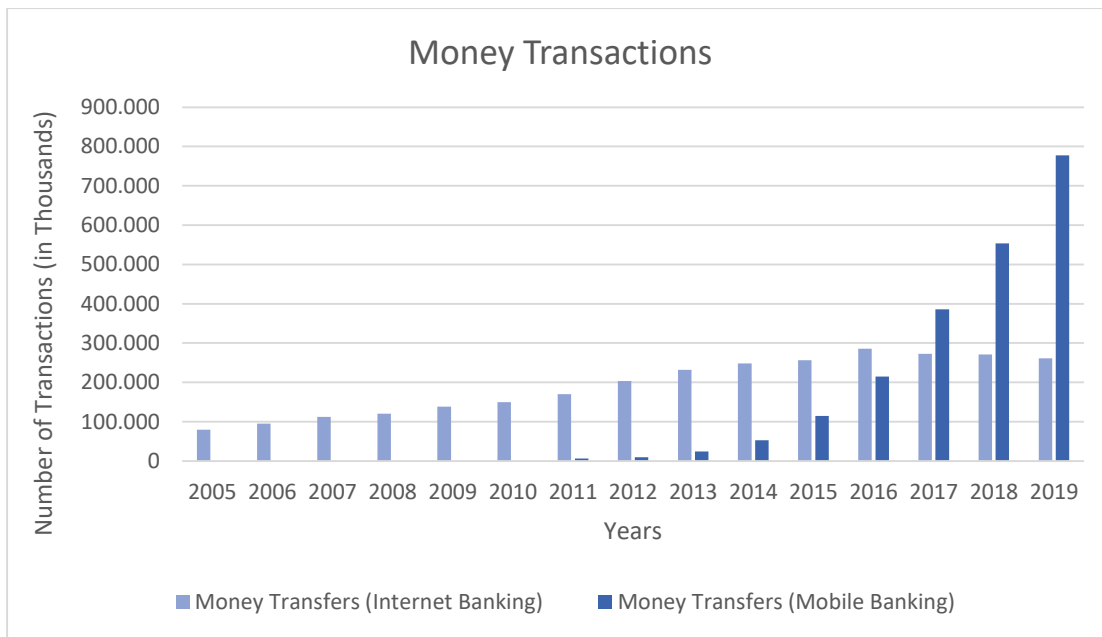
Figure 2: Number of Money Transactions in in Internet Banking and Mobile Banking Systems Between 2005 and 2019

(tbb.org, 2021)

Figure 3 demonstrates the number of money transactions through the internet and mobile banking in Turkey from 2005 to 2019.

Overall, money transfers in mobile banking first emerged in 2012 in a very small amount, while money transfers with internet banking were available from the beginning of the period. It appears that when mobile banking became available, the popularity of internet banking began to decrease, just like the previous case.

From 2005 to 2015, money transfers through internet banking were showing an upward trend. In 2005 their number was about 80 million, at the end of 2016 the number was almost 300 million. However, after 2016, the number of transfers done by internet banking started to decrease, and by the end of the period, their number was down to 260 million.

On the other hand, the number of money transfers through mobile banking increased dramatically throughout the period. In 2012, the number was about 6 million and at the end of the period, only in 7 years, the number was increased to almost 800 million. The ratio between the number of transfers done by mobile and internet banking was about 3 to 1. Mobile banking has become extremely popular, and it is expected to increase even more day by day.
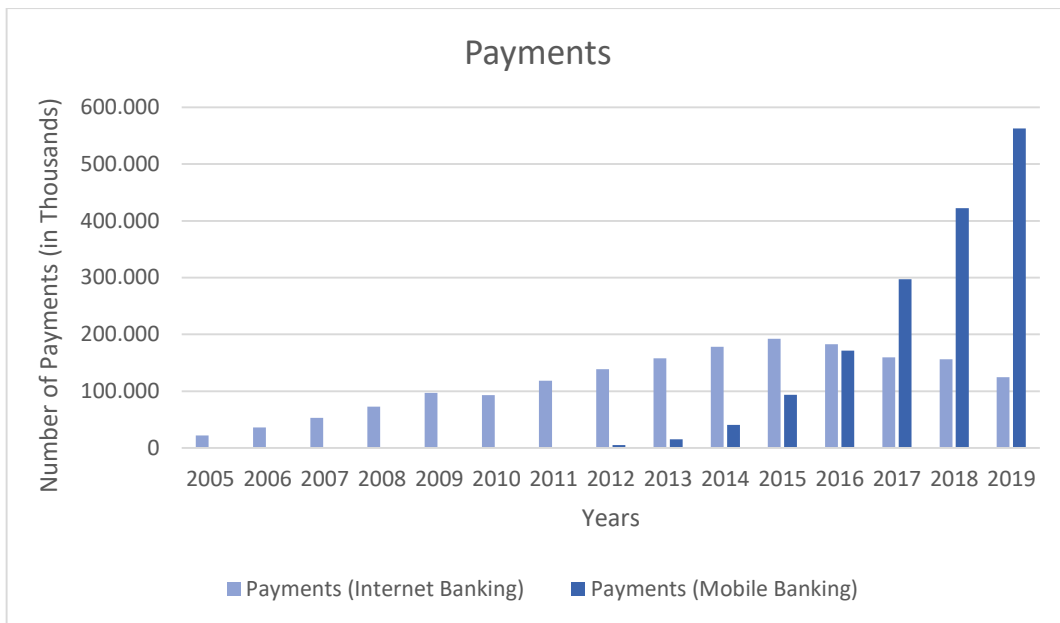
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Payments

Figure 3: Number of Payments in Internet Banking and Mobile Banking Systems Between 2005 and 2019

(tbb.org, 2021)

Figure 4 shows the number of payments through internet and mobile banking in Turkey from 2005 to 2019. These payments include bill payments, tax payments, credit payments, and other payments.

Figure 4 goes parallel with Figure 3. At first, we see that mobile banking is not available, and people are using internet banking. After 2012 mobile banking emerged and started to increase in a significant amount, outracing internet banking. In 2015, payments made by internet banking reached a peak point at about 190 million. In the following years, the popularity of using internet banking decreased and ended up at about 120 million. On the other hand, payments by mobile banking rose significantly, and in 2019 the number was about 560 million, almost one-fifth of the mobile banking. In the following years, it is expected that the gap between the internet and mobile banking for payments will increase even more.
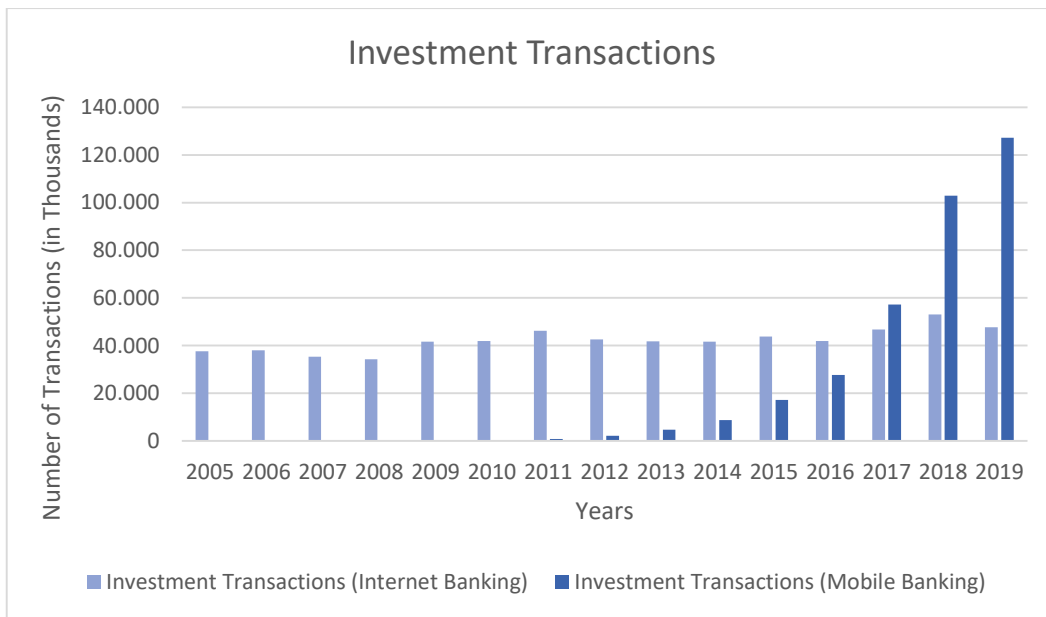
Figure 4: Number of Investment Transactions in Internet Banking and Mobile Banking Systems Between 2005 and 2019

(tbb.org, 2021)

Figure 5 given above is from TBB, and it is about the number of investment transactions in Turkey in both internet banking and mobile banking systems between the years 2005 and 2019. The investment transactions contain investment of funds, forex investments, treasury bills, government bonds, gold transactions, and VOB transactions. The general trend has been in the upward direction during the years.

The number of transactions in the internet banking system fluctuated from 2005 to 2019. It started at the point of around 38 million in 2005, and it reached the point of around 47 million in 2019. On the other hand, transactions in the mobile banking system started in 2011. The number of transactions increased significantly in recent years, as it can be seen from Figure 5 that with mobile banking, the number of transactions has a huge increase. This change is interpreted as the intensive transition of customers to the digital banking system as it can be said that investors have been making more investments in the internet and mobile banking environment in recent years.
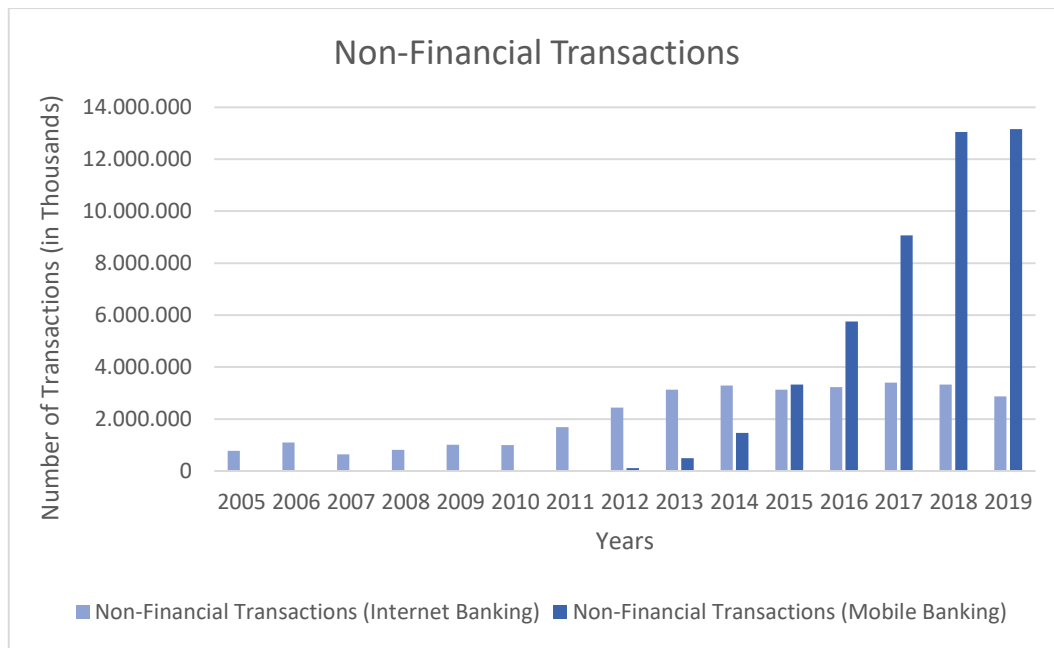
Figure 5: Number of Non-Financial Transactions in Internet Banking and Mobile Banking Systems Between 2005 and 2019

(tbb.org, 2021)

Figure 6 is given above, and it is from TBB data, and it demonstrates the number of non-financial transactions in Turkey between the years 2005 and 2019. Non-financial transactions consist of credit card and additional card applications, credit card applications, regular payment orders, invoice payment orders, and other non-financial transactions. The general trend is in the upward direction during the period.

There was an increase in non-financial transactions in the internet banking system from 2005 to 2014. However, with the emergence of the mobile banking system, the number of non-financial transitions has decreased slightly from 2014 to 2019, as it can be seen that after 2012, there was a huge increase in the mobile banking system. With this increase, there is a big transition from non-financial transactions to a digital banking system. This transition in 14 years shows the change in customer tendency in the banking sector.

Data in Figure 7 is about the bank side. This graph is from the TBB data, and it shows the number of bank workers in Turkey from 2007 to 2020. When we look at the general framework, the graph is divided into two in the middle. While there is a general increase in the first half, there is a decrease in the second half.

There is an increase from the point of around 400 thousand to around 510 thousand between 2007 and 2014. After 2014, the number of bank workers started to decrease slightly, and it reached about 480 thousand in 2020. The reason for this is people's transition to digital

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banking. The need for the number of physical employees in banks has decreased. In addition, it can be said about this situation that this is positive in terms of the cost of banks. These data support our hypothesis. The number of employees is expected to decrease in the next few years.
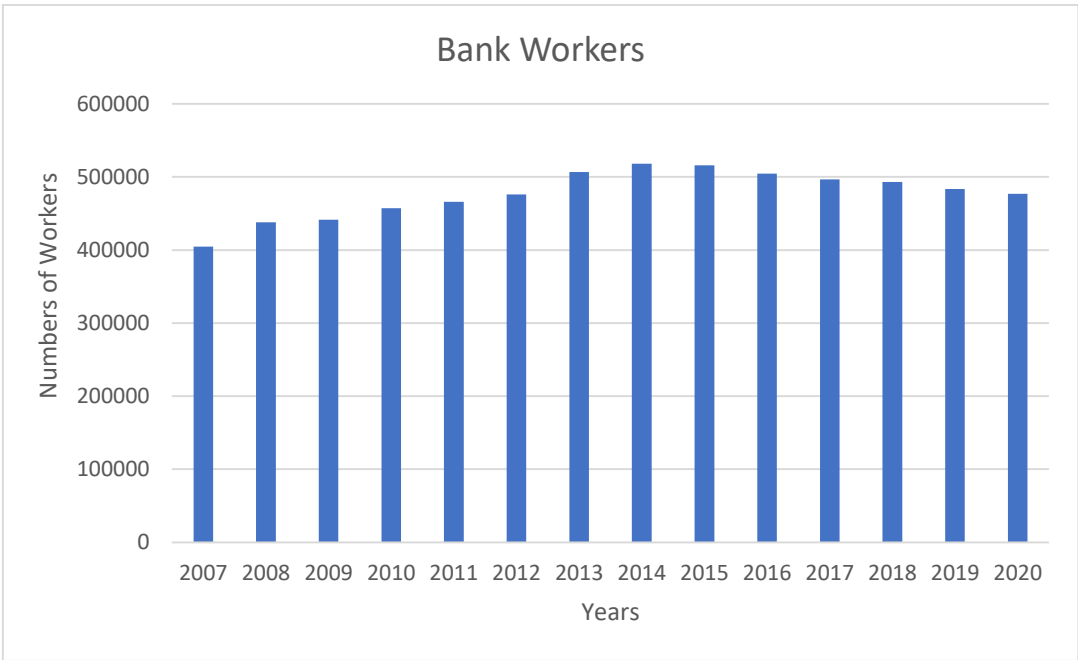

Figure 6: Number of Bank Workers Between 2007 and 2020

(tbb.org, 2021)

Survey Data Analysis

We have done 100 surveys with a random sample which is composed of our neighborhood. We reached the participants of our survey by using WhatsApp groups. We asked thirteen questions, and for all questions, we had predictions about the distribution of the answers. Now, we will analyze answers for all questions by talking about our predictions firstly.

We asked our participants' ages in the first stage. Due to our neighborhood, we predicted that our participants are mostly between 20-30 years, and the answer is given below.
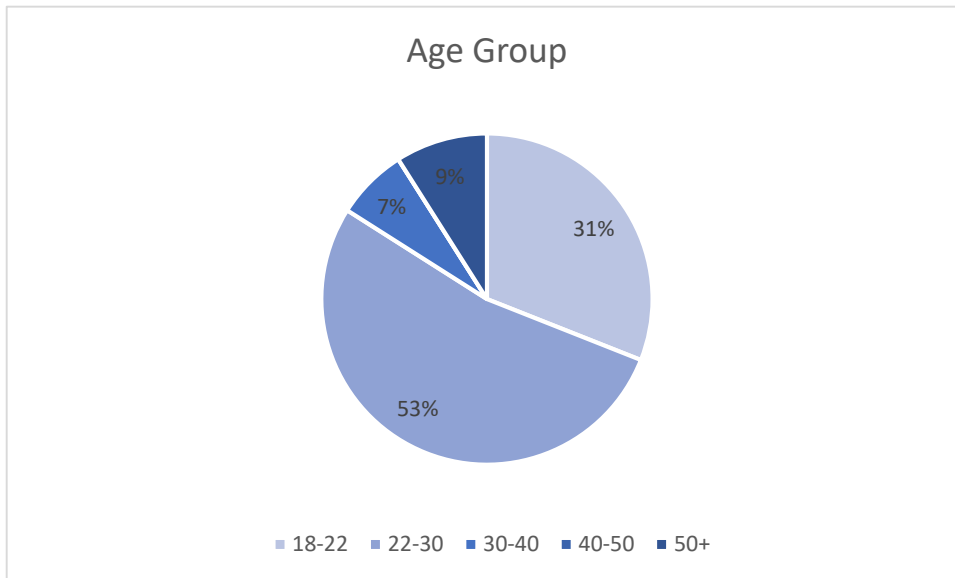
Figure 7: Age Group of Survey Participants

As is seen in Figure 8, 84% of participants are between 18-30 years old. Also, we have 9% of participants above 50 years old. However, we could not reach any participants between 40 to 50 years old.

Secondly, in order to get an idea about our participants' profile as bank customers, we asked them how many different banks they have banks account in, and we predict at least 95% of our participants to be active bank users.
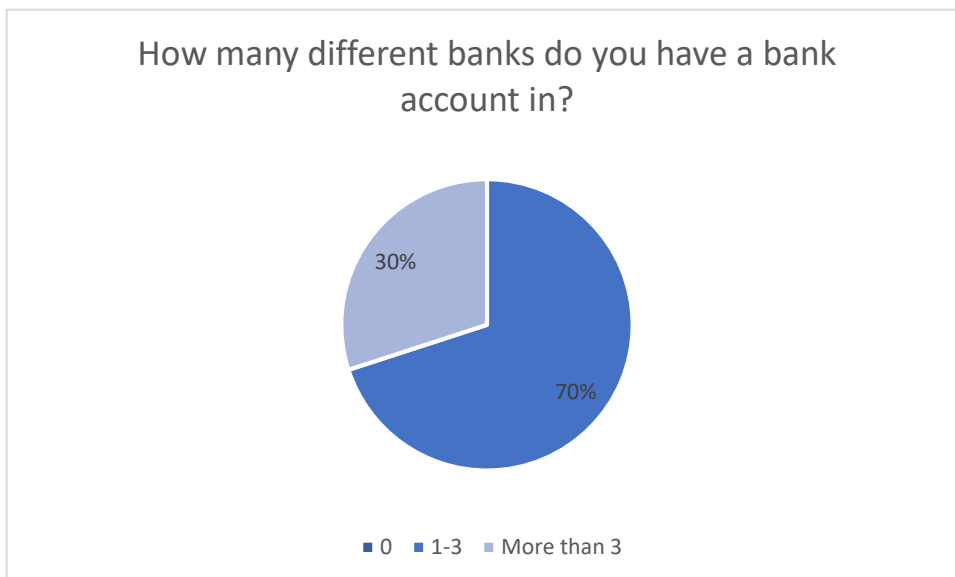

Figure 8: Number of Different Banks Usage by Survey Participants

According to given answers by our participants, it is seen in Figure 9 that we observed that all participants are bank customers at least one bank while 30% of them are customers of more than three banks at the same time.

Additionally, we wondered whether these active bank customers are using mobile banking applications or not. We presumed more than 95% of bank customers to use mobile banking applications.

According to Figure 10 given on the left, 99 of 100 active banks users are using mobile banking.
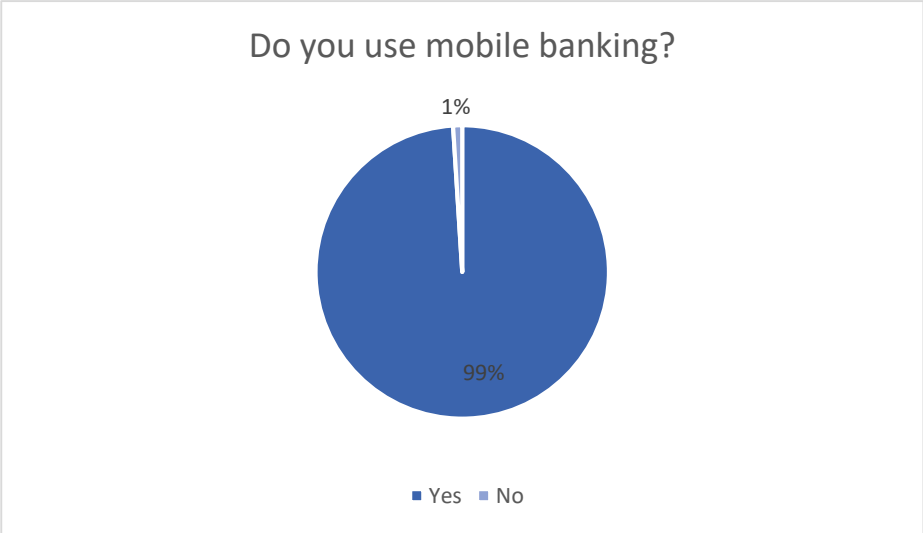
Do you use mobile banking?

1%

99%

■ Yes ■ No

Figure 9: Usage Status of Mobile Banking System by Survey Participants

We also wanted to learn how important mobile banking is for people and asked them to rate its importance out of five. We expected the average importance rate to be higher than 3. According to Figure 11 below, the average rate given by our participants is 4,35, which is very high. This shows us that mobile banking applications play an important role in our random sample.
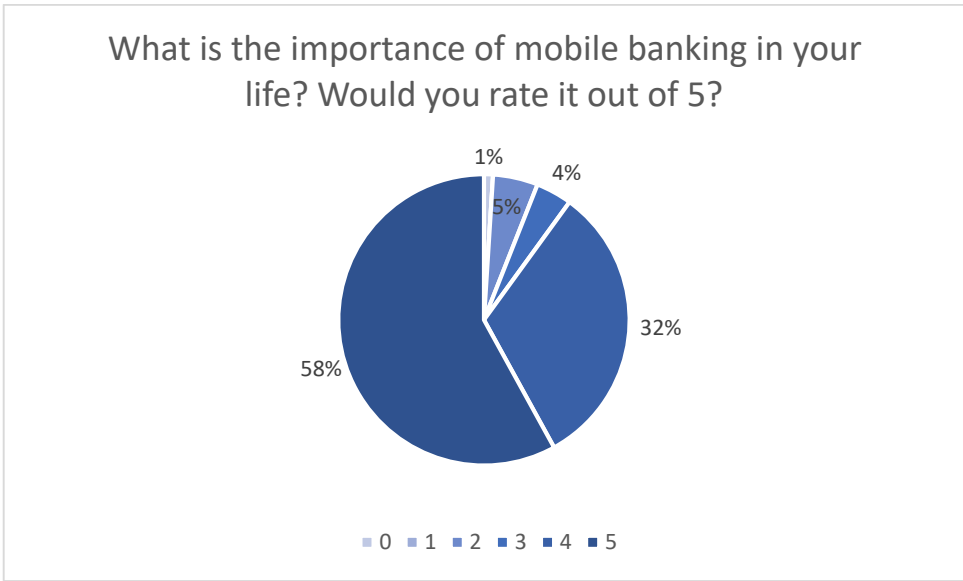
What is the importance of mobile banking in your life? Would you rate it out of 5?

1%   4%
5%

32%

58%

■ 0 ■ 1 ■ 2 ■ 3 ■ 4 ■ 5

Figure 10: Importance of Mobile Banking in Survey Participants' Lives

Afterward, since we used the changing data of active digital banking users, we wondered how many years our participants have been using mobile banking applications. As we showed in previous parts, the number of active users of mobile banking has been increasing every year since 2011. According to the answers given to our survey, we found that 76% of our participants have been using mobile banking for more than three years.
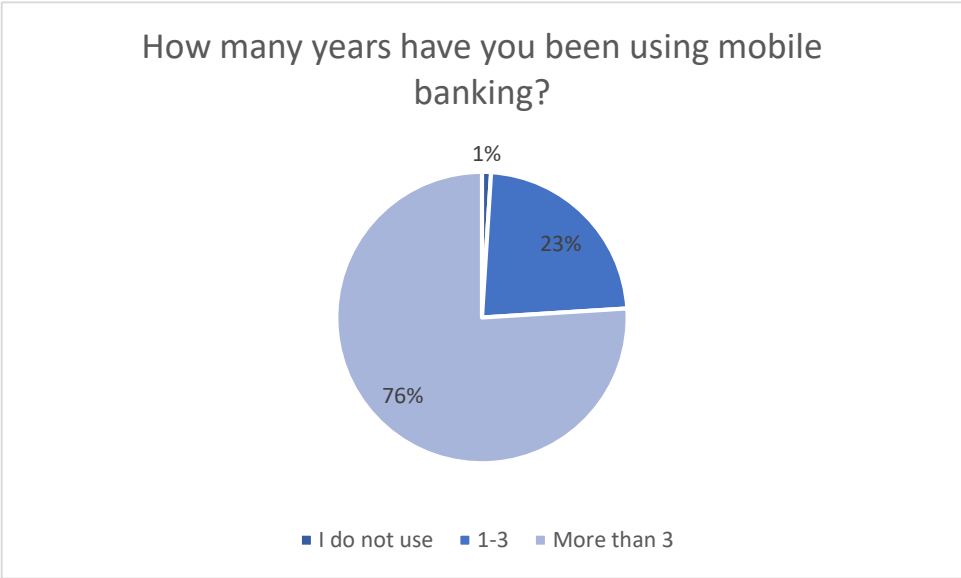

Figure 11: Number of Years for Mobile Banking Usage of Survey Participants

We also wondered how many different banks' mobile banking applications are installed on their phones. This data is important for us because it results in competition between different banks to improve their applications and keep their customers with them. When we asked our participants how many different banks' mobile banking applications are installed on their phones, we realized that 78% of them are using at least two different banks' mobile banking applications, which gives space for the customers to compare the ease and convenience of usage, accessibility, and reliability of the applications.
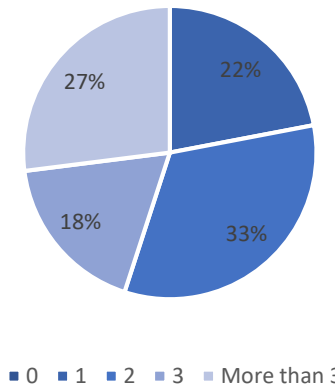
Figure 12: Number of Different Banks' Mobile Banking Applications Installed by Survey Participants

In order to compare participants' ATM vs. mobile banking usage habits, we asked them how many times they are using ATMs per month and how many times they are log into mobile banking applications per day. Their responses are given below.
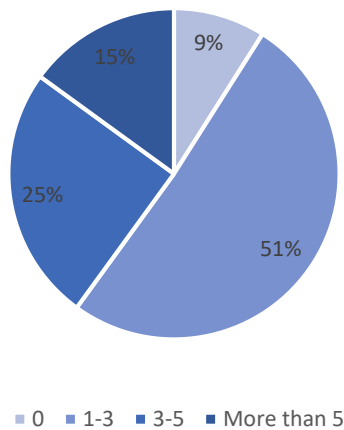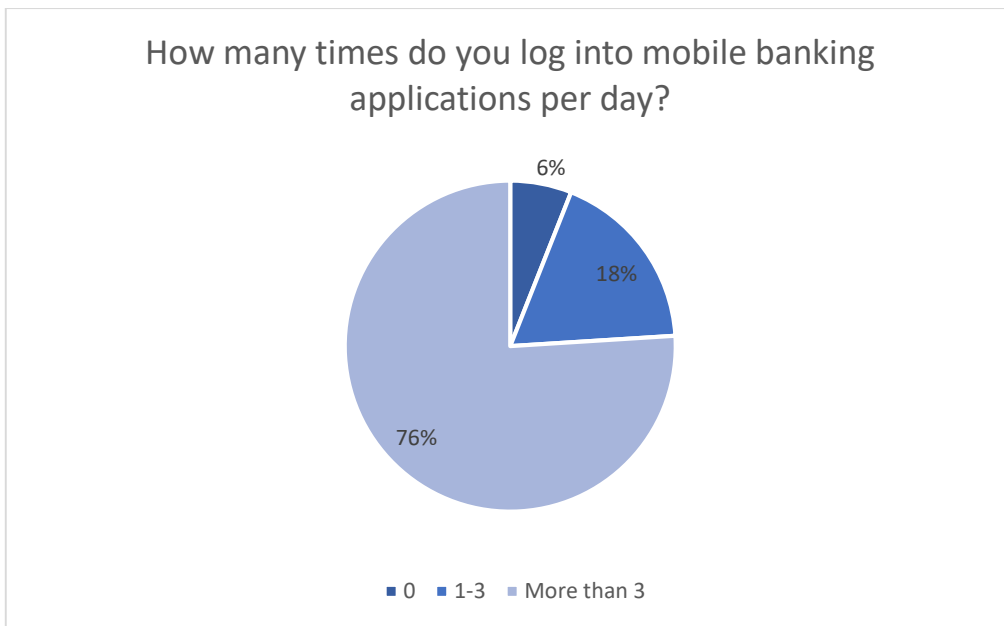

Figure 13: Number of Usage for ATMs per Month by Survey Participants

Figure 14: Number of Logged into Mobile Banking Applications per Day by Survey Participants

According to Figure 14 and Figure 15 given above, 51% of participants are using ATMs 1-3 times per month, while 76% of them are logging into mobile banking applications 1-3 times per day. Thanks to these responses, we can clearly see that there is a huge difference between ATM and mobile banking usage by our random sample. We also see that answer given to the first question assigns 91% of our sample are using ATMs at least one time per month while 94% of them are using mobile banking applications at least one time per day. We can approximately say that people are using mobile banking applications more than thirty times.

In terms of the changing ATM usage habits of our sample, we asked them directly whether their ATM usage has decreased while their mobile banking usage is increasing. 87% of them answered this question positively. This question also supports our hypothesis that with the emergence of digital banking technologies, people reduced their ATM usage.
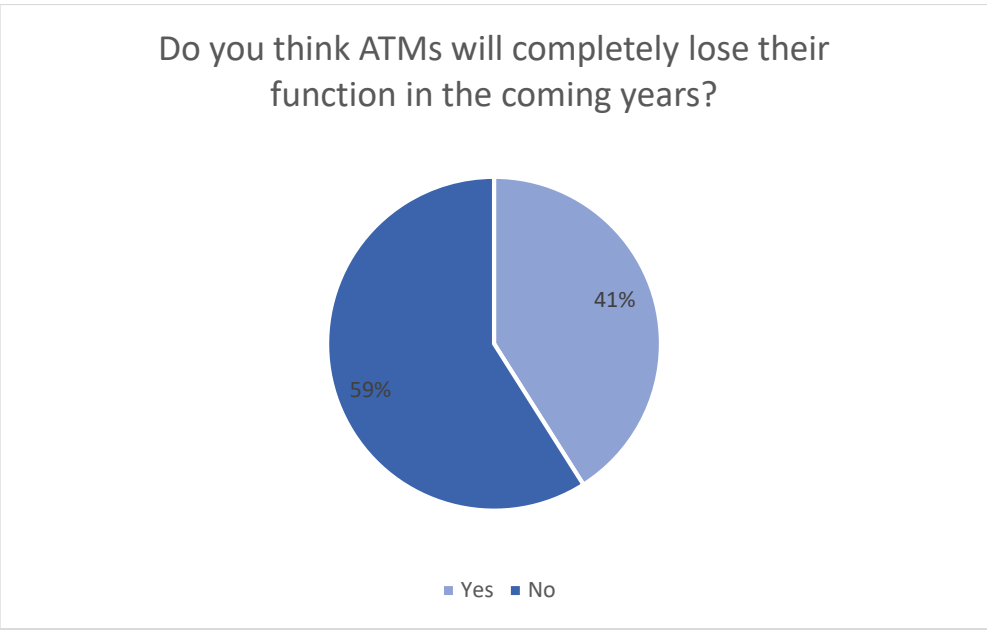
Figure 15: Opinion on the Function of ATMs by Survey Participants

We wanted to ask our participants' points of view about our main hypothesis while writing this paper. Then, we got the results in the Figure 16. According to responses from our random sample, 41% of them think that ATMs will completely lose their function in the coming years. Our hypothesis is not saying ATMs will lose their function completely in the coming years, but we believe that there will be a significant reduction in the usage of ATMs in the long run.
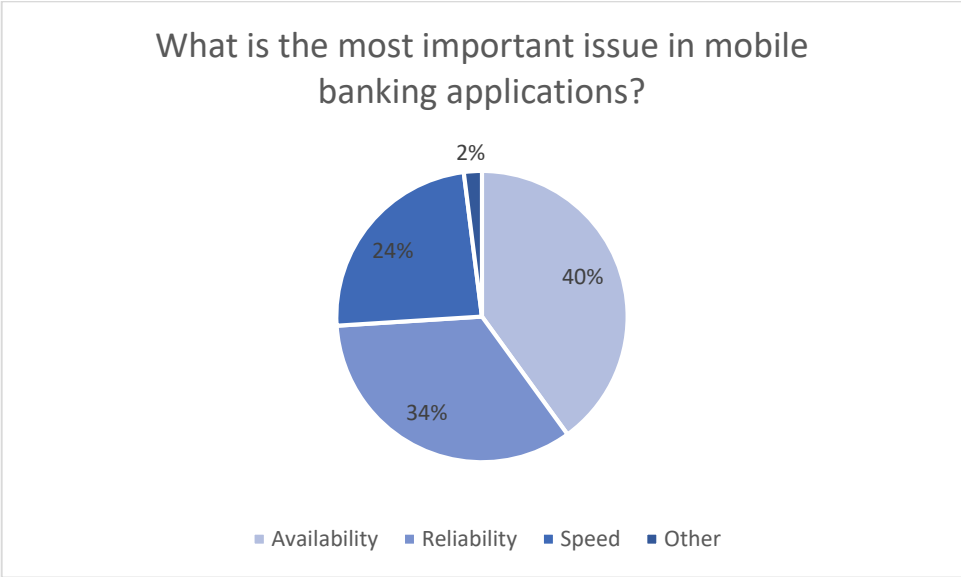
Figure 16: The Most Important Issue in Mobile Banking Applications by Survey Participants

We also asked our participants the reason behind the reduction of their ATM usage. Mostly given answers were to the reduced need for cash money, the ability to handle all of the transactions by using mobile applications, and ease of achievability of mobile applications.

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Additionally, when we asked them what effect mobile banking has on their life, the most common answers were time, speed, minimum contact. We found these measures in the literature review part of our term paper. The match between the measures provided by our survey and the literature means that our sample is reliable.

As a conclusion of the analysis of the result of our survey, we can say that our hypothesis has a high potential to be true. Therefore, in this part of our paper, we can clearly say that with the developments of digital banking applications technology, ATM usage of people is affected negatively, and their preference is shifted to mobile banking applications.

Interview Data Analysis

In order to show people are using less cash money, we conducted 50 interviews. Sample for interviews is composed by Askıda Ne Var? and Kampüste Ne Var? volunteer team. Participants are between 20-27 years old, and they are all university students. However, we could not standardize or classify our participants into significant groups, so our sample is random. During interviews, we asked our participants their digital wallet balances in three different online shopping websites during the last three months and their payment habits while shopping. The functions of these websites are totally different from each other. The first one is Trendyol which is mostly a shopping site for clothes; the second one is Steam which is a website that also provides shopping options for gaming and entertainment purchases for its users; the last one is Yemeksepeti which is an online food delivery website. The total digital wallet balances of 50 participants are as follows:

- 26 Trendyol: 8844,76 ₺
- 9 Steam: 974,39 ₺
- 15 Yemeksepeti: 7178, 24 ₺
- Total: 16.997,39

In total, 50 people have almost seventeen thousand Turkish Lira digital wallet balances, which means in the last three months, seventeen thousand Turkish Lira has been turned into digital money instead of being

As a result of our interviews, we found that people are using less cash money during shopping. They are using credit cards, square codes, and digital payment systems instead of using cash money. This reduction in usage of cash money assigns us that because people need less cash, they need fewer ATMs. Therefore, we can say that one reason behind the reduction of the usage of ATMs can be improvements in digital payment technologies.

DISCUSSION

As a result of our research, we talked about the accuracy of our hypothesis with this digitalization process. However, we need to consider the impact of COVID-19 when evaluating the last few years. With the pandemic, people tried to continue their lives at home with minimum contact. For this reason, interest in online shopping has increased in the last two years. It was used a lot by people, especially in clothing, technology, and grocery shopping. This situation has led people to online payment options rather than cash. These are contactless card payments and different online payment options. Considering the future process, we anticipate that this type of shopping habits of customers will continue. For this reason, we expect physical banking transactions to decrease in the coming years.

On the other hand, cryptocurrencies have been used as an investment tool in recent years. In the future, we foresee that cryptocurrency will become a currency recognized by the governments that people can use for online shopping rather than an investment tool. Due to this foresight, we anticipate that consumers' need for cash will further decrease, and the tendency towards digital banking applications will increase.

With all this digitalization, of course, some problems will come to light. Especially, the security problem in the virtual environment poses a great danger to the customer side. The government should make some policies in this regard. Technical information and support services should be existed by the government in the form of freely available. For example, they can be provided by interactions with banks and customers or holding conferences. In this way, an informed customer and bank profile can be created. Also, dangerous events can be prevented by introducing legal regulations and requirements to digital banking and online shopping sites. In addition, informative messages or verification codes are sent to the customer side for contactless credit card payments or online payments, and these situations are tried to be prevented to some extent. The increase in such applications will ensure that the customer side will not be victimized in future events. Therefore, the government should cooperate with the private sector, and in this way, the government should develop some legal obligations and policies.

CONCLUSION

The paper's major hypothesis was that consumers are utilizing ATMs less now than before the technological advancements of digital banking.

Academic and numerical data is observed using information from the literature and data from the Turkish Bank Association (TBB) and the Interbank Card Center (BKM). Our data observations proved that our hypothesis was highly accurate. In addition to our data, we also surveyed our topic. As a consequence of our survey's analyzed results, we may conclude that our hypothesis has a high probability of being correct.

It can be stated that with the advancement of technology and innovation in the banking system, the number of ATMs has reduced, and the purpose of their use has shifted. Traditional banking practices have evolved due to digitalization, with more mobile applications being employed in banking services. When it comes to customer preferences, digital banking has begun to play a significant role.

Traditional banking systems are slower, more complex, and less accessible than digital banking. As a result, digital banking creates an environment where customers may obtain banking services without experiencing any difficulties. Bank costs have fallen due to digital innovations, as client services have been substituted by e-banking services rather than people. As a result, the number of people using mobile banking applications is growing every day.

People are not transacting their money with cash; instead, they use credit cards, square codes, and transacting with mobile banking applications since it is easier to manage and eliminates the need to visit banks or ATMs.

As a result, we can clearly state in this section of our research that as digital banking applications technology advances, people's ATM usage is severely impacted, and their preference is switched to mobile banking applications.

APPENDIX.1

Survey Questions

1. **What is your age?**
2. **How many different banks do you have a bank account in?**
3. **Do you use mobile banking?**
4. **What is the importance of mobile banking in your life? Would you rate it out of 5?**
5. **How many years have you been using mobile banking?**
6. **How many different banks' mobile banking applications are installed on your phone?**
7. **How many times do you use ATM per month?**
8. **How many times do you log into mobile banking applications per day?**
9. **Do you think ATMs will completely lose their function in the coming years?**
10. **What is the most important issue in mobile banking applications?**

APPENDIX.2

Interview Questions

1. **What is your age?**
2. **What is your education level?**
3. **Do you prefer to do shopping online?**
4. **Do you use digital wallet option while doing online shopping?**
5. **What was your digital wallet balances in Trendyol in the last three months?**
6. **What was your digital wallet balances in Steam in the last three months?**
7. **What was your digital wallet balances in Yemeksepeti in the last three months?**

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