THE IMPACT OF COVID-19 ON DIGITAL BANKING

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ABSTRACT

In the current business landscape, characterized by the widespread adoption of Information and Communication Technologies, companies must adapt to new paradigms and align their management strategies accordingly. The retail banking sector has experienced significant transformations, and the process has been further accelerated by the Covid-19 pandemic. The shift towards digital banking has become essential due to market conditions, offering advantages such as differentiation from competitors, cost reduction, and improved customer engagement.

This study aims to explore the strategies implemented by the banking sector during the digital transformation and examine the extent to which Covid-19 has influenced the growth of Digital Banking. The research methodology involved conducting a questionnaire survey among clients of banking institutions. The sample size for this study comprised 351 respondents. The survey findings indicate that, overall, respondents are content with the digital services provided by financial institutions. They perceive them as secure and exhibit a preference for Homebanking/Mobile Banking over traditional channels.

KEYWORDS: Covid-19; Digital Baking; Digital Channels; Digital Transformation; Fintech.

1. INTRODUCTION

The topic selection was motivated by the ongoing transformation of retail banking into the digital age. This transformation is driven by the increasing use of digital channels by consumers, which allows for time-saving and efficient banking operations (Whitlock, 2009). The need for adaptation and its consequences are subjects of current discussion, impacting various stakeholders such as customers, employees, and managers. Consequently, this topic holds relevance for financial institutions as it can shape future strategies. The emergence of Covid-19 has further accelerated the digital transformation that was already a strategic focus for financial institutions. Customers have had to adapt to new communication channels with the bank, such as phone lines, Homebanking, and Mobile Banking. Non-traditional payment methods are gaining popularity, as customers seek personalized services that prioritize convenience and security. Banks have invested in digital means to meet these needs. Understanding the impact of the pandemic on consumer behaviour and the adaptation to the digital world is crucial (Vilhena, 2022).

Currently, the term “fintech” or Financial Technology is commonly used. Mocker and Ross (2016, *apud* Agostinho, 2016) define fintech as the result of companies innovating their business models to keep pace with the evolving digital economy. However, this innovation can create complexity in business processes when integrating new products and services with existing ones, potentially leading to customer and employee dissatisfaction. Thus, adaptation becomes essential for all stakeholders. Pousttchi and Schurig (2004) state that banks should invest in information technologies to update their market presence, develop distribution networks, and reduce costs.

While few studies have focused on the increased use of digital channels due to Covid-19, an EFMA study (2021) emphasizes the importance of modernizing legacy systems to meet rising customer expectations and remain relevant. The present study aims to examine the extent to which Covid-19 has accelerated the global growth of Digital Banking from the perspective of its users. A comparison will be made between customers who were already using Digital Banking and those who started using it during the pandemic. Additionally, different age groups will be analysed to create user profiles for digital channel adoption.

The main research objectives are as follows: analyse the strategies implemented by the banking sector for digital banking adoption, present real cases of digital transformation, identify challenges and difficulties faced during implementation, understand how digital banking impacts customer relationships, explore the Bank's future strategies and objectives, gather consumer opinions on the influence of Covid-19 on the growth of Digital Banking, and examine consumer perceptions of the future of Digital Banking.

A quantitative methodology was employed, utilizing a questionnaire survey to collect data. The survey covers respondents' personal information, including age group, gender, region, marital status, academic qualifications, employment status, and monthly net income. Subsequent questions address respondents' opinions on the security of internet-based banking services, frequency of usage, reasons for not using the service (if applicable), likelihood of recommending digital services, preferred channels, and financial institutions for Homebanking, qualities valued in digital banking services, familiarity with technological terms, preferences for digital channels over physical ones, and usage of cards/mobile devices for payments. The survey also explores respondents' opinions on cryptocurrencies and analyses changes in consumer behaviour during the pandemic regarding preferred communication channels, frequency of channel usage, preferred payment methods, usage of Contactless technology and MB WAY, utilization of credit grace periods/moratoriums, changes in digital channel usage, perceptions of the digital transformation of banking with Covid-19, and intentions to continue using digital banking services and move towards fully digital banking.

The collected data will be processed to present concise and clear results. Data analysis will involve sample characterization and multivariate analysis. The survey was conducted among users of social networks, particularly Facebook and LinkedIn, and the findings will shed light on the impact of Covid-19 on Digital Banking.

Regarding the structure of this paper, the next chapter provides a literature review on digital banking and Covid-19. It covers the concept of fintech, regulatory and supervisory bodies related to fintech, the Millennial generation, digital banking and its mechanisms, characteristics of digital banking users, the impact of Covid-19, and its effects on the banking sector. The third chapter describes the quantitative methodology used in the research. In the fourth chapter, data analysis is conducted based on the results obtained from the questionnaire survey. Chapter five presents a brief discussion of the results and finally, we present the conclusions drawn from the obtained results.

2. LITERATURE REVIEW

The banking sector has undergone significant transformation in recent decades (Santos, 2006). The financial sector has been particularly active in customer communication, investing in new technologies while maintaining traditional channels (Hughes, 2006). Financial Technology (fintech) refers to technology-supported companies that offer innovative financial services (Arner, Barberis & Buckley, 2019). Fintechs provide digital-centric services and typically lack physical customer service spaces (Dhar & Stein, 2017). This enables them to have a business model with lower investment in fixed assets, global negotiation capabilities without physical presence, and greater flexibility in change processes (Achrol & Kotler, 1999). Although market volumes are still relatively small in many fintech segments, sectors such as online billing, lending, and payments may gain relevance in the near future and require regulatory scrutiny (Haddad & Hornuf, 2018 and Kasri et al., 2022).

Fintech has emerged as a complementary solution to traditional banking services, offering cost-effective, efficient, and convenient digital financial transactions (Gai, Qiu, & Sun, 2019 and Khan, 2022). Multiple studies have demonstrated that fintech companies are more agile and innovative compared to traditional banks (Li, Zhang, & Chen, 2018). Consequently, fintech companies have revolutionized the banking industry by providing digital services like mobile banking, peer-to-peer lending, and robot-advisors (Alnemer, 2022 and Vilhena, 2022).

The cost advantage of digital channels over physical channels prompts banks to gradually reduce the number of branches and restructure their offerings and locations accordingly. This shift reduces the reliance on physical branches and emphasizes the importance of online services, diminishing the significance of geographical proximity to customers (Kaur et al., 2021; Khan, 2022 and Wu et. al., 2023). Nevertheless, branches remain essential, and their closure can lead to long-term declines in small business hiring (Nguyen, 2019) and less competitive job markets (Bonfim, Nogueira & Ongena, 2020).

One of the primary advantages of integrating fintech in banking is enhanced financial inclusion. Fintech has expanded access to financial services for individuals who previously lacked access to traditional banking (Böhme & Christin, 2018). Mobile banking and digital wallets, offered by fintech services, have facilitated transactions and financial access from anywhere (Alnemer, 2022; Böhme & Christin, 2018 and Wu et al., 2021). Moreover, fintech has enabled small and medium-sized enterprises (SMEs) to access loans and financing without the stringent processes and requirements of traditional banks (Gai et al., 2019).

Furthermore, fintech has helped banks reduce operational costs by automating processes and reducing manual labour. This, in turn, has enabled banks to provide personalized services to customers, resulting in improved satisfaction and loyalty (Kasri et al., 2022; Kaur et al., 2021 and Li et al., 2018). Additionally, fintech has enhanced the security of financial transactions through advanced encryption technologies that safeguard customer information and prevent fraudulent activities (Böhme & Christin, 2018).

It is worth noting that the financial difficulties and negative macroeconomic implications during the Covid-19 pandemic did not originate solely from the banking sector, unlike the Great Financial Crisis (GFC) (Elnahass, Izzeldin & Steele, 2018). The banking sector was heavily leveraged before the GFC, and lending decisions in the housing sector contributed to pro-cyclical patterns, along with excessive leverage in the domestic sector (Elnahass, Izzeldin & Steele, 2018). In the context of the pandemic, the virus and the subsequent quarantine and social distancing measures imposed by governments led to immediate impacts on the real economy, resulting in simultaneous supply and demand shocks (Elnahass, Trinh & Li, 2021). According to data from the International Monetary Fund (IMF), the recession experienced during Covid-19 is more severe than the recession during the GFC, with a 3.3% decrease in the GDP of advanced economies and a 2.8% increase in emerging market economies (IMF, n.d.).

A study by Dadoukis, Fiaschetti, and Fusi (2021) found that banks that invested more in IT before the Covid-19 pandemic had better market performance, including smoother stock price declines, increased credit supply, and lower loan renegotiation rates during the initial stages of the pandemic. IT enabled banks to select top-quality loan borrowers and attract new customers. Consequently, IT investments acted as a protective measure during market turbulence, as investors viewed them as a source of resilience in the face of current company performance and a strategic advantage for long-term success. Technology plays a crucial role in promoting financial stability by enhancing banks' performance and resilience. Banks with extensive IT usage may also be more efficient in expanding their customer base, as digital banking platforms significantly reduce the cost associated with customer research and switching banks (Dadoukis et al., 2021 and Kasri et al., 2022).

According to Levine et al. (2020), most banks experienced a substantial increase in deposits during the initial months of the pandemic. However, banks with higher levels of IT observed significantly larger increases in deposits during

the first two quarters of 2020. In areas heavily affected by Covid-19, companies were more likely to switch to banks with superior IT capabilities. Therefore, it is evident that the IT resources of banking institutions influenced their ability to serve customers during the pandemic (Vilhena, 2022).

In a study conducted by Borri and Giorgio (2021), the evolution of European banks' contributions to systemic risk and its determinants over a 20-year period (January 3, 2000, to September 30, 2020) was analysed, covering three major shocks: the Great Financial Crisis (2007–2009), the European Sovereign Debt Crisis (2010–2012), and Covid-19 (2020). The study concluded that all banks in the sample significantly contributed to the increase in systemic risk, with larger banks having business models more exposed to securities and derivatives traded in financial markets making a more substantial contribution.

A study by Li et al. (2021) examined the relationship between the use of non-interest revenue sources and bank profitability and risk during the economic crisis caused by the Covid-19 pandemic. The aim was to determine if diversification had a positive impact. The findings suggest that diversification was advantageous for American banks in utilizing non-interest revenue sources, particularly in the initial phase of the pandemic. Additionally, the results indicate that banks with stronger fintech performance continued to perform well during the pandemic. However, riskier banks experienced increased risk levels. Banks that achieved high levels of growth saw profitability gains accompanied by risk reductions. The study concludes that non-interest income is positively correlated with performance but inversely related to risk.

A survey conducted by the FED in July 2020 revealed that a significant percentage of banks reported credit standards restrictions for various loan types and weaker demand for commercial and industrial real estate and consumer loans. However, there was a slight increase in demand for residential mortgage credit. Elnahass et al. (2021) conducted a study analysing the financial performance of banking institutions during the Covid-19 outbreak. The study encompassed conventional and Islamic banks from 116 countries, covering six quarters from the first quarter of 2019 to the second quarter of 2020. The pre-Covid-19 period included the four quarters of 2019, while the first two quarters of 2020 represented the pandemic period. The results provide strong evidence that the Covid-19 outbreak had detrimental effects on various financial performance and financial stability indicators in the global banking sector. The study's findings reinforce the indication of recovery in banking stability during the second quarter of 2020, coinciding with the easing of imposed restrictions.

In the first weekend of March 2020, global capital markets, foreign exchange markets, and financial assets worldwide experienced severe impacts. Major international institutions and banks were compelled to revise their growth forecasts downward (Donthu & Gustafsson, 2020). The Covid-19 outbreak significantly diminished banks' profitability, cost efficiency, stock market valuations, and financial stability.

Banking operations in many countries were affected, leading to precautionary actions by depositors, such as increased withdrawal rates, and adjustments by financial intermediaries, such as reducing market funding (Sharma et al., 2020). Concurrently, there was a need to maintain financially beneficial and profitable relationships while meeting capital requirements. Banks were expected to actively seek economic solutions and support governments in combating the recessionary factors brought about by Covid-19.

The Covid-19 outbreak reduced banking companies' profitability and impacted the financial stability, performance, and stock market valuations of banks (Elnahass, Trinh & Li, 2021). Older banks showed lower profitability and cost efficiency, while larger banks had lower credit risk but higher operational risk after the pandemic.

Islamic banks demonstrated lower operational risk compared to conventional banks during the outbreak, and banks in Asia and the Middle East had better asset quality (Elnahass, Trinh & Li, 2021).

The pandemic also led to changes in consumer payment behaviour, with a decline in the use of cash. Central Bank Digital Currency emerged as a new digital payment system, but not all digital payment methods protect against virus transmission. Countries like Austria, Germany, the UK, and Portugal have implemented measures such as raising transaction limits for contactless payments (Auer, Cornelli & Frost, 2020).

As a downside, cryptocurrencies that are not pegged to a conventional currency have a high level of price fluctuation (which leads to speculation), competition for commercial banks, geographic restrictions (CBDCs are only accepted in the country that issues them), lack of trust, and low economic growth. The Covid-19 pandemic has made appeals for CBDCs to be activated by the Central Bank, mainly due to the issue of viral transmission through physical currency (Özsoy, 2020).

Chauhan, Akhtar and Gupta (2022), provide an overview of the current state of research on customer experience in digital banking and proposes future research directions in this area. The authors define digital banking as "the delivery of traditional banking services through digital channels such as mobile and internet banking".

3. METHODOLOGY

The Statistical Package for the Social Sciences (SPSS) version 27 was used to analyse and process the survey data. To validate the questionnaire survey results, a statistical analysis was conducted using descriptive techniques and factor analysis.

After constructing the questionnaire, a preliminary test was conducted to validate its consistency and identify any errors. The pre-test assessed how the questions were perceived by the participants, checking if they made sense, were understood, and elicited the desired responses. It also evaluated the adequacy of instructions and the availability of response options. The pre-test involved five participants and aimed to obtain constructive feedback on language, time allocation, and familiarity with the terms used. Based on the pre-test findings, some changes were made, including adding the option "do not know/do not respond" to certain questions that participants may be unfamiliar with. The questionnaire will help us to answer the following research questions:

- How has the Covid-19 pandemic impacted the adoption and growth of digital banking among different user groups?
- What strategies have banking sectors implemented to facilitate the adoption of digital banking?
- What are the challenges and difficulties faced during the implementation of digital banking in the banking sector?
- How does digital banking influence customer relationships in the banking sector?
- What are the future strategies and objectives of banks in response to the digital transformation of the industry?
- What are consumer opinions regarding the influence of Covid-19 on the growth of digital banking?
- What are consumer perceptions of the future of digital banking?
- How do different demographic factors, such as age, gender, and income, influence the adoption and usage of digital banking services?

The study included a questionnaire survey divided into five sections. The first section, completed by a total of 351 respondents, aimed to characterize the sample and gather opinions on the security of internet services. It also assessed the usage of Homebanking/Mobile Banking services and the duration of usage. The second section, exclusive to Digital Banking users (276 respondents), collected opinions on service usage, channels accessed, financial institutions used, importance attributed to certain aspects, familiarity with technological terms, perceived advantages, and openness to technological advancements. The third section analysed consumer behaviour in the "Before Covid-19" era, while the fourth section focused on consumer behaviour during the "Covid Era", examining

the impact of the pandemic on the growth of Digital Banking. These two sections had the same number of respondents as the previous section (276 respondents). The fifth section targeted respondents who reported not using the Digital Banking service (75 respondents) and aimed to understand their reasons for not using it and whether they would consider using it in the future.

Then we formulated eight hypotheses based on the research questions:

- H1: The Covid-19 pandemic has accelerated the global growth of digital banking among both existing and new users.
- H2: Banks that have successfully implemented digital banking strategies have experienced improved customer relationships and increased customer satisfaction.
- H3: The adoption of digital banking presents challenges and difficulties related to integrating new products and services with existing systems, potentially leading to customer and employee dissatisfaction.
- H4: Younger age groups exhibit higher levels of adoption and usage of digital banking services compared to older age groups.
- H5: Customers who started using digital banking during the pandemic have different user profiles and preferences compared to those who were already using it.
- H6: Positive consumer opinions on the influence of Covid-19 on the growth of digital banking are associated with higher levels of adoption and usage.
- H7: Consumers with higher familiarity with technological terms exhibit a greater preference for digital banking services.
- H8: Consumer perceptions of the future of digital banking are influenced by their experiences and satisfaction with current digital banking services.

The aim of this study is to examine the impact of Covid-19, specifically the population lockdown, on the usage of Digital Banking. Data collection was conducted through an online survey using the Google Forms platform. The survey was available from August 21, 2020, to December 7, 2020, and a total of 351 valid responses were obtained. The choice of an online questionnaire was motivated by its ease of dissemination and its interactive nature, allowing for closer engagement with the respondents. The online platform was selected to target individuals who are already internet users and familiar with digital media, as the survey focuses on the topic of Digital Banking. The survey was conducted in the Portuguese language and was open to respondents from Portuguese-speaking nations worldwide. Dissemination of the survey was carried out through Facebook and LinkedIn, as well as through email contacts with various academic institutions.

While the population refers to a group of individuals sharing common characteristics and defined criteria, the sample represents a selected group of individuals from the population for the purpose of gathering information about a phenomenon. Due to constraints in time, resources, and access, it is impractical to collect and analyse data from the entire population. Therefore, a non-probabilistic sampling method was employed, as it is not possible to determine the probability of an individual belonging to the population. Convenience sampling, a non-probabilistic sampling technique, was used to select respondents based on easy accessibility. It should be noted that the data obtained from this sample cannot be generalized to the entire population.

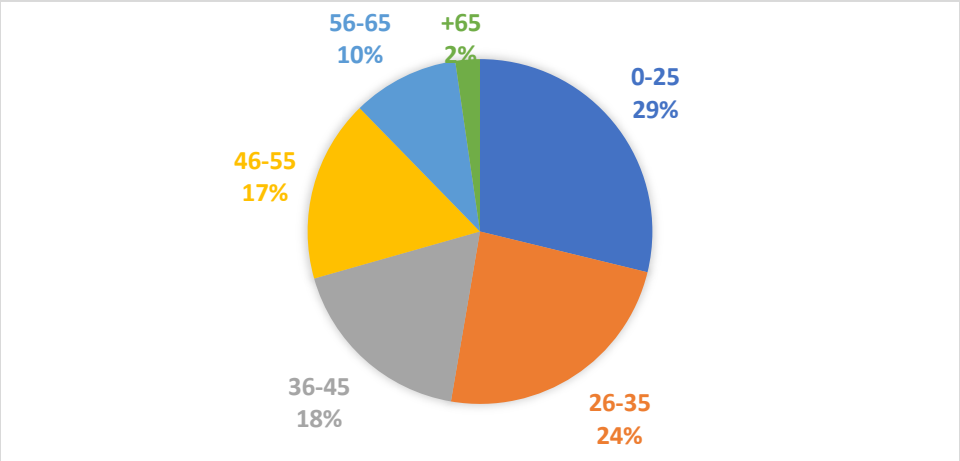
4. FINDINGS AND ANALYSIS

4.1. QUALITATIVE ANALYSIS

In Figure 1, the age distribution of respondents is as follows: 101 respondents (28.8%) are up to 25 years old, 84 respondents (23.9%) are between 26 and 35 years old, 63 respondents (17.9%) are aged 36 to 45 years, 60 respondents (17.1%) are between 46 and 55 years old, 35 respondents (10%) are aged 56 to 65 years, and 8

respondents (2.3%) are over 65 years old. The majority of respondents fall within the youngest age group (up to 25 years old), while the smallest proportion is represented by respondents over 65 years old.

FIGURE 1: Distribution of respondents by age group.



SOURCE: Developed by the author.

A cross-reference analysis by gender was conducted for respondents who reported not using the service. Table 1 shows that the majority of non-users are female (66.67%), aligning with the literature indicating lower inclination among women to use digital services.

TABLE 1: Cross-referencing between gender and respondents who do not use the Homebanking/Mobile Banking service.

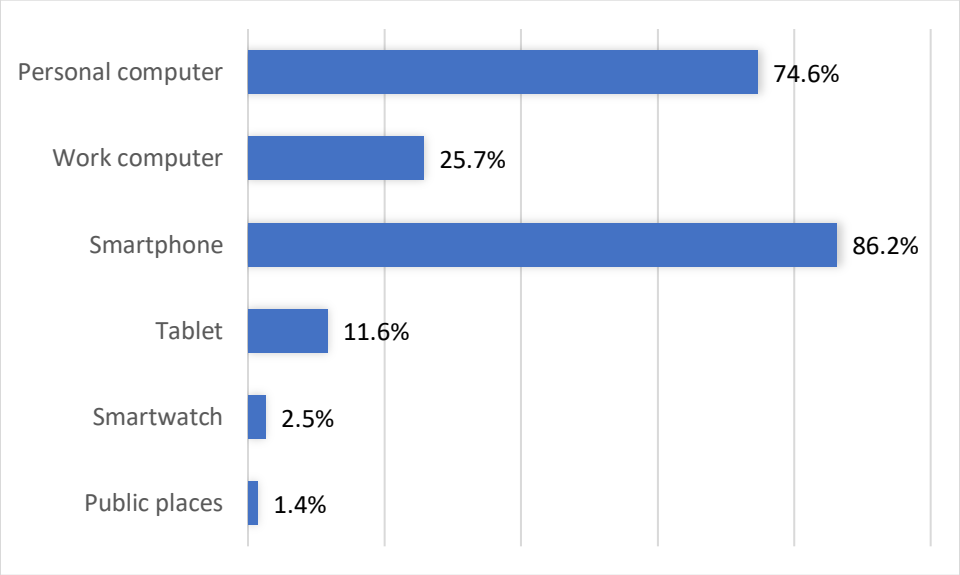
		DOES NOT USE THE HOMEBANKING/MOBILE BANKING SERVICE
GENDER	MASCULINE	25
	FEMININE	50
	TOTAL	**75**

SOURCE: Developed by the author.

Section 2, 3, and 4 of the questionnaire collected responses from Homebanking/Mobile Banking users (n=276), while section 5 gathered responses from non-users (n=75). In section 2, when asked about recommending the service to others, 272 users (98.6%) answered positively, indicating a majority who would recommend it.

Figure 2 shows the channel preferences of Homebanking/Mobile banking users. Among the respondents, 238 users (86.2%) reported using their cell phone/smartphone, 206 users (74.6%) use their personal computer, 71 users (25.7%) use their work computer, 32 users (11.6%) use a tablet, 7 users (2.5%) access it through a smartwatch, and only 4 users (1.4%) claim to access the service in public places. It can be concluded that most users access the service through their mobile phone or smartphone, with a slight difference in usage on personal computers.

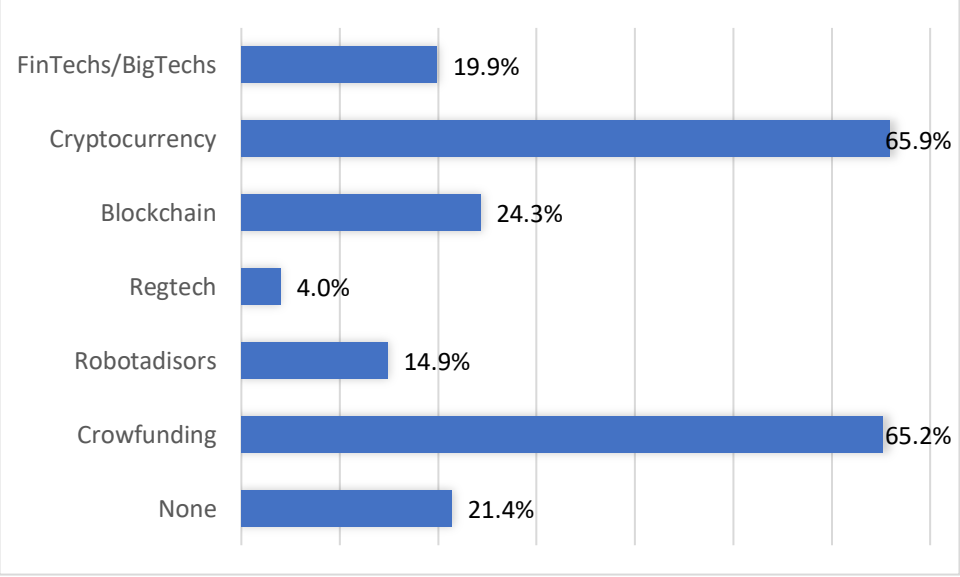
FIGURE 2: Channels used by respondents to access Homebanking/Mobile Banking.



SOURCE: Developed by the author.

One survey question pertained to the respondents' familiarity with various terms: FinTechs/BigTechs, Cryptocurrency, Blockchain, Regtech, Robotadvisers, and Crowdfunding. Out of the 276 responses, 182 respondents (65.9%) are knowledgeable about Cryptocurrency, 180 respondents (65.2%) are familiar with Crowdfunding, 67 respondents (24.3%) know about Blockchain, 55 respondents (19.9%) are aware of FinTechs/BigTechs, 41 respondents (14.9%) are familiar with Robotadvisers, and 11 respondents (4%) have knowledge of Regtech. Furthermore, 21.4% of respondents (n=59) indicated that they do not know any of the mentioned terms. The results are displayed in Figure 3.

FIGURE 3: Respondents' knowledge of fintech terms.



SOURCE: Developed by the author.

The survey was conducted to gather insights on customer preferences and behaviours related to banking services. The findings are as follows: 88.4% of respondents considered Homebanking/Mobile banking to be a tool for financial institutions to be closer to customers, while 6.9% disagreed and 4.7% did not respond. 98.6% of respondents found using debit/credit cards or mobile devices for payments advantageous. 79.3% of respondents would choose video calls to communicate with their managers instead of visiting the bank counter. 77.9% of Homebanking/Mobile Banking users had never thought about or invested in cryptocurrencies, while 22.1% had considered or invested in them. 64.5% of respondents expressed willingness to open a 100% online account, while 22.8% indicated unwillingness. ATM usage decreased from 31.5% to 26.8% after the pandemic, while Homebanking usage slightly increased from 30.1% to 31.5%. 58% of respondents reported not using the telephone helpline/customer support service provided by banks during the pandemic. ATM was the preferred means of payment before the pandemic, but its usage decreased by 12% during the pandemic. Mobile applications and Homebanking experienced significant growth. Contactless technology usage increased from 54% before the pandemic to 71.4% during the pandemic. 72.5% of respondents currently use the MB WAY service, indicating an increase in users.

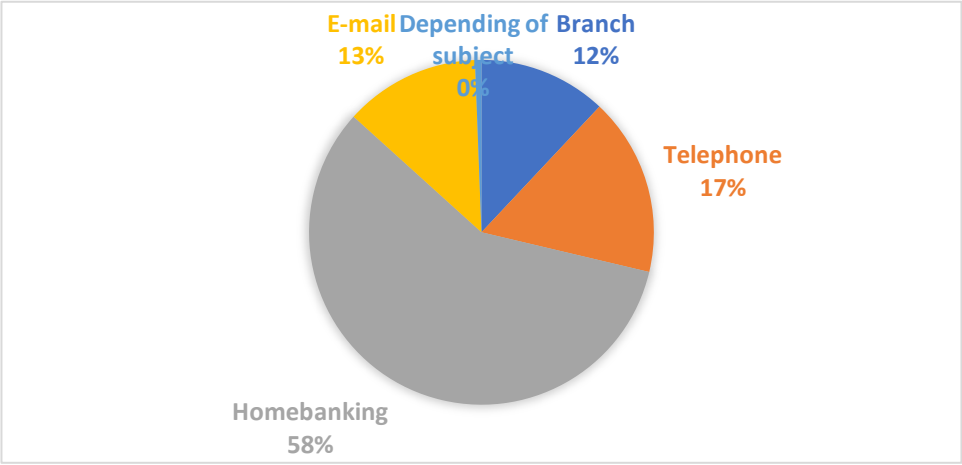
Homebanking and Mobile Banking were the preferred channels for various banking operations, with a slight increase in usage during the pandemic and gained more users for paying taxes and/or social security, while Mobile Banking replaced ATM as a preferred channel. Homebanking was the preferred channel for consulting financial investments and investment funds.

The branch was the preferred channel for contracting banking products/services, but its usage decreased during the pandemic. Homebanking was the preferred channel for requesting information, with a slight increase in usage during the pandemic.

Credit simulations were primarily conducted through the branch before the pandemic, but usage decreased during the pandemic. 58% of respondents currently prefer Homebanking as their communication channel with the bank, while only 12% prefer the branch.

These findings provide insights into the shifting preferences of customers towards digital banking services, such as Homebanking and Mobile Banking, during and after the pandemic. The use of physical channels, such as visiting the bank counter or using the telephone helpline, has decreased. The study also highlights the increased adoption of contactless technology and the consideration of online accounts and cryptocurrencies. Please refer to Figure 4 for a visual representation of the results.

FIGURE 4: Preferred communication channel for respondents during Covid-19.



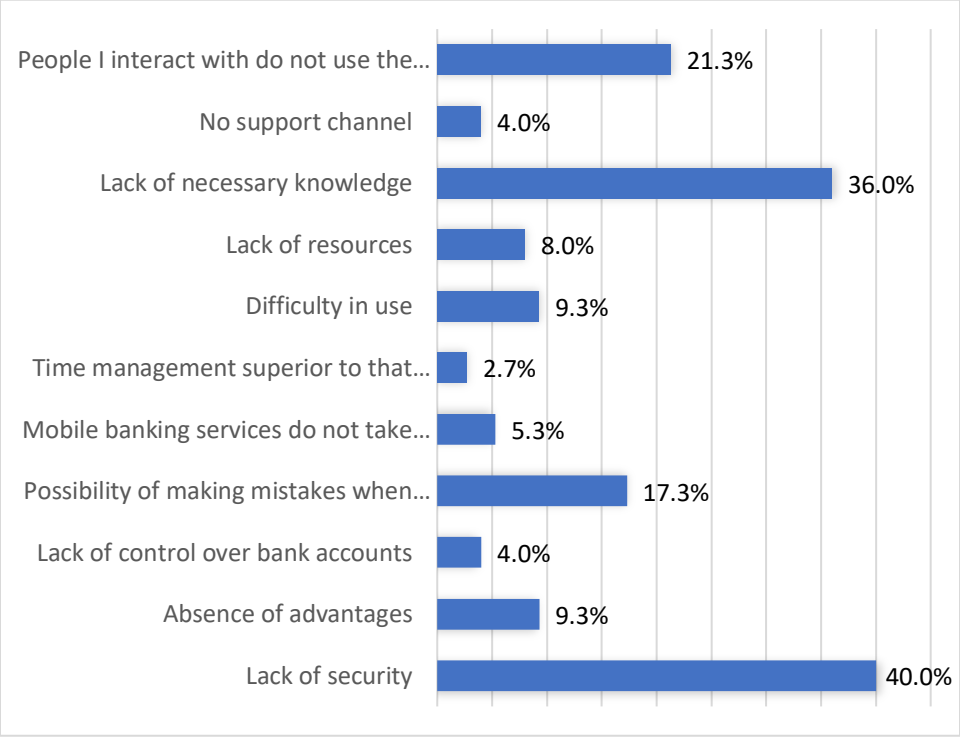
SOURCE: Developed by the author.

In terms of respondents' loan status, 51.8% confirmed having at least one loan in progress, while 46% answered negatively. A small portion (2.2%) preferred not to respond. Among the 152 customers with outstanding loans, 83.6% did not opt for the government-approved grace period/moratorium, while 16.4% reported adhering to it.

Regarding the frequency of Homebanking/Mobile Banking service usage, 52.9% stated no changes due to the pandemic, while 47.1% indicated otherwise. Regarding the increased maximum payment limit for Contactless technology on cards, 73.9% expressed a positive opinion, while 26.1% disagreed. 86.5% of respondents agreed that the pandemic accelerated the urgency of digital transformation in banking, while 13.5% disagreed. 99.6% of respondents planned to continue using Digital Banking services, with only 0.4% indicating a negative response. 56.5% of respondents expressed disbelief in the complete digitalization of banking in the future, while 43.5% believed in the possibility.

Figure 5 illustrates the reasons provided by 75 non-users of Homebanking/Mobile Banking services. The most common reasons cited were: lack of security (40%), lack of necessary knowledge (36%), influence of non-users in their network (21.3%), concerns about transaction mistakes (17.3%), lack of perceived advantages (9.3%), difficulty in use (9.3%), lack of necessary resources (8%), perceived lack of customer interest prioritization (5.3%), concerns about lack of control over accounts (4%), absence of support channels (4%), and perceived time-consuming nature (2.7%).

FIGURE 5: Reasons for not using Homebanking/Mobile Banking.



SOURCE: Developed by the author.

Among the non-users of the Homebanking/Mobile Banking service, a significant portion of respondents (45.3%) were uncertain about their ability to use the service in the future and did not provide a definite answer. On the other hand, 40% of respondents expressed openness to the possibility of using the service in the future. However, 14.7% of non-users remained adamant in their rejection of the idea of using Homebanking/Mobile Banking services.

4.2. QUANTITATIVE ANALYSIS

In the multivariate analysis conducted in this study, a factor analysis was performed using the principal components' method with varimax rotation. The objective of this analysis was to identify the underlying components that explain the correlations among the qualities mentioned in section 2 of the questionnaire, namely speed, convenience, availability, low cost, practicality, safety, and ease of use.

The Kaiser-Meyer-Olkin (KMO) test is a measure of sampling adequacy that assesses the suitability of the data for factor analysis. According to Hair et al. (2006) and Kaiser (1974), a minimum acceptable value of 0.5 is considered statistically significant. In this study, the KMO values obtained were 0.933 (before Covid-19) and 0.832 (nowadays), which are considered excellent. These high KMO values indicate that the correlation among the variables is strong, suggesting that the data is suitable for factor analysis.

The varimax rotation was chosen as the method of rotation in this study. Varimax rotation is an orthogonal rotation method that aims to simplify the interpretation of the factors by maximizing the variance of the factor loadings. It preserves the distances and angles between variables and keeps the axes perpendicular. Through rotation, high loadings tend to become even higher and low loadings become even lower. The goal is to eliminate intermediate values and clarify the relationships between variables.

The results of the factor analysis, as shown in Table 2, indicate that the solution is appropriate. The Bartlett test, which assesses the significance of the correlations among the statements, yielded a significance level of less than 0.05, indicating an acceptable level of correlation. This further supports the adequacy of the factor analysis in this study.

Overall, the factor analysis with varimax rotation yielded meaningful results, with high KMO values and significant correlations among the qualities being examined. These findings suggest that the factor analysis successfully identified the underlying components explaining the relationships among the qualities mentioned in the questionnaire.

TABLE 2: KMO and Bartlett Test 1.

			Before Covid	Nowadays
KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY			.933	.832
BARTLETT'S TEST	**SPHERICITY**	**APPROX. CHI-SQUARE**	2349.356	2398.348
		GL	28	55
		SIG.	.000	.000

SOURCE: Developed by the author.

In Table 3, the commonalities of each statement are presented. Commonalities represent the proportion of total variance in each statement that can be explained by the extracted factors. Higher commonality values indicate a stronger relationship between the statement and the extracted factors.

In this study, the commonality values range from 0.733 to 0.826, which are considered adequate. These values suggest that the extracted factors explain a substantial portion of the variance in each statement.

When performing factor analysis, it is generally recommended to exclude variables with commonality values below 0.5, as it indicates a weak relationship between those variables and the extracted factors. However, in this case, all the variables have commonality values above 0.5, indicating a satisfactory level of association with the factors.

Among the variables examined, availability had the highest relationship with the extracted factors, indicating that it contributes significantly to the underlying components identified in the factor analysis. On the other hand, convenience had the smallest relationship with the factors, suggesting a relatively weaker association.

TABLE 3: Commonalities 1.

	Start	Extraction	Average
SPEED OF EXECUTION	1.000	.784	3.51
CONVENIENCE	1.000	.733	3.40
AVAILABILITY	1.000	.826	3.57
LOW COST	1.000	.735	3.60
PRACTICALITY	1.000	.814	3.53
COMMODITY/COMFORT	1.000	.769	3.55
SECURITY	1.000	.800	3.71
EASE OF USE	1.000	.825	3.57

NOTES: Extraction Method: Principal Component analysis.

SOURCE: Developed by the author.

In Table 4, the total variance explained by each component is presented. The variances indicate the amount of variability in the data that is accounted for by each component. Components with eigenvalues greater than 1 are considered significant and are typically selected for further analysis.

The first component in the table explains approximately 79% of the total variance. This means that the variables grouped under this component are highly correlated and contribute significantly to explaining the underlying factors in the data.

According to the Kaiser criterion, which suggests retaining components with eigenvalues greater than 1, only the first principal component should be retained for further analysis. This component captures the most significant portion of the variance in the data.

TABLE 4: Total variance explained 1.

	INITIAL EIGENVALUES			EXTRACT SUMS OF SQUARED LOADS		
COMPONENT	Total	% Variance	% Cumulative	Total	% Variance	% Cumulative
1	6.286	78.576	78.576	6.286	78.576	78.576
2	.408	5.103	83.678			
3	.366	4.572	88.251			
4	.272	3.400	91.650			
5	.232	2.905	94.555			
6	.174	2.171	96.726			
7	.145	1.817	98.543			
8	.117	1.457	100.000			

NOTES: Extraction Method: Principal Component analysis.

SOURCE: Developed by the author.

A Cronbach's Alpha coefficient of 0.961 indicates a very good or almost perfect internal consistency among the statements. This means that the statements used in the survey are highly reliable and consistent in measuring the underlying constructs or qualities associated with the Homebanking/Mobile Banking service.

Table 3 suggests that respondents, in general, are satisfied with the characteristics associated with the service. Among these characteristics, security is the variable that received the highest average satisfaction rating from the respondents.

Moving on to the channels that respondents prioritized before Covid-19 based on the specific banking operations they needed to carry out, a factor analysis was conducted. The solution obtained a KMO value of 0.831, which is considered good, indicating that the level of correlation between the statements is acceptable. The Bartlett test also showed a significance level of less than 0.05, further supporting the adequacy of the factor analysis.

The results of the factor analysis for the channels preferred by respondents for different banking operations can be seen in Table 5. These results provide insights into the patterns of channel preference based on the specific tasks or services respondents were engaged in before the Covid-19 pandemic.

TABLE 5: KMO and Bartlett Test 2.

			Before Covid	Nowadays
KAISER-MEYER-OLKIN MEASURE OF SAMPLING ADEQUACY			.831	
BARTLETT'S TEST	SPHERICITY	APPROX. CHI-SQUARE	1975.630	
		GL	55	
		SIG.	.000	

SOURCE: Developed by the author.

In Table 6 it is possible to identify the commonalities, where the values vary between 0.548 and 0.856 and it is verified that they are adequate.

TABLE 6: Commonalities 2.

		Extraction	
	Start	BEFORE COVID	NOWADAYS
CHECK BALANCES AND MOVEMENTS	1.000	.722	.795
CHECK OF INFORMATION ON BANK ACCOUNTS (NIB/IBAN)	1.000	.716	.768
PAYMENT FOR SERVICES	1.000	.772	.790
INTRABANK TRANSFERS	1.000	.730	.772
INTERBANK TRANSFERS	1.000	.719	.761
PAYMENT OF TAXES AND/OR SOCIAL SECURITY	1.000	.548	.558
CHECK OF FINANCIAL INVESTMENTS AND INVESTMENT FUNDS	1.000	.766	.856
BUYING AND SELLING SHARES	1.000	.832	.848
APPLYING OF BANKING PRODUCTS/SERVICES	1.000	.699	.744
REQUEST OF INFORMATION	1.000	.776	.846
CREDIT SIMULATION	1.000	.822	.853

NOTES: Extraction Method: Principal Component analysis.

SOURCE: Developed by the author.

Based on Table 7, the total variance explained by each of the 11 components is provided. It is observed that the first three components explain approximately 74% of the total variance. According to the Kaiser criterion, which suggests retaining components with eigenvalues greater than one, three main components should be retained in this analysis. These three components capture a significant portion of the underlying variance in the data and are therefore considered meaningful in explaining the patterns and relationships among the variables.

TABLE 7: Total variance explained 2: Before Covid.

	INITIAL EIGENVALUES			EXTRACT SUMS OF SQUARED LOADS			SQUARED LOAD ROTATION SUMS		
COMPONENT	TOTAL	% VARIANCE	% CUMULATIVE	TOTAL	% VAR.	% CUMULATIVE	TOTAL	% VAR.	% CUMULATIVE
1	5.280	47.997	47.997	5.280	47.997	47.997	4.124	37.488	37.488
2	1.767	16.060	64.057	1.767	16.060	64.057	2.082	18.926	56.414
3	1.055	9.586	73.643	1.055	9.586	73.643	1.895	17.229	73.643
4	.798	7.255	80.899						
5	.534	4.855	85.754						
6	.434	3.948	89.702						
7	.327	2.976	92.678						
8	.297	2.700	95.378						
9	.270	2.452	97.830						
10	.131	1.194	99.024						
11	.107	.976	100.000						

NOTES: Extraction Method: Principal Component analysis.

SOURCE: Developed by the author.

Table 8, the rotating component matrix, provides the factor loadings for each variable in the analysis. In interpreting the factors, loadings with values greater than 0.5 are considered significant and indicative of strong contribution to the respective factor.

Factor 1 is characterized by six variables that exhibit a strong positive correlation: Consult balances and movements, consult information on bank accounts, payment of services, intrabank transfers, interbank transfers, and payment of taxes and/or Social Security. Factor 2 is primarily influenced by the variables related to the consultation of financial investments and investment funds, as well as the purchase and sale of shares and the contracting of banking products/services. Factor 3 is mainly driven by the variables associated with the contracting of banking products/services, the request for information, and the credit simulation.

By considering the higher factor loadings, it becomes possible to discern the underlying components to which each variable belongs, allowing for a better understanding of the results obtained in the factor analysis.

TABLE 8: Rotating Component Matrix: Before Covid.

Operations	Component		
	1	2	3
Check balances and movements	**.815**	.228	.078
Check of information on bank accounts (NIB/IBAN)	**.818**	.203	.079
Payment for services	**.862**	.127	.115
Intrabank transfers	**.834**	.063	.175
Interbank transfers	**.829**	.104	.144
Payment of taxes and/or Social Security	**.665**	.199	.256
Check of financial investments and investment funds	.336	**.794**	.149
Buying and selling shares	.165	**.893**	.084
Applying of banking products/services	.052	**.662**	**.508**
Request of information	.233	.130	**.839**
Credit simulation	.161	.189	**.872**

NOTES: Extraction Method: Principal Component analysis; Rotation Method: Varimax with Kaiser Normalization, rotation converged in 5 iterations.

SOURCE: Developed by the author.

The reliability and internal consistency of each component were assessed using Cronbach's Alpha coefficient. Cronbach's Alpha measures the expected correlation between the scale used in the sample and other hypothetical scales with the same number of items, measuring the same characteristic.

Analysing Table 9, we can observe that the Cronbach's Alpha values for the variables under study range from 0.770 to 0.907. These values indicate good internal consistency among the variables within each component. A Cronbach's Alpha value above 0.7 is generally considered acceptable, while values above 0.8 are considered good. Therefore, the results suggest that the variables within each component are reliable and demonstrate a satisfactory level of internal consistency.

TABLE 9: Cronbach alfa: Before Covid.

	CRONBACH ALFA	NUMBER OF ITEMS
COMPONENT 1	.907	6
COMPONENT 2	.793	3
COMPONENT 3	.770	3

SOURCE: Developed by the author.

4.3. DURING/AFTER COVID (NOWADAYS)

Table 10 presents the total variance explained by each of the 11 components. From the table, we can observe that the three components explain approximately 79% of the total variance. According to the Kaiser criterion, which suggests retaining components with eigenvalues greater than one, three main components should be retained.

By retaining these three components, we can capture a significant amount of the variability present in the data. These components represent the underlying patterns or dimensions that explain the correlations among the variables. The eigenvalue indicates the amount of variance explained by each component. Therefore, components with eigenvalues greater than one are considered important in capturing meaningful information from the data.

TABLE 10: Total variance explained 2: Nowadays.

	INITIAL EIGENVALUES			EXTRACT SUMS OF SQUARED LOADS			SQUARED LOAD ROTATION SUMS		
COMPONENT	TOTAL	% VARIANCE	% CUMULATIVE	TOTAL	% VAR.	% CUMULATIVE	TOTAL	% VAR.	% CUMULATIVE
1	5.433	49.392	49.392	5.433	49.392	49.392	4.320	39.273	39.273
2	2.093	19.028	68.420	2.093	19.028	68.420	2.188	19.895	59.168
3	1.066	9.690	78.110	1.066	9.690	78.110	2.084	18.942	78.110
4	.651	5.914	84.024						
5	.522	4.749	88.773						
6	.349	3.169	91.942						
7	.254	2.309	94.251						
8	.247	2.246	96.497						
9	.212	1.926	98.422						
10	.099	.896	99.318						
11	.075	.682	100.000						

NOTES: Extraction Method: Principal Component analysis.

SOURCE: Developed by the author.

The interpretation of the factors is now done through the rotating component matrix shown in Table 11, choosing the components with loadings greater than 0.5.

TABLE 11: Rotating Component Matrix: Nowadays.

Operation	Component		
	1	2	3
Check balances and movements	**.858**	.196	.141
Check of information on bank accounts (NIB/IBAN)	**.853**	.161	.122
Payment for services	**.870**	.169	.066
Intrabank transfers	**.863**	.041	.162
Interbank transfers	**.861**	.065	.124
Payment of taxes and/or Social Security	**.673**	.316	.068
Check of financial investments and investment funds	.250	**.879**	.145
Buying and selling shares	.197	**.879**	.193
Applying of banking products/services	.063	**.617**	**.600**
Request of information	.180	.101	**.896**
Credit simulation	.149	.233	**.881**

NOTES: Extraction Method: Principal Component analysis; Rotation Method: Varimax with Kaiser Normalization, rotation converged in 5 iterations.

SOURCE: Developed by the author.

Table 12 displays the Cronbach's Alpha coefficients for each of the three components extracted from the data. According to the table, the first component has a Cronbach's Alpha coefficient of 0.919, indicating a very good level of internal consistency. For components 2 and 3, the Cronbach's Alpha values are 0.837 and 0.835, respectively, which represent a good level of internal consistency.

These results suggest that the items within each component are highly correlated and measure a similar construct or concept. It indicates that the statements within each component are reliable and provide consistent measurements for assessing the underlying dimensions they represent.

TABLE 12: Cronbach alfa: Nowadays.

	CRONBACH ALFA	NUMBER OF ITEMS
COMPONENT 1	.919	6
COMPONENT 2	.837	3
COMPONENT 3	.835	3

SOURCE: Developed by the author.

5. DISCUSSION

Based on the results of the factor analysis comparing the pre-pandemic and pandemic periods, several findings can be observed: i) The variable with the lowest relationship with the extracted factors in both phases was the payment of taxes and/or Social Security; ii) The variable that showed the strongest relationship with the factors extracted before the pandemic was the purchase and sale of shares, while during the pandemic, it was replaced by the consultation of financial investments and investment funds; iii) The total explained variance by the three main components was higher during the pandemic period (approximately 79% of the total variance) compared to the pre-pandemic phase (approximately 74% of the total variance). This indicates that the factors extracted accounted for a larger proportion of the variability in the data during the pandemic; iv) In terms of factor loadings, all factors belonging to components 1 and 3 had higher loadings during the pandemic. However, for component 2, only the consultation of financial investments and investment funds showed a higher loading during the pandemic, while the purchase and sale of shares and the contracting of banking products/services had decreased loadings compared to the pre-pandemic period; v) In terms of internal consistency measured by Cronbach's Alpha, component 1 demonstrated almost perfect internal consistency in both periods. Components 2 and 3 showed acceptable values before the pandemic, but during the pandemic, their values improved and reached the level of good internal consistency. This indicates an increase in the internal consistency and reliability of the questionnaire during the pandemic.

Overall, these findings suggest that the relationships between variables and the structure of factors changed to some extent during the pandemic period. The pandemic might have influenced people's preferences and behaviours in using banking services, leading to shifts in factor loadings and internal consistency of the questionnaire.

Our findings align with previous studies that have also examined the transition from traditional to digital banking (see Alnemer, 2022; Kaur et al., 2021; Khan, 2022 and Wu et al., 2023).

Based on the provided findings, we can address the eight hypotheses as follows:

- H1: The Covid-19 pandemic has accelerated the global growth of digital banking among both existing and new users.
    - Based on the data collected, we can conclude that the Covid-19 pandemic indeed accelerated the growth of digital banking. The usage of Homebanking and Mobile Banking services increased, as indicated by the slight increase in usage during the pandemic. Furthermore, the number of users

of contactless technology and the MB WAY service also increased, suggesting a rise in digital banking adoption.

- H2: Banks that have successfully implemented digital banking strategies have experienced improved customer relationships and increased customer satisfaction.
    - The findings support this hypothesis. The majority of respondents (88.4%) considered Homebanking/Mobile banking as a tool for financial institutions to be closer to customers, indicating a positive impact on customer relationships. Additionally, 98.6% of respondents found using debit/credit cards or mobile devices for payments advantageous, suggesting increased customer satisfaction with digital banking services.
- H3: The adoption of digital banking presents challenges and difficulties related to integrating new products and services with existing systems, potentially leading to customer and employee dissatisfaction.
    - While the data does not directly address this hypothesis, it is possible to infer that the integration of new products and services in digital banking may pose challenges. The preference for Homebanking and Mobile Banking over physical channels like visiting the bank counter suggests a shift in customer behavior, potentially indicating some level of dissatisfaction with traditional banking methods.
- H4: Younger age groups exhibit higher levels of adoption and usage of digital banking services compared to older age groups.
    - Based on the findings, it can be concluded that younger age groups show a higher adoption and usage of digital banking services. The use of mobile phones or smartphones as the preferred channel for accessing Homebanking/Mobile Banking services supports this hypothesis.
- H5: Customers who started using digital banking during the pandemic have different user profiles and preferences compared to those who were already using it.
    - The data does not explicitly address this hypothesis. However, the slight increase in Homebanking usage during the pandemic suggests that new users may have different preferences and profiles compared to existing users.
- H6: Positive consumer opinions on the influence of Covid-19 on the growth of digital banking are associated with higher levels of adoption and usage.
    - The findings support this hypothesis. The majority of respondents (86.5%) agreed that the pandemic accelerated the urgency of digital transformation in banking. Additionally, a high percentage (99.6%) indicated their intention to continue using digital banking services, suggesting a positive correlation between positive opinions and adoption/usage of digital banking.
- H7: Consumers with higher familiarity with technological terms exhibit a greater preference for digital banking services.
    - Based on the findings, it is evident that familiarity with technological terms, such as Cryptocurrency and Blockchain, is relatively high among respondents. While the data does not directly address the preference for digital banking services, it can be inferred that consumers with higher familiarity with technological terms may have a greater inclination towards adopting digital banking.
- H8: Consumer perceptions of the future of digital banking are influenced by their experiences and satisfaction with current digital banking services.
    - The findings do not explicitly address this hypothesis. However, the high percentage of respondents (56.5%) expressing disbelief in the complete digitalization of banking in the future suggests that consumer perceptions of the future of digital banking may be influenced by factors beyond their experiences and satisfaction with current services.

6. CONCLUSION

The present study has contributed valuable insights into the digitalization of the banking sector and the impact of the Covid-19 pandemic on accelerating this transformation. The findings highlight the significance of digital banking channels and underscore the need for financial institutions to focus on personalized and self-service offerings. Customers perceive digital channels as secure and convenient, leading to an increasing willingness to adopt digital banking services.

Moreover, the study also reviewed existing research on customer experience in digital banking, highlighting the significance of customer satisfaction, loyalty, design, usability, and the overall impact of digital transformation on the banking industry. The results of the study are consistent with the existing literature, supporting the importance of customer experience in digital banking.

The findings of this study have several implications for both theory and practice in the field of digital banking. What regards to theory implications, the study contributes to the existing literature on digital banking by providing empirical evidence on the impact of the Covid-19 pandemic on the adoption and usage of digital banking services. The findings validate and support the importance of customer experience in digital banking, emphasizing its influence on customer satisfaction, loyalty, and the overall success of digital banking strategies. The study also contributes to the understanding of the role of technology familiarity, such as fintech terminology, in shaping customer preferences and behaviors in the digital banking landscape.

What regards to practice implications, financial institutions can leverage the findings to enhance their digital banking strategies and offerings. The emphasis on personalized and self-service offerings, along with the preference for mobile channels, highlights the importance of providing convenient and secure digital banking experiences for customers. Banks can prioritize investments in mobile applications and contactless technology to align with customer preferences and adapt to the changing landscape accelerated by the pandemic. The insights on customer perceptions, preferences, and barriers to digital banking usage can inform targeted marketing and communication strategies aimed at increasing adoption rates, particularly among non-users. Banks can consider the implications of customer preferences for certain banking operations, such as consulting financial investments and investment funds through digital channels, to streamline their service offerings and improve customer satisfaction. The study also highlights the need for continuous monitoring and improvement of security measures in digital banking services to address customer concerns and enhance trust.

In summary, the implications of the findings underscore the importance of customer-centric approaches, technological advancements, and continuous innovation in digital banking. Financial institutions can draw upon these implications to inform their strategies, improve customer experiences, and navigate the evolving digital landscape in the post-pandemic era.

However, it is important to acknowledge the limitations and uncertainties inherent in the study's design and development. Given the relatively recent nature of the Covid-19 pandemic, there may be a scarcity of sufficient data or empirical studies to fully comprehend its economic effects, particularly within the banking sector. Consequently, comparing the results of this study with other investigations may present challenges.

Furthermore, since the study employed an online questionnaire and a non-probabilistic sample, caution must be exercised in generalizing the findings to the entire population. These limitations should be taken into consideration when interpreting the study's results.

Overall, this study provides valuable insights into the digital transformation of banking and calls for further research to deepen our understanding of this dynamic and evolving field. Future studies should aim to access a broader range of scientific studies to gain a more comprehensive understanding of the pandemic's broader effects on digitalization

in the banking sector. Additionally, analyzing the long-term impacts of the pandemic is crucial for a comprehensive understanding.

In terms of future research, conducting exploratory interviews with financial institution employees would provide valuable insights into their daily experiences and the internal reactions of banks to the pandemic. Moreover, segmenting the market and conducting a more extensive sociodemographic analysis would enhance our understanding of the influence of sociodemographic factors on the adoption of digital banking.

In conclusion, the findings suggest that respondents generally perceive internet-based services as secure and are willing to recommend their usage. They predominantly access these services through mobile phones/smartphones, with security being the most valued quality. Respondents exhibit familiarity with fintech terminology and institutions, expressing their intention to continue using digital banking channels in the future.

Most notably, respondents believe that Homebanking/Mobile Banking tools facilitate closer interaction between financial institutions and customers. They also prefer the convenience of using debit/credit cards or mobile devices over cash payments, demonstrating a preference for digital channels over traditional ones. Comparing the pre-Covid and Covid periods, branches experienced a decline in usage, while Homebanking and Mobile Banking gained more frequent users. ATMs, previously the preferred payment method, were replaced by mobile applications and Homebanking, with an increased adoption of contactless technology and MB WAY for payments. Currently, respondents favor digital channels for most banking operations, except for buying/selling shares and credit simulations, which are less commonly used channels. When seeking information, respondents prefer utilizing branches and Homebanking.

Thus, Homebanking emerges as the preferred communication channel for respondents to interact with their banks. Among respondents with outstanding loans, the majority did not avail themselves of the government-approved moratorium period. However, most respondents did not perceive a significant change in their frequency of Homebanking/Mobile Banking usage during the pandemic. Furthermore, they do not believe that banking will become entirely digital, despite acknowledging that Covid-19 has accelerated the need for digital transformation in the banking sector.

For individuals who do not currently utilize digital banking services, the most commonly cited reasons include concerns about security and a lack of knowledge required to effectively use the services.

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ETHICAL STATEMENT

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