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PERSPECTIVES OF BANKING NETWORK BRANCHES AND THE EFFECTS OF REDUCING TERRITORIAL PRESENCE IN THE BANKING SYSTEM

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Digital transformation in the banking industry is a continuous process that significantly reshapes internal processes and operational flows. It raises important dilemmas regarding the geographical distribution of bank branches, the efficient use of physical space, and the extent to which services can be delivered exclusively through technology without human involvement. At the same time, customers continue to rely on physical branches, particularly for complex operations such as mortgage lending, specialized financial advice, or other non-standard transactions. Consequently, traditional branches remain an important pillar in maintaining trust and long-term relationships between banks and their customers. Digital transformation is driven by multiple factors, including the ability to provide services without physical presence, 24/7 availability, customer base expansion, and cost optimization. Advanced technologies have simplified and accelerated key processes, such as account opening, improving efficiency and customer experience. This paper analyzes the evolution of digitalization in commercial banks and its impact on branch networks, workforce, and profitability. Using the Pearson correlation method, it examines the relationship between online banking penetration and banking performance. While existing literature focuses primarily on operational and technological benefits, it pays limited attention to the structural effects of branch downsizing on competition, regional accessibility, and customer trust. The paper is structured as follows: Section 2 reviews the literature and conceptual background; Section 3 presents the methodology and data analysis; Section 4 discusses the empirical results; and Section 5 concludes with key findings, managerial implications, and future research directions.

Keywords: **Digital banking, Bank of the future, Online banking penetration, Bank branches**

JEL Classification: **G00, G10, G20, G21, G29, I20, I22**

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1. Introduction

Traditional banking activities are increasingly challenged on the one hand by start-ups which bring along technological progress of financial and banking services, and, on the other hand, by the need to digitalize banking services. The banking transformation component comprises at least three main fields: to increase the market share, to optimize overhead and to supply services to customers who wish to make use of the technology instead of the traditional banking services made available through the traditional bank offices.

Fifteen years ago, the main operations provided through online internet banking services enabled access to bank account data, bank statements, account receivables records etc. and, subsequently, the initiation of payments and foreign exchange exchanges. When they transferred the responsibility for performing account service operations (i.e. payments/deposits) from the bank front office staff to customers (in the case of natural persons) and to accounting departments (in the case of legal entities), banks found that operations performed well, with mutual benefits. Customers do not have to show up at bank counters anymore, whereas the front office staff could be directed to other added value services. Customers had to show up at the bank offices only to activate online services.

If prior to 2019, bank accounts could only be opened based on the physical presence of the customer at the bank office, as their identity papers had to be checked for authenticity and the Know Your Customer process had to be carried out, the situation caused by the pandemic caused banks to find solutions to maintain operational continuity going well under the new conditions. These solutions had the same denominating factor, namely digitalization. Consequently, in a relatively short time, both natural persons and legal entities which are bank customers can open bank accounts by executing 100 % online processes.

The research focus of the foregoing study is connected to identifying to what extent technological progress stimulated banks to redesign their regional network, the conditions in which the number of traditional bank offices will continue to be reduced, when this process ceases and what impact it has on profitability.

A first research-relevant question arises here: why do banks reduce their traditional network, why do they close offices and how does the movement of customers previously serviced in the physical offices to the online services stand? There are several causes to explore:

- The population does not need bank accounts, products and services any longer;

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- There are also other options for bank accounts and operations, which are more adjusted to the needs of the customers;
- The customers do not feel the need to attend the bank offices as these are crowded or as they spend too much time calling on the physical offices.
- The population found alternatives to the traditional bank office counter, which are more convenient for them
- Banks want fewer customers in their physical offices to avoid costs generated by the maintenance of the regional network.

A second research question refers to the future of the bank office. Will these offices continue to be dismantled?

- The bank industry representatives created alternatives to the traditional counter in the online and thus they attracted many more customers.
- However, younger generations do not like or are not accustomed to spend time in the physical offices.
- The processes that involved the reduction of the number of bank offices and staff had an impact on the earnings of the banks.

As branch networks shrink, questions arise regarding their long-term role in sustaining customer trust, inclusion, and regional accessibility. In this context, the central research question guiding this paper is: To what extent does the penetration of online banking influence the financial performance of banks, and how does the digitalization process reshape the balance between efficiency, profitability, and territorial accessibility in the European banking system?

It stands to reason that the technology-created options to enroll customers online provide at least the following benefits: bank services can be accessed from any location, whenever (24/7) and without human interactions. According to Yıldırım, A.C., Erdil, E. (2024), the digital bank is defined as a whenever wherever system, that comprises a whole array of delivery channels, products and services that are developed and implemented by a bank or a financial institution, that enable customers to access bank data to carry out financial activities using an electronic device connected to the Internet.

There are several benefits connected to using technology: it saves time, effort, reduces operational expenses and makes profitability grow. Financial transactions may be executed in a matter of minutes and are instantly accessible. These apps are appealing and have major importance for smartphone users. Younger customers, millennials and Gen-Z especially, strongly prefer to use technology and real-time operations. At the same time, in Europe, 65 % of the second generation owns smartphones. As regards the younger generation, this percentage stands already at 90 %. According to a survey carried out by Gîrlea, M. (2020), these new digital customers are estimated to execute around 50 % of the new bank transactions in Europe. Digital customers use mobile phones and the internet almost exclusively for bank operations, access funding and open new accounts.

The progressive reduction in the number of territorial branches has not only reshaped the operational landscape of the banking system but has also altered its competitive dynamics. As physical networks shrink, large banks with significant technological investment capacity have gained a clear competitive edge through scale economies, automation, and omnichannel strategies (Kaličanin et al., 2021; Campbell et al., 2023). Conversely, smaller institutions with limited digital budgets face challenges in maintaining customer proximity and brand visibility in regions where branches previously acted as trust anchors (Proctor, 2019; Val Srinivas & Wadhwani, 2019). The consolidation of the branch network thus amplifies market concentration and fosters cost efficiency, yet risks marginalizing certain customer segments—particularly elderly and rural populations—who remain reliant on face-to-face banking (Carlson, 2024; Accenture, 2024). In the long term, the equilibrium between digital efficiency and territorial accessibility will become a determinant of competitiveness and financial inclusion within the banking ecosystem (Sullivan, 2015; ECB, 2024).

While the benefits of digitalization in terms of efficiency and profitability are widely recognized (Kaličanin et al., 2021; Yıldırım & Erdil, 2024), there remains a crucial need to understand its broader systemic implications. Previous studies have predominantly examined the operational and technological aspects of digital transformation, such as automation, cost optimization, and customer satisfaction in digital environments (Falkovitch & Rozental, 2019; Polatoglu & Ekin, 2001; Campbell et al., 2023). However, the academic literature is comparatively limited in addressing how the progressive reduction of territorial branch networks affects regional accessibility, competitive balance, and the trust-based relationships that have historically underpinned banking services.

Most existing research either focuses on highly digitalized economies or relies on qualitative insights from customer surveys, leaving quantitative evidence about the connection between digitalization and financial performance across diverse European markets underexplored. Furthermore, there is a lack of integrative approaches combining technological, organizational, and geographical dimensions of digital banking transformation. This research aims to bridge that gap by empirically examining the correlation between online banking penetration and key performance indicators—Return on Equity (ROE) and Return on Assets (ROA)—over a significant temporal interval (2010–2023), providing a data-driven assessment of how digital adoption influences profitability in the European banking sector.

From a theoretical standpoint, this paper contributes to the existing literature by extending the analysis of digital transformation beyond its technological domain toward its structural and spatial consequences. It advances the conceptual understanding of how digitalization interacts with territorial accessibility, institutional trust, and financial inclusion—key determinants of long-term banking sustainability. The research also integrates elements of

Banking 4.0 theory, which posits that financial services will become seamlessly embedded in everyday life, transforming banking from a transactional process into a continuous, technology-mediated experience (Kaličanin et al., 2021).

From a practical perspective, the findings have managerial and policy relevance. The study provides empirical evidence that the increasing penetration of online banking correlates positively with profitability indicators, reinforcing the strategic rationale for digital investment. At the same time, it highlights the risk that excessive branch reduction could lead to customer exclusion, particularly among less digitally literate populations. Therefore, it suggests that banking institutions and regulators should pursue hybrid operational models—combining digital channels with selective physical presence—to ensure both efficiency and inclusivity.

The mission of this research is to bridge the empirical and conceptual gap between digital transformation and banking performance by integrating technological, geographical, and economic perspectives. The study aims to:

1. Quantify the relationship between digital adoption (measured through online banking penetration) and financial performance indicators (ROE and ROA) in European banks between 2010–2023.
2. Assess how the expansion of digital services correlates with the reduction of bank branches and employees across the European banking sector.
3. Provide theoretical and practical insights on how banks can optimize their digital strategies while preserving accessibility and customer trust.

2. Literature Review

The article analyzes the specialized literature and the available statistical data to extract an overview of the evolution regarding the structure of commercial banks both in the European Economic Area and in Romania. This analysis focuses on the equation including the number of employees, the number of physical offices, as well as the progress of ROE (return on equity) and ROA (return on assets) as indicators of business efficiency in the banking industry. The available statistical data from 2007 to 2024 was quantitatively analyzed. This period is deemed relevant because the main technological developments occurred in this interval and they caused the transition to the current stage of digitalization.

The data was extracted from international databases (Statista) and from specialized online libraries, such as CEEOL, Deloitte Insights, McKinsey. Traditional bank experience, based on the regional network, will continue to be an important pillar of the bank industry in the coming years, especially in countries where the adoption of digital tools stands low. At the same time, yet even this traditional infrastructure will have to adjust to new technologies.

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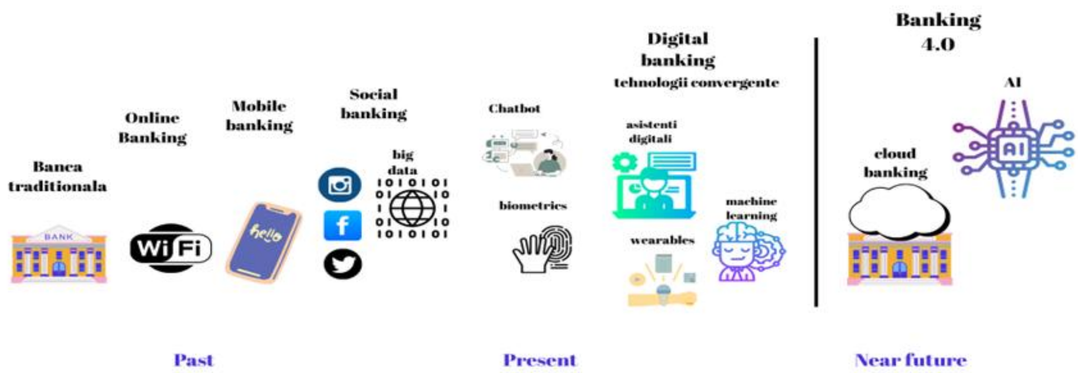
The banking technology evolution is illustrated in a diagram in Figure 1 below:



Source: developed by the authors

Figure 1. Impact of technology on the bank business model

From traditional banking, the technological progress beginning with wi-fi and mobile phones with data connections revamped how customers interact with the bank, while artificial intelligence is just the next step in this evolution.

2.1 Digital banking

Various researchers analyzed the extent to which digital transformations impact the perception of both customers and their own managers regarding business digitalization. Falkovitch O., Rozental C. M., (2019), highlights that most respondents believe that services supplied in physical offices may be replaced with digital services on condition of compliance with the standards that customers are familiar with. According to the participants in the survey, going to the bank office and queueing are obsolete; in addition, digital services are accessible, convenient, carried out in real time and cheaper. Moreover, they stated that even though digital may replace the standard, the routine and the relatively simple operations, it cannot replace non-standardized transactions and customized financial advice.

Other surveys, by Polatoglu & Ekin, (2001), Kadir et al., (2011), Ahmad & Al-Zu'bi, (2011), Ankit, (2011), also indicate a positive correlation between customer satisfaction and reliability, through accessibility. In addition, in two of these, by Polatoglu & Ekin, (2001), and Ankit, (2011), a positive link is highlighted between customer satisfaction and parameters such as the risk perceived and problem solving.

The younger generation though, accustomed as it is with Google and Instagram, are intensive internet users and want to minimize the need to attend the bank office. For the needs of these users, who will soon be the main customers for bank transactions, the Internet interfaces and mobile banking are and will remain in a continuous evolution in the coming years, incorporating new technologies, such as biometric solutions for identification and digital assistants, and artificial intelligence increasingly that will allow for customizing banking service even in the online environment. From the point of view of implementing digitalization, the process may be viewed from two angles:

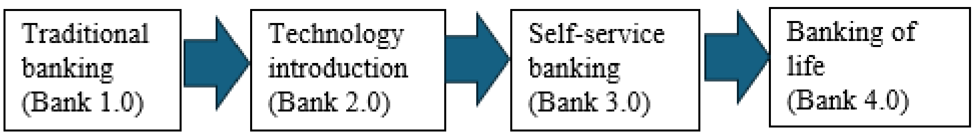
- the internal component to improve processes with a view to maximizing the quality of labour, efficiency and saving on the overhead
- the external component focused on the interaction with the end user, the increase in the quality of services and the retention rate.

According to Kaličanin M, Perić, M and Kaličani, Z., (2021), investing in digitalization processes, one invests in the business itself, with a view to surviving on a competitive market. Corporations that do not adapt or do not tackle the digitalization of their business in due time will be faced with significant challenges in solving the administrative and financial obstacles that may be harmful to maintain a quality service and a profitable business.

Thus, the banking system will have to be redesigned and even the business model be adapted from the one aimed at the market share to the one aimed at the interaction with existing and potential customers.

At the same time, as the new generations of customers enter and operate on the cryptocurrency market, the current banking industry services and products need to be deeply analysed. Innovating products, improved productivity, quick transfer of currencies and funds, real-time data feeding systems are all cutting edges in efficiently managing digital technologies in the banking industry.

The high level of technological changes in the whole banking and economic ecosystem contributed to the significant impact which digitalization has both for the individual and the community. The automated learning based on artificial intelligence, the increase in the level of data and digital technologies usage are important actors that will continue to influence the digitalization process. Similarly, Kaličanin, M., Perić, M and Kaličani, Z., (2021), showed in Figure 2 the current level of the commercial banking industry as a stage of transition to Banking 4.0 (banking of life).



Source: https://www.ceeol.com/search/article-detail?id=1003224

Figure 2. Banking revolution

Banking 4.0 suggests the deep and natural integration of banking services in the daily life of people, up to the point where banking is not a separate, scheduled or formal activity, but it becomes part and parcel of the daily life, just like going shopping, speaking on the phone or social media use.

2.2 Traditional banking

Equally, traditional banking experience, based on the regional network and customer networking staff, will continue to be an important pillar of the banking business in the coming years, especially in the countries where the adoption of digital tools stands low. At the same time, though, even this traditional infrastructure must adapt to the new technologies, especially through the increased adoption of self-service terminals for bank transactions.

Even though closing branches is a business decision that may be justified out of several reasons, banks should not give them up entirely. In many cases, the bank office is and will be the end destination in the journey of a customer that started online or on the mobile phone - Proctor, K. B. (2019). Thus, the bank office provides the connection between the customer in person and the digital financial world as banks need to provide an integrated, customized experience, to be deemed successful.

The bank office is especially relevant for the much elder population, who are less sophisticated from the technological point of view. This was one of the factors that keep traditional branches alive, and their potential as regards sales, even though at lower levels. The financial needs of this demographic sector are decreasing, while the new generations, familiar with new technologies, relying on digital banking services, significantly reduce sales volumes in the physical offices. Bank offices remain important yet because they allow testing new ideas for banking products and services.

Srinivas, Wadhwani. (2019). consider that the traditional bank counter remains important as it generates greater satisfaction for customers as compared to the services supplied through digital channels. The authors' view is that owing to the typical complexity and/or urgency, opening an account and solving issues are two critical services which customers are likely to execute through channels that do not involve human contact – usually in bank branches and offices. At the same time, bank customers view physical offices as a must for complaints. Digital neobanks start to reach the same conclusions, therefore begin to open physical offices.

At the same time, customers' satisfaction may be high if a question raised at a physical office was treated efficiently or if they had a successful meeting with the branch manager; this way, it is much higher than the satisfaction provided by the mobile app.

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Timisoara Journal of Economics and Business TJE&B

Another impact of the traditional branch is that banks are a symbol of trust. And, if one considers that the issue of money is complex and personal, trust becomes paramount when it comes to operations to deposit one's money or to attract one's personal savings. The traditional branch continues to be treated as the typical location of choice to open bank deposits.

At the same time, according to the Global Banking Consumer Study (2023), carried out by Accenture, on a sample of 49,000 bank customers worldwide, over 6 out of 10 customers of all demographic categories rely on branches to cope with specific and complicated financial challenges. It shows that the traditional bank counter continues to play an important role in satisfying the needs of the customers. Additionally, the report highlights the importance of bank offices in showing stability and availability, as 67 % of the customers expressed their preference to have a branch nearby. It is worth mentioning that the feeling holds for all demographic groups.

In the absence of physical branches, it is challenging for banks to deliver significant advice and sell complex bank products. As a result, they must find means to resume personal conversations with customers to build successful relationships, to increase loyalty and trust. According to Carlson (2024), physical bank counters are making a comeback as money is personal: when it comes to personal issues, such as investment, retirement and real estate plans, customers want to talk to somebody.

The most recent bank-related trend in the US is a surge of the phenomenon to open physical bank branches – hundreds of them in large and small markets around the country. This happens after more than a decade of contraction of the physical office networks. Bank of America has recently stated that it would open 165 branches by the end of 2026, whereas other hundreds will be opened in the coming years.

At the beginning of 2025, JP Morgan Chase, the owner of the largest network of bank branches in the US, stated that 500 new locations will be opened by 2027. Large regional banks, such as PNC Financial Services Group, also expand their network with hundreds of new branches. A recent KPMG report suggests that the network of bank branches and credit unions are ready to upgrade and innovate. Services will outgrow by far traditional supplies. Bank of America, for instance, calls its new branches financial centers that will provide such services as asset management, an important service for banks and loans for small enterprises. While closing some bank branches is a business decision which may be justified for several reasons, apparently banks should not completely abandon branches yet.

2.3 Statistical data overview

According to Garcia, (2019), as of 2007, the first year of the last economic downturn, we have witnessed a marked downsizing in the bank networks, a process noted both in the US

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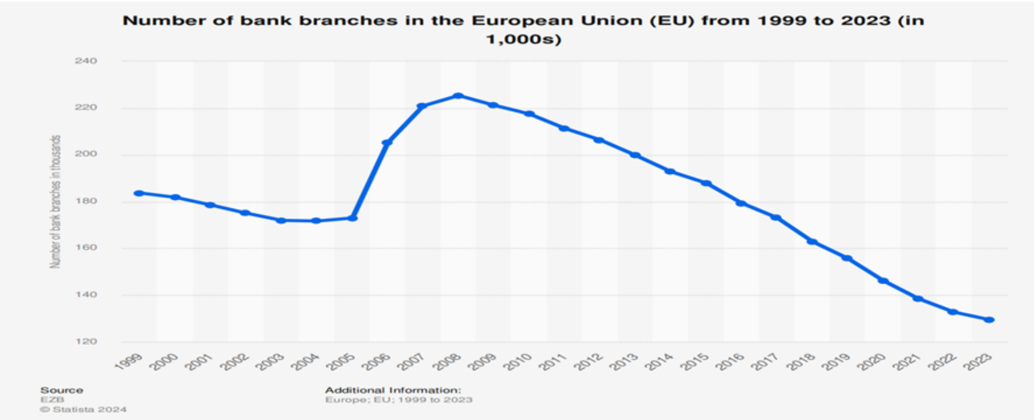
and the EU. Figure 3 shows the evolution of the number of bank offices in the European Union:



Source: https://www.statista.com/statistics/940970/number-of-bank-branches-in-europe/

Figure 3. Evolution of the number of bank offices in the EU

According to data from the Romanian Bank of Romania extracted from the overview by Dinu, C., (2023), the same decreasing trend (around 30 %) was also noted in Romania, as the number of physical offices of the largest 10 banks in the industry was significantly reduced from 4,924 in 2009 to 3,209 in 2023, whereas this decreasing trend continues to be manifest.

Restructuring the bank system in Romania by revamping regional networks was a clearly observable process from 2009 to 2023, a period marked in the beginning by the financial downturn and then by digitalization. All banks in Romania, without exception, were forced to reduce the number of bank offices. Consequently, the banking industry had to strongly reconfigure itself, especially against the backdrop of the transformation of traditional banking. Many Romanians became increasingly aware of the benefits provided by the remote interaction with the bank, learning how to use payment instruments and the Internet and mobile banking services to their benefit.

In the context of these major changes, on the one hand, credit institutions welcomed a process to aggressively slash down the number of branches and, on the other hand, they put in practice plans to upscale and upgrade the remaining ones. In the new context, bank branches become technological hubs where multifunctional machines (MFMs) replace cash transactions and operations.

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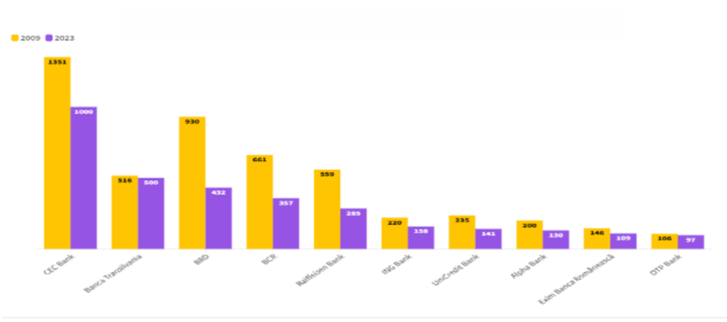

Source: https://bankingnews.ro/top-banci-sucursale-agentie-banca-transilvania-bcr-brd-raiffeisen-ing-bank.html

Figure 4. Evolution of the number of bank offices in Romania

According to a survey carried out by Dinu, C., (2023), CEC Bank had the largest network of agencies in 2009, more specifically 1,351. Currently, this number stands at little over 1,000. The second largest bank based on regional presence was BRD Groupe Société Générale in 2009, as it operated a network of 930 bank offices. Presently, after cutting down more than half of the number of branches, BRD has 432 units and climbed down one place in this top.

BCR and Raiffeisen Bank are the other credit institutions that halved their regional networks, faring alongside BRD as the banks with the most aggressive restructuring plans. Banca Transilvania, which ranks second in the meantime in the regional presence top, has maintained its number of offices almost intact. Still, one should not lose sight of the fact that, in Banca Transilvania's case, the agencies owned by Volksbank (185) and Bancpost (286) in 2009 are completely out of the picture as the two credit institutions were bought out by the bank from Cluj in the meantime. When it was acquired (in 2014), Volksbank had 130 bank offices and Bancpost (bought in 2018) had 147, one can say that Banca Transilvania "brought its share" to the restructuring process of the bank network of Romania with around 270 agencies.

Medrega, C., (2024), pointed out that as compared to the peak of 2008 over 20,300 employees (20,384 bank staff) left the banking system (- 28.5 %). At the same time, more than 3,000 bank offices (3,086 branches) closed down in the banking industry as a whole; cutting costs, part of the system moved the banking business online as a result of several banks having disappeared from statistics, while the regional banking network adjustment throughout the period stand at around 50 %.

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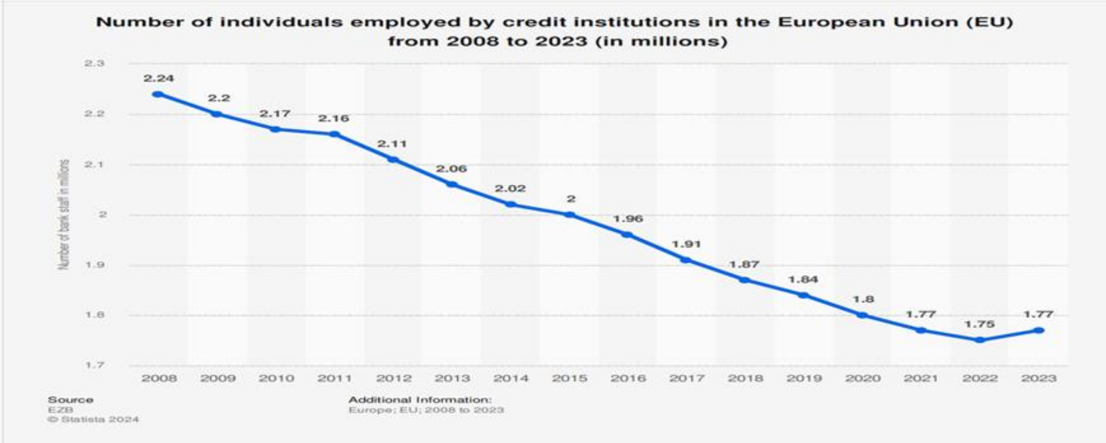

Source: https://www.statista.com/statistics/940990/number-of-bank-staff-in-europe/

Figure 5. Evolution of the number of employees in EU banks

Based on the statistics of the National Bank of Romania, Medrega, C., (2024), points out in a *Ziarul Financiar* article, titled *How many offices and how many employees do credit institutions of Romania still have?*, that the total number of persons hired by banks in the EU Member States decreased significantly from 2008 to 2023, despite a slight increase in 2023. Overall, at the end of 2023, there were around 1.77 million people working in banks in Europe as a whole, with around 470,000 less as compared to 2008.

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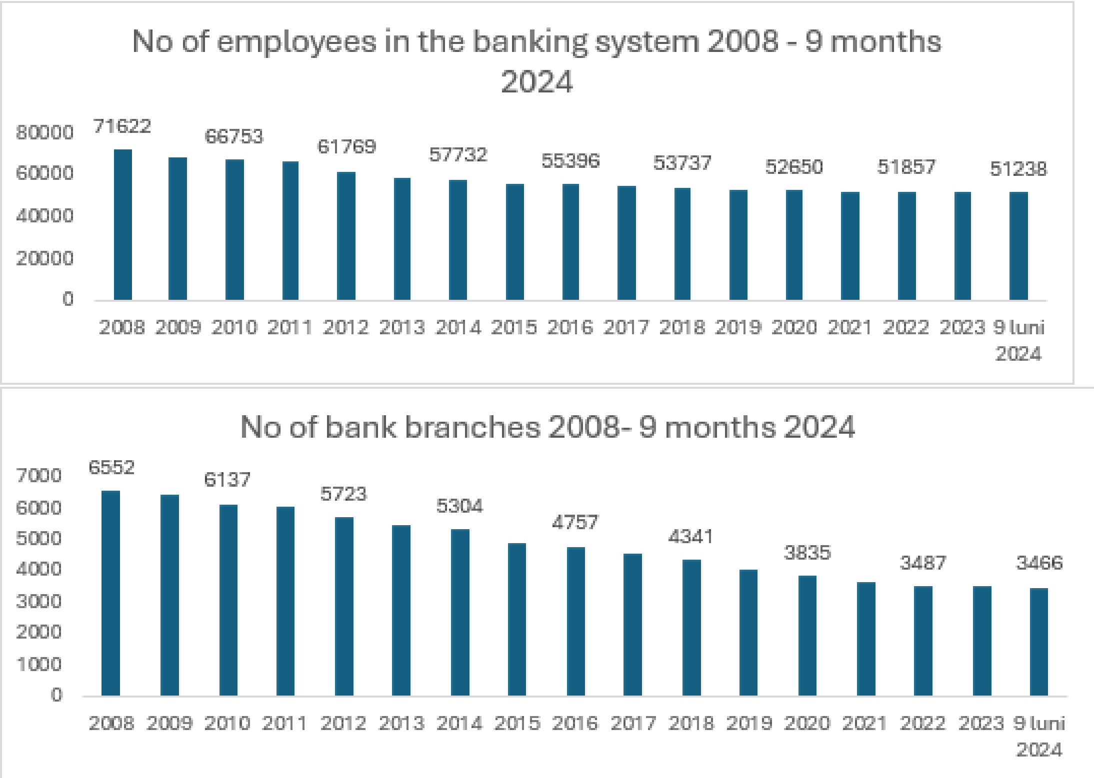

Source: https://www.zf.ro/banci-si-asigurari/cati-bancheri-cate-sucursale-agentii-aveau-institutiile-credit-22602042

Figure 6. Evolution of the number of bank offices and employees in the banks of Romania

In Figure 6, Medrega, C., (2024), notes in *Effervescence in banking: the consolidation and the restructuring of the banking system continue*s that the restructuring of the banking system continued in the first 9 months of 2024 as well, just like in 2023, but its pace slowed down, after it had speeded up in 2020 and 2021 in the context of COVID-19 pandemic. The banks that are active on the Romanian market had 51,238 employees at the end of the first 9 months of 2024, whereas the number of branches went down to 3,466.

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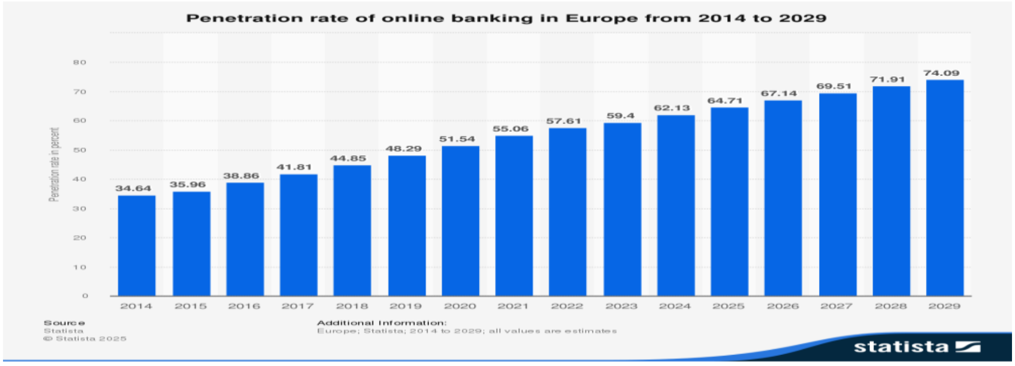
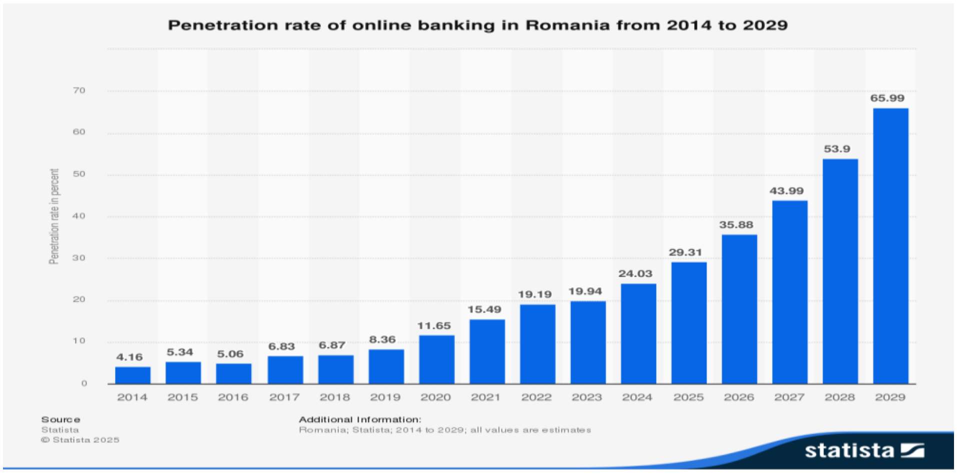


Source: https://www.statista.com/statistics/1310965/online-banking-penetration-in-the-european-union/

Figure 7. Penetration rate of online banking in the European Union from 2010 to 2024

In Figure 7 Eurostat. (2024) *Penetration rate of online banking in the European Union (EU) from 2010 to 2024* there is an overview of the penetration rate of online banking in Europe from 2014 onwards, while it reaches 62 % in 2024 and is estimated to peak 74 % in 2029. The reduction of the number of bank offices and their employees as a result is closely connected to this penetration rate.

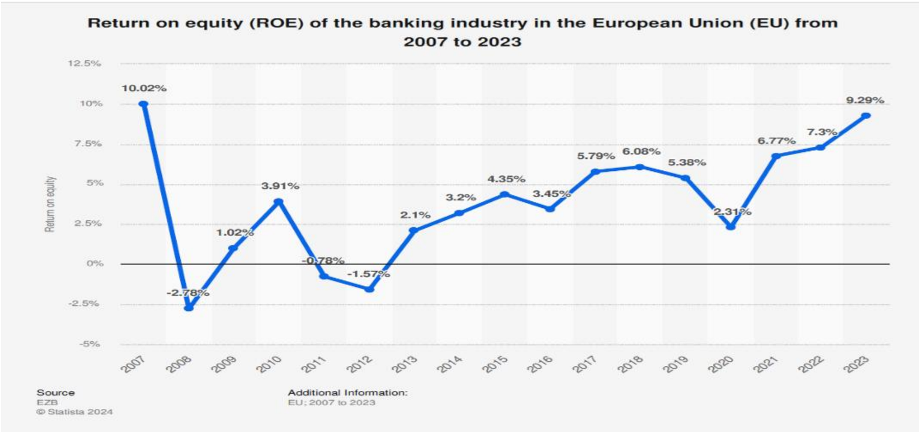


Source: https://www.statista.com/forecasts/1150414/online-banking-penetration-forecast-in-romania
https://ec.europa.eu/eurostat/databrowser/view/tin00099/default/table?lang=en

Figure 8. Penetration rate of online banking in Romania

According to Figure 8 Eurostat, (2024), the penetration rate of online banking in Romania has been forecast to grow continuously from 2024 to 2029, by a total of 42 percentage points. After the thirteenth consecutive year of growth, the penetration rate of online banking is estimated to stand at 65.99 % in 2029.

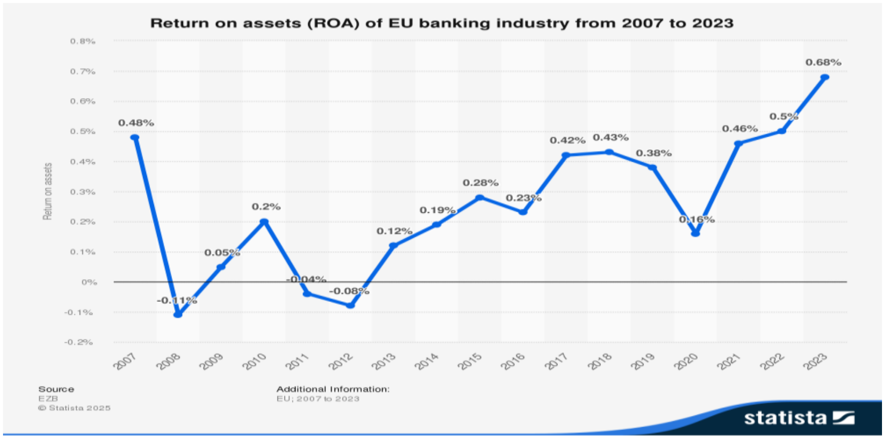
If the trend to embrace digital services is increasingly rising, and the reduction of staff and physical offices indicate banks' commitment to their digitalization, only 3 out of 10 EU citizens (in average) imagine they could execute their financial transactions exclusively online.



Source: https://www.statista.com/statistics/1259170/roe-eu-banking-industry/

Figure 9. Return on equity (ROE) of the banking industry in the European Union

The efficiency of banking industry in the European Union has gone through some significant fluctuations as regards the return on equity (ROE) during the past two decades. After a marked decrease in 2020 because of COVID-19 pandemic, the industry made a remarkable recovery and growth. ROE has made a come-back from a minimum of 2.31 % in 2020 to 6.77 % in 2021, followed by an additional growth to 7.22 % in 2022. Until 2023, ROE reached an impressive percentage of 9.29 %, which marked its highest peak since 2007.



Source: https://www.statista.com/statistics/1275935/roa-eu-banking-industry/

Figure 10. Return on assets (ROA) of EU banking industry from 2007 to 2023

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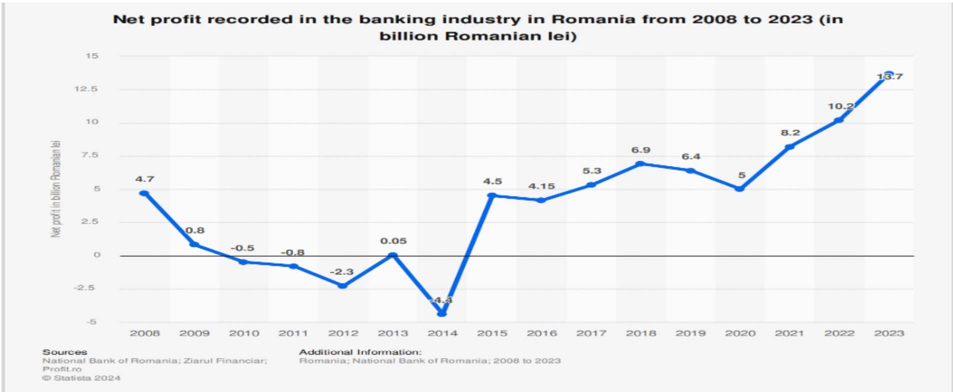

Source: Ziarul Financiar, & Profit.ro. (February 9, 2024). Net profit recorded in the banking industry of Romania from 2008 to 2023 (in billion Romanian lei) [Graph]. In Statista. Retrieved February 25, 2025, from https://www.statista.com/statistics/1219588/romania-net-profit-recorded-in-the-banking-industry/

Figure 11. Net profit recorded in the banking industry in Romania from 2008 to 2023

3. Research methodology

We chose Pearson coefficient to analyse the relationship between the efficiency indicators related to the banking industry of Europe (return on equity – ROE and return on assets – ROA) and the penetration rate of online banking and our choice was based on the following methodological and statistical arguments:

1. All three variables – penetration rate of online banking, ROE and ROA – are expressed on a continuous scale, which makes for the appropriateness in using Pearson coefficient as it is fit to measure linear relations among numerical variables.
2. Normal distribution of variables – Pearson coefficient is deemed efficient when the analyzed variables have a distribution closer to normal.
3. Comparability and academic usage – Pearson is one of the most widely used methods in econometric and financial research to examine the link between two financial indicators. Its choice facilitates comparability with other banking industry surveys.
4. Direct interpretation – According to Salamao, A., (2024), Understanding mathematics behind relations, Pearson coefficient provides a numerical result easy to interpret, as it varies from -1 to 1, where 1 indicates a perfect positive correlation, 0, lack of correlation, whereas -1 indicates a perfect negative correlation. It is useful to quantify the force of the relationship between ROE and ROA.

In the case of business and financial data, the distribution may be checked through normality tests (Kolmogorov-Smirnov, Shapiro-Wilk) or through graphic visualizations (histograms, Q-Q plot). If the variables are almost normal, then the use of Pearson coefficient is justified.

Three sets of data extracted from 2010 to 2023 were analyzed from the point of view of the correlation:

- ROE (return on equity) levels recorded in Europe in the banking industry from 2010 to 2023
- ROA (return on assets) levels recorded in Europe in the banking industry from 2010 to 2023 and
- the penetration rate of online banking in Europe from 2010 to 2023.

Table 1: 2010- 2022 evolution: ROE, ROA, the penetration of online banking in the banking industry of Europe

YEAR	ROE BANKING INDUSTRY EUROPE	ROA BANKING INDUSTRY EUROPE	ONLINE BANKING PENETRATION
2010	3.91	0.20	36
2011	-0.78	-0.04	36
2012	-1.57	-0.08	38
2013	2.1	0.12	40.13
2014	3.2	0.19	42.29
2015	4.35	0.28	43.82
2016	3.45	0.23	46.27
2017	5.79	0.42	48.88
2018	6.08	0.43	51.43
2019	5.38	0.38	54.57
2020	2.31	0.16	57.69
2021	6.77	0.46	58.31
2022	7.3	0.50	59.63
2023	9.29	0.68	63.87

Source: Statista

The data was processed in JASP to determine the presented statistical indicators.

4. Results

Table 2: Correlation ROE/ONLINE BANKING PENETRATION RATE

Pearson's Correlations

Variable		ROE	E-BANKING
1. ROE	Pearson's r	—	
	p-value	—	
	Covariance	—	
2. E-BANKING	Pearson's r	0.778	—
	p-value	0.001	—
	Covariance	21.914	—

The results of the Pearson correlation coefficient analysis show a positive significant link between the two variables: ROE (Return on Equity) and E-BANKING. Pearson correlation coefficient is r = 0.778, which suggests a strong and positive correlation between these variables. This coefficient may be interpreted as showing that while E-BANKING grows, ROE tends to grow as well.

The P-value linked to the correlation coefficient is 0.001, which is far less the standard significance level of 0.05. Thus, one may conclude that there is a statistically significant correlation between ROE and E-BANKING.

The covariance between the two variables stands at 21.914, which reflects their shared variability. A positive covariance suggests that variables tend to grow and decrease together.

Table 3: Shapiro-Wilk Test for Multivariate Normality

Shapiro-Wilk Test for Multivariate Normality

Shapiro-Wilk	p
0.909	0.108

In the case of the correlation between ROE and penetration rate of online banking, the Shapiro-Wilk test for multivariate normality was applied to check whether data follows a normal distribution. The result of this test for the combined values of variables is p = 0.108, which is a higher value than the threshold of significance of 0.05. Consequently, one may consider that the data is almost normally distributed, which is a valuable indicator if one carries out the correlation analysis.

Table 4: Correlation ROA/PENETRATION RATE OF ONLINE BANKING

Pearson's Correlations

Variable		PENETRATION	ROA
1. PENETRATION	Pearson's r	—	
	p-value	—	
2. ROA	Pearson's r	0.820	—
	p-value	< .001	—

The results of the Pearson coefficient analysis regarding the link between PENETRATION and ROA (Return on Assets) suggest a positive significant link between these two variables. Pearson correlation coefficient is r = 0.820, which indicates a strong and positive correlation. Consequently, one may conclude that the growth of the penetration rate of online banking pairs with the growth of ROA, having therefore a positive influence on the return on assets.

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The P-value associated to the correlation coefficient is < 0.001, a significant statistical result (well below the threshold of significance, which is 0.05). This means that the correlation noted between PENETRATION and ROA is not the outcome of a perchance phenomenon and may be deemed as statistically significant.

Table 5: Shapiro-Wilk Test for Multivariate Normality

Shapiro-Wilk Test for Multivariate Normality	
Shapiro-Wilk	p
0.919	0.174

In the case of the correlation between ROA and the penetration rate of online banking, Shapiro-Wilk test for multivariate normality was applied to test whether data follows a normal distribution. The result of this test for the analyzed variables is p = 0.174, which is a higher value than the significance threshold of 0.05. This result suggests that data is normally distributed, which validates the use of statistical tests based on this assumption.

The results of the Pearson correlation analysis indicate a strong and statistically significant relationship between the penetration rate of online banking and profitability indicators across European banks. Specifically, the correlation coefficients between online banking penetration and ROE (r = 0.778, p < 0.01) and between online banking penetration and ROA (r = 0.820, p < 0.001) reveal a consistent and positive linkage between digital adoption and financial performance.

These findings are broadly consistent with recent empirical studies that highlight the profitability benefits of digital transformation in the banking sector. For instance, Yıldırım and Erdil (2024) demonstrated that post-pandemic digital acceleration significantly enhanced operational efficiency and profitability across EU financial institutions. Similarly, Kaličanin et al. (2021) found that higher levels of digital integration correlated with stronger competitive resilience and improved asset utilization, particularly among large, technologically mature banks.

However, when compared with the research by Campbell et al. (2023) and Accenture (2024), the present results reveal nuances in the impact of digitalization. Campbell's findings suggested that small and mid-sized banks face diminishing marginal returns on digital investments when technology costs exceed operational benefits, while this study shows a generalized positive correlation across the European market. This difference can be attributed to the aggregated dataset used here, which integrates both advanced and emerging digital economies, providing a broader macroeconomic view

In alignment with Proctor (2019) and Val Srinivas & Wadhwani (2019), the findings confirm that digitalization enhances cost efficiency but simultaneously contributes to branch consolidation. The closure of physical branches, while improving short-term profitability, could threaten customer proximity and trust — especially in less digitally mature regions. This duality reinforces the argument of Carlson (2024) that the resurgence of hybrid models (combining digital and physical interfaces) is necessary to maintain long-term competitiveness and inclusivity.

A comparison with Garcia (2023) and Dinu (2023) further validates the observed trends: as online penetration increased, both the number of physical branches and banking staff declined by approximately 30–40% across the EU. Nevertheless, the return on equity and assets steadily recovered post-2020, reaching their highest levels since 2007 (EBA, 2025). These data confirm that digitalization contributes to profitability recovery after financial downturns, supporting the positive correlations established in this study.

Beyond consistency, this analysis extends prior work by quantifying the intensity of this relationship over a long temporal interval (2010–2023). Unlike earlier cross-sectional studies, the present approach demonstrates that digital adoption has not only a statistically significant but also a sustained and reinforcing effect on financial performance across time. The long-term data horizon allows for a better understanding of structural rather than cyclical digitalization effects.

Furthermore, when contrasted with the findings of McKinsey's Global Banking Review (2024) and ECB Digital Finance Outlook (2025), the correlations observed in this paper align with the strategic direction of the European banking ecosystem, where profitability growth increasingly depends on digital operational maturity rather than branch density. This trend confirms that digital adoption has become an independent driver of competitiveness, transcending traditional variables such as network size or market share.

5. Conclusions

Traditional banks must cope with fierce competition from the newcomers on the market such as the fintech start-ups and digital banks. These companies use technology to provide consumers with innovating and convenient banking solutions, disturbing the traditional banking model. To retain their competitive edge, traditional banks invest massively in digital transformation initiatives, such as mobile banking applications, online banking portals, artificial intelligence and chat bots to improve customers' experience and operational efficiency.

Additionally, COVID-19 pandemics accelerate led transition to the digital banking industry even more, as customers are increasingly looking into contactless and online banking solutions. Digital adoption in the banking industry advanced by a few years in a few months because of the pandemic. Most certainly closing branches is a way that financial institutions use to save money and improve profitability, but it comes at a price – the lack of face-to-face interaction with customers, deemed essential to cement long-standing relationships with customers.

Banks closed thousands of branches after the financial downturn of 2008 - 2009. There followed the rise of remote and digital banking services, accompanied by an increase of an extended range of online services. According to Statista Insights data, the penetration rate of online banking services reached 69 % this year and it is forecast to peak 79 % in 5 years.

Despite all this, the traditional banking experience, based on the regional network and customer networking staff, will continue to be an important pillar of the banking business in the coming years, especially in those countries where the adoption of digital tools stands low. At the same time, however, even this traditional infrastructure must adjust to new technologies, especially through the increased adoption of self-service terminals for bank transactions and MFMs.

Moreover, taking into account that banks do not offer an end product, but a service that streamlines the purchase of products and services, some banks have begun to act as brokers in the relationship with end product suppliers, by developing marketplace type of portals for various products, such as instance motor third party liability contracts, taxes, vignettes, bridge tolls, e-Sim and others, for instance.

Pearson coefficient shows that there is positive significant link between ROE and E-BANKING, which suggests that the adoption and use of electronic banking services positively influences financial performance in the banking industry. The analyzed data observe the assumption of normality, which validates the applicability of the statistical tests that were used. These results may provide a robust base for additional research studies and detailed analyses of the links between financial performance and the use of electronic banking technologies.

At the same time, there is a positive significant link between the penetration rate of online banking and ROA, which suggests that a better penetration rate is associated with a better financial performance, measured through the return on assets. The normality test does not reject the hypothesis according to which data is distributed normally, which supports the validity of the results of the link analysis.

These conclusions suggest that there is a significant and strong connection between the enlargement of the market or services and financial performance, and the analyzed data is compliant with the statistical assumptions required to correctly interpret results.

The obtained results will be useful both to strike a balance between the size of the network of physical offices and the level of digitalization, and to manage banks from the point of view of resource efficiency and healthy and sustainable business growth.

The research study provides support in understanding how digitalization influences banking efficiency and profitability, measured through ROA and ROE. Its results may guide banks in making strategic decisions, by providing a competitive edge and supporting investments in technology to increase performance.

The analysis is based mainly on aggregated European data, which may conceal national specificities and the heterogeneity of digital adoption across markets. Future research could extend this work by incorporating cross-country comparative approaches or micro-level data on customer behaviour, assessing how branch downsizing impacts financial inclusion, customer satisfaction, and long-term competitive positioning. Additionally, further studies could explore the mediating role of regulatory frameworks and technological readiness in shaping the efficiency–competition nexus within the European banking system.

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