

EUROPEAN BANKING SECTOR IN THE ERA OF DIGITALIZATION. INNOVATION AND UPCOMING SCENARIOS

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Abstract. *European banking sector has a long history and has developed gradually with society. First representations of banking in European area are mentioned in ancient Greece and territory of the Roman Empire. To some extent this may be linked to the cultural and civilization level and to economic exchanges with other regions of the world. Furthermore, in these geographical boundaries are present indications of people that performed the role of bankers (European Investment Bank, 2000). After the fall of the Roman Empire, the banking activity entered in a period of downfall, witnessing rebirth of specific elements during the Early Middle Ages. Gradually it started to develop again, with the commerce done by Sweden and Italian cities, like Genoa and Venice. Italian towns developed trade activities with Byzantium, Egypt, North Africa and Asia Minor (European Investment Bank, 2000). Later, advances are registered with the medieval banking families in Italian cities, such is Medici in Florence (Karan et al., 2024) and German banking houses. Another significant moment is noticed during the extension of financial activity in Amsterdam, this having the role of first large securities exchange (Karan et al., 2024). European banking continued to develop in different modalities, specific to the political, economic and social realities. For example, towards the nineteenth century there were different approaches regarding the metal used for the coins in circulation, such is the case of gold for England and silver in German states, Austrian and Russian Empires and Scandinavia (European Investment Bank, 2000). Acceptance in the use of banknotes on a large scale took a lot of time, being strictly linked to the confidence level of the people and the concentration of issuing under central banking authority. In the last decades, innovation, technology and digitalization started to shape new realities inside the banking sector. This paper will analyze the impact of digitalization inside European market, how it has started, where it has arrived and how it could develop further.*

Keywords: *European banking sector; banks; digitalization; innovation; banking processes.*

JEL classification: *F00; G21; L86; M15; O31.*

1. Introduction

European banking sector has been under the impact of numerous transformations in the last years, being considered among the dynamic ecosystems of the society. The evolution has been produced by the social and economic realities, new consumer behaviour and customer aspiration to have personalized experiences from their banks.

European banking system has witnessed an increase in the values of operational, financial and reputational risks at industry level. Consequently, financial players have been required to increase the monitoring of market evolution and to implement new measures asked by legislators and market supervisors (e.g. new financial regulations: PSD2, NIS2, GDPR, DORA).

Furthermore, banks have been in the front row of digital expansion, their business processes being characterized by a significant percentage of technical innovation. Availability of a massive amount of info (Big Data) has forced the financial institutions to consider proper measures for storage, processing and protection. Implementation of innovation has conducted to the appearance of new risk categories, such as cyber and cybersecurity (Bajracharya et al., 2023), banks having to increase their portfolio of unforeseen events, prevention and mitigation actions.

The legislative framework at European level impacting the sector is quite extensive, some of the regulations being specific only to banks, some to other categories of financial entities (European Commission).



Figure 1: European legislation impacting the European banking sector (selection)
Source: European Commission

European Commission is addressing the impact of digitalization in finance, issuing a digital finance strategy, a retail payments strategy and several legislative actions (European Commission). Among them can be cited the Markets in Crypto-Assets Regulation or MICA, which offers one regulatory framework in the field. Service providers in crypto market have to ask for authorization to be present in European Union and follow requirements to protect investor crypto wallets. European Banking Authority will preserve a public register with non-compliant service providers. Second legislative initiative, the Digital Operational Resilience Act is presenting a background of requirements for the security of networks and information systems of

organizations present in financial area and of third parties offering ICT services to them. Furthermore, the Commission initiated a pilot regime for market infrastructures based on distributed ledger technology (European Commission).

As digitalization is founded consistently on AI, the European Union has issued the Artificial Intelligence Act. It has the objective to put in place a legal background to support the development of AI with the respect of fundamental rights of people and mitigating the risks associated with this technology (European Union, 2024).

2. Research Questions

There are several study questions that could be addressed, in order to have a better understanding of the research theme:

- Which have been the technologies that have transformed the European banking sector?
- What lessons can be learnt from the analysis performed?
- Which are the possible scenarios of evolution for European banking sector?

3. Methodology

In terms of methodology relevant literature has been reviewed and legislation in the field has been addressed and mentioned.

Historically have been identified the key moments associated with the implementation of specific technologies in the banking sector and how these are represented inside the structure of banking processes.

Based on the studies and articles reviewed, quantitative data has been identified and mentioned to show evolution of European banking sector.

For EU countries (where data is available) have been mentioned the initiatives in place and digitalization characteristics present in national banking sector.

Additionally, with accessible information, have been drafted some high-level conclusions that will be subject of future analysis.

4. Results and Discussions

Performing an assessment on the evolution of digitalization in European banking sector have been identified several periods, many of them associated to the launch of alternative channels. Initial moment is linked to the putting in place of the first automated teller machine in England, followed by Sweden – summer of 1967 (Thodenius et al., 2010).

In New York in 1982 have been launched the online services, when four of the city's major banks (Citibank, Chase Manhattan, Chemical and Manufacturers Hanover) offered home banking services using the videotex system (Cronin, 1997) (Koskosas, 2011). According to K Devi and Devadutta Indoria (2020) some financial institutions were offering electronic banking to their customers in 1985. Expansion on the use of electronic banking came into place in Europe and in other regions with the launch of the internet that has been one of the key innovations in business (Agwu, 2013).

Another key moment has been the launch of the first smart phone in 2007 that together with the internet changed forever the communication and interaction

behaviour in numerous economic and social processes and services. From that instant on, the innovation advanced continuously in most of the products offered by financial institutions.

Currently, there are mobile applications that include budget management, automated investments, scheduled payments, virtual cards, biometric authentication, smart phones being used on a large scale for financial services (Oliveira et al., 2016). Digital transformation contains cloud banking, API for integration with Fintechs (Gomber et al., 2018), tools for advanced analysis, artificial intelligence and chatbots answer to questions, identify client needs and propose personalized services. Furthermore, AI is utilized in fraud detection, to raise the cybersecurity level. Blockchain is bringing a new approach to the management of financial data, offering further transparency and security (Danțiș, 2021).

Among the priorities of financial sector is the design of client experience. This can be seen in the services that were requiring in the past, physical presence in the branches (Front Office) and can be done in present through alternative channels, centralized platforms and virtual assistants. In this perimeter can be included client on boarding, Know Your Customer (Arner et al., 2019), selling of financial services and products.

In Middle Office area can be seen automations in: analysis using Big Data and interactive dashboards, in Treasury processes or selling of investment products, utilization of alternative channels for communication, personalized offers, process digitalization (Von Solms et Langerman, 2022).

Back Office in banks is witnessing the use of AI for efficiency in standardized processes, decrease of payments' processing time, automation in data input or control execution, handling of documents (Ling et al., 2020).

As the retail area is offering numerous opportunities in business development, merchants can use smart phones for digital payments or benefit from the existence of e-commerce platforms (Paun et al., 2024).

The increase in the use of alternative channels and implementation of new technologies can be linked contemporarily (for sure not completely) with the decrease of domestic banking branches at European Union level.

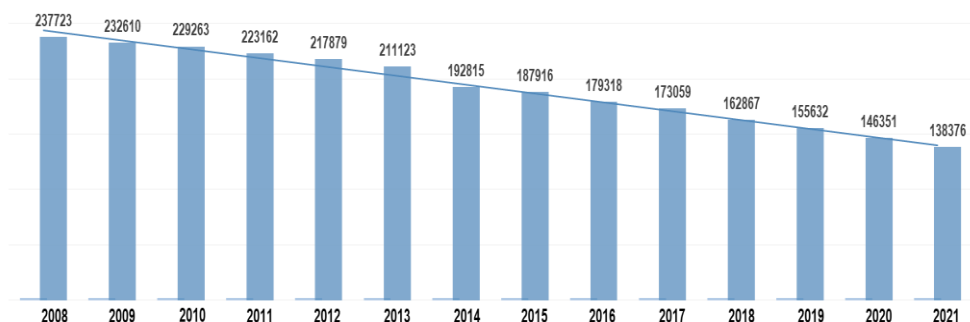


Figure 2: Number of domestic branches in the EU banking sector

Source: European Banking Federation. Banking in Europe: EBF Facts & Figures 2022

It can be seen that since 2008 the number of branches has decreased from over 237.723 units to 138.376 units in 2021.

The same study of European Banking Federation is showing a decrease in the number of employees in banking from 2.789.622 in 2008 to 2.149.178 in 2021.

Table 1: Number of employees in EU banking sector

Year	Number of employees
2008	2.789.622
2009	2.712.598
2010	2.681.757
2011	2.660.858
2012	2.609.098
2013	2.541.776
2014	2.485.753
2015	2.452.400
2016	2.413.639
2017	2.371.483
2018	2.296.454
2019	2.265.274
2020	2.219.044
2021	2.149.178

Source: European Banking Federation. Banking in Europe: EBF Facts & Figures 2022

Regarding ATMs in EU, for year 2021 are indicated 333,786 units, registering a decrease of 55.000 units compared to 2020. This value represents an indication regarding the increase in the use of digital channels and payments (European Banking Federation, 2022).

Performing a specific evaluation on the initiatives ongoing or digital implementations in various countries of the EU have been identified the following points (European Banking Federation), as it is shown in Table 2.

Table 2: Initiatives and characteristics of digitalization in banking in EU Countries

Country (data updated December 2024)
Belgium: electronic banking and mobile banking are increasing, most of the population using these channels. Strictly linked to digitalization and banking are mentioned challenges arising from financial literacy, cyber threats, increase of digital implementation, AI.
Cyprus: mobile solutions, contactless transactions, smart device applications.
Estonia: high utilization ratio of cards in payments, majority of payment orders are initiated electronically, small percentage of the population receives the salary totally or partially in cash.
France: significant development of innovation and FinTech, large exposure of the inhabitants towards electronic banking and applications.

Hungary: it is seen an increase in the volumes of electronic transactions.
Ireland: information shows an increase in the payments via cards.
Latvia: strong digital innovation, implementation of SCT instant payments (transfers available 24/7).
Luxembourg: innovative financial technologies, banks collaborating with FinTech actors.
Poland: positive representation for digitalization.
Portugal: it can be seen a significant increase in the use of internet banking, online access to accounts, issue of new cards and utilization of cards in online purchases.
Romania: challenges are seen in increasing the digitalization level and cybersecurity.
Slovakia: increase in the use of contactless cards, mobile and instant payments, card transactions.
Spain: investments in digitalization, towards new digital sales accounts, instant payments.
Sweden: high percentage of digitalization, with mobile banking, bank E-ID, e-invoices, cards and instant payments.
The Netherlands: efficient and innovative payment systems.

Source: European Banking Federation website

Information in the table is showing that many of the EU countries, if not most of them (not all data is available, further research necessary) have implemented to a smaller or extended level, digitalization inside their banking system.

Therefore, digitalization represents a strategic direction for each national and EU banking system. To highlight this statement, the European Banking Authority has a statutory duty to monitor and assess market developments, inside the Digital Finance, having the following priorities:

- decentralized finance, crypto and tokenization;
- artificial intelligence and machine learning;
- value chain developments.

Not only European Banking Federation is involved in understanding and monitoring the strategic digital transformation of the banking sector. European Central Bank has launched in 2022 a survey among 105 large banks to evaluate their digital approach, stating that results may require further assessment. The survey has concentrated around six areas (European Central Bank, 2023):

- digital strategy and KPI steering;
- digital business;
- investments and resources;
- governance and cooperation;

- use of innovative technologies;
- risks.

The results are quite interesting and provide further insights in terms of lessons learnt and guidelines for future developments. “43% of banks’ top 5 projects are aimed at revenue/customer experience enhancement and 83% of banks see process automation as a key lever to reduce costs (mainly through IT legacy transformation)”. Survey provides significant information in terms of resources allocated by banks for digital transformation. “On average, banks invested 2,8% of their operating income” and “allocated 5,2% of their workforce” in 2021 in this direction. Many banks have indicated that Senior Management is involved in putting in place of the digital strategy. Attention point is seen in identification and retention of skilled employees; therefore, many organizations cooperate with external organizations. Use cases are being opened for: API, cloud, AI and distributed ledger technology. For the last area, the risks associated to the digital transformation are cyber risk, dependency of third parties, AML/fraud, loss of customers. As challenges for the digital transformation are perceived: cybersecurity, legacy systems, lack of internal skills and cost management.

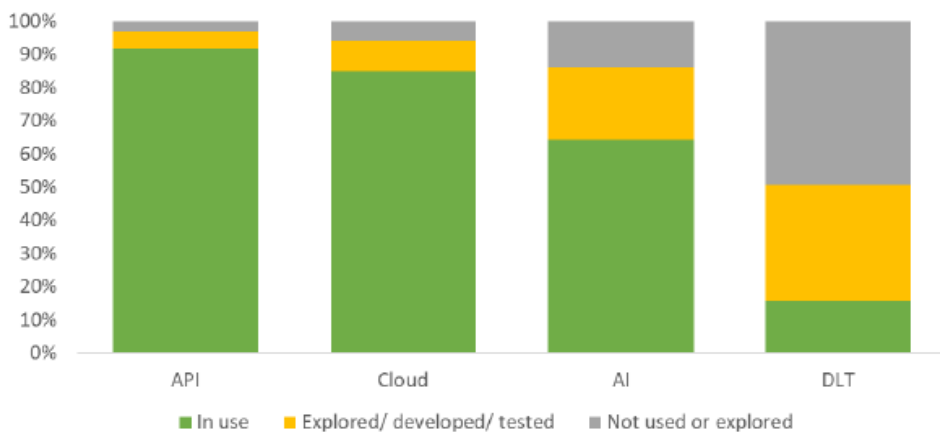


Figure 3: Adoption rates of innovative technology
Source: European Central Bank survey (2023)

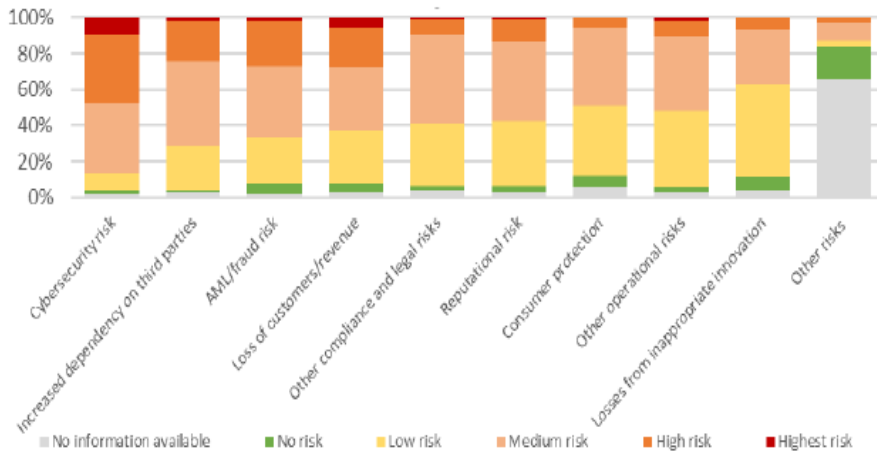


Figure 4: Key risks in digital transformation
Source: European Central Bank survey (2023)

5. Conclusions

The digital transformation of EU banking sector is far from being finished. It is still on going and will require further allocation of budget, resources and evaluation of projects launched.

What can be noticed is the fact that many of banking actors in the EU have enrolled in this journey of change of their business model.

It has been observed that implementation of digitalization provides to the industry several benefits: rises the operational efficiency, increases the customer satisfaction index, supports innovation of particular services, reduces costs, better risk monitoring allowing the staff to concentrate on critical activities. Nevertheless, these benefits have to be linked to the challenges and risks in place, as it was shown by the survey done by European Central Bank (2023).

Further assessments by market regulators or joint research should be launched and used for analysis of the projects and activities on going.

Based on the information evaluated and collected until now, can be mentioned for the future, the following directions:

- maintenance in the trend of domestic branch reduction;
- increase in the automation ratio of banking process, even for the ones that had an increased number of manual steps;
- growth in the budget and resources allocated for digital transformation by banking players. Organizations that will not invest in the development of this hybrid banking model should expect a decrease in their business value;

- opening of new projects by banks to implement additional measures of data storage and protection, reduction and prevention of cyber risk, putting into practice and compliance with various legislative requirements;
- extension of partnerships between banks, FinTech's, academia and other organizations.

An evaluation of the European Central Bank (2025), at the end of 2024 for Euro area has identified around 60 banks, having a business model founded only on digital. The same source indicates that the market share of digital banks increased from 3,1% of total assets in 2019 to 3,9% in 2024.

As a general idea can be stated that digital banks will continue to develop and to generate value. Citing Statista platform, in the digital banks (only) market, the projected Net Interest Income worldwide is set to reach US\$1.56tn in 2025. Looking ahead, it is expected that the Net Interest Income will display an annual growth rate (CAGR 2025-2030) of 7,07%, leading to a market volume of US \$ 2.20tn by 2030. Considering the above-mentioned forecasts, can be seen clearly the opportunity for market evolution and research, to analyze further the digital transformation of the European banking sector.

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