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API INTEGRATION IN THE BANKING ECOSYSTEM: THE ROLE OF OPEN BANKING

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Abstract: To provide banking services to clients at any location in the world has become a necessity as the economy operates on a global scale. This has brought about the innovations of both Fintech companies and digital ecosystems. They offer additional competition and remote services to consumers banking on other institutions. Having little infrastructure at a global scale results in a lack of trust with the consumers, and an inexperience when it comes to the financial industry, confines these organizations to a lack of customer bases.

Open banking systems will permit the clients to handle their assets from a single dashboard. It will replace the multitude of applications used from different banking institutions by providing a single comprehensive unified application that will integrate different financial products such as accounts, loans, credit and debit cards, insurance and investments.

Open banking systems as a model is integrated with a host of other networking facilities, and associated with the need for advanced data protection systems. It is vital for the clients these days to keep in mind that they are not simply surrendering their data to any and every organization. Data is only accessible to any of third parties after the clients have expressly given consent for their data to be processed.

The open banking model using application programming interfaces is the first step in a sequence of innovations to banking processes.

Keywords: open banking, API, digitalization, banking services, data security, client safety
JEL Classification: G21, O33, G28

INTRODUCTION

The digital transformation has influenced the development of the financial market and the economy as a whole, leading to the widespread use of digital financial services by both individuals and companies, as well as to an increase in consumer demands regarding improved convenience and security of the products and services offered, along with the diversification of their range. In order to create new, modern services for clients, service providers are compelled to identify new business models and solutions, and to develop the information technologies that will be applied. At the same time, traditional perceptions of consumers and market participants regarding the importance of financial data and the possibilities of managing it are also changing.

In many countries, including the Republic of Moldova, there is a visible trend of expanding access to data. For a long period, in the financial sector and in other branches of the global economy, application programming interfaces (APIs) have been widely used. Companies primarily use APIs to simplify and speed up digital data exchange in integration projects, to expand the functionality of internal systems and launch mobile services, as well as to connect business partners. Currently, open APIs are gaining particular importance. Their main distinction from internal or partner APIs lies in the fact that they are developed according to open standards and imply equal access for all participants. A number of countries are already actively implementing initiatives for the introduction of open APIs. Generally, three data-sharing models based on open APIs are considered: Open Banking, Open Finance, and Open Data.

A common feature of all levels is that client data may only be obtained with the client's consent, while the main difference between the models lies in the composition of the data provided by companies. Open APIs are programming interfaces published by organizations in accordance with the requirements of the National Bank of Moldova, in order to enable digital data exchange with service providers (with the client's consent) and with clients in the process of organizing and delivering financial services.

Open Banking is a model whereby service providers obtain clients' banking and payment data, as well as carry out banking operations at the client's initiative.

Open Finance is a model under which service providers receive not only banking and payment data, but also information on other financial services: insurance, investments, pensions, and others.

Open Data is a model that extends the requirement of open client data exchange to both financial and non-financial companies (for example, enterprises in telecommunications, e-commerce, etc.), as well as to state information databases where client data is stored and processed.

MATERIAL AND METHOD

In the specialized literature, issues related to the influence of open application programming interfaces on the future of financial services provision by commercial banks are still in the formative stage. In the process of delivering various banking services, commercial banks are involved in collecting, processing, and storing data such as clients' personal information, preferences, performed operations, and their frequency, etc. With the increase in the number of services and products offered, banks face the challenge of accessing the full spectrum of data regarding clients and executed transactions, as well as using this data to better respond to clients' needs. Each commercial bank chooses the optimal way of storing this information, while resorting to third-party companies – outsourcing – to cover a certain range of activities has become a rather common practice. This can occur for several reasons, for example: the lack of necessary functionalities developed internally. Another example may be business diversification, creating an ecosystem capable of attracting as many clients as possible by diversifying the range of services provided. In both cases, the need arises for rapid access to internal information, the solution being represented by open APIs.

Thus, an API is a software intermediary that allows applications to interact with each other and exchange data.

A banking API is an API that allows an external application to access the bank's internal information systems. These manage clients' accounts, process incoming and outgoing transactions, and generally automate and support activities considered banking services. The most widespread example of the use of a banking API is the mobile banking application, which currently exists at practically every bank. When a client presses the button to check the balance of their account, the application uses the banking API to create and send a request to the bank's corresponding information system. The system, in turn, transmits the requested information. If a client makes a payment from the mobile banking application, the application uses the API to create and transmit to the bank the corresponding electronic payment order.

In the use of the banking API for the functioning of the mobile banking application, it does not matter what happens inside the bank's information systems, where the data is stored, or how customer orders are executed. What matters is the existence of a clear list of commands and requests, the use of which leads to the completion of the task by the bank's internal systems. This list represents the banking API.

The most common applications of APIs, besides banking, are:

- Provision of weather data;

- Provision of currency exchange data;
- Online translators, which receive the text, the source language, and the target language, and return the translated text;
- Sending emails / SMS / Skype / Telegram / Viber;
- Money transfers;
- Closed interaction between servers;
- Obtaining news.

The revision of the bank's strategy and the open use of APIs can transform the bank's business in the future. It is expected that, following this process, bank cards will become a thing of the past. All online payments and transfers will be carried out directly from the account, eliminating the use of cards that require entering the number and personal data. This is a timely measure, considering the increasing number of cases of users' money being stolen during online card payments.

The European Payment Directive recommends the application of a new identification procedure that involves three verification steps: login + password, SMS confirmation on the phone, and biometric data. It is even possible that the cumbersome and outdated login + password pair will be completely removed from the authentication process, as it represents the most insecure and vulnerable factor. In real transactions, plastic cards will be replaced by smartphone applications.

The origins of open banking can be traced back to the push for financial inclusion and transparency in the activity of commercial banks. This development is driven by the acceleration of the modernization process in the financial sector, making it more competitive and innovative, and also more resilient to the challenges posed by artificial intelligence. The idea came to life in Europe with the introduction of the Revised Payment Services Directive (PSD2) and the Open Banking Implementation Entity (OBIE) in the United Kingdom. These regulations required banks to open their payment services and customer data to third-party providers, substantially reshaping the traditional banking model. Thus, the key regulations are:

PSD2 in Europe: The PSD2, enforced in January 2018, is a landmark regulation in the European Union that aims to make payments more secure, boost innovation, and help banking services adapt to new technologies. It obliges banks to provide access to their customers' data to third-party payment service providers (PSPs) with the customers' consent. This opens the door for fintech companies to develop new financial products and services. The PSD2 is the revised version of the original Payment Services Directive (PSD) that the EU introduced in 2007 to create a single payment market within Europe. It set down rules and guidelines for payment services, simplified payment processing across EU countries, advocated innovation, and encouraged competition by opening payments to new entrants (Mansfield-Devine, Steve, 2016). One of the PSD2 aims is to promote innovation in the payments sector, particularly by opening it up to new, non-bank players. This aim is closely related to the formation of the open banking innovation;

One example of a successful implementation of open banking is the United Kingdom (UK), where implementing open banking regulations has led to a significant increase in competition and innovation in the financial services sector (Open Banking Limited, 2021). OBIE in the UK: The Open Banking Implementation Entity (OBIE) was created by the UK's Competition and Markets Authority to enhance competition and innovation in the UK financial services sector. OBIE has established standards and frameworks to facilitate the secure sharing of financial data between banks and third-party providers, fostering a more dynamic and customer-centric financial ecosystem;

United States: Unlike Europe and the UK, the US lacks a single unified open banking regulation. Instead, it has a more fragmented approach with various state and federal regulations. However, the Consumer Financial Protection Bureau (CFPB) has been working on initiatives to promote consumer data access and security;

Australia (CDR): The Consumer Data Right (CDR) in Australia empowers consumers with control over their data, starting with the banking sector under the Open Banking regime. The aim is to enhance competition and encourage new service developments in the financial industry;

Asia (Singapore and Hong Kong): Singapore's Monetary Authority of Singapore (MAS) and Hong Kong's Open API Framework have been proactive in promoting open banking. Both regions have developed guidelines and standards to encourage banks to open their APIs to third parties, enhancing service offerings and consumer choice (Komandla, 2017).

In June 2023, the European Commission proposed a comprehensive Regulation on open finance, aimed at extending the principles of open banking to other financial sectors, such as insurance, pensions, and investments. This regulation seeks to facilitate data sharing across financial services, strengthen competition, and improve consumer access to financial products.

In APAC countries, including India, Japan, China, Indonesia, and Australia, the growth of open banking operations is driven by a combination of regulatory initiatives, technological advancements, and the increasing adoption of digital financial services by consumers. Consumers in the Asia-Pacific region are interested in using innovative financial products that provide convenience and personalization. The wider integration of APIs and the spread of fintech startups have also played an important role in driving market growth. In September 2023, the Government of India announced plans to expand the scope of APIs to include more financial services. This ensures real-time payments and financial data sharing, further boosting the country's open banking ecosystem (Global Market Insights (n.d.)).

In the researcher's opinion, there are several difficulties in designing an open banking system. Firstly, mutual authentication is difficult to manage transparently. Because the most important resource in Open Banking is the right to access user data and must be carefully considered, the invocation of confidential data must be registered in an organized manner. Secondly, the data source allows users to audit and track data in case of misconduct or system attacks. When this information is not available, large banks have a significant advantage, as they have access to low-cost innovations. To avoid market imbalances and to protect user confidentiality, it is important to ensure the transparency of data origin (Xu, Z. 2020).

With this challenging conception, Xu et al. (2020) suggest three main points to be managed with the advent of Open Banking, which are described in figure 1.

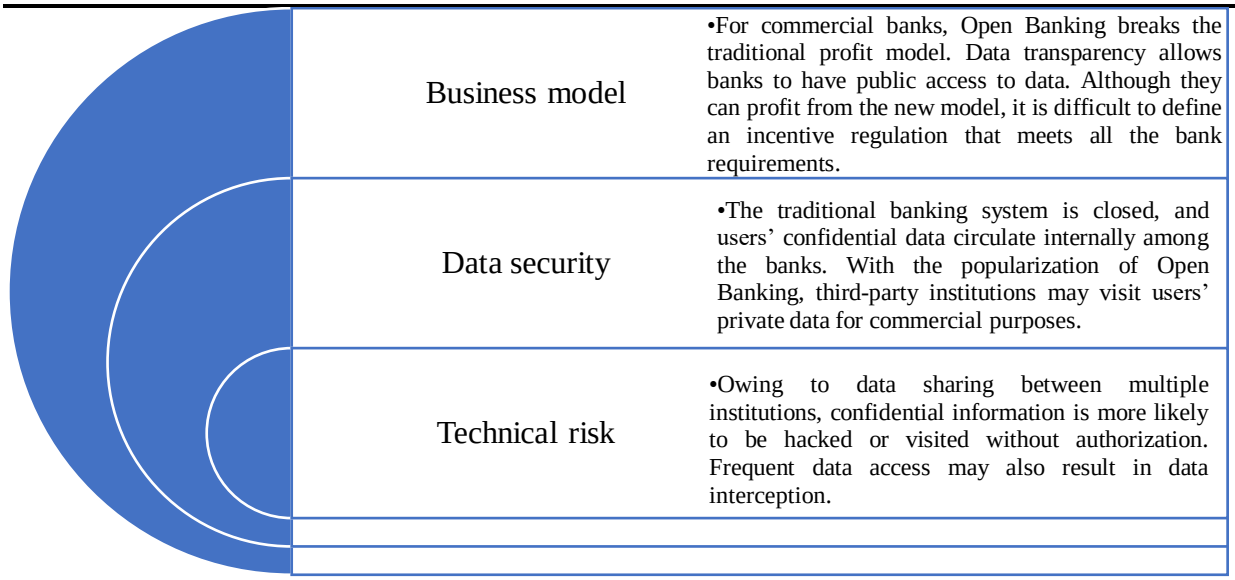

Figure 1. Main aspects to be managed in the context of the emergence of Open Banking

Source: elaborated by the author based on Xu, Z. et al. (2020)

RESULTS AND DISCUSSION

In the financial field, the integration of APIs has become a revolutionary tool, transforming the way financial services are delivered and used. APIs allow different software systems to interact with each other, facilitating the rapid integration of various financial platforms and services (Oluwaseun, Godwin, Njideka, 2024). A commercial bank has the capacity to offer a wider range of services, enhance user experience, and improve processes through strategic API integration. APIs, for example, allow banks and fintech startups to collaborate in creating new products and services such as digital wallets, instant payment solutions, and personalized financial management tools.

Collaboration between commercial banks and fintech companies can take various forms of interaction – from the simple use of fintech startups' services to full technological partnerships, investments in the implementation of new systems, or the acquisition of already developed projects (table 1).

Table1. Directions of Collaboration between Fintech and Banking Businesses

Type of collaboration	Characteristics and benefits
P2P and P2B Lending Market	In this market, banks can collaborate advantageously with electronic lending platforms or create their own similar platforms. Benefits: more favorable development conditions and additional revenue in the form of commissions, adopting technological solutions, reducing current expenses for certain types of services, and indirectly participating in activities they cannot carry out independently due to restrictions imposed by the financial regulator and the lack of legislative regulation for some aspects of this type of activity.
Open Banking	Banks must open access to their own data and services to fintech providers (through open programming interfaces – APIs). Benefits: minimizing the costs and time required for the development and implementation of financial technology innovations; gradual transition to digital banking in the banking sector; new opportunities for banks to create modern services and products that meet the needs of current and potential clients; active use of Big Data; expanded possibilities for using social networks as the main communication channel.

Introduction of Remote Client Identification and BankID	The BankID system will allow convenient and secure user identification for the provision of a series of banking, commercial, and administrative services via the internet.
Banks' Use of Open APIs for Data and Digital Asset Monetization	Open APIs allow banks to integrate their products and services into new programs to offer clients various products or services through the banking ecosystem. This creates a partnership ecosystem and collaboration between banks and fintechs, fostering cost-saving data exchange. Open API interfaces allow clients to connect to other services within the banking ecosystem and expand the range of services offered.
New Business Model – Banks Acting as a Platform for Multiple Fintech Companies	Banks-as-a-Platform (BaaP) represents a complete change of the banking business model, directly interacting with fintech companies for their innovative solutions, enabling them to offer customers a "single order." This collaboration will generate new revenue streams for banks with minimal infrastructure development, while fintech companies gain access to a vast customer base and substantial financial support from traditional banking networks.
Joint Cybersecurity Systems	Remote services have compelled banks to invest in cybersecurity systems due to the increasing level of cybercrime. The rise in digitalization and internet connectivity has led to more data breaches, forcing banks to strengthen their security systems.
Investments in Augmented Reality (AR)	Banks are investing in AR as it allows them to deliver flawless solutions to customers and stand out in the financial services market. AR involves the real-time use of information and other virtual extensions integrated into real objects. The ability to combine digital and physical realities will transform customer experiences, integrating continuous banking activities into daily interactions. AR programs can help the banking industry provide easy account access and faster payments. In the near future, banks will be able to replace traditional branches with virtual branches and consultants, saving time and capital.
Artificial Intelligence (AI) and Cognitive Technologies	AI and cognitive technologies allow banks to accelerate digitalization initiatives and deliver targeted, personalized products and services. AI is increasingly important in banking through customer assistance with voice assistants, enabling more efficient responses to customer requests. AI will also support decision-making in banks, suggesting possible courses of action based on data analysis. As fintech companies emerge, banks will explore the use of AI to enhance efficiency and customer experience, reduce cloud computing costs, and reshape employee work profiles.
Robotic Process Automation (RPA)	RPA is a technology that imitates human interaction with computers. It speeds up processes by removing human involvement in physically difficult, monotonous, or concentration-intensive tasks, thereby accelerating task execution.

Source: elaborated by the author

Considering the international trends in the development of fintech companies, banks are showing interest in creating joint projects with developers of innovative financial technologies. As fintech companies become more mature and technology-oriented, they face the necessity of investing more resources in complex software, supported by advanced analytics and personalized marketing campaigns.

In this context, we deem it appropriate to evaluate the data regarding the results reported from the use of open banking and APIs both in the EU and the UK.

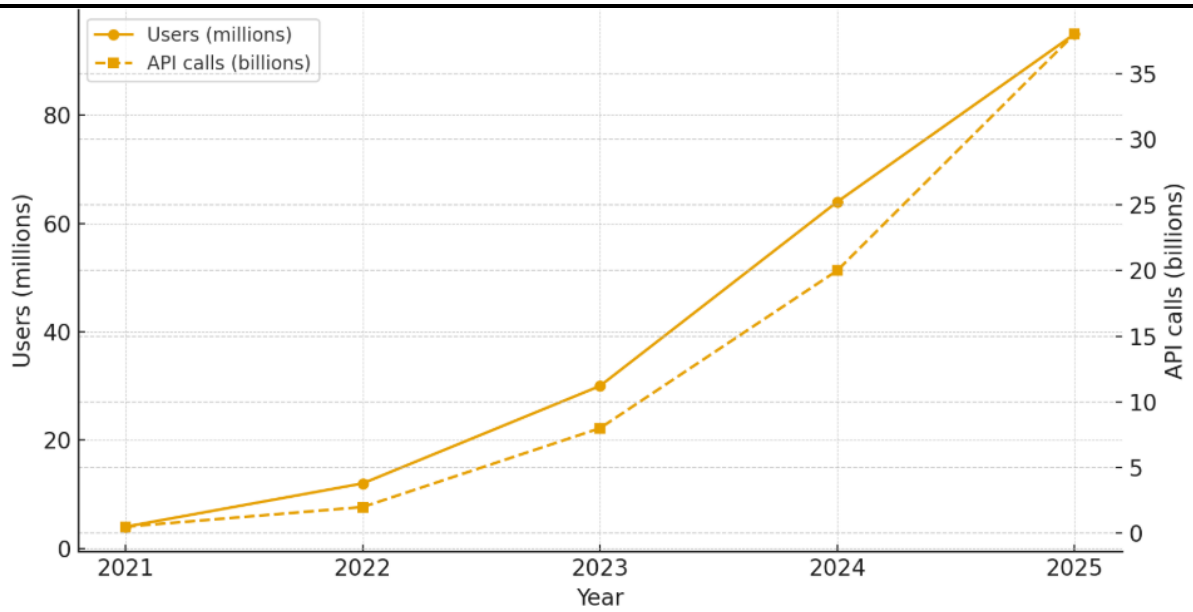

Figure 2. Estimation of the evolution of users (millions) and API call volumes (billions) for Open Banking in Europe

Source: elaborated by author based on (Kontomatik (n.d.), Yapily (2025))

The data in the figure indicate a steady increase in both the number of users and the number of API calls for open banking at the EU level, which can be explained by the interaction of several factors: regulatory developments (the adoption of PSD3 and the Financial Data Access Regulation – FIDA), the consequences of COVID-19, accelerated digitalization, the diversified FinTech offering, and the need to adopt API-based integrated payments and services.

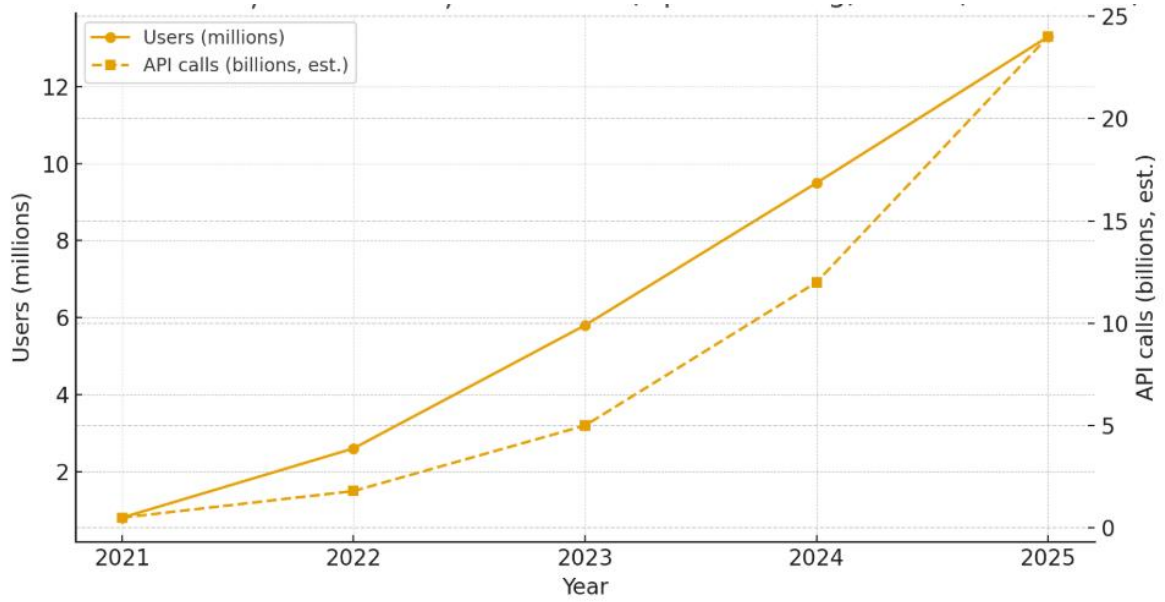

Figure 3. Estimation of the evolution of users (millions) and API call volumes (billions) for Open Banking in UK

Source: elaborated by author based on OBL Impact Report 7: open banking delivers real-world impact as adoption accelerates year-on-year

At the UK level, we also witness an exponential increase in the number of users and the volume of API calls for open banking, explained by the combination of institutional, technological,

and behavioral factors. Thus, the UK, being a member of the EU in 2018, was the first state to mandatorily implement Open Banking under the supervision of the Competition and Markets Authority (CMA) and the Open Banking Implementation Entity (OBIE/OBL). In the same context, the nine major banks (CMA9) were required to ensure the provision of standardized APIs, based on a clear regulatory framework that enabled FinTechs to substantially develop during the 2021–2025 period, even though the UK is no longer a member of the EU.
Looking at data over the past five years, we can see that penetration has climbed from:

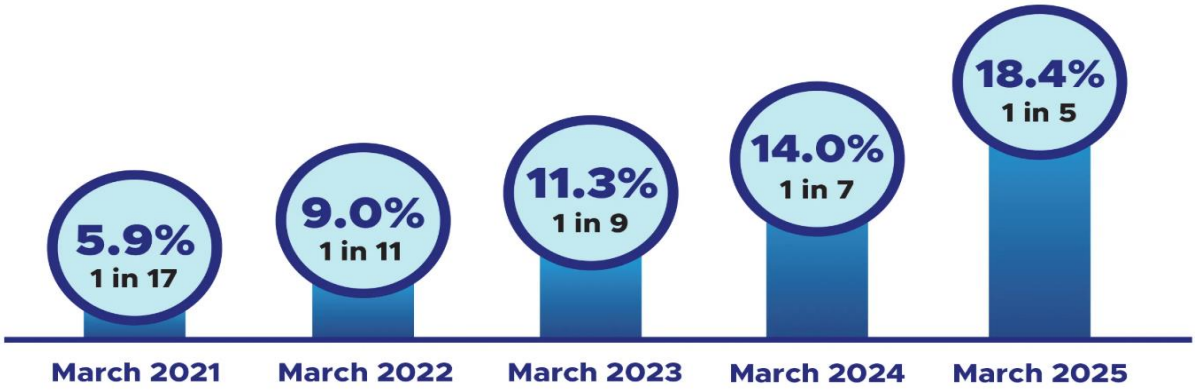

Figure 4. The growth of current account were open banking active
Source: (Open Banking Limited (n.d.))

We have seen continued growth in the proportion of people and small businesses who have an active open banking connection or have made an open banking payment in the past month. In March 2025, 1 in 5 or 18.4% of people and small businesses with online access to their current account were open banking active. This marks a new record high, with 13.3 million active open banking users (Open Banking Limited (n.d.)).

Open APIs can be developed in various ways, but the primary priority of any open API architecture is that the API can be easily used and accessed by as many different clients as possible. The most common open API architectures fall into two categories: REST APIs and SOAP APIs. SOAP-based APIs typically use XML as the data exchange format, whereas RESTful APIs are characterized by the use of JSON. The current trend is primarily oriented toward REST APIs and away from SOAP-based APIs. Many older open APIs offer both a SOAP and a REST base to support legacy clients, but newer implementations generally provide access only via REST. Once an API becomes publicly available, it becomes difficult for organizations to control who uses the API and how it is used. As a result, API management must be taken seriously; otherwise, issues may arise from a customer satisfaction perspective (Cate, 2025).

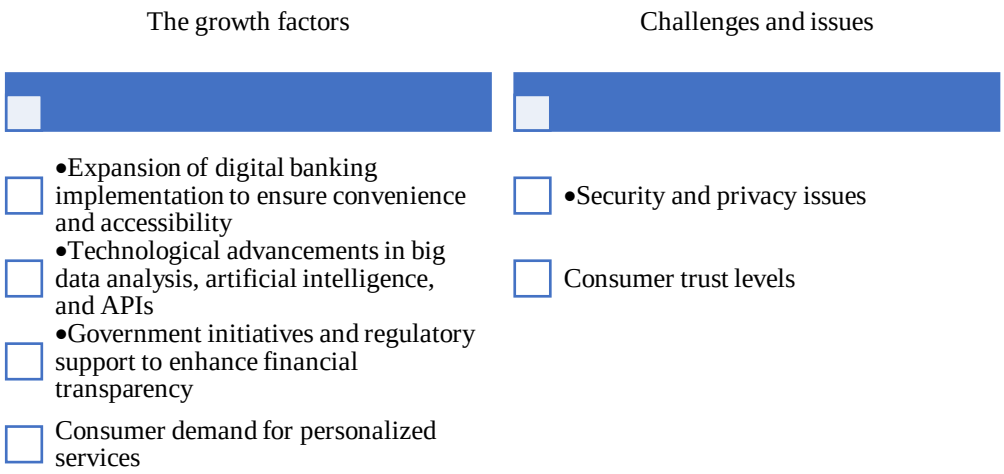

Figure 5. Key market trends
Source: elaborated by the author

CONCLUSIONS

As banks develop and implement new technologies and services, they must ensure timely and updated training for their employees to promptly identify potential risks and ensure security, being prepared to respond immediately to emergency situations arising from various security breach scenarios. Banks are obligated to develop appropriate procedures for their customers and to inform them about such potential risks or action plans.

Today, customers have a variety of options to enhance their protection against cybercriminals. For example, multifactor authentication has proven to be highly effective: in addition to a plain-text password, at least one additional form of identity verification is required before a customer can access their digital bank account. Among the most popular verification methods are one-time passwords (OTPs) for authentication, which are valid for a short period. These passwords typically include codes sent via SMS or authentication apps. Since it is unlikely for a hacker to also have access to the user's mobile phone, this method significantly reduces the likelihood of account compromise. Other common forms of additional identity verification usually include biometrics: fingerprint or facial recognition authentication is used to verify the user's identity.

An additional effective measure to protect customers is identifying scenarios that make them more prone to becoming targets of phishing scams (e.g., avoiding public Wi-Fi networks when accessing digital bank accounts, regularly updating passwords, and using different passwords for various banking applications). Although cyber threats stemming from artificial intelligence, open banking, and other technologies increase the risk of fraud, banks will need to implement newer and more sophisticated measures to prevent such incidents and enhance security in the financial sector. Paradoxically, the key to addressing these challenges will be the widespread adoption of artificial intelligence technologies, which will help banks detect anomalies more quickly and, perhaps one day, stop them entirely.

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