GLOBAL DEVELOPMENT TRENDS IN BANKING TECHNOLOGIES

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Abstract: *Banking technology represents a solution for organizing the provision of financial services, ensuring certain functionalities, expertise in execution, infrastructure and hosting. Actually, the basic vector for the development of the modern banking industry is placed on the path of digitization ant artificial intelligence application. A multitude of opportunities for banks is offered by neobanking, open banking, cloud banking, blockchain, hyper-automated banking, hyper-personalized banking, immersive technologies, banking of things, quantum computing, bank-as-a-service, super-app, uberization of banking. The implementation of new technologies has generated, together with a complex of benefits, certain additional cyber problems. Therefore, an important field in banking activity has become the strengthening of cyber security, as well as the prevention and combating of banking frauds in the digital space.*

Keywords: *banking; technology; digitalization; artificial intelligence*

JEL classification: *G21, G28*

Introduction

In the opinion of the author Vadlamani Ravi (2011), "the term "banking technology" refers to the use of sophisticated information and communication technologies together with computer science to enable banks to offer better services to its customers in a secure, reliable and affordable manner and sustain competitive advantage over other banks."

Banking technologies represent the complex of techniques, skills, methods and processes applied to the provision of financial services, intended to ensure the basic functionalities for customers and internal operations, expertise in execution, infrastructure and hosting. (Banking technology…, n.d.)

The current period is considered as the information age (digital age), which marked the transition to an information economy based on the collection, transmission, processing and storage of information. (Era…, n.d.)

Inevitably this process leaves its mark on the evolution of banking technologies.

The purpose of this article is to examine the basic trends of the current evolution in the field of banking technologies.

Description of the Problem

It is about the implementation of the concept of Bank 3.0, which essentially finds the increasing placement of customer service in the informational space, the widening of the gap between the way customers with different levels of experience choose and use banking services being noted (Figure

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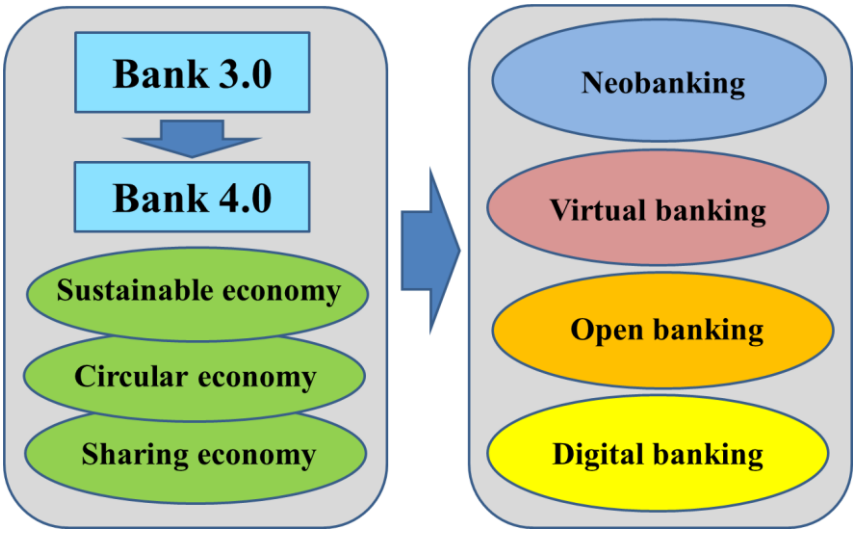

Figure 1 - Global trends in banking technologies

Source: developed by the authors

In this context Brett King stated: “Bank 3.0 is about the transition from banking dependent on a physical structure to banking that can be done at a time and place most convenient to the customer. It is about a new form of engagement and experience that harnesses the power of the internet without sacrificing the ‘human touch’. It is about leveraging the potential of big data for better 1:1 interactions and more powerful marketing.” (Marous, 2012)

It is about the ever-deeper exploitation of the capabilities of the Internet, the potential of big data and efficient marketing. The implementation of this concept was linked to the development of self-service banking services, the use of technologies and digital devices.

Since 2020, the financial community has started talking about the Bank 4.0 concept. In this context, we consider the vision of the expert Akanksha Mishra (2022) important: “Banking 4.0 can be defined as the foundation of creative destruction that came through fintech companies, transitioning innovation, and traditional retail banks reorganizing their business models on new-age digital principles of platforms, apps, data intelligence, and embedded finance. This radical reordering brings a promise of platform-based banking to deliver experience-driven customer satisfaction through the optimum channel.”

At the same time, the situation created at the global level, which essentially represents an economic and ecological crisis, requires the implementation of new models of economic activity, which have found expression through the sustainable economy, the circular economy and the sharing economy.

All these require the connection of banking technologies and products to the new realities.

Methodology and Data

The object of the study was the basic global trends in the development of banking activity in cyberspace. For this purpose, open access publications on the Internet were examined by experts in the field of banking information technologies and specialized companies. Then a synthesis of the examined materials was carried out and a general presentation of the addressed field was made.

Results

The basic directions of the evolution of banking technologies are presented in Figure 1.

Neobanking represents the activities of providing financial services by the respective institutions (neobanks) exclusively digital.

The author Danielle Antosz (2023) thus presents this banking institutions: “A neobank is a digital-first financial company that offers banking services like checking accounts and debit cards but does not have a physical location. The term neobank is often used interchangeably with fintech bank, challenger bank, or digital bank. Neobanks aim to streamline the banking process by delivering financial services in a customer-centric, digital-only format.”

Also, this expert forecasts an increase in the global number of users from 146.4 million in 2021 to 350 million in 2026.

A notion close to the previous one is *virtual banking*, which refers to the activities of accessing traditional banking services online, without the need for physical infrastructure. As particular cases of virtual banking are remote banking, internet banking, online banking and the provision of telephone banking services. (*Virtual…*, n.d.)

Open banking (also known as *open bank data*) has become one of the important sources of promoting the innovative process on the banking market.

Open banking is a type of banking activity that gives customers access to their bank accounts through third-party applications. Open banking provides third-party financial service providers with open access to consumer banking data, transactions and other financial data from banks and non-bank financial institutions through the use of application programming interfaces. (*Open…*, n.d.)

But the basic vector for the development of the banking industry is placed in the field of *digitization*, which requires banks to collaborate with fintech companies in various areas, such as loans and the creation of co-branded products.

In this context, two notions are important:

•*Bank digitization* is the conversion of data into a digital format with the adoption of technology. (*What are…*, n.d.)

•*Digital banking* is the digitization of all traditional banking products, processes and activities to serve customers through online channels. (Malyshev, 2023)

Wikipedia defines *digital bank* as “a virtual process that includes online banking, mobile banking, and beyond”. (*Digital banking*, n.d.)

A certain part of the new banking technologies is based on *artificial intelligence (AI)*, which is the ability of machines (or software) to mimic the problem-solving and decision-making capabilities of the human mind. (*What is…*, n.d.)

Likewise, its core components are remarkable - *machine learning* and *deep learning*.

The use of artificial intelligence in banking activity takes the following forms:

•*Chatbot* is a software application or web interface designed to mimic human conversation through text or voice interactions. (*Chatbot*, n.d.)

•*Robo Advisor* is a digital platform that offers financial planning and automated investment services, with client contact being maintained in the form of a dialogue about the financial situation and future goals. The data obtained is used to provide advice and invest automatically. (Frankenfield, 2023)

•*Predictive Analytics* is a branch of data analytics that uses data to apply machine learning models to predict future outcomes. In banking and finance, these can be, for example, predicting customer behavior, forecasting market trends, risk assessment. (Welland, 2023)

•*Cybersecurity* - AI in banks can be applied to prevent potential cyber-attacks before they affect employees, customers or internal systems. AI also helps banks to identify fraudulent activities, track gaps in their systems, minimize related risks. (*AI in Banking…*, n.d.)

•*Internet of Things (IoT)*. According Wikipedia, IoT „describes devices with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks.” (*Internet…,* n.d.) Using IoT In Banking refers to obtaining real-time feedback, identifying fraudulent activity, customer service, data analytics, improving security, smart wallets, automation. (*The Applications…*, n.d.) In some sources,

the application of IoT in the banking industry has been called *Banking of Things*. (*Banking of…*, n.d.)

•*Self-service kiosks* are automated self-service machines that provide customers with access to certain banking services (deposits, withdrawal of funds, transfer of funds between accounts, online bill payment, check ordering, and others). They often have touch screens, cash dispensers, card readers and other sophisticated technologies for interactive customer service. (*Wavetec…*, n.d.)

•*Interactive Teller Machine (ITM)* is interactive video-based technology that allows bank customers to perform transactions and services conducted by a central teller in a real-time video/audio interaction. (*Interactive…*, n.d.)

•*Virtual avatar* is a virtual consultant (assistant) presented as a digitized bank worker, who communicates with customers in natural language, usually in the form of asking questions by customers to the virtual assistant in order to obtain general information and personalized advice. (*Commerzbank…*, n.d.)

Some experts mention: "A report by Business Insider suggests that nearly 80% of banks are aware of the potential benefits of AI in banking. Another report by McKinsey suggests the potential of AI in banking and finance would grow as high as $1 trillion." (*AI in Banking*…, n.d.)

Also, artificial intelligence is used for the development of credit scoring technologies.

Apart from those mentioned, the following new banking technologies can be presented: cloud banking, blockchain, hyper-automated banking, hyper-personalized banking, immersive technologies, banking of things, quantum computing, bank-as-a-service, super-app, uberization of banking.

According to some views, *cloud banking* is the on-demand delivery of hosted computing services (servers, data storage, communications and networks, applications and data analytics) to banks over the Internet. (*What is…*, n.d.)

According to expert Alex Malyshev (2022): "Cloud banking services refer to deploying (and managing) banking infrastructure in order to control banking cloud services and financial operations without dedicated physical servers."

Blockchain technology (also known as *distributed ledger technology*) is a decentralized, distributed ledger system that allows transactions between two parties without the need for a trusted intermediary. The ledger consists of a series of interconnected blocks, each containing a list of transactions. Once a block is added to the chain, it cannot be modified. Blockchain also uses cryptography to ensure that only authorized parties can access and validate transactions. (*Blockchain…*, n.d.)

According to some experts, the areas of banking activity potentially recommended for the application of blockchain technology are international payments, peer-to-peer remittances and identity verification. (*Blockchain…*, n.d.)

On the other hand, the expert Cem Dilmegani (2023) is of the opinion that "*hyper-automation* is a digital transformation strategy that involves automating as many business processes as possible while digitally augmenting the processes that require human input."

At its core, hyper-automation is a combination of certain technologies, including artificial intelligence, machine learning and robotic process automation, to automate repetitive and time-consuming processes, allowing employees to focus on more strategic and value-added activities. (Singhal, 2023)

Hyper-personalized banking is intended to transcend traditional banking models by leveraging advanced technologies, data analytics, and artificial intelligence to provide customers with highly personalized financial experiences by understanding and anticipating each customer's needs, preferences, and behaviors. The implementation of hyper-personalized banking is linked to certain important activities, such as data collection and analysis, customer segmentation, investment in AI and advanced technologies, customer education and communication. (*Hyper-Personalized…*, n.d.)

Certain trends in the innovation process in the banking market are related to the application of

immersive technology.

This is an integration of virtual content with the physical environment in a way that allows the user to naturally engage with mixed reality. (Wigmore, 2018)

Some specialists see virtual reality as the future of digital banking. With the help of the metaverse, financial transactions can take place in virtual space. Virtual reality has the potential to change the way people use banking services and interact with their finances. Banks are likely to adopt virtual reality technology as new ways are developed to engage customers via mobile devices or computers, provide better understanding of complex data and even better educate staff. It is about the use of virtual avatars, digital reality, and immersive experiences. (*Banking in…*, n.d.)

Some innovative expectations are related to *quantum computing*, which tends to harness the laws of quantum mechanics to solve problems too complex for classical computers. (*What is…,* n.d.)

Thus, the author Alex Clere (2023) states: "Quantum computing can perform operations magnitudes quicker, meaning complex financial information – such as the data that goes into assessing credit risk, for example – can be analysed quickly and with more accuracy."

Banking as a service (BaaS) is a financial technology solution that allows non-bank companies, such as platforms and marketplaces, to provide services directly. (*What is…*, n.d.)

In other words, BaaS is the provision of banking products and services through third-party distributors. Through BaaS, there is the integration of non-banking businesses with regulated financial infrastructure into financial or non-banking platforms through application programming interfaces. BaaS allows third-party companies, often fintech firms or other businesses, to provide banking and financial services to their customers without having to build and maintain banking and payment infrastructure from scratch and without holding a financial services license. (*Banking as…*, n.d.), (*Unleashing…*, n.d.)

An important banking innovation has become *the financial super-app*, which constitutes an ecosystem of functions and services that are customized according to the needs of the user. Its core is user experience and continuity. A possible list of services offered includes: a shared wallet; bill reminders; car bill payments; managing subscriptions; investment options; savings accounts; and budgeting tools. (*Financial…*, n.d.)

The sharing economy has determined certain changes in retail banking.

This is an economic model designed to leverage peer-to-peer social and commercial activities to increase the utility of goods and services. (Kunov, 2019)

Uberization has become a specific form of the sharing economy.

The increased use of this type of Uber digital platforms will impact the banking industry. For example, this can be expressed in the platform having the ability to provide loan approvals in an instant, or even to anticipate and make recommendations about the types of services the customer will need now and perhaps in the immediate future. (Ragu, 2019)

In choosing the opportunities to implement new technologies, banks are required to take into account the following considerations: complexity, cost-effectiveness, integration. The implementation of new technologies has generated, together with a complex of benefits.

Some authors mention, for example, the benefits of banking digitalization for customers through the reduction of human errors, the permanent accessibility and convenience of online banking services, the facilitation of cashless transactions, all of which contribute to strengthening the loyalty of consumers of banking products. (What are…, n.d.)

Other experts present a broader list of key benefits of digitization for banks (*Digital transformation…*, n.d.):

- Improving efficiency and reducing costs;
- Improving the quality of customer service;
- Enhanced security;

- Greater agility and faster time-to-market;
- Improving data analysis and forecasting;
- Raising the level of competitiveness;
- Improved collaboration and communication.

At the same time, the promotion of digital innovations in banking is linked with certain problems.

For example, the application of new banking technologies has generated certain banking ethics issues.

The expert Marcin Frąckiewicz (2023) examined the ethical issues of neobanking:

- *The problem of financial inclusion* - the massive implementation of this concept can eliminate from banking services clients with insufficient informational culture and technical endowment;
- *The issue of ensuring data confidentiality and security* - banks hold sensitive financial information, the possibility of data breach and misuse is a significant danger;
- *The problem of job replacement* - the massive application of automation and artificial intelligence in banks reduces the need for employees, which touches on the social responsibility aspects of digital banks.

As the level of digitization of the banking activity deepens, the problems of cyber-attacks and digital banking frauds become more acute. Therefore, an important area in banking has become the strengthening of cyber security, as well as the prevention and combating of bank fraud in the digital space.

Conclusions

The establishment of the information society at the global level determines the creation of a new type of economy with an important field of industries based on information, which inevitably influences the world banking industry. Modern banking is increasingly moving into cyberspace. Depending on the level of activity in the information sphere, digital and virtual banking can be differentiated. An important boost to the innovation process in the banking market is due to the implementation of artificial intelligence in all its forms. Likewise, the digitization of banking has led to the development and implementation of a wide range of new banking products. This has brought a number of important benefits to banks, but also problems that require solutions.

Future Directions

In the coming years the process of broadening and qualitative improvement of digital banking activity will continue, which will determine the need for detailed study.

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