

INTRODUCTION OF THE LATEST DIGITAL TECHNOLOGIES IN THE BANKING SECTOR: FOREIGN EXPERIENCE AND RUSSIAN PRACTICE

Oksana V. Vaganova^{1*}, Natalya I. Bykanova², Irina L. Mityushina³, Al-Saadi Mohanad⁴, Raheem Salim⁵
^{1,2,3,4,5}Belgorod State University, Russia, 308015, Belgorod, Pobedy st., 85, Russia.

Email: *vaganova@bsu.edu.ru

Article History: Received on 25th August 2019, Revised on 26th September 2019, Published on 24th October 2019

Abstract

Purpose: The article is devoted to topical issues of strategic development of commercial banks in the context of digitalization of the economy, requiring the introduction of new financial technologies in the financial and credit sphere. The paper describes a number of new digital technologies based on artificial intelligence; open API, biometric identification system, Big Data, Blockchain, cloud technologies, as well as how these technologies are used in the Bank's work with customers.

Methodology: The study of the chosen topic is based on the methods of generalization and comparison, analysis and synthesis, the method of groupings, as well as models of banking management used in practice by modern domestic and foreign banks.

Result: The article analyzes the experience of foreign countries in the use of these technologies in the banking sector and substantiates the need for an early transition of the Russian banking sector to a more innovative model of functioning. In conclusion, the paper identifies opportunities and ways for the further development of digital technologies in the banking sector.

Applications: This research can be used for universities, teachers, and students.

Novelty/Originality: In this research, the model of Introduction of the Latest Digital Technologies in the Banking Sector: Foreign Experience and Russian Practice is presented in a comprehensive and complete manner.

Keywords: *Digital Economy, Banking Sector, Financial Technologies, Artificial Intelligence, Open API, Biometric Identification System.*

INTRODUCTION

Modern trends in the development of the global and national financial systems are associated with the strengthening of the processes of digitalization of its individual segments and spheres. Such changes contribute to the increasing penetration of new financial technologies into the financial market, which can reduce the level of existing risks, improve the efficiency of financial institutions and, consequently, increase their profits. [Flandreau, M. \(Ed.\). \(2005\).](#)

The banking sector is one of the most mobile and prone to innovative changes in business areas. With the help of digital innovations, as well as modern financial technologies, it is possible not only to strengthen the competitive position of the Bank in the market, but also the necessary level of security of the banking business, both for the credit institution itself and for its customers.

Digitalization of the economy and the transition of banking services to a new financial and technological level, provide access to banking products and services around the clock and contribute to the transformation of the banking system into digital banking. [Flandreau, M. \(Ed.\). \(2005\).](#)

METHODS

The study of the chosen topic is based on the methods of generalization and comparison, analysis and synthesis, the method of groupings, as well as models of banking management used in practice by modern domestic and foreign banks.

The object of the analysis is the commercial banks of Russia and their digitalization of banking services in accordance with the latest digital technologies.

Development trends of the banking business and the possibility of introducing digital technologies were considered and covered in the works of such famous scientists and researchers as E. F. Avdokushin, A. Akulov, Yu. M. Alekseev, L. Yu. Andreeva, I. T. Balabanov, M. P. Berezina, N. Brooke, N. And. Valencia, D., Galbraith, John. Gobson, O. I. Lavrushin, G. Marcus, E. A. Utkin, R. A. Fatkhutdinov, and others.

RESULTS AND ITS DISCUSSION

The modern world cannot be imagined without information and digital technologies that have changed and facilitated various fields of activity opened up new opportunities for economic development. The emergence of new digital platforms, technologies, communications, and their introduction into the socio-economic system of society contribute to the formation of a digital model of the economy and a new system of international trade. [Flandreau, M. \(Ed.\). \(2005\).](#)

The digital economy is an activity in which the key factors of production are the data presented in digital form, and their processing and use in large volumes can improve quality, reliability, and productivity in various activities. (Dodgson, M., Gann, D. M., & Salter, A. (2008).

The regulatory framework of the digital economy in Russia is represented by the Program "Digital Economy of the Russian Federation", which defines the goals, objectives, directions and periods for implementing the basic measures of state policy to create the necessary conditions for the development of digital economy in Russia. In the Program, the digital economy is represented by three levels, which are reflected in Figure 1.

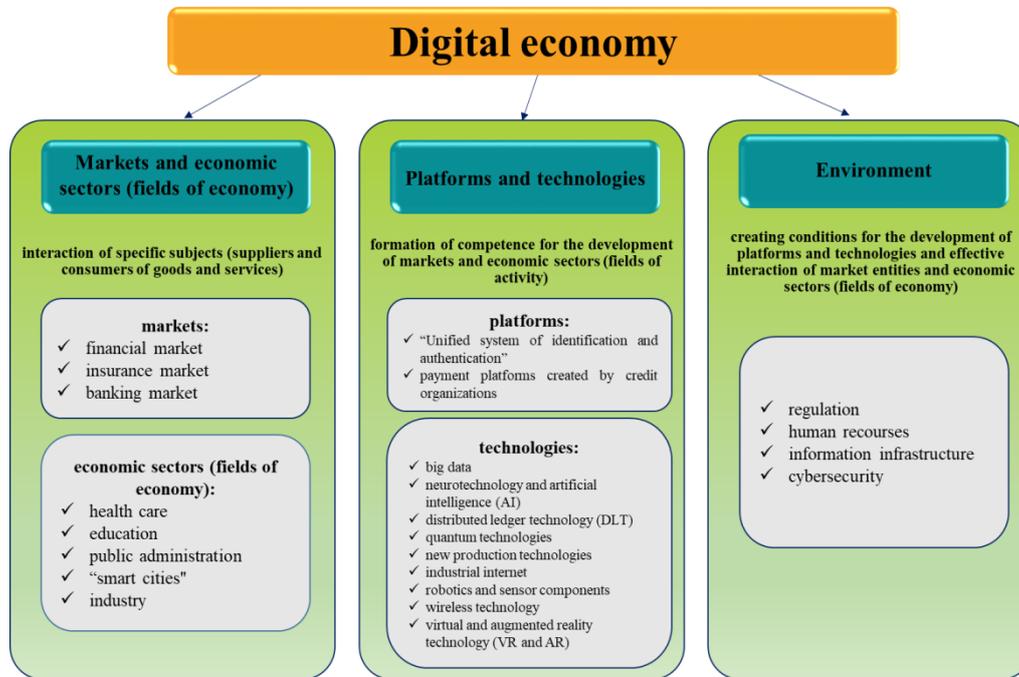


Figure 1: Directions of development of the digital economy in Russia for the period up to 2020

Compiled by the author on the basis of the program «Digital Economy of the Russian Federation».

It should be noted that in Russia, the digital transformation of the financial market is proceeding at a rapid pace, setting an example to other industries. According to the World Bank, Russia is among the five leading countries in the world in terms of the maturity of digital banking (Deloitte Digital, 2018).

According to the global survey of the world's leading banking organizations by the specialists of the analytical Internet resource "The Financial Brand", the strategic priorities for companies are to expand the package of digital technologies for consumers, reduce operating costs and automate the main types of business processes. Achieving these priorities is possible only with the use of the latest technological products in the banking sector. Thus, the world's largest independent Russian online Bank "Tinkoff Bank" using low-interest rates, received a net profit of 27.1 billion rubles. (423.4 million dollars. US) at the end of 2018. This proves that the digital banking model is effective and can be used by many financial and credit institutions to reduce their operating costs and attract new customers. Medvedev, D. (2015).

A special feature of the development of the banking sector in Russia is the integration of the state and the private sector, so the introduction of digital technologies is regulated by the state. The state, represented by the Central Bank of the Russian Federation, carries out not only regulatory but also supervisory activities in the field of the country's banking sector. In 2018, the Bank of Russia prepared the document "Main directions of development of financial technologies for the period 2018-2020", in which it defined the key elements of the digital financial infrastructure, as well as the main regulatory acts regulating the activities of commercial banks regarding financial technologies. The main legislative acts regulating the banking sector include:

"International financial reporting standard (IFRS) "Financial instruments". The standard provides for changes in the reporting of financial assets and liabilities; Medvedev, D. (2015).

"Regulation on information security requirements in the payment system of Bank of Russia" (comes into force on 28.06.2019). The provision regulates the security of non-cash payments.

In addition to these documents, specialists of the Central Bank of the Russian Federation prepared two draft Federal laws: "On digital financial assets" and "On alternative ways to attract investment (crowdfunding)." It is expected that the adoption of these laws will be a significant step in the development of the digital economy. These laws reflect the main areas of development of the banking sector through the introduction of digital technologies such as: open banking (open

API); Biometric identification systems; Big data; Blockchain; Artificial intelligence; Cloud technologies (Figure 2). [Dodgson, M., Gann, D. M., & Salter, A. \(2008\)](#).

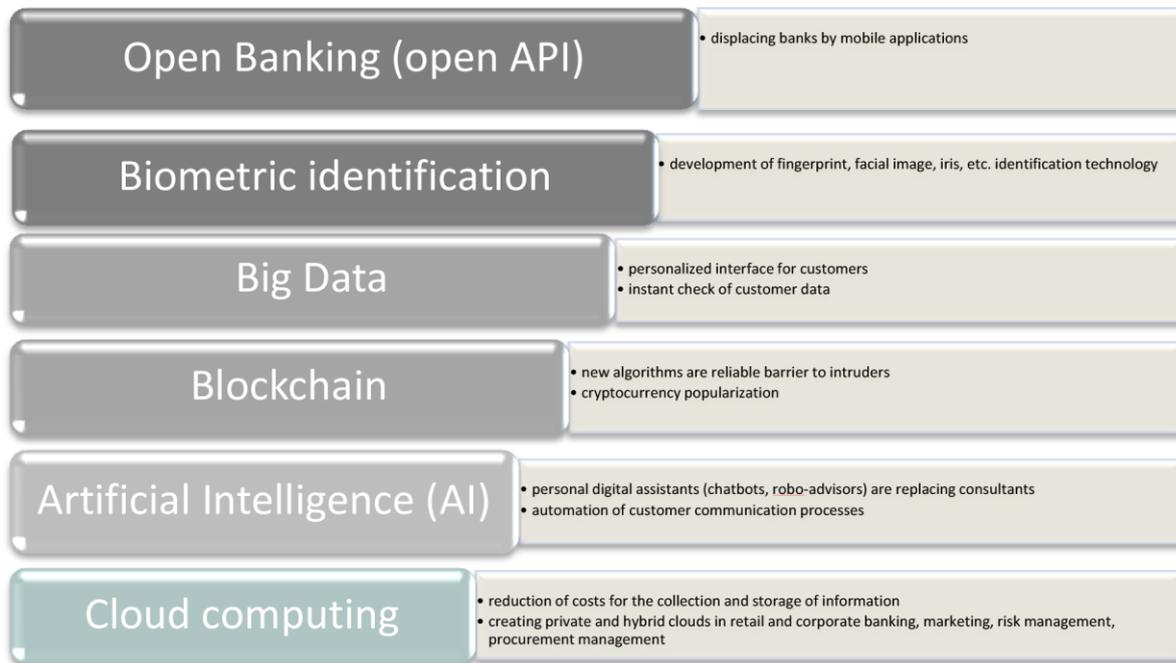


Figure 2: The scheme of the introduction of banking digital technologies according to the degree of market penetration (from largest to smallest) compiled by the author according

For a deeper understanding of the essence of the latest digital technologies in the banking sector, consider them separately. [Medvedev, D. \(2015\)](#).

Open banking (open banking) is a system that provides the user with the data network of financial institutions that use application programming interfaces, better known as API (Application Programming Interface). This is a peculiar set of functions that programmers use to gain access to functional components – be it a program, a library, etc.

The API in the banking system allows external applications to access the internal systems of the Bank itself. The simplest and most obvious example of this API is a mobile application. For example, if a customer needs to check the balance of his account, the application on his smartphone, using the banking API, creates and sends a request to the appropriate system of the Bank, and that in response sends the necessary information. Due to this, literally in a second, the user can learn on the screen of his gadget about the state of Finance on his account or card. Different countries of the world have their own peculiarities of implementation of open API principles (table 1). [Dodgson, M., Gann, D. M., & Salter, A. \(2008\)](#).

Table 1: Features of the introduction of principles of open APIs in different countries

Countries of the world	Obligation to use open API principles	The principles of definition and development of standards	Availability of common infrastructure
European Union	Mandatory for all banks	The standards are defined and developed by the market participants themselves (only uniform requirements are established to provide access to financial organizations to information about user accounts, as well as to ensure the possibility of initiating transactions from these accounts by financial service providers)	No
USA	No	There are no regulatory standards for API provision in the US, but the developed economy and a large number of financial companies have become favorable factors for the active development of various "aggregators" of financial services.	One of the first "aggregators" in the United States was the company Mint
India	Mandatory for all banks	In India, within the framework of the national digitalization program, the India Stack platform was created with a set of open APIs, on the basis of which developers can obtain the necessary information for the identification and authentication of users of financial services, and financial transactions	India Stack

Singapore	Mandatory for all banks	The standards are defined by the Monetary Authority of Singapore (MAS) and the Association of banks of Singapore. At the same time, they are working to systematize and standardize their internal APIs in order to provide access to participants of the financial market (some of them have already become available on the official website of MAS)	Finance-as-a-Service API Playbook
Britain	Required only for 13 largest banks	Detailed uniform standards developed by the specially authorized body (OBIE)	A special information portal for publication of standards, specifications, and links to open API of banks has been launched; a centralized dispute resolution system is being tested
Russia	Mandatory for 5 large banks ("Sberbank", "VTB", "Gazprombank", "Alfa-Bank", "Otkrytiye bank»)	The development of standards and methodological documents on the use of open API by financial market participants is carried out by the Central Bank of the Russian Federation and the fin Tech Association.	Launch of the Market "Place Platform"

Compiled by the author according to

Russia belongs to a number of countries where the issue of the introduction of open banking is resolved. At the moment, the Russian Association "FINTECH", which includes Sberbank, VTB, Gazprombank, Alfa-Bank, Otkrytie, QIWI, and the national payment card system, has been established ([Vaganova, et al. 2018](#); [Skinner and Walue, 2018](#); [Ragimova, 2017](#); [Barberis and Chishti, 2017](#); [Leventsov, et al. 2017](#); [Ernst & Young, 2017](#)).

Biometric technologies based on the physiological characteristics of the person are another trend in the development of digital banking technologies, which are used in Russia for personalization data and further identification of clients with the aim of increasing security, reducing fraud and simplifying the input of personal data. For example, today several Russian banks are adopting the technology, which uses photos of clients, fingerprints, iris of the eye and even the voice of the customer (Figure 3). With the help of a fingerprint, you can pay for purchases in a cashless way, this makes physical presence of a plastic card unnecessary. According to the forecasts of analysts J'son & Partners Consulting, the use of biometric technologies in the banking sector by 2022 will be 85%, which will be 25.62% more than the world biometric market.

In 2014, Barclays introduced the option of finger vein pattern authentication for corporate clients, and in 2016 launched the voice identification system.

In 2015, Bank of America allowed customers to make payments in the mobile app by signing in with a fingerprint. These and other biometric identification technologies are also used by HSBC, National Westminster Bank, Royal Bank of Scotland and other banks.

In Russia, Sberbank was the first to introduce customer identification using Touch ID technology in 2014. Today, fingerprint identification was introduced by VTB, Tinkoff Bank, Promsvyazbank and Home Credit.

In addition to the development of open banking platforms and the introduction of biometric data, almost all banks use Big Data Analytics (BDA) technologies in their activities. This technology helps to solve such problems as security, fraud prevention, prompt reporting, work with staff, personalization of banking products offered to customers and marketing. With the use of BigData technology banking services are becoming more accessible and more convenient for consumers. After examining the preferences and wishes of their customers, banks can form more accurate promotional offers or adjust the interface of their automated systems: voice control for consumers who have vision problems; simplified menu, for people who do not own computer technology and much more. [Medvedev, D. \(2015\)](#).

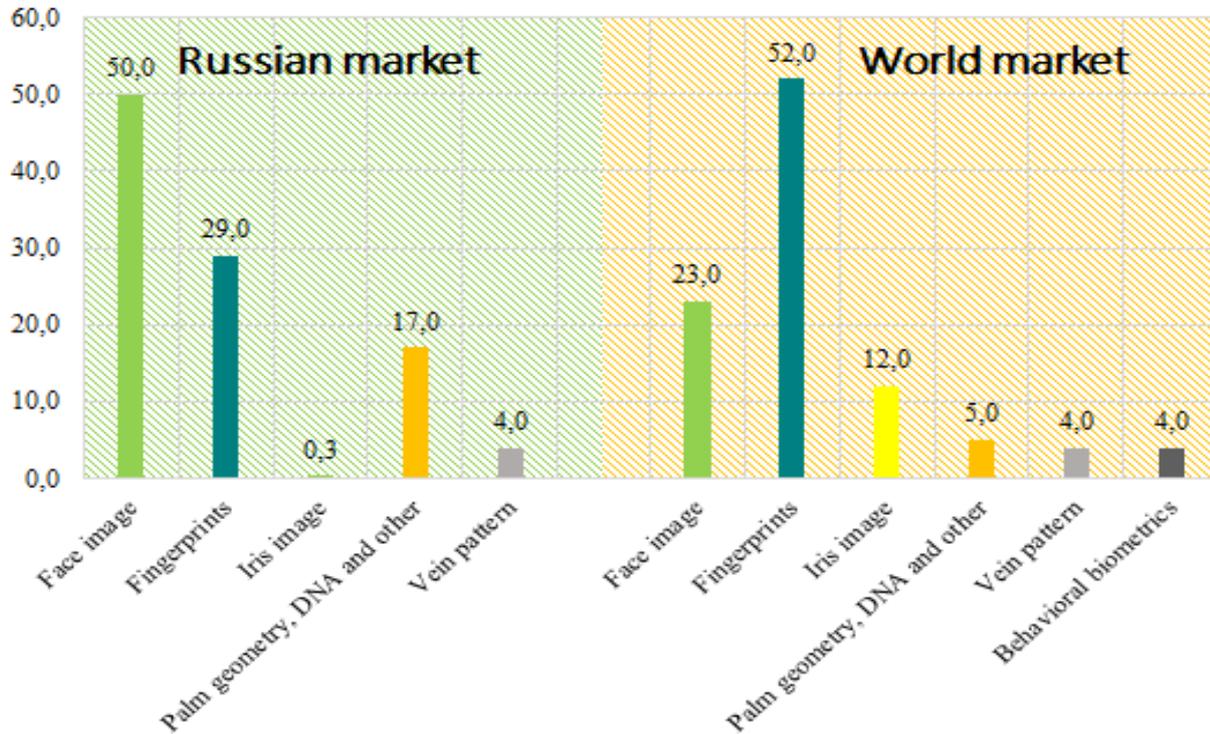


Figure 3: Use of biometric data in the global banking market and in Russia in 2018, %, compiled by the author

In addition, with the advent of Big Data technology, the process of issuing credit cards has greatly accelerated. If earlier data verification took a few days, today, in banks that use Big Data, it occurs almost instantly. For example, MoneyGram International, an international payment services company, has implemented the IBM InfoSphere Identity Insight solution to monitor finances and prevent fraudulent activities related to the transfer of funds. [Medvedev, D. \(2015\).](#)

In Russia, these technologies have already mastered Sberbank, Tinkoff Bank, VTB, Alfa-Bank (Figure 4).

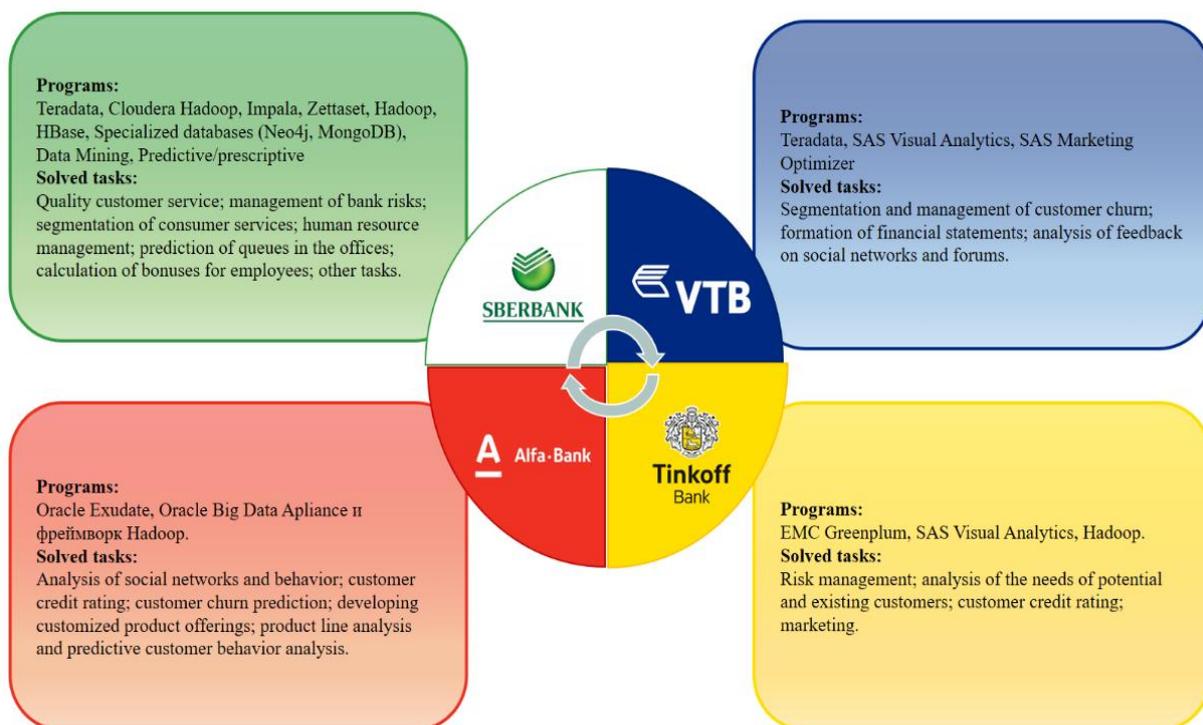


Figure 4: Software products based on the use of Big Data technologies in the Russian banking sector, compiled by the author according to the sites of the studied banks

Optimization of the activities of banks, reducing their costs, improving information security, tracking transactions in real-time contribute to Blockchain technology, where all operations and transactions are encrypted in a unique way. And without direct access to the account, third-party forces cannot decrypt the data or "hack" the system. [Medvedev, D. \(2015\).](#)

The first to introduce Blockchain technologies in banking was the German Internet Bank Fidor, which in 2014 offered its customers instant currency exchanges. And in January 2017, it became known about the creation of the Blockchain platform "Digital Trade Chain" (DTC) on the basis of the eponymous application of the Belgian Bank KBC, which allows you to track and manage trade transactions. [Medvedev, D. \(2015\).](#)

In Russia, Blockchain technologies are developing at a global pace, the First to use Blockchain technology in the domestic financial sector was Alfa-Bank, which, in partnership with Sberbank-factoring, implemented a platform for factoring. The company "MegaFon" has transferred from the account in Alfa-Bank RUB 1 million of its subsidiary company "Megalabs" to an account with Sberbank. The transaction was verified using four servers. [Medvedev, D. \(2015\).](#)

Another equally important area of digitalization of banking business is the use of artificial intelligence, elements of which are becoming mandatory for each Bank. The advantages of artificial intelligence are that it can work 24 hours a day, is not prone to psychological disorders and has an unlimited amount of knowledge, the application of which can quickly find the answer to any question. The use of artificial intelligence is a good tool for cost management of the Bank, aimed at automating the same type of operations in the banking sector and is represented by the technologies of "Robo-adviser". [Georghiou, L. \(Ed.\). \(2008\).](#)

Robo-advisor (robo-advisor) is an artificial intelligence that becomes an alternative to financial consultants in banking. Robotic Advisor is an automated platform that provides financial advice and services for the creation and management of the Bank with minimal human intervention. Robo-adviser is a software package that, when it receives data on customer preferences, forms a package of products and services for it, and often, suggests the most advantageous positions. First of all, it is a one-click application and the opening of an account in real-time, monitoring, current news, and processing of large volumes of transactions at once. [Flandreau, M. \(Ed.\). \(2005\).](#)

As an example, the activities of Bank of America, which is one of the three largest financial corporations in the United States, and is actively introducing new technologies. In January of this year, three branches were opened at once without employees and only automatic terminals serve customers on registration of mortgage, car loan or credit card.

The arguments in favor of "dehumanization" of offices are obvious, it is saving on salaries, reducing the cost of rent by reducing office space. But in robotics, there are also disadvantages. For example, in the UK, Barclays Bank has been implementing automated branches for a long time. However, the organization of robotic service is imperfect, since some simple operations require interaction with several terminals, so many customers find it much easier and more convenient to contact the employee. [Flandreau, M. \(Ed.\). \(2005\).](#)

In Russia, artificial intelligence technologies are actively developing in the activities of commercial banks. Sberbank has created and implemented Robotic Process Automation and Machine Learning programs that optimize the process of providing repetitive simple operations, as well as analyze a variety of documents, freeing employees from this operation. The Sberbank system called "Iron Lady" is intended for calling individuals with outstanding credit debts. Therefore, through the use of artificial intelligence, the Bank's communication with the client is perfectly established. One of these communication channels is a chatbot, whose task is not only to inform the client but to perform the operation by entering text or voice. The benefits of an hour-bots compared to the use of mobile phone applications are obvious and banks create chatbots in social networks: Skype, Vkontakte, Facebook, **Instagram**, and Odnoklassniki. Recent studies show that they are used by more than 20% of Russian banks in various social networks and messengers, but the greatest development of chatbots from banks occur in Telegram (Table 2). [Flandreau, M. \(Ed.\). \(2005\).](#)

Table 2: Chat-bots of Russian commercial banks in social networks

Bank	Bot address in					
	Twitter	VK	Facebook	Instagram	Odnoklassniki	Telegram
Sberbank	+	+	+	+	+	+
Alfa-Bank	+	+	+	+	+	+
VTB	+	+	+	+	+	-
Tinkoff Bank	+	+	+	+	+	-

Compiled by the author according to the sites of the studied banks

In 2017, Sberbank launched the "My assistant" in the app "Sberbank Online". This service collects impersonal user data such as expenses, savings, profile data, predicts their behavior and provides relevant information to the user. The service offers simple tips after analyzing the data, for example, if "My assistant" records a monthly write-off, it will understand that the client took a mortgage and remind him that it is possible to return the tax [\(Ragimova, 2017\).](#)

Today, the introduction of artificial intelligence in the banking sector has taken place, but this does not mean that employees will disappear in Bank branches and there will be only robotic machines (Deloitte Digital, 2018). Artificial intelligence is rather advanced information systems capable of solving complex problems, but no machine can surpass human intelligence. So, the Turing test could not pass even the most powerful supercomputer, yielding intellectually mouse. Flandreau, M. (Ed.). (2005).

Cloud technologies are one of the fastest-growing segments of digital services, presented both at the global and Russian level. According to Forrester, the volume of the cloud market in Russia increased by 24% in 2017. High dynamics is primarily associated with the readiness of companies to optimize IT and implement a business transformation strategy. The growth is also facilitated by the spread of innovations such as Big Data and artificial intelligence, which require significant amounts of computing power. Kramsch, C. (2014).

According to IDC research, the world's most active consumers of public cloud services and infrastructure are companies in the discrete industries (\$19.7 billion.), specialized services (\$18.1 billion)) and the banking sector (\$16.7 billion).

More than 60% of banking transactions in 2018 were conducted using private or hybrid cloud technologies. Today, the use of public clouds by banks is gaining momentum in the cloud sector. Major American and European banks (Morgan Stanley, BBVA, Goldman Sachs, Capital One and others) have already launched the process of carrying out elements of their IT infrastructure in the clouds.

In Russia, only Tinkoff Bank, has already implemented some services, can talk about using public clouds, and in a few years, the Bank is going to become a full-fledged cloud bank. Sberbank also shows an active interest in this technology, has implemented a pilot project with the Russian Federal Tax Service to transfer cash checks to the tax office. According to a study by SAP and the National Agency for financial research, Russian banks use clouds in many types of operations, including retail banking, marketing (communications), corporate banking, risk management, and compliance, and procurement management.

CONCLUSION

In the conditions of globalization of the economy, the emergence of new digital platforms, technologies, communications and their implementation in the socio-economic system of any state, contribute to the formation of a new system of international relations and the development of the banking market. Flandreau, M. (Ed.). (2005).

The six leading countries in terms of maturity of digital banking are: United States, Spain, China, Turkey, and including Russia. Castells, M. (2004).

Analysis of the process of introduction of new digital technologies in the banking sector of Russia showed that the state and commercial banks are actively developing and implementing advanced information technologies. This allows for better and safer operation, reducing part of operating costs by automating processes. Flandreau, M. (Ed.). (2005).

The most interesting and significant area at present is the development of such a form of innovation in the field of digital technologies as the development of a biometric identification system, since its introduction facilitates access to many banking products and services, as well as allows banks to closely monitor their customers. This system will penetrate into all spheres of human activity (education, financial sector, health care, public services) and will create an identification of an individual citizen. Flandreau, M. (Ed.). (2005).

But the introduction of digital technologies requires enhanced data protection. Therefore, every year banks allocate more and more funds for the development of advanced cybersecurity systems. But despite the financial difficulties and obstacles to the formation of a full-fledged digital banking system, new banking technologies provide great opportunities to significantly improve the efficiency of banks and gain a competitive position. Digitalization will not only be a tool to improve the operational efficiency of the Bank but will also improve the quality of customer service.

REFERENCES

1. Carol, Co. Fintech does not disrupt banks, they just fill in gaps, Computerworld Hong Kong Fourth. Deloitte Digital., 2018. EMEA Digital Banking Maturity 2018. Deloitte Development LLC. URL: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf>
2. Deloitte Digital., 2018. EMEA Digital Banking Maturity 2018. Deloitte Development LLC. URL: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/About-Deloitte/central-europe/ce-digital-banking-maturity-study-emea.pdf>
3. Developing the Digital Economy in Russia, World Bank., 2016. URL: [http://www.worldbank.org/en/events/2016/12/20/developing-the-digital-economy-in-russia-internationalseminar-seminar-1\(In Russian\)](http://www.worldbank.org/en/events/2016/12/20/developing-the-digital-economy-in-russia-internationalseminar-seminar-1(In Russian))
4. Digital Dividends, World Development Report., 2016. URL: <http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf>
5. Ernst&Young. 2017. EY FinTech Adoptign Index., 2017. URL: [http://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/\\$FILE/ey-fintech-adoption-index-2017.pdf](http://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/$FILE/ey-fintech-adoption-index-2017.pdf)

6. Ja. Barberis, S. Chishti., 2017. FINTECH. Guide to the latest financial technologies. M.: Al'pina Publisher, 2017, 105 p.
7. Kholyavko, A., Kantyshev, P., 2017. In Russia, the first payment for the blockade was held on November 29, 2017. URL: [//www.banki.ru/news/bankpress/](http://www.banki.ru/news/bankpress/) (In Russian)
8. Leventsov, V.A., Radaev A.E, Nikolaevskiy N.N., 2017. The aspects of the «Industry 4.0» concept within production process design/. St. Petersburg State Polytechnical University Journal. Economics. 10 (1): 19—31. DOI: 10.18721/JE.10102 23 (In Russian)
9. Order of the Government of the Russian Federation. dated 28.07.2017 №1632-R "On approval of the program "Digital economy of the Russian Federation".(2017): URL: http://www.consultant.ru/document/cons_doc_LAW_221756/ (accessed: 30.09.2018) (In Russian)
10. Ragimova, S., 2017. Banking from the mind.. URL: <http://www.banki.ru/news/bankpress/?id=9534112/>.(accessed: 02/09/2017)
11. Russia's Alfa Plans to Take on Rival Tinkoff by Creating a Digital Bank., URL: <https://themoscowtimes.com/articles/alfa-bank-plans-to-create-a-digital-bank-59164> (accessed: 05.10.2017) (In Russian)
12. Skinner, K. Value, Web., 2018. how FINTECH companies use blockchain and mobile technologies to create Internet of values / Kris Skinner; per. s angl. N. Yatsyuk. — M.: Mann, Ivanov i Ferber,416 p. (In Russian).
13. The development of open interfaces (open API) in the financial market., 2017. URL: https://www.cbr.ru/Content/Document/File/36006/api_survey.pdf (In Russian)
14. The overview of international market of biometric technologies and their application in the financial sector., 2018. URL: https://www.cbr.ru/content/document/file/36012/rev_bio.pdf (In Russian)
15. Vaganova, O. V., Bykanova, N.I., Grigoryan, A. S., Cherepovskaya, N. A., 2018. Directions of development of bank technologies applied in the Russian market of retail credit services. Revista Publicando, 15 (2): 1365-1377.- URL: <https://www.rmlconsultores.com/revista/index.php/crv/article/view/1457>
16. Flandreau, M. (Ed.). (2005). Money Doctors: The experience of international financial advising 1850-2000 (Vol. 26). Routledge. <https://doi.org/10.4324/9780203987599>
17. Castells, M. (2004). The network society A cross-cultural perspective. Edward Elgar. <https://doi.org/10.4337/9781845421663>
18. Sauvant, K. P. (2005). New sources of FDI: the BRICs-outward FDI from Brazil, Russia, India and China. J. World Investment & Trade, 6, 639.
19. Kramsch, C. (2014). Teaching foreign languages in an era of globalization: Introduction. The modern language journal, 98(1), 296-311. <https://doi.org/10.1111/j.1540-4781.2014.12057.x>
20. Gowan, P. (1995). Neo-liberal theory and practice for Eastern Europe. new left review, 3-3.
21. Ögütçü, M. (2002). Foreign direct investment and regional development: sharing experiences from Brazil, China, Russia and Turkey. Universitäts-und Landesbibliothek Sachsen-Anhalt.
22. Dodgson, M., Gann, D. M., & Salter, A. (2008). The management of technological innovation: strategy and practice. Oxford University Press on Demand.
23. Georghiou, L. (Ed.). (2008). The handbook of technology foresight: concepts and practice. Edward Elgar Publishing.