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Key Trends and Regulations of the Development of Digital Business Models of Banking Services in Industry 4.0

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ABSTRACT

The **subject** of the research is trends in the implementation of digital technologies in the banking sector. The **relevance** of the paper is due to the objective processes of global digital intervention of technologies in all spheres of human life and society. The research **aims** to identify, systematize and generalize key trends and regulations in the development of digital business models of banking services in Industry 4.0. For the first time, the authors identified and systematized modern trends and regulations in the development of digital business models of banking services in Industry 4.0, offered their own conceptual vision of the concept of "digital business model of banking services". The authors apply general scientific, philosophical, analytical, statistical, problem-chronological and historical-genetic **methods**, as well as methods of expert assessments. The article summarizes the main stages of the evolution of business models of the banking sector, reveals substantive and methodological differences between traditional remote banking services and digital banking, highlights the main business models for organizing digital banking; provides up-to-date data on the level of development of digital banking in the main geographic zones of the world; shows the dynamics and key areas of investment in the fintech industry in 2014–2019 and provides a critical analysis of their conditions; identifies problematic aspects of the development of digital business models of banking; describes the functionality of the main digital business models of Russian banks with the author's assessment of their capabilities and examples of their use in Russian practice. The authors **conclude** that the main drivers of digitalization of the banking sector are stable growth of non-cash payments in the world and in Russia; stable growth of the global digital banking market; the impact of the COVID-19 pandemic on the active demand of consumers of remote financial services; increased competition in the retail banking market; and a significant decrease in margins for traditional banking products. Identification and systematization of trends and regulations in the implementation of digital business models of banking services can form the basis for further analysis of the specifics of digitalization and personalization of digital banking in Industry 4.0 for the sustainable socio-economic development of the country in terms of possible advantages and threats to the security of financial resources and personal data of customers.

Keywords: digital banking; banking products; business models; Industry 4.0; cybersecurity; digitization; financial market

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INTRODUCTION

The digital economy inevitably affects all spheres of life of the socio-economic system, changing the traditional rules and mechanisms of its functioning, considering the global trends of digitalization. The banking system is one of the most receptive areas of the national economy to the introduction of innovations and the use of new digital solutions. This is due to a number of internal and external reasons. The internal reasons include:

- stable growth of non-cash payments in the world and in Russia (the share of non-cash transactions using bank cards in Russia in 2015–2019 increased from 38 to 64.7%¹);
- the development of competition in the payment services market on the part of non-banking organizations (in 2019, more than 6 non-bank payment services operated in Russia — direct competitors of banks, and the share of e-money as a settlement instrument was 77.6%) (for comparison, bank cards accounted for 90.5%).

The external reasons include:

- stable growth of the global digital banking market (according to GlobalMarketInsight, in 2019 its volume amounted to US \$ 8 trillion, and by 2026 it is expected to grow to US \$ 12 trillion²);
- the impact of the COVID-19 pandemic on the active demand of consumers of remote financial services (according to Fidelity National Information Services (FIS), since April 2020, the number of new unique customers in mobile banking increased by 200%, and traffic increased by 85%³).

In addition, the expansion of the range of digitalization of banking services is due to the trend towards the development of personalized banking. On the one hand, personalization today is a key competitive advantage of a modern bank that relies on meeting the unique needs of its customers. On the other hand, a personified approach in the banking sector is an adequate response to the personal economic, and psychological expectations of consumers of banking products. These expectations are associated, firstly, with an increase in the level of well-being of the population (according to the IMF and UN data, incomes are expected to grow by 3.0–10.0% by 2025, depending on the region), secondly, with the expansion of the middle class — the main driver of innovation for individuals (according to WorldDataLab, by 2030, the size of the global middle class will reach 5.3 billion people⁴), thirdly, with a change in personal motives for organizing financial services based on lifestyle and needs (life-style-banking). These facts are a breeding ground for the development of digital services for the personalization of banking products, considering the national characteristics of Industry 4.0.⁵

All of the above determines the relevance of the topic of this scientific research, since the banking sector is most actively introducing new digital technologies due to the need, on the one hand, to ensure that the costs of conducting banking operations are minimized for both clients and for your own business, and on the other, to improve security, the speed and convenience of such transactions for retail and corporate clients. In addition, in the context of the COVID-19 pandemic, not only the transition to

¹ Melnikova Y. Non-cash is taking over cash. (16.10.2020). URL: <https://www.comnews.ru/content/211038/2020-10-16/2020-w42/beznaval-pobezhdaet-kesh> (accessed on 18.01.2021).

² Digital banking market size by type. (October 2020). URL: <https://www.gminsights.com/industry-analysis/digital-banking-market> (accessed on 17.01.2021).

³ Matsiborska T. How the pandemic impacted banks: the digital revolution and new trends. (02.06.2020). URL: <https://psm7.com/bank/kak-pandemiya-izmenila-banki-cifrovaya-revolyuciya-i-novye-trendy.html> (accessed on 17.01.2021).

⁴ Kharas H. The Unprecedented Expansion of the Global Middle Class: An Update: Global Economy & Development Working Paper 100. 2017 (February). Brookings Institution, 14. UN World Population Prospects. P. 14.

⁵ Kirakasyants A. Fintech: Brief history. (19.11.2019). URL: <https://frankrg.com/8732> (accessed on 18.01.2021).

remote forms of service in various spheres of society has intensified, but the problem of the vulnerability of virtual services and services offered by Russian banks has also intensified, in connection with which the task of forming viable digital business models of banking services especially relevant and of practical value.⁶

The purpose of the scientific article is to identify, systematize and summarize the key trends and patterns in the implementation of digital business models of banking services in Industry 4.0. It seems that the results of the study can form the basis for further analysis of the specifics of digitalization and personalization of banking products and services in Industry 4.0 in the direction of summarizing data on financial effects for initiating banks, assessing the significance of banking innovations for sustainable socio-economic development of the country with positions of possible benefits and threats to the security of financial resources and personal data of clients.

MATERIALS AND METHODS

This scientific paper is of an interdisciplinary nature. We applied both general scientific and philosophical methods of cognition, as well as special economic, analytical, and statistical research methods based on them. To study the process of introducing digital business models in the banking sector, we used problem-chronological and historical-genetic methods of scientific knowledge, as well as methods of expert assessments.

The study is based on materials from open sources of thematic reviews of the VC.RU consulting agencies, the Skolkovo Research

Center, Digital IQ, PWC, Delloite, and the Bank of Russia.

LITERATURE REVIEW

In recent years, there has been a rapid increase in the interest of the scientific community in the problems of digital transformation of the banking sector. A number of researchers, for example, L. Magomayev [1], V. Zakshevski, A. Pashuta [2], T. Yu. Popova [3], A. A. Timchenko [4], and others in their works pay attention to the problems of introducing banking innovations.

The issues of transforming business models of banks into a digital economy are reflected in the works of Yu. B. Bubnova [5], A. P. Belous, S. Yu. Lyal'kov [6], S. Yu. Pertseva [7] and others.

F. T. Aleskerov⁷ and his colleagues from the Higher School of Economics presented a typology of business models for Russian banks.

At the same time, the issues of the formation and development of digital business models of banking services were poorly studied in domestic and foreign literature, which served as an additional motivation for the authors to study this scientific area in more detail. At the same time, banking services should be regarded as well-established electronic technologies for servicing and supporting customers, for example, online banking, mobile banking, a virtual account in an electronic payment system, online banking services, etc.

It seems that at the beginning of this study, it is important to understand the conceptual apparatus. For this, the author managed to systematize various approaches to the content of the concept of "digital business models of banking services"

⁶ Bank losses due to cybercrime. (29.10.2020). URL: https://www.tadviser.ru/index.php/Статья:Потери_банков_от_киберпреступности (accessed on 24.02.2021); How the post-Covid-19 reality will change banks and fintech services. (12.05.2020). URL: <https://vc.ru/finance/125294-kak-novaya-realnost-posle-covid-19-izmenit-banki-i-finteh-servisy> (accessed on 24.02.2021).

⁷ Aleskerov F. T., Belousova V. Yu., Bondarchuk P. K., Popova E. S. Russian banking business models: Typology, structure and loyalty. National Research University Higher School of Economics. URL: <https://www.hse.ru/data/2012/12/04/1268905426/бизнес-модели%20рос%20банков%20статья.pdf> (accessed on 22.02.2021).

presented in domestic and foreign literature (*Table 1*).

Summarizing the material presented in *Table 1*, the authors propose their own interpretation of the concept of “*digital business model of banking services*” — this is a way of digital interaction of a bank with customers, focused on creating new value using the latest digital technologies in a virtual mechanism to create and promote personalized banking products and services. This interpretation summarizes all modern patterns and trends in the development of digital banking both in Russia and abroad.

It should be emphasized that an important feature of the banking system in terms of identifying the stages of its integration into the digital economy is the inalienability of digital technologies in banking sector processes. Thus, the first mention of “Industry 4.0” as an evolutionary stage of the world economy belongs to the American computer scientist N. Negroponte, but the genesis of digitalization should be sought much earlier [14].

According to I. A. Sedykh, the first successful example of digitalization of banking services was the creation of a stable operating ATM of Barclays Bank in London in 1969, which laid the foundation for the development of a new segment of the banking market — bank card products, and in 1970 Bank Americard was issued in the USA, which later transformed into international system Visa International [15].

The second stage is considered to be the period from 1980 to 2000. The “client-bank” methodology of remote banking services was formed at this stage, which is the basis of modern digital solutions and services.

The third stage covers the period from 2001 to 2010 when there was an active filling of the previously created client-banking platform with various services and products [16].

From 2011 to the present, the era of an open banking system has begun, which is

gradually forming large-scale digital spaces with the involvement of an increasing number of representatives of the non-financial sector within the framework of thematic partnerships: businesses in FMCG, HoReCa, airlines, taxis (the most common examples), which most often are the sphere of interests of leading banks [17].

The COVID-19 outbreak in 2019–2020 became one of the most active catalysts in the entire history of the formation of remote banking services and, like spring, rapidly pushed the development of banking services, forcing to rethink traditional strategies and models of communication with customers. It should be noted that at present, the effect of a sharp start is still preserved, and in the next 2–3 years it will act as one of the key drivers of the intellectual development of digital banking in the world and in Russia.

Critical analysis of scientific and applied research of such foreign scientists as R. Amit, C. Zott [8], C. Burmeister, D. Lüttgens [9], J. Björkdahl, M. Holmen [18], streamline the development and implementation of innovations in the business models of the banking sector date back to the 1970s. In general, the evolution of the stages of transformation of business models in the banking sector can be represented as follows (*Table 2*).

Table 2 shows that the transition from a physical to a digital business model took place in a fairly short period of time, and recent years have demonstrated literally rapid development of the banking sector in the direction of digital optimization and personalization of virtual bank-client interaction.

RESULTS AND DISCUSSION

The key signal for the revolutionary transformation by banks of existing business models for organizing and promoting banking services for retail and corporate clients was the adoption in September 2015 by the government regulator of the UK banking system of an initiative to switch to the

Table 1

**The content of the concept of “digital business model of banking services”
in domestic and foreign literature**

Author (s) / reference	Content of the concept
<i>I. Foreign authors</i>	
1. Amit R., Zott C. [8, p. 43]	Maximum use of the potential of digital technologies for the sale of banking products and services exclusively in a remote format
2. Burmeister C., Lüttgens D., Piller F. [9, p. 67]	A large-scale transformation of the architecture and infrastructure of banking sector processes to provide a product (service) to the client, in which his communication with the bank takes place in a virtual environment
3. Parker G., Van Alstyne M., Choudary S. [10, p. 145]	A new organization of banking services, which allows increasing the performance of all banking systems and personalizing the product (service), considering client's preferences
4. PWC Analytical reports*	The bank's work format is based on the use of social, mobile, and other digital technologies in order to reduce transaction costs and personalize banking services to increase its own competitiveness
<i>II. Domestic authors</i>	
1. Borovkov A.I., Ryabov Yu.A., Maruseva V.M.**	Strategy for the digital transformation of banking sector processes by transferring the mechanism for selling products (services) into a virtual format
2. Gaisina D.V.***	A conceptual vision of the implementation of a portfolio of banking products and services in the format of start-end digital chains on the Internet
3. Orekhova S.V. [12, p. 85]	A new stage in the development of the architecture of banking processes for the creation, management, implementation, and maintenance of banking products and services with the dominant use of innovative digital technologies
4. Melenkin V.L. [13, p. 45]	Conceptual implementation of the digital architecture of the future mechanism for the provision of banking products and services, reflecting the vision and interests of its functional stakeholders
5. IFRS “Financial Instruments” ****	The way an entity manages its financial assets to generate cash flows

Source: compiled by the authors based on the research of the specialized domestic and foreign scientific literature.

* Financial Services Technologies in 2020 and Beyond: Revolutionizing Change. Analytical report. PWC. (published on 14.12.2020). URL: https://www.pwc.ru/ru/banking/publications/_FinTech2020_Rus.pdf (accessed on 24.02.2021); Blurring the Boundaries: How FinTech Companies Are Impacting the Financial Services Sector: A Worldwide View of the FinTech Segment. PWC. (published on 09.05.2016). URL: <https://www.pwc.ru/ru/banking/publications/fintech-global-report-rus.pdf> (accessed on 24.02.2021).

** Digital Manufacturing: Methods, Ecosystems, Technologies. Skolkovo. URL: http://tpp74.ru/storage/tsifrovoe_proizvodstvo_112017.pdf (accessed on 12.02.2021).

*** Gaisina D.V. Transformation of modern business models towards ecosystems: Report at the conference “Designing business structures”. Business studio. (16.09.2017). URL: <https://www.businessstudio.ru/upload/iblock/7e6/Тайщина.pdf> (accessed on 24.02.2021).

**** International Financial Reporting Standard (IFRS) 9 “Financial Instruments” (put into effect in the Russian Federation by order of the Ministry of Finance of Russia dated August 26, 2015, No. 133n). URL: http://www.consultant.ru/document/cons_doc_LAW_186221/ (accessed on 24.02.2021).

Table 2

Key stages of the evolution of the banking sector business models

The stage of development of business models in the banking sector	Stage description
1. Stage of the physical business model	<i>Chronological boundaries:</i> 1950–1970. <i>Stage content:</i> the banking sector is focused on the active development of a physical presence in the widest possible geographical area. Time of rapid growth of branches and representative offices of the bank in foreign countries. The use of remote services (radio, telephone, television) is of a targeted operational nature and, as a rule, is concentrated in the marketing block of the banking sector
2. Stage of the technocratic business model	<i>Chronological boundaries:</i> 1980–1990. <i>Features of methodological paradigms:</i> the banking sector is actively developing the technical side of its activities through the use of telephone tools, the emerging Internet connection for managing remote branches, as well as the formation of a new direction of activity – a remote banking service system as an independent business unit
3. Stage of the model of cross-border communications	<i>Chronological boundaries:</i> 1990–2000. <i>Stage content:</i> as the banking sector scales and goes beyond the national financial markets, a request arises to include in the business model the factor of foreign influence of stakeholders and the need for predictive management of their economic interests. Active development of the concept of accumulation of personal information, the first attempts to form a digital portrait of the client
4. Stage of the synergy model between banking and non-financial enterprises	<i>Chronological boundaries:</i> 2001–2011. <i>Stage content:</i> in order to increase its own competitive positions in the market, as well as develop a portfolio of cross-functional products and services, the banking sector is increasingly involving non-financial enterprises in its sphere of activity on the principles of partnership and technical collaboration (for example, cooperation of the bank with fintech companies, creation on the basis of the bank of venture funds to support innovations)
5. Stage of the digital business model of financial ecosystems and marketplaces	<i>Chronological boundaries:</i> 2011 – present. <i>Stage content:</i> the rapid growth of digital technologies and their rapid scaling led to the orientation of the bank's management towards the formation of digital markets that unite many independent physical and virtual enterprises, connected by partner contracts and operating in an autonomous zone of mutual non-competition, and since 2015 the market has formed a new message for the formation of business -models in the form of ecosystems – autonomous socio-economic systems that implement packages of products and services in one space via the Internet of Things (IoT)*

Source: compiled by the authors based on the data [19; 20, p. 3].

* Gaisina D.V. Transformation of modern business models towards ecosystems. URL: <https://www.businessstudio.ru/upload/iblock/7e6/Гайсина.pdf> (accessed on 24.02.2021).

Table 3

Characteristics of informative and methodological differences between traditional remote banking and digital banking

Comparison criterion	Traditional remote banking	Digital banking
1. Chronological boundaries	? – 2015 (for the EU – 2018)	2015 (2018) – present
2. Business model	Violent (a rigid vertical structure created by a bank based on a portfolio of services and the services it offers)	Customer-oriented (banking is a constructor that responds flexibly to customers' requests and can adapt to their behavior)
3. The main source of information	Client's personal data constituting a bank secret	Open customer data, BigData about customer transactions, data from social networks, thematic discount cards, available to a certain scope of persons
3. Tools for the implementation of services	Package solutions or tariff plans that are strictly defined by the bank and are offered to the client (as a rule, it is difficult to change their functional composition)	Marketing, behavioral (software products are smart and capable of self-adaptation, considering the behavioral characteristics or lifestyle of the clients, their professional preferences)
4. Source of income for the bank	Commission for the client's performance of certain transactions based on the banking infrastructure	Commission fee for managing the client's personal data, ensuring the cybersecurity of his interaction on the Internet
5. Format of the banking service	Physically focused on its own infrastructure and specialists of a particular bank (the same service may differ qualitatively depending on the competencies of the bank's specialists)	Virtually focused on special infrastructure solutions of an open type (regardless of the bank, the client receives a service that is almost identical in quality and safety)
6. Tools for competition and customer acquisition	Pricing. Banks offer flexible rates and discount schemes, as well as loyalty programs in exchange for attracting customers	Technical. Banks attract customers with the convenience of solutions, availability, and a wide range of means of individualization of financial instruments

Source: compiled by the authors based on the data [15, p. 49; 22, p. 50–51].

application of open API standards (developed by the Open Banking Working Group⁸). This allowed banks to use data on customers of other organizations, considering the requirements of the privacy policy, to improve banking services and proactively respond to changing customer needs and requests. We emphasize that since January 13, 2018, the use of open API standards in the UK has become mandatory for the 9 largest banks in the country [21, p. 80].

Independently of the UK, in January 2016, the EU payment directive PSD 2 was adopted, which provided the client with the right to transfer the rights to manage financial transactions to third parties based on the open API standard [15, p. 22–23].

These two events became a bifurcation point in the development of banking services: everything that was in force before the adoption of the open API standard is called traditional remote banking, and everything that was later is called digital banking. *Table 3* presents substantive and methodological differences between traditional remote banking and digital banking in more detail.

The information summarized in *Table 3* allows us to conclude that digital banking is a qualitatively new technical and functional add-on, which is a free designer for the formation of unique financial marketplaces, considering the needs of a particular retail client or corporate business needs.

The trends analysis of digitalization in the banking sector allowed us to identify three main business models for organizing digital banking that are currently used in world practice: Anglo-American, European and Russian. A more detailed description of each of them is given in *Table 4*.

It is noteworthy that the patterns of digital banking development are directly

related to the concept of Fintech — a market segment that combines pure financial services and high technologies into original products for implementation in virtual reality without reference to a specific physical location of the bank. This means that it is fair to analyze the development of new digital business models for the sale of banking products precisely from the position of the Fintech market [24].

To assess the scale of the development of digital banking as a key product of the Fintech market, let us present the dynamics of its penetration into the banking systems of the main geographic zones of the world (*Fig. 1*).

The *Fig. 1* data show that the UK was the most developed geographic center of digital banking in 2019—71.0% of all financial transactions in the country were carried out through digital banking mechanisms. The Asian region (Singapore and Hong Kong) ranked second — 67.0% each, third — Australia — 58.0%. It is interesting to note that in the United States, despite the highest level of development of digital technologies, the share of digital banking was only 46.0%.⁹

Based on the data of the E&YGlobal Fin Tech Adoption Index-2019, we will consider the most promising banking services for digitalization (the rating is based on the volume of transactions made by customers) (*Fig. 2*).

According to *Fig. 2*, we can conclude that in 2015–2019 the main development was received by the least regulated instruments of banking services: P2P, P2B money transfers — 75.0%, in second place — investments and savings — 48.0%, in third place — services for household budgeting and planning — 34.0%. The least widespread are complex products with a high level of risk of losses for banks or non-financial companies: insurance — 29%, borrowing — 27%.

⁸ Information and analytical review “The Russian banking system today” (September 2019). URL: https://asros.ru/upload/iblock/c30/20397_informatsionnoanaliticheskoeobozreniesentyabr2019.pdf (accessed on 17.01.2021).

⁹ Omelchuk N. Fin Tech conquered the world: EY research (25.10.2019). URL: <https://psm7.com/fintech/fintech-zavoeval-mir-issledovanie-ey.html> (accessed on 18.01.2021).

Table 4

Main business models of digital banking and their characteristics

Business model	Business model description
1. Anglo-American	<p><i>Formation factors:</i></p> <ul style="list-style-type: none"> – the highest level of Internet access in the world (95.0%)*; – growth of public and business confidence in digital providers in terms of personal data (in the UK, the cybersecurity index was 0.931, in the USA – 0.926)**; – the formation of a large-scale integrated market for services due to the technical cooperation of the companies of the FAMGA group (Facebook, Apple, Microsoft, Google, and Amazon) and BAT (BAIDU, ANTFINANCIAL, TENCENT)***; – policy of strict isolation and quarantine during the COVID-19 pandemic in the United States, China. <p><i>Description of the business model.</i> Creation of autonomous platforms for the integration of banking services into gadgets and other personal digital devices in order to create a barrier-free environment for obtaining banking services “here and now”. The business model is distinguished by the active integration of banks into the non-financial sphere of clients’ lives and its seamless integration into the client’s life rhythm, as well as the tools for developing their own financial solutions</p>
2. Russian	<p><i>Formation factors:</i></p> <ul style="list-style-type: none"> – active innovation policy of the Big Three Russian banks (Sberbank, Tinkoff Bank, Alfa-Bank); – the policy of protectionism on the part of the banking regulator (Bank of Russia) and strategic goals for the creation of domestic digital banking systems; – large-scale state programs for digitalization of the economy (National Program “Digital Economy of the Russian Federation” dated 04.06.2019 No. 7); – reaching a ceiling on market growth on the part of the largest Internet providers (Rostelecom, MTS). <p><i>Description of the business model.</i> In the Russian digital banking business model, individual banking players are developing standalone solutions that are not yet ready to combine their customers’ data into a single transparent library for sharing. Due to strong competitive sentiment, banks are producing similar products, spending money on solving the same problems many times, instead of productive cooperation within the framework of national projects to digitalize the economy</p>
3. European (EU countries)	<p><i>Formation factors:</i></p> <ul style="list-style-type: none"> – the need to create cross-border solutions in the field of financial services for the convenience of making retail and corporate transactions between the countries of the union; – active growth of customer interest and the need to unify requirements for working with personal data, cybersecurity, and countering fraudulent transactions; – moral and physical obsolescence of traditional banking portfolios of services. <p><i>Description of the business model.</i> The EU countries form digital banking based on the adoption of uniform standards for the processing of personal data of clients and the granting of the right to the client to distribute personal information among certain persons, for example, business structures, taking into account the provision of an appropriate level of cybersecurity. As a rule, each country individually develops its own innovative direction, considering the specifics of the banking sector and national priorities</p>

Source: compiled by the authors based on data [14, 17, 23].

* Sergeeva Y. Internet statistics in 2019 – in the world and in Russia. (11.02.2019). URL: <https://www.web-canape.ru/business/vsya-statistika-interneta-na-2019-god-v-mire-i-v-rossii/> (accessed on 18.01.2021).

** Public confidence in network technologies and services. (20.06.2019). URL: https://issek.hse.ru/data/2019/06/20/1488856771/NTI_N_133_20062019.pdf (accessed on 17.01.2021).

*** FINTECH World Market (2019). URL: https://innoagency.ru/files/FinTech_StartupCafe_2020.pdf (accessed on 18.01.2021).

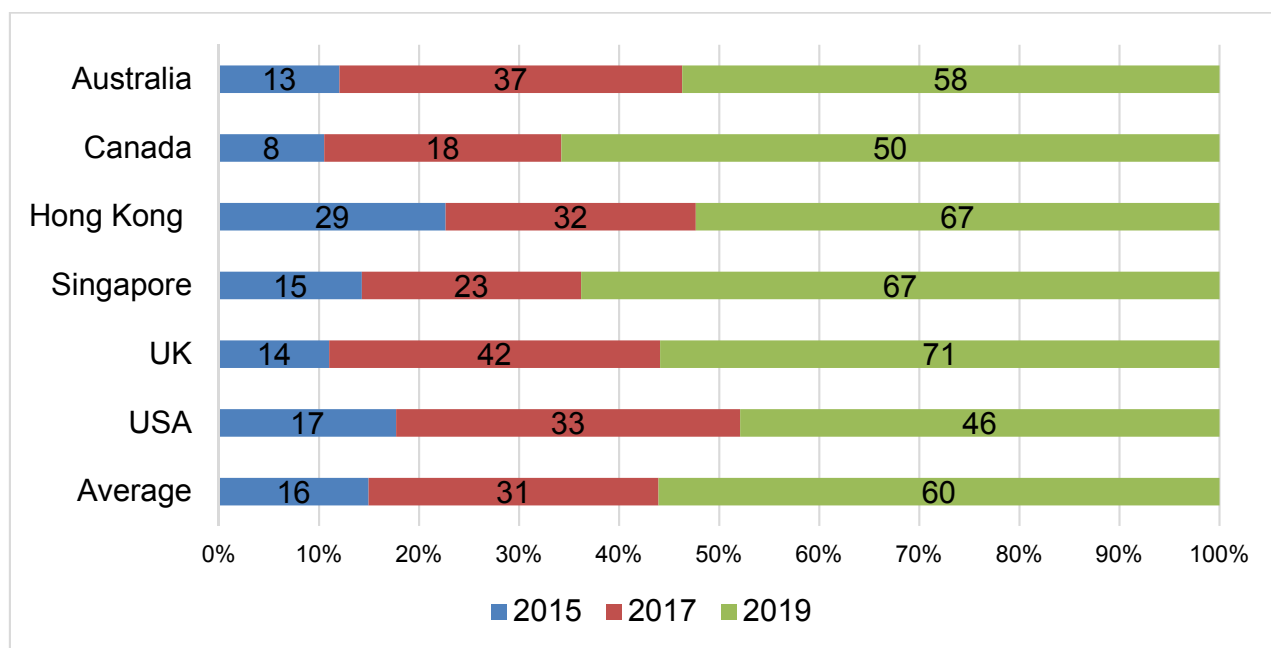


Fig. 1. The level of development of digital banking in the main geographical zones of the world, %

Source: Global Fin Tech Adoption Index 2019 (2019). URL: https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/banking-and-capital-markets/ey-global-fintech-adoption-index.pdf (accessed on 17.01.2021).

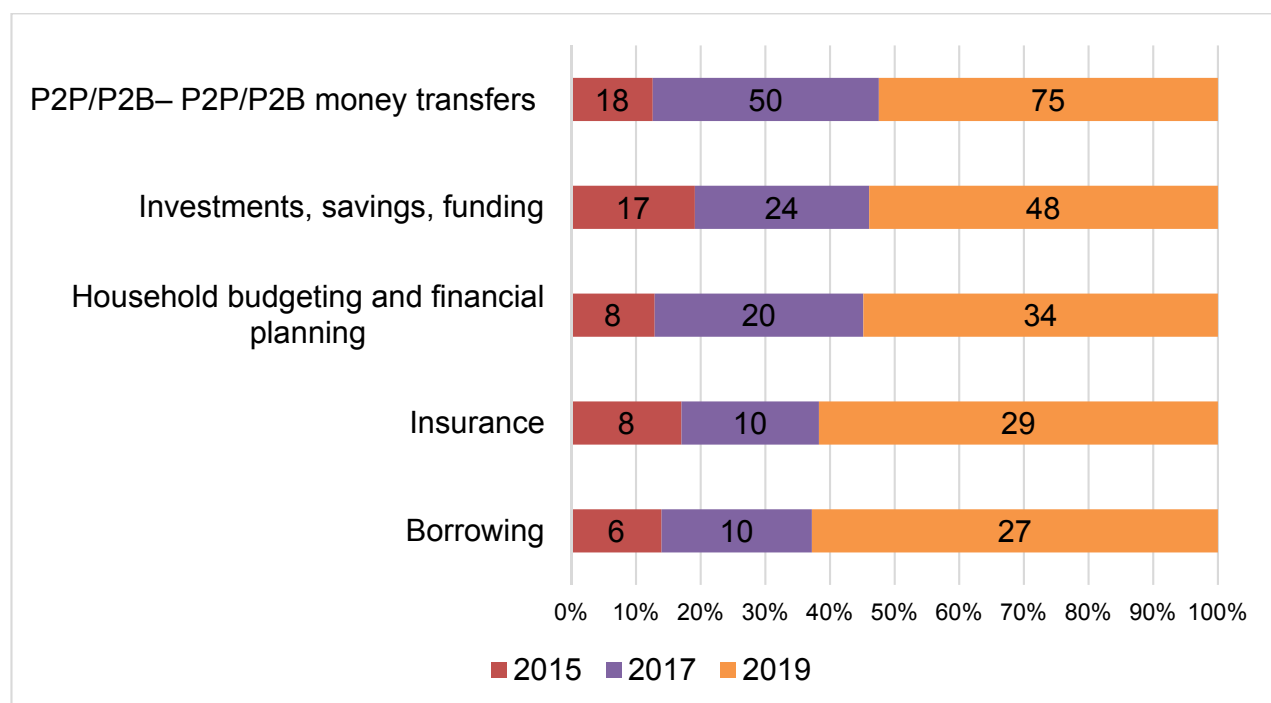


Fig. 2. The most promising bank services for digitalization (world practice), %

Source: Global Fin Tech Adoption Index 2019 (2019). URL: https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/banking-and-capital-markets/ey-global-fintech-adoption-index.pdf (accessed on 17.01.2021).

Table 5

General dynamics and key areas of investment in the fintech industry in 2014–2019 (I and II quarters)

Indicator	2014	2015	2016	2017	2018	2019 (1/2 of the year)
1. Total investment in the Fintech industry market, total, USD billion <i>Including:</i>	70.4	92.1	141.1	148.1	270.2	109.4
1.1. Blockchain and cryptocurrency investments	0.7	0.5	0.7	4.9	5.0	1.0
1.2. Cybersecurity investment	60.1	78.9	120.0	128.9	250.5	102.6
1.3. Investment in regulatory technology	3.9	1.2	3.7	1.3	3.9	1.5
1.4. Insurance investments (innovative insurance products)	3.7	3.1	12.1	10.0	7.6	1.1
1.5. Digital management solutions investments	1.7	8.0	3.6	2.5	1.8	2.2
1.6. Development and real estate investments (in terms of financing the construction industry)	0.3	0.4	1.0	0.5	1.4	1.0

Source: The Pulse of Fintech 2019. Biannual global analysis of investment in fintech (31 July 2019). URL: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/07/pulse-of-fintech-h1-2019.pdf> (accessed on 19.01.2021).

To understand the development trends of the global Fintech industry market, let us consider the general dynamics of investments in this segment of the financial market and, in particular, key areas for 2014–2019 (data are available for the 1st half of the year) (Table 5).

According to Table 5 data, the key place in the object-thematic direction of investment was taken by cybersecurity — on average, this area accounted for US \$ 123.5 billion per year (88.3% of the total investment), in second place — insurance investment — US \$ 6.3 billion per year (4.6%), in third place — investments in digital solutions in the field of investment management — US \$ 3.3 billion per year (3.0%). At the same time, such popular technologies as blockchain

accounted for 1.4% of all investments in Fintech. Practical technologies in development finance also accounted for a very small share — 0.6%.

The reasons for this investment “unpopularity” of the two indicated areas are the legal unsettledness of the status of the first object (currently only 10 countries officially recognize the blockchain technology and bitcoin as a financial instrument and means of payment, respectively¹⁰) and the absence of a single regulatory act or a single mechanism for bank financing of development projects

¹⁰ Top 10 countries where cryptocurrency is allowed (05.01.2021). URL: <https://bitexpert.io/wiki/cryptocurrencies/top-10-stran-gde-razreshena-kriptoalyuta/> (accessed on 18.01.2021).

Table 6

Dynamics of indicators of driver factors in the formation of digital business models of banking in the Russian Federation in 2015–2019

Indicator	2015	2016	2017	2018	2019
1. The share of citizens with Internet access, %	72.1	74.8	76.3	76.6	76.9
1.1. Including broadband internet	66.8	70.7	72.6	73.2	73.6
2. The share of financial sector enterprises using high-tech services, % (for 2019, data are estimated)	18.4	20.1	30.1	33.8	36.2
3. Index of digitalization and intensity of use of digital technologies in the financial sector, %	29.8	33.6	34.7	40.0	41.6

Source: compiled by the authors. Gorodnikova N.V., Gokhberg L.M., Ditkovsky K.A. and others. Indicators of innovation: 2018. Statistical collection. Moscow: National Research University Higher School of Economics; 2018.p. 13, 146, 149. Gokhberg L.M., Ditkovsky K.A., Kuznetsova I.A. and others. Indicators of innovation: 2019. Statistical collection. Moscow: National Research University Higher School of Economics; 2019. p. 13, 14, 166.

and real estate (in the world there are at least 3 different models of organization of mortgage lending and more than 20 different laws on mortgages) [25].

In Russia, digital banking business models are developing rather unevenly and contradictory. At the same time, experts note the following key trends:

- the active development of Internet traffic in the Russian Federation has become a key driver of growth in the Fintech market: according to the All-Russian Omnibus GfK, by the beginning of 2019 the number of Internet users aged 16+ amounted to 90 million people or 75% of the total adult population of the country.¹¹ The share of financial organizations using cloud services (as an integral element of the digital business

model of a banking organization) amounted to 33.8% at the beginning of 2019 [26];

- stable growth of e-commerce and services in e-commerce, which is objectively impossible without the corresponding development of P2B and P2P bank transfer services. At the same time, the share of entrepreneurial organizations using high-tech services for doing business online amounted to 30.1% at the beginning of 2019 [10, 15];

- the index of digitalization and the intensity of the use of digital technologies in the financial sector at the beginning of 2019 amounted to 40.0%, which also significantly hinders the development of digital business models of banking since only the largest players in the banking sector allow the implementation of large infrastructure projects for the transition to full-fledged digital banking.

¹¹ GfK Research: Internet Penetration in Russia (15.01.2019). URL: <https://www.gfk.com/ru/press/issledovanie-gfk-proniknovenie-interneta-v-rossii> (accessed on 19.01.2021).

Table 7

Main business models of digital banking implementation in the Russian Federation

Business model	Business model description
1. Digital banking brand	<p><i>Types of banks using a business model</i> Classic banks with a rigid vertical architecture and a large-scale physical presence in the market.</p> <p><i>Drivers of digitalization:</i></p> <ul style="list-style-type: none"> – a large client base of various ages, lifestyles, social and professional statuses; – the need to maintain a loyal attitude of customers to the existing line of banking products, while at the same time the impossibility and (or) reluctance of management to revolutionize the product portfolio; – large-scale infrastructure and proprietary software systems that require maintenance costs. <p><i>Features of the business model</i> Old-school banks, due to the reluctance and (or) impossibility of large-scale changes in the portfolio of banking products, create branded versions based on traditional products with options available only to certain categories of customers or under certain conditions (for example, placing a deposit in the amount of at least US \$ 100 thousand).</p> <p><i>Examples of banks:</i> Tochka, Delobank, Rocket-Bank</p>
2. Bank with digital channels	<p><i>Types of banks using a business model</i> Banks create separate divisions or subsidiaries that operate on the basis of a parent license and implement separate, as a rule, specialized digital products or services.</p> <p><i>Drivers of digitalization:</i></p> <ul style="list-style-type: none"> – the need to diversify the banking portfolio of service products; – decrease in marginality for regular banking products; – the need to consolidate or expand the client base (usually the market for such banks is limited to a specific region or even a city). <p><i>Features of the business model</i> The bank's management finances and forms a turnkey new structural business unit that provides specialized services or sells assistance products under the parent license. In the future, a procedure for separating a business structure into an independent Fintech business or carrying out a buyback procedure (the subsidiary buys control over the parent bank) is possible.</p> <p><i>Examples of banks:</i> Sphere, Prosto Bank, Megafon Bank</p>
3. Digital branch of the bank	<p><i>Types of banks using a business model</i> Medium and large banks that are developing a long-term strategy for digitalizing business processes by reforming the parent business model based on a pilot project – a digital branch, which is actually a twin of the bank, but whose products and services are based on the digital economy. In the future, this experience can be extended to the entire bank, or the parent bank can be liquidated as unprofitable.</p> <p><i>Drivers of digitalization:</i></p> <ul style="list-style-type: none"> – increasing the competitive position in the rating of banks; – participation in the management of a promising startup project; – testing the possibilities of restructuring the business model on the example of a separate branch. <p><i>Features of the business model</i> Features of the business model. As part of the parent business model, a separate branch, or a new branch created from scratch, is organized according to the latest achievements of Industry 4.0. The bank's management evaluates the performance of the branch, and in case of satisfactory performance, the model is scaled to the entire bank.</p> <p><i>Examples of banks:</i> Elba Bank, TalkBank.</p>

Table 7 (continued)

Business model	Business model description
4. Completely digital bank	<p><i>Types of banks using a business model</i></p> <p>Large and super-large banks, which, as part of the restructuring strategy, decided to completely reformat the business model of organizing banking services, or were initially distinguished by the maximum interest in innovative solutions.</p> <p><i>Drivers of digitalization:</i></p> <ul style="list-style-type: none"> – strengthening the position of market leadership in the banking services market; – obtaining unique competitive and technological advantages that can be used for banking expansion in other countries; – increasing the credibility and business reputation of the bank as a market expert in the field of innovations; – participation of the bank in complex non-standard projects and government programs requiring the development of innovative tools. <p><i>Features of the business model</i></p> <p>Banks with such a model are digital twins of real banks with a request to form a banking ecosystem by involving non-financial market agents in the orbit of their influence and forming partnership agreements with them on a joint work strategy.</p> <p><i>Examples of banks:</i> Sberbank, Bank 131, Tinkoff Bank</p>

Source: compiled by the authors based on data [24, 26, 27, 33].

The dynamics of indicators of driver factors in the formation of digital business models of banking in Russia for 2015–2019 are summarized in *Table 6*.

Compared to the indicators of the leading countries, the Russian digital banking market is distinguished by the concentration of technological competencies directly in the banking system, or rather in a number of super-large banks from the Big Three and a number of innovative and active banks. According to experts, this is due either to the weakness of Fintech projects or to their absence in statistical accounting [15].

Our analysis allows us to conclude that Russian banks are currently implementing digital banking in the following business models (*Table 7*).

Another trend in the implementation of digital business models of banking products in Russia is the uneven distribution of digital services: for example, according to KPMG, 86% of Russian banks in the top 20 have their own programs for the development of digital technologies, and there is no information on

the rest of the banks. It can be concluded that less than 20 domestic banks are the driving force behind digitalization, and out of the top 20, only 3 allocate regular budgets to finance projects in the field of digitalization of banking services and products (*Fig. 3*).

Fig. 3 shows that Sberbank is leading in the digital development of the banking sector — on average, its annual budget for financing projects in the field of digitalization of banking services and products was 91.4 billion rubles in 2014–2018 (for full years). VTB Bank is in second place — 9.6 billion rubles, Rosselkhozbank is in third place — 4.4 billion rubles.

Russian banks have different visions of strategies for the further development of digital business models of banking services,¹²

¹² Banking UX Trends 2020: Artificial Intelligence, Voice Assistants, and Hyperpersonalization (30.01.2020). URL: <https://vc.ru/design/102910-ux-trendy-bankinga-2020-goda-iskusstvennyy-intellekt-golosovye-pomoshchniki-i-giperpersonalizaciya> (accessed on 19.01.2021); Financial Services Technologies in 2020 and Beyond: A Revolutionary Change (2020). URL: https://www.pwc.ru/ru/banking/publications/_FinTech2020_Rus.pdf (accessed on 17.01.2021).

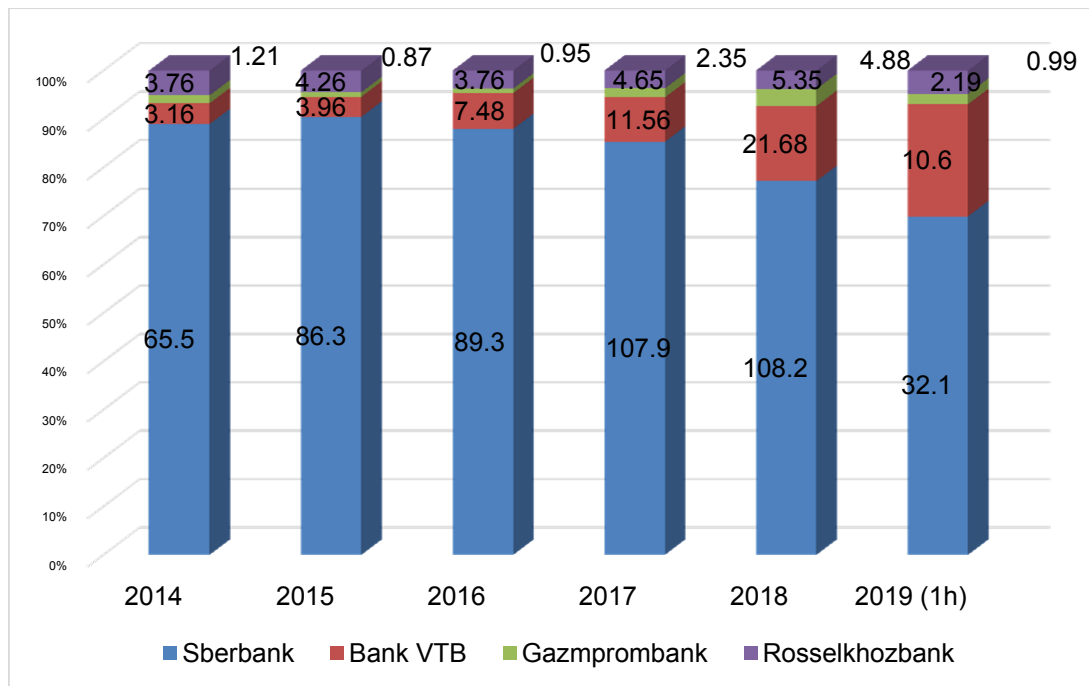


Fig. 3. The volume of budgets for financing projects in the field of digitalization of banking services and products, billion rubles

Source: FINTECH 2019 annual research of the financial technology market in Russia (2019). URL: <https://ict.moscow/static/f1c840b8-468c-5a33-b94b-f15ee9f66230.pdf> (accessed on 18.01.2021).

but in general, they can be structured into the following groups:

1. **The de facto standard** — the bank develops norms and criteria for the implementation of a banking product, which are mandatory for all customers [27, 28]. The innovativeness and personification of such a model, as a rule, is low and limited by the framework of the legislation. These include, for example, money transfer instruments:

- U-Money (formerly Yandex.Money) has been successfully integrated into the system of the Unified and Regional Portal of State and Municipal Services, but the possibility of forming an individual set of services is limited by the functionality of partner portals;

- the practice of transfers by phone number both between the accounts of one client and different clients, including abroad: from June 29, 2020, the Mir payment system launched cross-border transfers to cards of national payment systems of the

CIS countries, which imposes restrictions on transfers to bank cards of local payment systems;

- the use of QR codes for making payments in the e-commerce system (such a service is provided by TalkBank in the format of the “Paylastic.me” product). The convenience of this product is encrypted storage of data about the user of the bank account and increased security of the money transfer operation, but its functionality depends on the beneficiary of the payment and its technical equipment [32].

2. **Switch** — development of individual and digital solutions based on proprietary technologies and infrastructure [29]. Thus, Tinkoff Bank offers the client to build their own banking platform, considering the age, needs, professional status of clients.

3. **Pyramid of products** — providing customers with the opportunity to create their portfolio of products or services from independent digital blocks based on the use of smart contracts [30].

Currently, such a model is available only for corporate clients of Sberbank, VTB Bank, and Rosselkhozbank when carrying out factoring and leasing operations, as well as when receiving subsidies for a farm. As part of the corporate cabinet, the client collects a diagram of connections between business partners, describes their functions, and determines financial flows, then this model is agreed with all participants and, with their common consent, a chain of smart contracts is created, within which financial transactions.

4. Blockbuster model — a high-tech company brings together, within a certain project or platform, various business agents from Fintech, physical business, and IT to create a cross-industry product (for example, a remote fare payment system, video surveillance system, and perimeter security, including “smart home”, “smart factory” systems from CELENO, Euro Mobile, Wo Master) [27, 29].

5. Customization model — platforms for social engineering and implementation of systems of invisible indicators to ensure the personal and public safety of large industrial, transport projects of corporate clients [29, 30]. Solutions are developed exclusively individually for the requests of specific projects, for example:

- artificial intelligence systems for assessing the risk of fraud in the implementation of multilateral investment projects;
- predictive analytics systems for online tariff adjustment for toll motorways, for example, Western High-Speed Diameter in St. Petersburg, considering the peculiarities of the user’s social status, for example, disability;
- systems for blocking card accounts when a client visits prohibited or restricted places to visit, for example, a casino;
- “invisible payments” — VisionLab offers the installation of a special chip in electric cars linked to the owner’s bank account, which will allow him to remotely pay for

charging the car using a bank card. This solution is relevant to ensure the safety of both the owner and the operator of gas stations in areas with dense development.

It should be noted that there are very few independent Fintech projects with a full-cycle digital personalization business model in the country, although experts note that, according to various estimates, the number of potential applicants for the status of digital banks among Fintech companies ranges from 200 to 300. However, there is not a single unicorn startup in Russia yet, although the neobank segment is actively growing (for example, Tinkoff Bank is a full-fledged online bank with multifunctional digital services without a network of its own branches).¹³

As for traditional banks, the most prepared for digitalization and integration of financial technologies are: Tinkoff Bank, Sberbank, Alfa-Bank, Raiffeisenbank, AK Bars, Rosbank, VTB Bank, Russian Standard Bank, Bank Saint Petersburg, and Uralsib Bank [24, 31].

CONCLUSIONS

The processes of digitalization of the economy are rapidly penetrating all aspects of the life of society and the socio-economic system, changing both the mental attitude to electronic and virtual technologies that have entered our reality and the purely pragmatic perception, due to the driving forces of competitiveness, optimization, and comfort. This is directly related to the banking sector. The result is the transformation of services, infrastructure, mobile and electronic technologies.

Despite a significant amount of research by domestic and foreign authors devoted to the digital transformation of banks, the introduction of new banking technologies,

¹³ Digital Banking Maturity — 2020. How banks are responding to the digital revolution/evolution? (September 2020). URL: https://www2.deloitte.com/content/dam/Deloitte/ru/Documents/research-center/DBM_2020_rus.pdf (accessed on 19.01.2021).

the formation, and development of modern banking infrastructure, the development of digital business models of banking services have not been deeply studied.

In this regard, the value of this scientific study lies in the fact that the authors for the first time identified and systematized modern trends and patterns in the development of digital business models of banking services in Industry 4.0. Based on the latest scientific works of Russian and foreign scientists, this study proposes its own conceptual vision of the concept of “digital business model of banking services”, which is distinguished by originality and depth of presentation of the features of new electronic interaction technologies between the bank and customers.

The authors have summarized the main stages of the evolution of business models of the banking sector, identified substantive and methodological differences between traditional remote and digital banking, identified the main business models for organizing digital banking.

The article presents relevant data on the level of development of digital banking in the main geographic areas of the world, the dynamics of investments, and key areas of investment in the Fintech industry in 2014–2019 and a critical analysis of its condition

is given. In addition, the authors identified problematic aspects of the development of digital business models of banking, as well as described the functionality of the main digital business models of Russian banks with the author’s assessment of their capabilities and examples of their use in Russia.

The article makes a significant theoretical and practical contribution to the generalization and systematization of the processes of digitalization of the banking sector in Russia and the development of promising business models of banking services in Industry 4.0, taking into account the national goals and objectives of sustainable development.

We believe that identifying and systematizing trends and patterns in the implementation of digital business models of banking services can form the basis for further analysis of the specifics of digitalization and personalization of digital banking in Industry 4.0 in the context of summarizing data on financial effects for initiating banks, updating the significance of innovative digital services and products for the sustainable socio-economic development of the country in terms of possible advantages and threats to the security of financial resources and personal data of customers.

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Usmanov D.I. — collection of statistical data, tabular and graphical presentation of the results.

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