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Monetization of Information Infrastructure Products in the Conditions of Development of Competition in the Credit and Financial Sector

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***Abstract*—The purpose of the work is to study the main directions of the difference between the new approach in the development of information infrastructure from the traditional approach, as well as the feasibility of creating a single front-end information platform that would combine mobile banking technology, personal finance management and control combined with supervisory functions to ensure the monetization of information infrastructure products of the credit and financial sector. The research suggests the substantiation of the following assumption: the formation of a global financial ecosystem based on the big data bank is impossible today without the creation of joint projects and partnerships in the conditions of constant interaction and fruitful cooperation on the exchange of customer experience and technological solutions. One of these solutions may be the creation of a single front-end information platform (SFIP).**

Keywords—information infrastructure; credit and financial sector; products and services; monetization; unified front-end information platform; technologies; service

I. Introduction

The development of modern information infrastructure depends on the need for trust and transparency in the creation of new products or services and maintenance of existing ones. Many stakeholders, both in the financial institution itself and among its clients, regulators and other third parties, may be sceptical about the use of modern information infrastructure, especially in the context of the introduction of artificial intelligence technologies, so its development should be based on the trust of users and all stakeholders.

Even the most modern and advanced information technology cannot guarantee that complex autonomous agent-programs will perform their functions perfectly. There is a wide range of effective methods, including the development of controlling tools and their monitoring, which will help to minimize the risk and promote the responsible use of information infrastructure.

Thus, it can be concluded that the effectiveness of any information infrastructure depends on the information data on the basis of which its development takes place. Maintaining of high quality of information data and continuous evaluation of the model efficiency are the key to success in the implementation of the platform based on artificial intelligence. As information and technologies are transferred to the cloud, the commercial value is determined by the size and the scope of “intellectual property” because any partnership with a supplier may involve the inevitable exchange of data, that is, the intentional or unintentional transfer of valuable intellectual property. Therefore, it is important to understand the value of the information provided and to carefully monitor its transmission and use.

II. Methods and Materials

The methodological basis of the study was a complex of scientific methods that are based on the requirements of objective and comprehensive factor analysis of the automation of the credit and financial sector (CFS). The studies were conducted using a set of methods and techniques of scientific knowledge. The abstract-logical method allowed us to reveal the theoretical aspects of the formation of information infrastructure and the factors of creditworthiness, to determine the main characteristics of the processes and phenomena occurring in this area. The system-structural method is used to analyse the main directions of the difference between the new approach applied to the development of information infrastructure and the traditional approach.

III. Literature Review

The academic interest was drawn by the fact that the modern information infrastructure in the credit and financial sphere can hardly without artificial intelligence technologies. For example, the book “Artificial Intelligence: A Modern Approach” by Stuart Russell and Peter Norvig gives the following definition of artificial intelligence in relation to its use in the global information infrastructure: it is “designing and building of intelligent agents that perceive environmental objects and take actions that affect the environment” [1]. The authors are convinced that the main difference between the information infrastructure using artificial intelligence and the classical general-purpose software is expressed by the phrase “they take action”.

The scientific novelty of the study is to substantiate the idea that the formation of a global financial ecosystem based

on the big data bank is impossible today without the creation of joint projects and partnerships, the creation of a single front-end information platform can become a solution.

Over the past five years, the commercial use of information infrastructure involving artificial intelligence technologies in the credit and financial sector has become widespread, primarily due to increased computing power, increased availability of data supermassives and the development of machine learning (including deep learning).

The use of a new approach in the development of information infrastructure allows us not only to apply new technologies and the operating model of business development, but also to change the strategy of the credit and financial organization by changing the decision-making processes.

In Table 1, we have structured the main differences between the new approach to the development of information infrastructure and the traditional previously used approach.

TABLE I. THE MAIN DIFFERENCES BETWEEN THE NEW AND TRADITIONAL APPROACHES IN THE DEVELOPMENT OF INFORMATION INFRASTRUCTURE

Direction of development	Traditional approach	New approach
Strategy	Information management technologies	Business management technologies
	Data - the tool for business-analytics	Data - the intellectual property object that provides competitive advantages
	Deterministic approach	Guiding (iterative) approach
Design	User experience is considered as one of the application levels	User experience - the main feature of the application
	The decision-making procedure is hard-coded	The software is trained to perform the decision-making process
	The information to be extracted – a fact from the database	The information to be extracted - the most likely answer
Development	Linear technology development	Iterative development of the technologies and business models
	A Head of business units provides specification, IT Department is engaged in software development	Primary experts from business units are the members of the development team
Operating model	Continuous and periodically updated technology	Dynamic, flexible models. Continuous development based on testing the results
	Technical risks are mainly system downtime and system errors	Technical risks include behavioural patterns acquired as a result of training
	Cyberattacks	Adversarial attacks

We will consider each of the directions proposed for information infrastructure development.

1. The compliance with strategic goals of information infrastructure development. It is necessary to take into account that any innovative developments in the field of information technology need to comply with the main strategic goals and performance indicators of the credit and financial institution.

The development of advanced information technologies, even taking into account their high capabilities, cannot replace human activity, since any machines also need training. For example, today among scientists and specialists there is a false opinion that artificial intelligence is able to miraculously learn without human intervention, but in fact, to perform this task, it is necessary to make a lot of effort to obtain and clean data, compiling classifications and training machines and employees [2].

Partnership with companies implementing innovative projects allows credit and financial institutions to increase the flexibility of their own products and services, as well as to reduce their time to enter the market.

No less important is the definition and the choice of a model for the transformation of knowledge into new platforms integrated into the existing information infrastructure.

It is impossible not to agree with the position of S. S. Galazova [3], which directly indicates that the unity of any economic space is an instrument for the development of all economic activity. Indeed, any change in the business model of a financial institution will affect its entire organizational structure. If the goal is to develop innovative technologies, then it is necessary to create a separate unit that implements this activity. The availability of specialists in the processing and analysis of big data in the credit and financial organization is extremely important for the formation of a developed information infrastructure that is ready to implement new technologies.

2. Designing of information platforms based on the use of high technologies involves the interaction with customers and making important business decisions, but the bigger part of these processes is closed. Proper control and protection mechanisms provide the ability to monitor the status of modular systems, as well as to quickly identify, correct and (if adjustment is not possible) disable out-of-control modules without the need to stop the operation of the entire platform.

For example, many information applications based on artificial intelligence provide very subjective indicators of the effectiveness of interaction with users, which can be compared with the individual characteristics or predictability of the entire information system. However, the development should focus on data analysis, since the success of a product or service always depends on what emotional response it will cause. This subjectivity points to the need for frequent feedback between the product owner and developers to effectively manage changing expectations and functionality [4].

In this regard, when designing, it is necessary to pay attention to the development of the brand and the creation of

personalized functionality through its design. To some extent, the analysis carried out on the basis of the information infrastructure needs to be constantly adjusted, as it is based on incomplete information.

It should be kept in mind that even the most effective means of control are introduced at the design and implementation stage, which makes it possible to detect problematic issues before they turn into serious problems. It is preventive controlling methods that also help to identify opportunities for optimization.

The development of new information technologies based on artificial intelligence. While the information infrastructure is developing, the amount of available information is increasing, and this leads to the necessity of using the unstructured data. Therefore, in order to avoid errors, it is necessary to provide the transparency in the use of customer information, which determines the need for functional monitoring.

3. Application of the new operating model. Any operational models, including machine learning, are affected by adversarial attacks. Today, it is possible to find such combinations of input data that can lead to incorrect results, especially when using machine learning technologies. Any risk can be reduced by simulating adversarial attacks and re-training the models so that they can recognize such attacks.

The design of information infrastructure development strategy determines the need for transformation and development of all activities and processes of the credit and financial organization.

To provide the transparency of the information infrastructure it is necessary to coordinate and to trust of all stakeholders, and that determines the need to provide preventive controls. Controls should be built into the business solution at an early stage of its development for the purpose of designing the necessary elements and mechanisms for its protection.

The development of the arranging basis within the framework of the information infrastructure determines the need to test possible operational models, including the creation of the Department of Advanced Expertise, the appointment of a special member of the Executive Board, and the introduction of special strategies for the implementation of specific decisions and management activities. In the course of compliance with this condition, it is necessary to establish information interaction and cooperation between various departments of the credit and financial organization and centralized coordination of initiatives in the field of high technology.

As the information platform develops, it is important to assess emerging risks and opportunities, as the use of new technologies determines the algorithm for changing operational processes and requires analysis to assess the results, identify emerging risks and monitor emerging opportunities [5].

Thus, we can say that the developed information infrastructure provides transparency in relation to projects for the introduction of new technologies and confidence in the availability of controls that guarantee the achievement of the expected results for the business of credit and financial institutions.

It should also be noted that the evolutionary development of information infrastructure in a competitive credit and financial sector of the Russian Federation should be divided into several stages that are not strictly consistent:

- Implementation of standard solutions with the similar user interface and set of functions. Such standard solutions are implemented relatively quickly, but they are difficult to adapt to user requirements, as the difficulties result from the addition of new non-standard functionality.

- Emphasis on the individual aapproach and the quality of service. At this stage, many banks begin to develop their own information systems based on a flexible software platform, there are mobile banking systems and other new services, such as personal finance planners. Credit and financial institutions are trying to use the information infrastructure to attract new customers and increase the loyalty of existing ones.

- Strengthening the role of information infrastructure in working with clients. This task is aimed at the emergence of fully virtual banks without the departments for which the information system plays not just an important, but a vital role.

- Strengthening the role of information systems to work with clients, as well as – as a consequence – the growth of investment in modern information systems making banks look for the ways to monetize them.

Monetization is a new direction in the development of information infrastructure for credit and financial institutions, the most common ways of which are:

- (1) Chargeable services, i.e. the option where the customer pays the bank for using mobile service channels. Today, most Russian banks provide remote services free of charge, because, as we noted before, the banks are interested in reducing their own operating costs [6]. Of course, mobile banking is attracting more and more users, especially among the generation of young people who want to choose the most convenient channels to work in the presence of many free alternatives on the market from other banks. However, the use of information mobile applications not only improves the quality of credit and financial services, but also determines the direction of their further monetization.

- (2) Fees for payments and transfers. The development of new channels for making instant payments using information applications has predetermined a new direction of online and Internet banking. The fact is that these services are currently the most popular among customers, they account for 50-70% of income from settlement transactions of individuals in the banking sector of the Russian Federation [7]. At the same

time, despite the differences in the ways of providing such services, the leaders among Russian banks are not large banks with state participation, but banks that actively promote remote service channels, such as Tinkoff Bank, Tochka Bank, Module Bank, etc.

For the past five years, the Russia has published an annual rating of Internet banks, which assesses credit and financial institutions on various parameters, including the quality of service, availability for users, efficiency, etc. [8]. The Internet bank considered to be more effective in the research, is the institution where a client has more opportunities to manage current accounts and other banking products, and in the interfaces of which these functions are implemented in the most convenient way.

The effectiveness of Internet banks was evaluated for three types of small businesses:

- micro business (self-employed entrepreneur without employees);
- trade and service company that makes payments only in rubles;
- company conducting foreign economic activity.

Banks that have concentrated their efforts in the direction of remote settlements, actively offer cross-products that are not directly related to the implementation of settlement operations, including the calculation of tax payments, reporting, billing contractors, etc.

It should also be taken into account that the monetization of information infrastructure products in the context of the development of competition in the credit and financial sector covers various areas of settlement operations, but the client always chooses the most profitable service with the possibility to “bind” a bank card and to make payments without commission.

Such a conscious refusal of transactional income from analogue services allows us to conclude that the main source of their monetization is not in the payments themselves. The absence of commission is rather a means of attracting new customers or an element of additional service that allows banks to compete for the market share. The absence of such a service in banks not only reduces the number of customers, but also formally determines the bank's reputation in the market.

The development of such services is a key direction in the development of information infrastructure worldwide, its further improvement determines not only the complete absence of operating offices, but also the complete digitalization of the banking infrastructure through the use of advanced technologies [9].

Currently, the assessment of monetization from the use of settlement operations in the segment of small and medium-sized businesses is controversial. The main problem is the lack of common criteria by which the Bank's activity and its convenience for the client can be assessed.

In this regard, in table 3 we have combined the data provided within the framework of standard service packages and the data used to calculate the customer service quality ratings in order to determine the most profitable segment in the credit and financial sector [10].

TABLE II. SEGMENTATION OF THE MOST POPULAR SERVICES FOR PAYMENTS AND TRANSFERS OF CLIENTS IN RUSSIA

Service	**Freelancer (self-employed person)**	**The company's B2B segment**	**Individuals and companies in the B2C segment**	**Retail business**
Legal form	Self-employed entrepreneur	Limited liability company	____	Limited liability company
Number of employees	1	20	1-10	10
Opening and maintenance of current account	+	+	+	+
Activation and maintenance of online bank	+	+	+	+
Transfers to individuals	+ (on average 2-3 transfers per month in the amount of 100 thousand rubles.)	-	+	-
Transfers to legal entities	-	11 transfers	5 transfers	14 transfers
Opening and maintenance of corporate cards	–	+	+	+
Participation in salary projects	–	2 million rubles	600 thousand rubles	450 thousand rubles
Participation in trade acquiring projects	–	–	+	+
Payments for international commercial transactions	–	–	–	+

According to the results of bank surveys and open analytical data [8], the average size of monetization of settlement services for small and medium-sized businesses in Russia reaches from 5.000 to 100.000 rubles per year, which is comparable to the cost of services of foreign banks. For individuals, this figure is from 1000 to 5000 rubles per year. The most popular services among customers are still settlement operations and money transfer operations.

- (3) Active development of cross-selling of banking products and services.

Active development of cross-channel sales by offering additional products and services to customers of banks today is the most popular direction in the activities of credit and

financial institutions/ Channels of remote banking services (RBS) are not designed for close interaction with the client, because they involve only the execution of settlement operations and payments.

IV. Results

We argue that the creation of a single front-end information platform (SFIP), which includes Internet banking, mobile banking, personal finance management and many other useful modules, will provide not only monetization of information infrastructure products, but also increase the opportunities for the development of digital marketing.

In our opinion, the SFIP should be based on the client profile formed on the basis of static information (age, gender, etc.), but also on the context (current position, device, browser), financial indicators, financial goals of the client, behavioural analysis, etc. From the point of view of the global source of information, the SFIP is a bank of large information data that combines complete information about the client, the addition of which is possible on the basis of the collection of information from credit and financial institutions and financial supermarkets.

SFIP can be a source of monetization of information infrastructure in the context of competition of the credit and financial sector, since its use involves the creation of new products and services based on the data.

A similar model of information infrastructure monetization is now presented in various credit bureaus, where information about borrowers is aggregated on a retrospective basis.

From our point of view, the key tasks integrated within the framework of SFIP will include:

1. Creation of a global client profile, its subsequent processing, segmentation and sale of information to accredited financial market participants.

2. An additional source of monetization of information infrastructure in the conditions of development of competition in the credit and financial sector in order to create customer-oriented services, individual products and services, as well as to cover the costs of software development and maintenance.

3. A new source for the implementation of supervisory and regulatory functions in order to identify unscrupulous market participants, reduce the number of fraudulent activities and prevent illegal capital turnover, its legalization.

4. Obtaining a detailed understanding of the principles of charging customer service of various credit and financial institutions, as well as identifying key initiatives to optimize the cost of service, attract new customers, retain and increase the activity of existing customers.

5. Identification of socially significant category of clients in order to ensure individual conditions of their service, reduction of existing tariffs for products and services used in the credit and financial sector.

V. Conclusion

Thus, as the results of the study showed, the development of information infrastructure in the credit and financial sector provides not only new opportunities for the development of traditional forms of service, but also the development of new directions. Information is the most important factor for the development of competition between and formation of a new type of financial and banking services. Accordingly, we state that the formation of a global financial ecosystem based on the big data bank is impossible today without the creation of joint projects and partnerships in the conditions of constant interaction and fruitful cooperation on the exchange of customer experience and technological solutions.

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