Model of a Digital Financial Ecosystem to Ensure the Commercialization of Russian Innovations at the Regional Level and Measures for its Regulation

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Annotation: The paper presents the existing Russian areas of financial technologies that use digital technologies, clarifies the concept of a digital financial ecosystem and proposes a definition for the concept of "digital financial ecosystem for commercialization of the results of innovative activities in the region", describes the comparative characteristics of open, closed and hybrid ecosystems. The study proposes a model that allows creating a digital financial ecosystem, the purpose of which is to manage financial flows in the process of commercializing the results of innovative activities of Russian scientists at the regional level using digital technologies. Also, for the financial support of regional innovative business within the framework of the digital financial ecosystem, goals have been defined and measures have been proposed that allow it to be regulated by the Central Bank of Russia as a regulator (administrator) of the presented ecosystem.

1 INTRODUCTION

The development of applied financial technologies was facilitated by the evolution of globalization processes and the expansion of competition, the creation of advanced innovative developments and the increase in intellectual capital, both in developed and developing countries. However, the process of commercialization of advanced innovative developments requires certain funding at all levels of management. Therefore, many innovative companies of significant regional and national importance are trying to optimize this process with the help of information systems.

Such companies have problems in managing financial flows related to their distribution, timeliness of receipt and transfer to various elements of the financial ecosystem of the region, which provides innovative business. The solution to these problems would be possible through the use of certain digital financial technologies.

Object research is a territorial entity - the region.

Item research is the management of financial flows in the process of commercializing the results of innovation activity (RIA) of the region using digital technologies.

The aim of the study is to develop a model for improving the management of financial flows in the field of commercialization of the results of the region's innovative activities using digital technologies, as well as to identify measures to regulate this model.

In accordance with the purpose of the study, the following tasks are formulated: to clarify the concept of "digital financial ecosystem of the region", to propose the concept of "digital financial ecosystem for ensuring the commercialization of RIA in the region"; propose a model of a digital financial ecosystem for ensuring the commercialization of RIA in the region; develop measures to regulate the digital financial ecosystem in the field of commercialization of RIA in the region.

The following methods were used in the research process: methods of logical and comparative analysis,

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simulation modeling, graphical presentation of information.

The hypothesis of the study is a simulation representation of a model of a digital financial ecosystem for ensuring the commercialization of RIA in the region and the definition of measures for its regulation will allow systematizing the process of interaction between participants in the regional innovative business and stakeholders, and optimizing the process of managing financial flows at the regional level.

The practical significance of the study lies in the possibility of using the model of the digital financial ecosystem by the regions to ensure the commercialization of the results of the region's innovative activities, as well as the application of recommendations for regulating the digital financial ecosystem in the field of commercialization of the region's RIA.

2 RESEARCH METHODOLOGY

2.1 Digitalization in Ecosystems

The concept of "ecosystem", since the beginning of the XXI century, has been used several times by scientists in various fields and fields of human activity, but a number of foreign and domestic scientists have formulated this definition closest to the field of economics and management [Banke, Butenko, Kotov, 2016; Aptekman, Kalabin, Klintsov, 2017; Moore, 2016; Jacobides, Cennamo, Gawer, 2018; Yakovleva, 2018; Yanitsky, 2005; Ivanov, Shustova, 2020; Dubova, 2009; Yakovleva, 2009; Glukhov, 2021; Korhonen, 2000; Pishchukhin, 2019].

On the eve of the fifth industrial revolution, many researchers are increasingly mentioning the industrial concept "Industry 5.0", which should be focused on people interacting with intelligent systems, machines and robots. In particular, several scientists proposed to consider Industry 5.0 as an “intellectual (“smart”) ecosystem based on a cyber-socio-techno-cognitive multimodal hyperspace (meta-ecosystem)” [Babkin, Shkarupeta, Plotnikov, 2021], which would stand above all in the hierarchy of existing digital ecosystems and actively interact with various economic agents and actors. Her model includes five components:

- cybermodality (metaverses, digital assets, cybersecurity);
- social modality (social heterogeneity, human-centeredness, sustainability and resilience, the economy of creation, social factories, measurement of environmental and social value, open innovation 2.0, four- and five-fold development spiral);
- technological modality (artificial intelligence, digital platforms, bioinspired technologies, smart materials, digital twins, data transmission, storage and analysis technologies, energy efficiency technologies, hyperautomation);
- cognitive modality (natural intelligence, emotional intelligence, cognitive reactions, activity theory, cognitive Internet of things);
- multimodality (systemology, metasystem, ecosystem) [Babkin, Shkarupeta, Plotnikov, 2021].

The model presented by the authors is comprehensive and represents a multidisciplinary approach to the development of science and technology and is actually connected with all branches and fields of activity.

Other researchers have described elements of an intelligent innovation ecosystem in the digital economy that “will open the market for new business models and new solution providers” [Voloshin, Ilkina, 2019] and are closely interconnected with communication services – 5G. Structurally, these elements are divided into 4 blocks:

- network provider;
- service provider;
- organization;
- end user [Voloshin, Ilkina, 2019].

According to the authors, “participants and “things” can interact, make transactions and exchange information using a common digital platform. Successful smart ecosystems should include:

- integrated network and cloud infrastructure, systems, software and applications that use analytics, artificial intelligence (AI) and machine learning to provide a more personalized and secure digital experience;

- multiple partners and customers who can provide common services using a common infrastructure and applications;

- many different devices and sensors of the Internet of Things (IoT)" [Voloshin, Ilkina, 2019].

There is also the concept of sustainable development of the digital economy based on intelligent innovation ecosystems, which considers the development of innovative processes based on intelligent technologies [Ecosystems in the digital economy: drivers of sustainable development, 2021]. The foundations of this concept are models of the knowledge ecosystem and the ecosystem of

innovation, within which knowledge services, artificial intelligence, digital platforms, and cognitive agents operate [Ecosystems in the digital economy: drivers of sustainable development, 2021].

Digital technologies have a significant impact on the financial sector, and in recent years this influence has been increasing.

In the financial environment, there is a real (traditional) financial ecosystem in which there are historically established relationships that have rules and schemes for the exchange of information between participants in the banking sector, as well as with the external environment. And since financial institutions face a variety of issues when analyzing incoming information, artificial intelligence technologies are able to solve these problems faster and more efficiently.

According to Sebastien Meunier in the financial industry, artificial intelligence can be directed to the following main areas:

1) investment;
2) credit scoring - underwriting;
3) compliance with regulatory requirements;
4) market research - reporting;
5) customer support.

Currently, all successful financial digital platforms based on artificial intelligence technologies have the following specializations:

banking;

InsurTech (Insurance Technologies - technologies in insurance);

PropTech (Property Technologies - technologies in real estate);

WealthTech (Wealth Technologies and - capital management technologies, including investment) [Kashevarova, 2020].

As real digital financial platforms and products created on the basis of AI, included in financial ecosystems at various levels of government, the following can be listed:

1) MoneyPark (financial advisory platform for mortgage and insurance products in Switzerland, with the function of analyzing financial services using artificial intelligence);

2) Sindeo (platform for finding the right mortgage program and lender);

3) Clear Minds (a digital investment platform that manages advisory and long-term investment processes, taking into account diversification and possible risks);

4) Revolut Ltd. (British fintech company offering banking services based on artificial intelligence technologies);

5) Robinhood (an American mobile app and website offering the opportunity to invest in stocks, exchange-traded mutual funds and options through Robinhood Financial and crypto trading through Robinhood Crypto);

6) Alipay (China's largest mobile and online payment platform in the world, which has integrated face recognition technology using artificial intelligence technology);

7) scoring model of Sberbank PJSC (thanks to artificial intelligence, decisions are made in the bank to issue loans to individuals in 99% of cases and to legal entities in 35% of cases;

8) TalkBank (developer - Russian resident company of the Skolkovo Innovation Center - offers a virtual bank that works on the basis of artificial intelligence using a chat bot, in various instant messengers (Viber, VK, Facebook Messenger, Telegram, WhatsApp) and answers various questions , given in natural language) [Kashevarova, 2020].

The list of digital financial developments based on various digital technologies is constantly growing, developments are becoming more interesting and relevant for many financial companies.

2.2 The Concept of "Digital Financial Ecosystem" and its Types

There are enough definitions of the financial ecosystem [Dugar-Zhabon, R. S., 2021; Akatkin, Karpova, Konyavsky, Yasinovskaya, 2017; Ecosystems: approaches to regulation, 2021; Kleiner, 2020], some of which refer to the ecosystems of the banking sector, others - to large technical companies (bigtechs), which provide financial services in addition to their core business. As part of this study, it is necessary to clarify the concept of the digital financial ecosystem of the region.

According to the author, the digital financial ecosystem of the region should be understood as the structure of various financial organizations that provide regional businesses with basic and additional financial services (loans, deposits, investments, insurance, etc.) using information technologies.

All ecosystem models differ in the type of publicity of the criteria for admission of participants, and are divided into open, closed and hybrid [Ecosystems: approaches to regulation, 2021].

A closed platform does not publicly announce the rules by which participants are allowed to it. In this case, the suppliers of goods and services are the platform itself, its affiliates, or a limited number of platform partner companies. With the expansion of business towards the ecosystem, the platform

becomes interested in having as many different types of services as possible on it, but not different providers of the same service. As a result, there is practically no internal competition among providers of the same service on such a platform, since from the point of view of the development of a closed ecosystem, it is important to have a product or service within the perimeter of the ecosystem, and not the completeness of its presentation options or a wide choice within each product category.

With an open platform model, competing suppliers of goods and services have access to it, their admission to the platform is based on criteria publicly disclosed by the platform. At the same time, such criteria are non-discriminatory in nature, that is, they are not formulated for the characteristics of any specific suppliers. The platform owner and its affiliates either do not themselves act as providers on such a platform, or "play by the general rules". Thus, the platform is an equidistant neutral infrastructure that provides an independent sales channel for suppliers.

An analysis of the business models of the largest global and Russian ecosystems shows that they all operate according to a hybrid model, combining open and closed segments. So, for example, product marketplaces within these ecosystems (e-commerce) operate according to an open model, while the ecosystem itself acts as a provider of mobile communications or messengers.

Financial services of all the largest ecosystems are offered mainly on a closed model - either by the ecosystem itself (companies belonging to its group), or by financial institutions - partners. This can be explained by the fact that financial services are "anchor" for banking-based ecosystems, and the transition to a platform (commission) model for their implementation with an open model and admission to the ecosystem of other banks and other financial organizations can reduce the marginality of the bank that is at the heart of the ecosystem [Kryukova, 2017].

As part of our study, it is recommended, in order to improve the management of financial flows in the field of commercialization of RIA in the region, to create a hybrid type ecosystem, the definition and structure of which will be described below.

2.3 Russian Directions of Digital Financial Technologies

Implementation from the beginning to the end of the innovation process in any field of activity requires building a constant feedback from the market and the intermediate results of innovation, and, in fact, financial flows can be obtained mainly from the same market. Moreover, successful adaptation of innovation in the market is possible in case of strengthening of competitive positions, after its use, at least one of the competitors (consumer of innovative development) of the market and increase in profits of the company - the buyer of innovation. However, there is often a lack of interest in the market for such potential consumers, and the inventor is forced to look for other sources of funding.

In particular, at all stages of commercialization, innovative entrepreneurs can use the credit services of banks, but the interest rate on the loan will depend on the level of commercial risk. The latter presupposes the presence of collateral or a guarantee, which clearly limits the possibilities of financing innovative activities. In this situation, you can use the services of venture investors who are ready to provide financial support, but only on the condition of participating in business management or receiving a percentage of the profits in the future. At the technological stage of commercialization, it is possible to use the services of leasing companies.

Therefore, the Central Bank of Russia, together with the Government of the Russian Federation, adopted a number of documents regulating the use of digital technologies in the provision of financial services, which could optimize the process of financing the commercialization of the results of innovative activities at all levels, including the regional one, also with the participation of various investors.

Currently, according to the Main Directions for the Development of Financial Technologies, approved by the Central Bank of the Russian Federation in 2017, there are 6 such areas of innovative financial technologies that use intelligent systems:

- Big Data and Smart Data;
- mobile technologies;
- artificial intelligence, robotization and machine learning;
- biometrics;
- distributed ledger technology;
- open interfaces.

To implement these areas, it was planned to create a certain financial digital infrastructure. To do this, participants in the financial ecosystem, government agencies and the Central Bank will need to use special IT solutions and digital platforms.

The use of such solutions was planned to be carried out as part of the implementation of the Digital Economy of the Russian Federation program, and the functionality of the participants had to be

determined depending on the composition of the tasks assigned to them. In particular, the functions of the Central Bank will be to coordinate the work of ecosystem participants and ensure the synchronization of financial technologies, create and regulate standards for the interaction of elements of the financial ecosystem.

However, the focus of the program "Digital Economy of the Russian Federation" is on platforms and technologies, as well as the environment (regulation, infrastructure, personnel and security), but markets and areas of activity are not taken into account at all. As a result, platforms in the digital economy are perceived as some kind of “digital twins”, and they begin to work in isolation from the real market and a specific industry. Such a focus is erroneous and does not allow achieving the set goals, including the goals of improving the management of financial flows in the field of commercialization of the results of the region's innovative activities.

Markets and areas of activity involve constant interaction of their participants (suppliers and consumers of goods, works and services), and, therefore, it is necessary to consider digital platforms and financial technologies as a tool for ensuring their effective transformation and growth, including innovative development.

Most entrepreneurs in the region, who have an innovative idea at one stage or another of development, as well as finished innovative products, face the main problem that hinders any innovative development in the region - this is the lack of funding. Therefore, the main task of any innovative business in the region is to find sources of financing, as mentioned above. To facilitate this search, it would be possible to create a digital financial ecosystem that would have all the features of a real financial ecosystem, would include services and platform solutions to ensure the interaction of all participants in the regional market and receive a wide range of services, including government support and support for other interested parties. persons [Krasnova, 2021].

3 RESEARCH RESULTS

3.1 Assessment of Financial Support for Innovations in the Regions of the Russian Federation

Before presenting recommendations in this paper, it is necessary to analyze the problematic field of the study.

According to the information catalog of the Ministry of Education and Science of the Russian Federation "Innovative infrastructure and main indicators of innovative activity of the constituent entities of the Russian Federation", the materials of which were compiled on the basis of the database of Rosstat of Russia, the block of indicators of financial support for innovations in the regions of the Russian Federation (see Table 1) consists of 7 components:

- internal current costs for research and development;
- capital expenditures for research and development;
- the share of domestic spending on research and development, as a percentage of the gross regional product;
- the share of budgetary funds in internal expenditures on research and development;
- the share of the sector of higher education institutions in the internal costs of research and development;
- costs of technological innovation;
- expenses for technological innovations as a percentage of the total volume of shipped goods, performed works, services.

Internal recurrent costs for research and development, at their core, are the actual monetary costs of doing research and development.

Over the period from 2010 to 2020, this indicator more than doubled, which indicates its increase mainly due to an increase in labor costs, insurance premiums to the Pension Fund, the Social Insurance Fund, the Federal Compulsory Medical Insurance Fund, Territorial fund of obligatory medical insurance, costs for the purchase of equipment at the expense of the cost of work, other material costs (the cost of raw materials, materials, components, semi-finished products, fuel, energy, works and services of an industrial nature, etc. purchased from the side), other current costs.

Capital expenditures on research and development also increased by more than 2.5 times in 10 years, due to higher costs for the acquisition of land, the construction or purchase of buildings, the purchase of equipment included in fixed assets, and etc.

The share of domestic spending on research and development, as a percentage of the gross regional product from 2010 to 2019, showed a decreasing trend, which indicates a reduction in R&D spending compared to other cost items of the country's regions. There are no data for this indicator for 2020.

The share of budgetary funds in domestic expenditures on research and development tends to

decrease over 10 years. It decreased by 3.3%, which indicates a decrease in funding from budgetary sources and an increase in the use of extrabudgetary funds.

Table 1: Indicators of financial support for innovations in the regions of the Russian Federation.

Indicators	Year										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Internal current costs for research and development (million rubles)	489450.8	568386.7	655061.7	699948.9	795407.9	854288	873778.7	950257	960689.4	1060589.7	1091333.5
Capital expenditures for research and development (million rubles)	33926.4	42039.9	44808	49848.8	52119.1	60381	70036.5	68895.2	67558.2	74196.9	83200.8
Share of domestic spending on research and development, as a percentage of gross regional product (percentage)	1.39	1.34	1.4	1.39	1.43	1.39	1.36	1.36	1.14	1.2	No data
Share of budgetary funds in domestic expenditures on research and development (percentage)	68.8	65.6	66	65.8	67.1	67.5	65.9	63.8	64.3	64.4	65.5
Share of the higher education sector in domestic spending on research and development (percentage)	No data	No data	9.3	9.1	9.8	9.6	9.1	9	9.7	10.6	9.9
Technological innovation costs (million rubles)	400803.8	733816	904560.8	1112429.2	1211897.1	1203638.1	1284590.3	1404985.3	1472822.3	1954133.3	2134038.4
Expenses for technological innovations as a percentage of the total volume of shipped goods, performed works,	1.55	2.2	2.52	2.9	2.9	2.64	2.5	2.44	2.14	2.1	2.34

services (percentage)											

Higher education institutions are becoming increasingly important in the distribution of financial resources, which confirms the share of the higher education sector in domestic R&D spending from 2012 to 2020. The dynamics of this indicator tends to increase on average . For 2010 and 2011 No data.

Technological innovation spending in absolute terms in 2020 increased by more than 5 times compared to the base year of 2010, which indicates an increase in demand for promising developments in the technological field in the country.

The cost of technological innovation as a percentage of the total volume of shipped goods, works performed, services increased from 1.55% to 2.34% over 10 years, which indicates a slight increase in the innovative activity of organizations and enterprises of the country that carry out technological innovation.

In general, financial support for the innovative activities of the regions of Russia for the period from 2010 to 2020. can be characterized as very significant, which implies control and competent management of the financial resources of the constituent entities of the Russian Federation.

3.2 Definition of a Digital Financial Ecosystem for Ensuring the Commercialization of the Results of Innovative Activities in the Region and a Description of its Model

According to the subject of the study, it is proposed to introduce a new concept: the digital financial ecosystem for commercialization (DEFEC) of the results of innovative activities of the region is a network of financial organizations that are part of a single information technology system, the purpose of which is to create favorable conditions for the development of innovative business and financial support for commercialization results of innovative activity in the region. This definition is the author's and is based on the proposed model (see Figure 1).

The model has two planes - the stages of commercialization of RIA and electronic platforms, at the intersection of which certain functions of the CFEOC arise, aimed at realizing a single goal - financial support for the process of commercialization of RIA in the region.

The Central Bank of the Russian Federation will actually be the regulator (administrator) of the CFEFC, which, using electronic platforms, will be able to manage financial flows online, coordinate the activities of financial organizations, synchronize digital technologies, and develop and regulate standards for interaction between CFEFC participants to financially support the process of commercialization of the region's RIA.

The government of the region will act as a moderator of the CFEOC and carry out its activities in cooperation with the Central Bank. His responsibilities will be: establishing business relations between the participants of the CFEOC; coordination of the RIA commercialization process in the region; carrying out analytical activities in the reporting periods based on the results of the functioning of the CFEOC; evaluating the effectiveness of managing financial flows based on the results of RIA commercialization; legal support of regional innovative business; organization of a representative function for ecosystem participants at the national and international levels, for example, with the help of the Chamber of Commerce and Industry of the region; and other measures and activities to organize the activities of ecosystem participants.

The digital financial ecosystem should be able to provide financial services in the digital environment and remotely identify participants in the ecosystem. This will expand the boundaries of financial services for consumers and increase their availability even for the most remote settlements of the region. In such an ecosystem, it would be possible to combine the entire range of financial services at all stages of commercialization with the involvement of all interested parties. In addition, competition between financial institutions in the regional market will increase, which will positively affect the cost and quality of financial services.

The main advantage of such a digital ecosystem is the receipt of financial services in the field of commercialization in a remote format. In particular, within the framework of such an ecosystem, it would be possible to remotely open bank accounts for innovative business owners, issue loans, make deposits, make financial transfers, etc. To do this, one of the elements of this system should be a remote identification platform using biometric technologies and using a unified identification and authentication system (ESIA). In addition, on this platform, it is possible to use an end-to-end client identifier, which will facilitate the availability of financial services while ensuring a higher level of protection of personal data in the digital space and control of access to such data by the client.

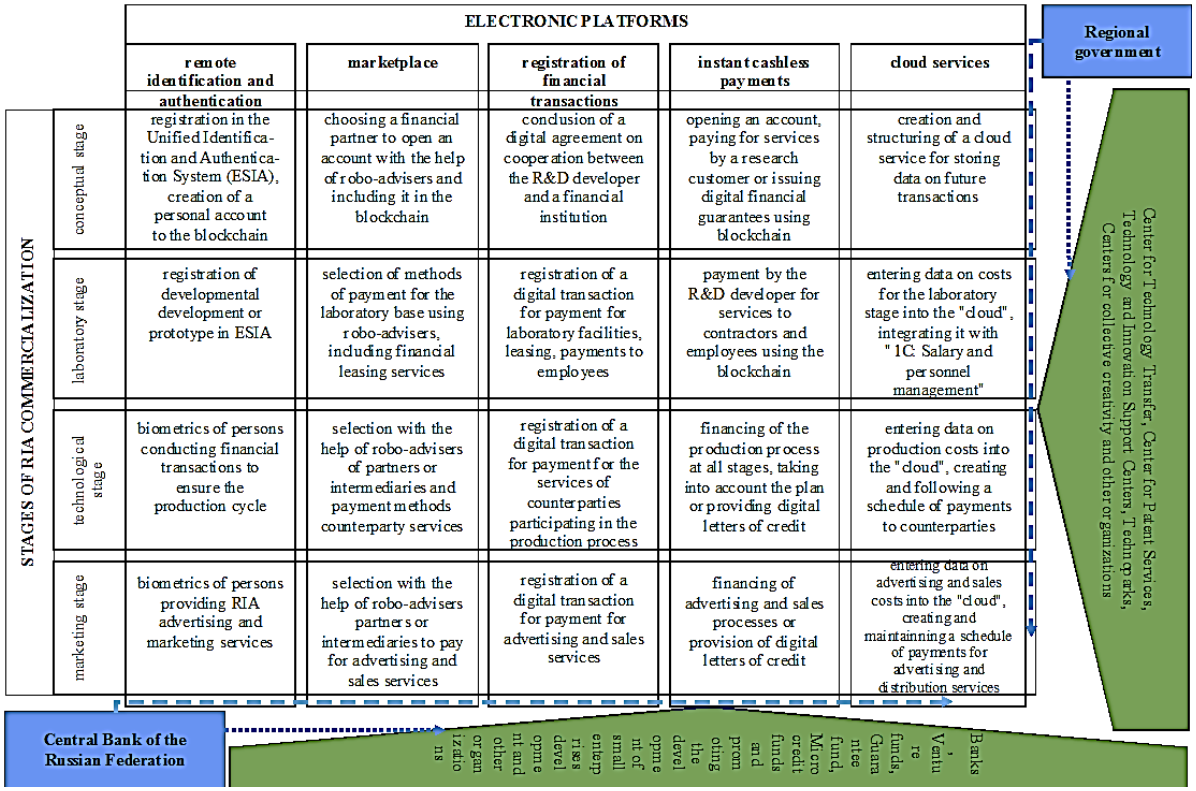

Figure 1: Model of the digital financial ecosystem to ensure the commercialization of the results of innovative activities in the region

This process can be made more efficient with the help of blockchain technology. This tool will make it possible to carry out financial and economic transactions between partners without prejudice to the interests of each of them. This is expressed in separate accesses in a common information system, where everyone sees only what he needs to know, without reference to a hierarchical distribution of powers and possible falsification of information without the consent of other participants in the system. This tool allows you to make money transfers to counterparties, various financial transactions, discuss and adjust agreements and contracts. In addition, in this system, you can see the entire hierarchy and chronology of records for joint projects. However, all these records (blocks) are subject to cryptography, and each of the participants sees only clearly limited information on certain transactions. This technology can be used on several DEFEC platforms presented in the model. In particular, it can be very effective for remote identification and authentication, as well as for communicating with financial partners in case of selection from several applicants on the marketplace platform, and for concluding a digital contract on the financial transactions registration platform. Blockchain will make it possible to implement such financial transactions as accounting for electronic mortgages, making digital letters of credit, providing digital bank guarantees, etc.

A "showcase" for financial services and products in the digital financial ecosystem will be a marketplace platform. It is she who will develop competition in the financial market. This platform will facilitate the search for financial products for innovative entrepreneurs, using robo-advisers (automated advisors), bots and chats. The use of these electronic assistants will help identify the needs and personal interests of entrepreneurs.

The platform for registering financial transactions actually regulates the legitimacy of the intentions of the parties - participants of the CFEOC, in accordance with the Civil Law Code of the Russian Federation.

The digital financial ecosystem should also include an instant cashless payment platform. It will allow developing the market of payment services, increasing the attractiveness of non-cash payments, and reducing the cost of financial transfers for regional participants in the commercialization

process. In addition, financial services can be carried out online, regardless of the time of day, day of the week, both between individuals and legal entities, using various means of communication and various media (for example, QR codes), at affordable rates and inclusive rules for the use of instant cashless payments. In fact, we are talking about the creation of a certain payment infrastructure that ensures the process of commercialization of the results of innovative activity in the regional market.

The platform for registering financial transactions involves registering and maintaining a unified register of transactions, providing equal access to information about transactions to all participants in the financial services market.

The creation of a cloud services platform will make it possible to form an IT infrastructure for participants in the digital financial ecosystem and reduce the costs of its use. In particular, it will increase the efficiency and security of using various external digital applications, services, networks and storage systems.

The proposed ecosystem model is recommended for creation of a hybrid type, that is, some platforms (marketplace, cloud services), according to their specific activities, should be open for new participants to enter, information on them should be made publicly available. And the other part of the electronic platforms (remote identification and authentication, registration of financial transactions, instant cashless payments) should be closed "from prying eyes" and the number of participants on them should be limited, and they should have a high degree of reliability in the field of their professional activity.

3.3 Goals and Measures to Regulate the Digital Financial Ecosystem to Ensure the Commercialization of the Results of Innovative Activities in the Region

As part of this study, in order to provide financial support for regional innovative business, create a favorable environment for the development of financial organizations in the region and develop its innovative infrastructure, recommendations are also proposed for the Central Bank of Russia, as a regulator (administrator) of the CFEFC, to regulate the digital financial ecosystem in the field of commercialization of the results of the region's innovative activities. .

The essence of these recommendations lies in the formation of goals and measures to regulate the activities of the digital financial ecosystem in the field of commercialization of the results of the region's innovative activities.

The main objectives of the regulation of CFEOC have the following main directions:

- pursuing a regional policy to maintain internal competition within certain electronic platforms of the ecosystem in order to maintain the optimal structure of the financial market, creating conditions for new players to enter "open" platforms (marketplace and cloud services);
- protecting the rights and interests of innovative entrepreneurs and suppliers both within and outside the ecosystem;
- providing conditions for the innovative development of the region's economy, as well as increasing the competitiveness of regional digital financial ecosystems;
- countering unscrupulous competitors in the provision of financial services to regional innovative businesses;
- checking the financial condition of suppliers and ecosystem participants;
- establishing "rules of the game" for suppliers from other regions and countries within the framework of "open" electronic platforms.

Summarizing the goals of the regulation of the PEFEC outlined above, it seems necessary to implement a set of measures, such as:

1. Measures to promote the development of digital financial ecosystems at the regional and national levels in order to maintain their competitiveness in the international market of digital ecosystems, subject to the WTO agreements and other international agreements. Building relationships with foreign regulators to develop approaches to the admission of foreign suppliers of goods and services to regional and national markets.

2. Application of antimonopoly measures (if necessary), taking into account the industry specifics of ecosystem clients. In particular, it is important to identify the segments and boundaries of the market for innovative products, as well as the shares of the dominant electronic platform in certain market segments. It is necessary to exercise control over this share by the Federal Antimonopoly Service of the Russian Federation and determine the criteria for applying antimonopoly measures in accordance with possible market situations.

3. Regulation of the rules of conduct for suppliers of goods and services of "open" and "closed" electronic platforms. Ensuring their effective activities, preventing their information, operational, tariff, technological discrimination, including advertising and search discrimination (restriction of information about suppliers). Implementation of mandatory open programming interfaces (Open API), allowing suppliers and consumers to quickly switch between different ecosystem platforms using a unified identification and authentication system (ESIA).

4. Creating equal conditions for the activities of all suppliers of goods and services for ecosystem platforms, including new players, in order to maintain a competitive environment, determine the fair value of goods and services and the conditions for concluding transactions, ensure transparency of money transfers, and use various national payment instruments.

5. Measures to ensure information security and counteract fraud. Creation of a regulation (protocol) for maintaining an appropriate level of information security for the functioning of ecosystem participants operating in a single cyberspace in order to ensure the stability of the functioning of the CFEOC.

6. A set of measures to ensure data management, including the protection of personal data. Formation of principles for the use of data within the CFEOC and outside it, a description of the rights of ecosystem participants in the field of disposing of their data.

7. Regulation of the use of points as internal accounting units of some ecosystem platforms and as motivating means in the promotion of certain goods and services, including a ban on their use as a means of payment, a means of accumulation and borrowed funds.

8. Promote the technological development of the electronic platforms of the ecosystem by creating independent technological structures for their maintenance. Such a structure should include a unified information resource for innovative business, ESIA, a unified biometric system, a financial messaging system, a fast payment system, a system for choosing a financial partner (the Marketplace platform), a system for creating a personal account for innovative business, a system for choosing cloud services, depending on the stage of commercialization.

9. Carrying out regular audits of the activities of ecosystem participants. Approval of the regulations for conducting such inspections, depending on the status of the ecosystem participant, its field of activity and the date of the last inspection.

Implementation of recommendations on regulation of the digital financial ecosystem in the field of RIA commercialization of the region is possible due to the allocation of a new regulatory entity (ecosystem management center) in the structure of the Central Bank of Russia and the establishment at the legislative level of the qualifying features of such an entity. The competence of such an entity would also include the compilation and maintenance of a register of participants in the ecosystem.

When defining and implementing requirements and restrictions for ecosystem participants, as well as for the functioning of its subject of regulation, it is necessary to be guided by the principle of interconnection of all its elements and obtaining the maximum effect from their joint activities.

In particular, regulatory restrictions aimed at the activities of certain suppliers of goods and services should not affect the development of innovative business and lead to the disappearance of network effects that will appear in the ecosystem.

There is also a risk of fairly tough competition between banks and big techs, which often provide lending services for their products (for example, to create or develop research and laboratory facilities, as well as provide applications, programs, etc. for cloud services). In this case, the regulator (administrator) will have to clearly define the requirements for suppliers and the goods and services they provide to electronic platforms. It is possible, in case of uniqueness of the offer of big tech suppliers, to meet them and allow the provision of credit services for certain segments of the market of innovative products.

4 THE DISCUSSION OF THE RESULTS

Based on the existing Russian problem of financing innovations at the regional level, the proposed model of the digital financial ecosystem for ensuring the commercialization of the results of innovative activities in the region will take into account the stages of commercialization of the results of innovative activities and the use of electronic platforms for financing projects at all these stages, which will eventually contribute to the creation and / or maintaining a favorable innovation climate in the region.

The proposed measures to regulate the digital financial ecosystem will make it possible to systematize and control the process of financing innovation and the use of digital technologies in this ecosystem.

In general, the recommendations proposed in the study will make it possible to systematize the process of interaction between participants in the regional innovative business and stakeholders, and optimize the process of managing financial flows at the regional level.

5 CONCLUSIONS (CONCLUSION)

As a result of the study, it is necessary to formulate the following conclusions:

1) the aforementioned elements of the digital financial ecosystem will allow timely, targeted and in the right amount to provide financial flows to the region's innovative business, as well as facilitate professional interaction in the process of commercializing the results of the region's innovative activities between interested parties;

2) one way or another, in all possible disputable situations, but the fulfillment of the main task of the regulator (administrator) of the ecosystem to finance the process of commercialization of the results of innovative activities in the region will contribute to the creation and maintenance of a favorable climate for the development of regional innovative business.

The applied use of digital technologies in the creation, operation and regulation of the activities of various digital ecosystems can bring their development to a new level and make modern business processes more dynamic.

Taking into account the indicated dynamism of business processes when localizing their consideration in the subject area of financing the commercialization of the results of innovative activities at the mesolevel, the adaptability of digital technologies will allow structuring both administrative and operational processes within the financial digital ecosystem.

REFERENCES

Banke, B., Butenko, V., Kotov, I., 2016. Paper templates. Russia online? You can't catch up / B. Banke, V. Butenko, I. Kotov [et al.]. The Boston Consulting Group.

Aptekman, A., Kalabin, V., Klintsov, V., 2017. Paper templates. Digital Russia: a new reality / A. Aptekman, V. Kalabin, V. Klintsov [et al.]. McKinsey.

Moore, JF, 2016. Paper templates. The death of competition: leadership and strategy in the age of business ecosystems. Harper Collins.

Jacobides, M.G., Cennamo, C., Gawer, A., 2018. Paper templates. Towards a theory of ecosystems. *Strategic Management Journal.* 39(8), 2255–2276.

Yakovleva, A. Yu., 2018. The book, Factors and models of formation and development of innovative ecosystems: diss. … cand. economy Sciences. – Moscow: HSE.

Yanitsky, O. N., 2005. Paper templates. Russia as an ecosystem. Sociological research. 7, 84–93.

Ivanov, A. L., Shustova, I. S., 2020. Paper templates. Study of digital ecosystems as a fundamental element of the digital economy. *Creative Economy*. 14(5), 655-670.

Dubova, N., 2009. Paper templates. Innovation Ecosystem. Open Systems. *DBMS.* 1, 50–55.

Yakovleva, A. 2009. Paper templates. Innovative ecosystem as a key success factor for "growing" a small venture company. *Creative Economy.* 2.

Glukhov, V. V., 2021. Paper templates. Strategic management of industrial ecosystems based on the platform concept. *Economics and Management.* 27 (10).

Korhonen, J., 2000. Paper templates. Industrial ecosystem: using the material and energy flow model of an ecosystem in an industrial system. *University of Jyväskyla.* 5.

Pishchukhin, A. M., 2019. The book, Obshchaya teoriya sistem [General Theory of Systems]. Metasystems: textbook. allowance. Orenburg. OGU Publishing House. p. 163.

Babkin, A. V., Shkarupeta, E. V., Plotnikov, V. A., 2021. Paper templates. Intellectual cyber-social ecosystem of industry 5.0: concept, essence, model. *Economic revival of Russia*, 4 (70),39-62.

Voloshin, I. P., Ilkina, A. S., 2019. Paper templates. Intelligent innovative ecosystems in the digital economy. Economic security and quality, 4 (37), 56-60.

The book, Ecosystems in the digital economy: drivers of sustainable development. 2021. St. Petersburg: POLYTECH-PRESS. 778 p. ISBN 978-5-7422-7529-9.

Kashevarova, N. A., 2020. Paper templates. Analysis of the modern practice of applying artificial intelligence technology in the financial sector and its impact on the transformation of the financial ecosystem. *Creative Economy*. 14 (8), 1565-1580.

Dugar-Zhabon, R. S., 2021. Paper templates. Modern approaches to the definition of the concept of "digital ecosystem". Collection of scientific papers of the Angarsk State Technical University. 1(18), 267-271.

Akatkin, Yu.M., Karpova, O.E., Konyavsky, V.A., Yasinovskaya, V.D. 2017. Paper templates. Digital

Economy: Conceptual Architecture of the Digital Industry Ecosystem. *Business Informatics,* 4(42), pp. 2-15.

The book, Ecosystems: approaches to regulation. Report for public consultations, Moscow, April 2021. URL:http://www.cbr.ru/content/document/file/119960/consultation_paper_02042021.pdf(date of access: 01/23/2022).

Kleiner, G. B., 2020. Paper templates. Development of ecosystems in the financial sector of Russia. Manager. 11(4), 2-15.

Kryukova, A. A., 2017. Paper templates. Tools of the digital economy. *Karelian scientific journal.* T. 6, 3 (20), 108-111.

Krasnova, O. V., 2021. Paper templates. Creation of a digital financial ecosystem to ensure the process of commercialization of the results of the region's innovative activities. Priorities for the development of the economy in the context of digitalization: Proceedings of the International Scientific and Practical Conference, Saratov, November 30, 2021. Saratov: Limited Liability Company Publishing House "KUBiK", 270-276.