ORIGINAL PAPER

DOI: 10.26794/2220-6469-2022-16-3-113-124
UDC 338.28;336.64;658.14(045)
JEL G18, M2, O32, O38, O44

Ecosystem Changes in the Structure of Socio-Economic Relations

V.A. Chernov
National research Nizhny Novgorod state University of N.I. Lobachevsky, Nizhny Novgorod, Russia

ABSTRACT

The methodological base of the research includes the theoretical foundations of cluster structure, structural integration of ecosystems, the network method of their coordination, platform interaction, global reporting initiative (GRI), international and domestic regulations in the field of sustainable development, scientific publications of Russian and foreign authors. The article proposes clarifications of individual formulations in the definition of ecosystems and conducts their classification: bionomic, industrial ecosystem, business ecosystem, business, innovative ecosystem. The evolution of the definition of "ecosystem" is investigated, in which its qualitatively new stage in the global concept of sustainable development is revealed. The formulation of the ecosystem of sustainable development as the intellectual coordination core of the innovation ecosystem is derived. The concepts of capital components of the new economic formation of "accessism" are introduced. The risks and threats of economic, legal, and state security in the formation of the access economy are investigated. A model of integration of components has been developed: economic, social, environmental, infrastructural elements and directions. The directions of creating new organizational forms of interaction in the ecosystem with the participation of state technology (Gostech) are proposed. Recommendations are given to counter threats and risks caused by ecosystem changes in the structure of socio-economic relations that have historical significance.

Keywords: sustainable development; innovation; ecosystem platforms; financialism; accessism; information capital; platform and organizational capital; Gostech

For citation: **Chernov V.A. Ecosystem changes in the structure of socio-economic relations. *The World of the New Economy*. 2022;16(3):113-124. DOI: 10.26794/2220-6469-2022-16-3-113-124**

INTRODUCTION

Due to the slow pace of development, the domestic industry needs new approaches to the activation of innovative productions, new forms of interaction of subjects of socio-economic relations, which makes the studied direction relevant. These approaches are carried out using new models of integration of economic systems with a cluster structure and network-based coordination, which are able to combine and accumulate existing resources and efforts, provide infrastructure interaction to solve the problems of innovative sustainable development [1–3].

Rapid changes are taking place in the structure of the means of production and in socio-economic relations under the influence of digital transformation, leading to a new historical stage of development. Changing the dominant form of capital, which we see as the sum of resources used in production for profit (which is consistent with the Marxist interpretation of capital as a value that brings added value, as well as the purpose of business). As you know, the use of resources for profit is impossible without production relations, so capital — is resources (material, financial, labour), objects of labour, means of labour in terms of socio-economic relations, and not in relation to any property. Outside of socio-economic relations, property cannot make a profit and therefore is not capital.

The initial stage of capitalism, the key capital of which was the technical means of production (factories, conveyor, power capacity), was replaced by financialism with dominance of bank emission capital in socio-economic relations, including the management, control, own and dispose of emission/ credit fiat, reserve and credit flows. Socio-economic relations in Marxist terminology are called industrial relations.

Transition to digital economy leads to domination of new form — information capital. Information capital is a set of information and communication resources and value-added technologies. Opening up access of their owners to these resources and technologies becomes key in the system of international socio-economic relations. And changes are taking place both in the structure of the basis — industrial relations, and in the public superstructure: politics, ideology, religion, morality, etc. Financialism is being replaced by the economy of access — accessism. The term is introduced by E. Larina [4].

In this change of formation, with all its advantages, new specific threats of global significance are added to the threats of financialism. Owners of information capital acquire enormous influence and control over society, exceeding the capabilities of all previous historical formations, because they can, through the Internet of Things (IoT), and then the Internet of everything, extract, collect and regulate the flow of comprehensive information from users, which becomes all citizens, organizations and institutions of the state. By managing information flows in industrial relations and geopolitics, owners of information and communication resources, systems and technologies can restrict or deprive both individuals and organizations and entire States of resources, if they do not have enough (critical mass) of information capital to preserve the independence. Information capital opens up additional opportunities in hybrid wars to establish puppet regimes in States and destroy them.

In the emerging public superstructure is a struggle for control over the spiritual sphere of man and his social behavior through information systems and technologies (gadgets, social networks, etc.). When a person falls under external influence, his personal qualities are lost, he turns into a blinded, demoralized, led by “human capital”, bringing added value, deprived of human values and norms, orientations, self-awareness.

Thus, three types of capital become the key means of production during excision:

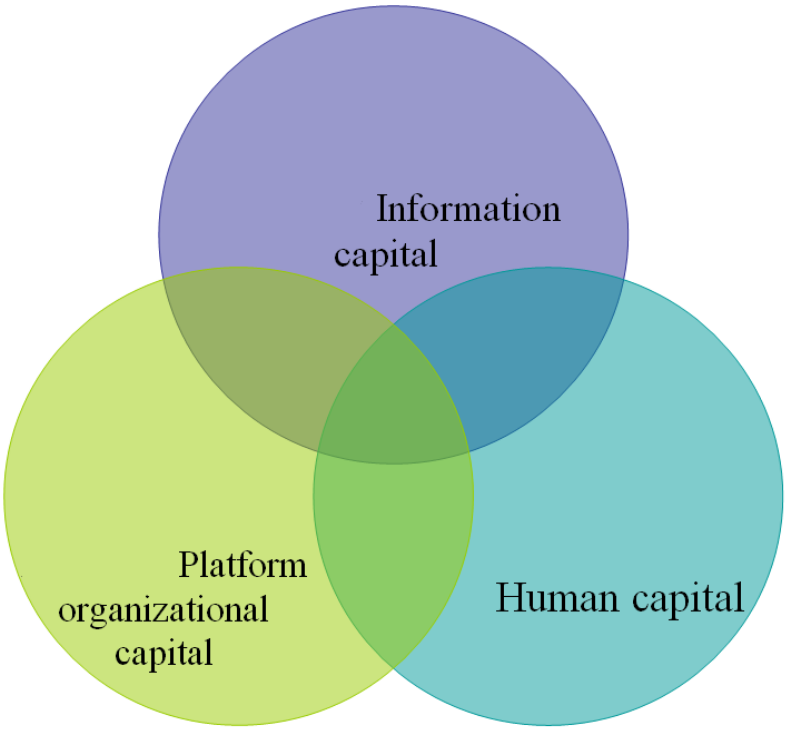

Fig. 1. **Structural components of socio-economic relations of accessism**

Source: compiled by the author.

platform-organizational, information, human (*Fig. 1*). Platform- organizational capital includes ecosystems that provide access for participants to interact on the platform for profit.

The influence of platform-organizational capital owners in society depends on the extent to which they own information and communication resources and technologies that work on the digital platform. The ecosystem approach offers new opportunities to enhance innovative development, but is accompanied by new risks and threats from the dominant role of information capital, reinforced by platform interaction. These risks and threats are far more dangerous than those of previous stages of capitalism.

The aim of the research is to find new forms of integrated interaction between the state and business in relation to information capital to solve the problem of economic growth, development of high-tech industries, overcoming threats and eliminating risks.

EMERGENCE AND EVOLUTION OF THE DEFINITION OF "ECOSYSTEM"

The concept of "ecosystem" was incorporated into the scientific vocabulary in 1935 thanks to A. Tansley [5, p. 284]. Ecosystems have come to represent relatively stable systems that form the habitat of communities of living organisms [6, p. 71].

By L. Bertalanfi's definition, an ecosystem — is a complex, self-organizing, self-regulating and self-developing system. It has a relatively closed, space- and time-stable exchange of substances and energy between its biotic and abiotic constituents. Historical changes in ecosystem terminology were noted by U.S. Podverbnykh [6, p. 75].

In economics and business, ecosystem theory first found its expression in the industrial ecosystem concept [7, p. 144]. The analogy of the development of living systems was borrowed due to the complexity of the chain of operations in creating values, increasing market uncertainty and the

emergence of new forms of interaction of economic actors.

Extrapolation of the regularity of interaction of biological phenomena in processes of economy appears in works M. Rothschild [8]. J. Moore in business strategy researches found similarities between business processes and biosphere behavior in the form of food chains [9, p. 76]. Analogies of ecological processes with those that take place in the business environment allowed to establish the postulates of the theory of the network society [10]. Thus, competing companies moved to open cooperation, mutual support for the creation of new products, trying to satisfy the needs of customers as much as possible, and their innovation activity increased.

Two types of economic ecosystems have appeared in the process of evolution: transactional and innovative. Ordinary business ecosystems are of the first type — *transactional ecosystems* (platforms). On such platforms, transaction relationships are built between interacting actors. Among them may be individual citizens or organizations: users, buyers, suppliers, etc. By interacting on the ecosystem platform, participating parties find each other. Examples of such ecosystems are: Uber, Alibaba, Airbnb, Google Search, Amazon Marketplace, eBay, Waze etc.

On innovative ecosystem platforms are interact together different developers of new applications. As a developer can be different citizens and organizations from all over the world. So work, for example, the ecosystems iPhone, Android, Windows.

The innovation ecosystem — is an open, dynamic, self-organizing and self-developing system composed of organizational, structural and functional units (institutions). Their relationships are manifested in the creation, consumption and transformation of scientific knowledge and ideas into innovative products [11, p. 93]. And knowledge can be generated through automated expert systems that are embedded in digital technology [12, 13].

Business ecosystems need to evolve in alignment with environmental imperatives to balance production growth, resource use and environmental conservation. This leads to an environmental direction for the further evolution of the ecosystem approach, which is in line with the concept of sustainable development adopted by the UN General Assembly Declaration from 25.09.2015, which says: "We are determined to pursue sustainable development in its three components — economic, social and environmental — in a balanced and integrated manner".[1]

In other words, in the strategic evolution of business ecosystems come to an inevitable relationship with the concept of sustainable development defined by the UN, initiated by Global Reporting Initiative (GRI) and Dow Jones Sustainability (DJS) [14].

In summary, we come to a new concept — "ecosystem of sustainable development" (*Fig. 2*).

As a result, we are seeing a transformation of the concepts of the ecosystem approach, which can be classified as follows: ecosystem in relation of living organisms to the environment; industrial ecosystem; bionomy, business ecosystem, entrepreneurial ecosystem, business ecosystem, innovative ecosystem; sustainable development ecosystem (*Table 1*). And a sustainable development ecosystem may include as a structural component the organizational forms of other, narrower ecosystems. And innovation will relate to the ecosystem of sustainable development if it encompasses three components: economic, social and environmental. Thus, the evolutionary cycle of ecosystems, starting from the habitat of communities of living organisms, after the industrial stages, returns to the biosphere, but at the level of the emerging need to preserve it.

[1] URL: https://unctad.org/system/files/official-document/ares70d1_ru.pdf

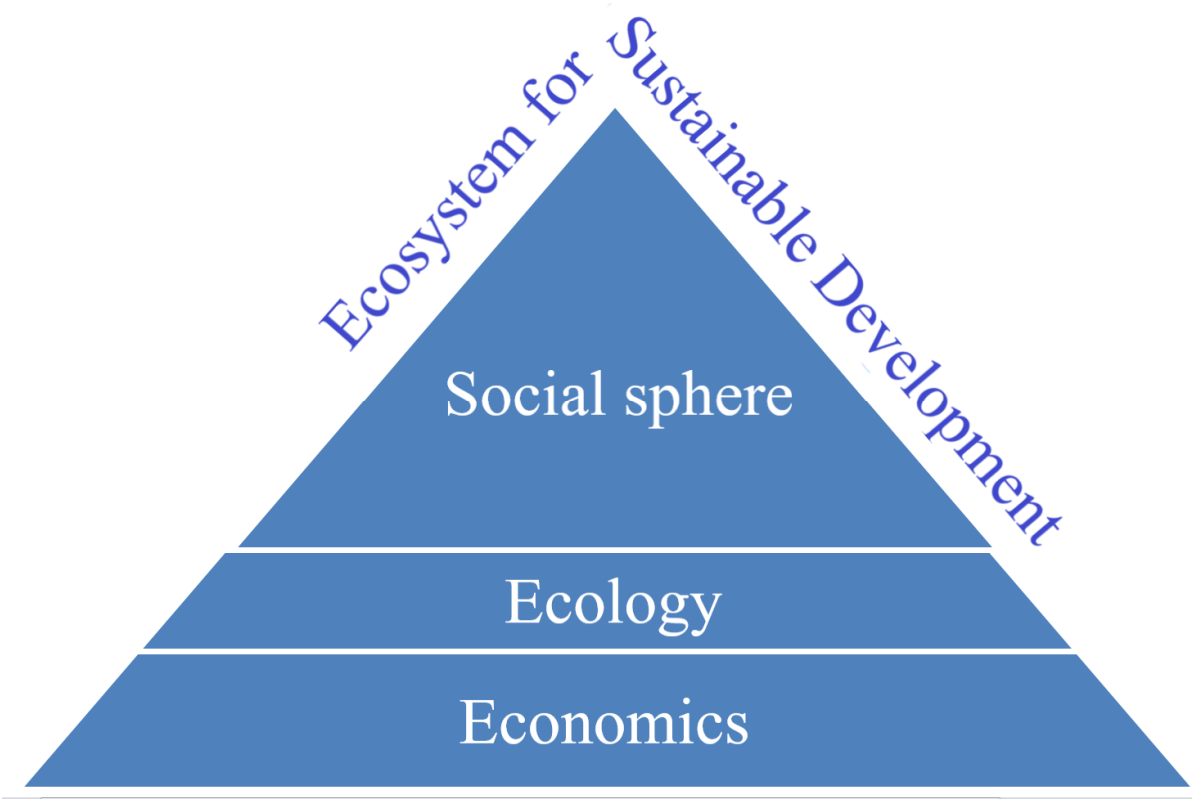

Fig. 2. **Components of a sustainable development ecosystem**

Source: compiled by the author.

The scheme of integrated interaction of the complex of structural components and target functions aimed at achieving sustainable development in its three components is presented at *Fig. 3*. It is based on — integrated thinking that involves active consideration by the organization of the links between its various operational and functional units and the capital it uses or influences [15, p. 97]. The main actors in the model are platform participants and service providers.

TRANSITION FROM TRADITIONAL BUSINESS MODELS TO PLATFORM ECOSYSTEMS

Currently, the external conditions for innovative sustainable development of the Russian economy are unfavorable. Low economic growth is reinforced by a long-term regime of unjust sanctions, limited opportunities to raise funds on world markets for Russian business, conditions of the COVID-19 pandemic. This leads to tighter monetary policy, increased opportunity costs, higher risk.

Traditional business strategies often fail to address emerging global threats and implement opportunities. Innovation in the country is not yet a key driver of economic growth, as the commodity orientation of the national economy has not yet been overcome.

Among the elements of innovative ecosystems, universities and research laboratories are the most important participants. The financial core of the ecosystem is the venture fund. An example of a venture financing system is Russian Venture Company (RVC). In Russia, due to lack of private sector funding, the State is a key player and occupies about one third of the venture fund market.

The problems of low financing lie in the state's fiscal and tax policies. At present, the

Table 1

Evolution of the ecosystem approach

Ecosystems	
Concept	**Definition**
Ecosystem	Complex self-organizing, self-regulating and self-developing system. Its main characteristic is the presence of relatively closed, space- and time-stable material and energy flows between its biotic and abiotic parts [5, p. 284]
Industrial ecosystem	The concept of the development of living systems applies to the transformation of industries under the influence of the complexity of value chains, the growing uncertainty of the environment and the emergence of new forms of interaction of economic actors [7, p. 144]
Bionomics	The transfer of biological concepts to real economic phenomena using the concept of "ecosystem" and allocation of a specific approach to the hotel direction of research, called "bionomics" [16, p. 39]
Company ecosystem	Network of interconnected "niches", organizations, communities, institutions that develop their products and services in a coordinated manner, support each other, so that investments and current activities give synergy effect [8, 9]
Entrepreneurial ecosystem	Enabling environment for the emergence of high-growth enterprises. The set of interrelated business entities (including enterprises, venture capital, business angels, banks), various institutions (universities, government agencies, financial bodies), which are connected by formal and informal ties [17, p. 44]
Business ecosystem	Group of companies involved in the creation or production of value, innovation development and commercialization [17, p. 44]
Innovation ecosystem	Inter-organizational, political, economic, technological and environmental systems through which a business environment is created, maintained and developed that creates, consumes and transforms scientific knowledge and ideas into innovative products*
Sustainability development ecosystem	An open, dynamic, self-organizing and self-developing system consisting of organizational, structural and functional components (institutions) that coherently develop their products and services to achieve economic, social and environmental development

Source: compiled by the author.

Note: * URL: https://www.rvc.ru/upload/iblock/06b/Innovation_ecosystem_ analytical_report.pdf

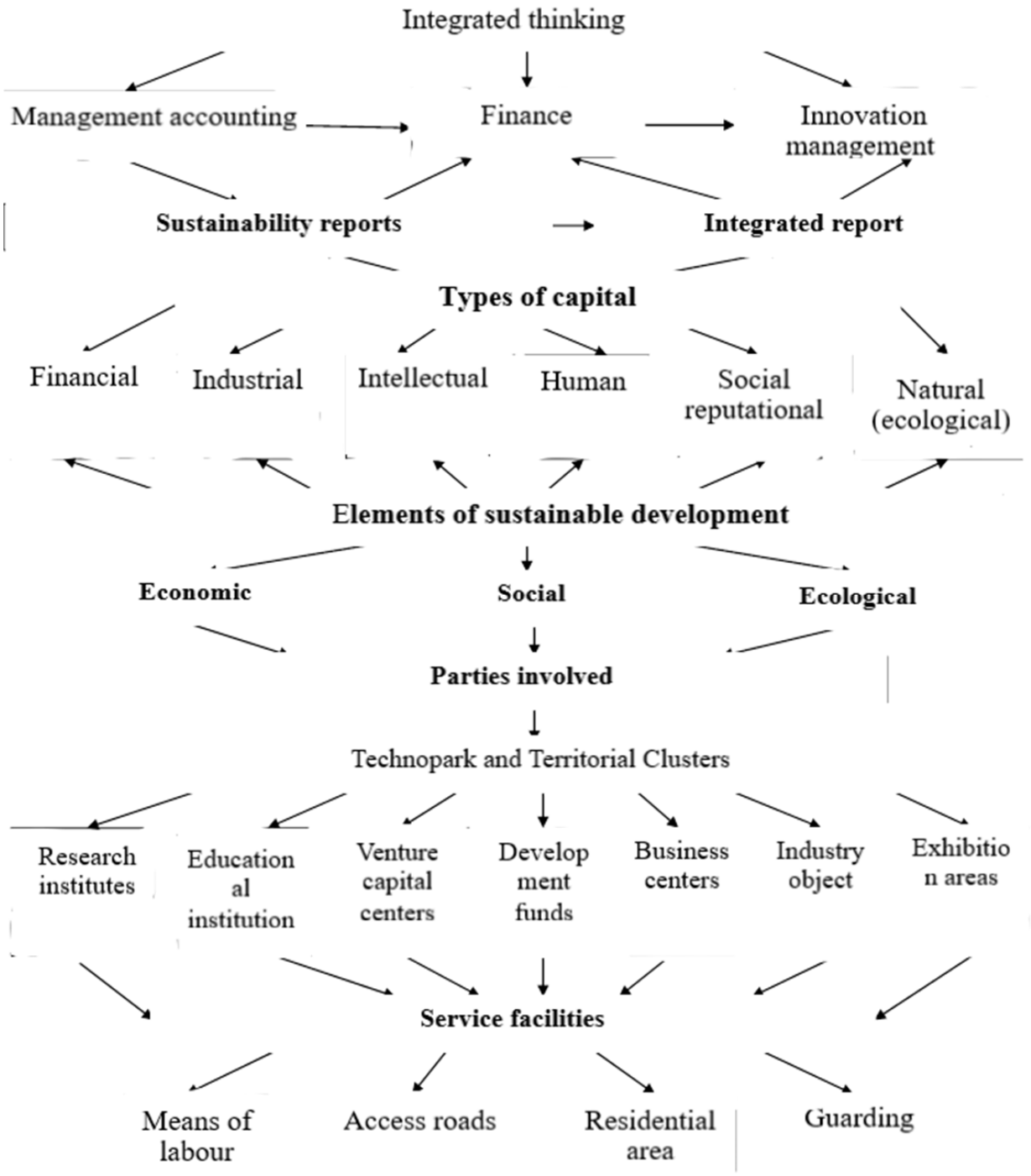

Fig. 3. **Model of integration of components and directions that determine innovative sustainable development of the ecosystem**

Source: compiled by the author.

Tax Code of the Russian Federation[2] exempts exports of fuel and raw materials from the payment of value added tax. Introduction of VAT on export of raw materials and increase of customs duties on them could be an additional source of replenishment of venture funds. Since fuel and raw materials

[2] URL: http://www.consultant.ru/document/cons_doc_LAW_28165/35cc6698564adc4507baa31c9cfdbb4f2516d068/

are supplied abroad, taxation of their exports will not increase the cost of domestic fuel and raw materials, a, on the contrary, will stimulate an increase in sales of energy resources in the Russian market, thereby contributing to a decrease in prices of fuel and raw materials for Russian business. Thus, the country's natural resources will become a competitive advantage of Russian producers and contribute to freeing our economy from fuel and raw materials dependence.

Tax policy justification for export of fuel and raw materials disclosed in monograph [18, p. 137]. They indicate that the introduction of VAT and customs duties on the export of fuel and raw materials will significantly increase the revenue portion of the budget, which will allow to replenish venture funds involved in the formation of new platforms for innovative collaboration, and to increase competitive advantages at the expense of the country's fuel and resources.

The ecosystem approach is implemented through platform interactions that differ significantly from traditional business models. In a traditional business model, values are created through linear processes, value chains. Therefore, this model is called "linear" or "pipeline". At the entrance comes raw materials and materials from which the output creates a finished product of higher cost.

The economic ecosystem is built on a platform that includes key assets. It includes the following:

- platform-defining firm movable and immovable property, which is called platform;
- ecosystem members (participants) from entities and individuals in the platform;
- resources invested in the ecosystem by its members, including software applications (Android, Windows, etc.), facilities, vehicles, products, ideas, information.

The platform firm itself does not directly create value. Its value (product) — is the organization of conditions (platforms) for interaction of ecosystem members and use of its resources, as well as the development of policies — rules of interaction between ecosystem actors and the use of its resources that support growth of the ecosystem.

Unlike the linear model, platform firms do not own or manage these assets, but rather coordinate them through standardization (e.g., API[3] and SDK[4]) and policy.

Traditional (linear) business models use internal resources as own property. Platform business model is built on external resources, no cost. For example, Uber, Airbnb, Alibaba ecosystems are bilateral platforms.

In the Uber ecosystem (the world's largest carrier) on one side of the platform — are the personal cars of citizens of different countries who choose to provide transportation services on their cars under the auspices of Uber, and on the other side — people who need a taxi.

Platform ecosystem business models show greater competitive advantages over traditional (linear) business models. They generate rapid growth and spread across the economy.

Having significant advantages, the platform has negative sides. Many start-ups who cannot compete with the ecosystem decide to become part of it. This leads to the absorption of individual entrepreneurs and business structures, the centralization of production and, consequently, the emergence of new risks and threats. Such processes require legal, antimonopoly regulation and State supervision.

In this regard, the greater share of government participation in the organization and financing of innovative high-tech projects in Russia has its advantages. State participation in ecosystem platforms can improve their safety and reduce risks. Digital ecosystem platform improves public administration and planning. Planning, monitoring the implementation of plans,

[3] Software interface for Windows application integration (API — Application Programming Interface)

[4] Standard source blocks for Windows application creation (SDK — Software Development Kit) — Program libraries, instructions, code samples, guides.

Table 2

The main indicators of science, innovation and advanced production technologies for the entities of the Russian Federation in 2020

Subjects of the Russian Federation	Number of staff in innovation	R&D costs, bln rub.	Number of advanced technologies developed	Number of advanced technologies used	Share of innovative products in total volume, %
Russian Federation, in general	679 333	1174.5	1989	242 931	5.7
Central Federal District	345 756	621.9	686	69 612	5.2
Northwestern Federal District	87 411	155.8	268	24 693	6.3
Southern Federal District	26 716	29.8	143	13 355	3.3
North Caucasus Federal District	6816	5.8	55	3060	5.1
Volga Federal District	101 929	180.9	323	70 100	11.3
Ural Federal District	44 486	74.5	321	30 512	3.8
Siberian Federal District	52 304	86.5	125	22 734	3.7
Far Eastern Federal District	13 915	19.4	68	8865	3.1

Source: compiled by the author according to Russian Statistical Yearbook.

control, system response at all sites and stages of the plan, correcting errors and adapting to changing conditions in real time.

Public technology models are being developed in international practice — Gostech (Government Technologies, GovTech). Gostech operates on a platform with neural network technology artificial intelligence "smart state". The platform unites all kinds of state information systems, creating a common online environment of interaction of citizens, business and state structures. Its resources improve coordination and communication between the State, citizens and business. Gostech makes State possible to regulate the access of platform participants to its resources. Thus, the state restrains the chaotic social and economic processes by establishing "rules of

the game", which is especially necessary in the context of weakening state regulation and planning capacities [19].

The ecosystem approach is spreading in Russian innovation projects. The main examples of territorial ecosystems — not only foreign ["Silicon Valley", MIT (Boston) Cambridge, Harvard], but also Tomsk region, Tatarstan, Samara, Kaluga, Far East [11, p. 93], Krasnodar region [20, p. 202] etc. In the Nizhny Novgorod region operates a technopark "Ankudinovka" — a state institution that supports small and medium-sized innovative business, forming an ecosystem.

Ecosystems become centers for innovation and high technology (*Table 2*). The share of innovative products in the total volume is the leading Volga Federal District (11.3%) — mainly due to the use of advanced production technologies in the amount of 70 100 units, which also exceeds the indicators of other subjects of the Russian Federation.

CONCLUSION

In response to emerging and increasing threats and risks in the transition to an access economy, the main task of States becomes the possession and taking under control of key resources of information capital, the development of domestic information and communication systems.

The most significant risks and threats of accessism are due to the fact that the management center of international servers, operating system, cybersecurity, cloud storage is located abroad. In the control center is the American company Wmware — software developer for virtualization head office in California.

Cyber security of servers is provided by Radar of the American company IBM. Management of cloud storage services is realized with the help of Azure products from Microsoft.

None of these companies systematically cooperates with Russian justice, does not provide source code and does not help in disclosure of media encrypted with its products.

The development controlled by of State and it regulates information and communication technologies and resources becomes a priority of historic importance in the transition to an access economy.

REFERENCES

1. Gandia R., Parmentier G. Managing open innovation through digital boundary control: The case of multi-sided platforms in the collaborative economy. *Journal of Innovation Economics & Management*. 2020;2(32):159–180. DOI: 10.3917/jie.032.0159
2. Gay C., Szostak B. From territorialised innovation to collaborative innovation space: What are the issues for contemporary organisations? *Journal of Innovation Economics & Management*. 2020;2(32):135–158. DOI: 10.3917/jie.032.0135
3. Solodilova N. Z., Malikov R. I., Grishin K. E. Methodological tools to measure the state of regional entrepreneurial ecosystem. *Ekonomika regiona = Economy of Regions*. 2018;14(4):1256–1269. (In Russ.). DOI: 10.17059/2018–4–16
4. Larina E. Access society or accessism. HRazvedka. Jan. 21, 2020. URL: http://hrazvedka.ru/blog/obshhestvo-dostupa-ili-eksizm.html (accessed on 02.02.2022). (In Russ.).
5. Tansley A. G. The use and abuse of vegetational concepts and terms. *Ecology*. 1935;16(3):284–307. DOI: 10.2307/1930070
6. Podverbnykh U. The measurement ecosystem of project teams performance in the industrial enterprises. *Organizatsionnaya psikhologiya = Organizational Psychology*. 2019;9(2):70–92. (In Russ.).
7. Frosch R. A., Gallopoulos N. E. Strategies for manufacturing. *Scientific American*. 1989;261(3):144–152. DOI: 10.1038/scientificamerican0989–144

8. Rothschild M.L. Bionomics: Economy as ecosystem. New York: Henry Holt & Co.; 1992. 423 p.
9. Moore J.F. Predators and prey: A new ecology of competition. *Harvard Business Review*. 1993;71(3):76–86.
10. Castells M. The rise of the network society. Oxford: Wiley-Blackwell; 2009. 597 p. (The information age: Economy, society, and culture. Vol. 1).
11. Shashlo N.V., Petruk G.V. The consumer value of knowledge in the innovative ecosystem of the Far East of Russia. *Universitetskoe upravlenie: praktika i analiz = University Management: Practice and Analysis*. 2017;21(5):93–102. (In Russ.). DOI: 10.15826/umpa.2017.05.065
12. Chernov V.A. Implementation of digital technologies in financial management. *Ekonomika regiona = Economy of Regions*. 2020;16(1):283–297. (In Russ.). DOI: 10.17059/2020–1–21
13. Chernov V.A. Algorithms for making managerial decisions in the digital economy. *Upravlencheskie nauki = Management Sciences*. 2022;12(1):6–16. (In Russ.). DOI: 10.26794/2304–022X-2022–12–1–6–16
14. Chernov V.A. Financial management of the capitals and sustainable development of business. Beau Bassin: Palmarium Academic Publishing; 2018. 117 p. (In Russ.).
15. Chernov V.A., Tikhova A.D. The integrated management of sustainable development: Methodological prerequisites and their practical realization. *Mir novoi ekonomiki = The World of New Economy*. 2018;12(1):92–103. (In Russ.). DOI: 10.26794/2220–6469–2018–12–1–92–103
16. Androsik Yu.N. Business ecosystems as a form of cluster development. *Trudy BGTU. Seriya 7: Ekonomika i upravlenie = Proceedings of BSTU. Series 7: Economics and Management.* 2016;(7):38–43. (In Russ.).
17. Efimov V.S., Lapteva A.V., Rumyantsev M.V. Science and education of the region: The ecosystem perspective (the case of the Krasnoyarsk territory). *Universitetskoe upravlenie: praktika i analiz = University Management: Practice and Analysis*. 2019;23(3):40–55. (In Russ.). DOI: 10.15826/umpa.2019.03.018
18. Malkina M. Yu., Zakharov V. Ya., Bezrukova N.A. et al. Economic security in the context of Russia's digital transformation. Moscow: RuScience; 2022. 268 p. (In Russ.).
19. Mukhametov D.R., Simonov K.V. "Smart government": Prospects for introduction of digital technologies in public administration in Russia. *Mir novoi ekonomiki = The World of New Economy*. 2021;15(3):17–27. (In Russ.). DOI: 10.26794/2220–6469–2021–15–3–17–27
20. Shcherbinina M. Yu., Kulishova A.V., Glazunova E.Z. The diagnosis of innovation ecosystems of Krasnodar region. *Azimut nauchnykh issledovanii: ekonomika i upravlenie = ASR: Economics and Management (Azimuth of Scientific Research).* 2017;6(1):220–222. (In Russ.).

ABOUT THE AUTHOR

Vladimir A. Chernov — Dr., Sci. (Econ.), Prof. at the Department of accounting and audit; professor of department of finance and credit, Institute Economies and businesses, National research Nizhny Novgorod state University of N.I. Lobachevsky, Nizhny Novgorod, Russia
https://orcid.org/0000-0002-7703-1660
chernovva@rambler.ru

Conflicts of Interest Statement: The author has no conflicts of interest to declare.

The article was received on 06.02.2022; revised on 19.02.22 and accepted for publication on 12.06.2022.
The author read and approved the final version of the manuscript.