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MANAGING BUSINESS ECOSYSTEMS

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The textbook presents an overview of modern approaches to the management of business ecosystems, combining the results of many years of research with the author's ideas and style of presentation. The chapters of the textbook cover the fundamental aspects of managing business ecosystems, starting from the theoretical foundations of

formation and development of business ecosystems and concluding with the methodological support for managing ecosystems in modern business. The stages of business model evolution are examined and the contribution of domestic scholars to the development of the ecosystem approach to organizational management is identified. We delve into the fascinating realm of how digitization shapes business ecosystems and their pivotal role in the transformation of modern businesses. Readers will also explore specific methodologies and algorithms for managing business ecosystems.

For students in economic specialties, postgraduates, lecturers, and a broader audience interested in the development of business ecosystems.

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FOREWORD

The central term in this textbook, "business ecosystem," brings together three distinct concepts, three different concepts of socio-economic science: business, ecology, and system. Combining these ideas into a unified theme for research and presentation carries significant conceptual importance. Business being the subject and form of economic activity focused on systematic income or profit generation, represents the research object. System, as a sustainable set of interconnected elements, signifies the perspective (angle) of studying and, consequently, the applied system approach in researching the object.

Ecology (represented in the term "business ecosystem" by the root "eco") signifies the acknowledgment of systemic similarities between natural biological entities and socio-economic formations. Thus, the concept of "business ecosystem" succinctly encapsulates the research object, subject, and the methodology employed. The presented textbook elaborates on the content of these concepts, offering rich and substantive information, providing a valuable learning experience for the reader.

The choice of the theme and key concept of the textbook not only defines the genre and research direction but also carries profound philosophical significance. Business, as we have seen, encompasses economic activities that intertwine processes of production, distribution, exchange, and consumption of economic goods. Economics, ubiquitous as we know it, spans nearly the entire globe and has provided favorable conditions for human existence since the formation of humanity. The progression of human society directly and necessarily results from people's economic activities. Consequently, society employs labor, intellectual, financial, and material resources to advance the economy.

In each production cycle of economic activities, business participants focus on generating income, recovering costs, and sustaining their economic activities in the next cycle. Therefore, business fulfills its historical mission by employing technological and economic processes, investment projects, financial and human capital, along with the interests, intentions, and plans of economic activity participants. This integrating mission of business naturally aligns with its differentiating mission of identifying competitive leaders among organizational, legal, and physical entities participating in activities. Here, we witness a vivid representation of two polar elements, the dialectical interaction of which forms the basis for the existence of society, nature, and humanity.

In nature, these forces manifest in the formation and development of biological ecosystems – relatively stable populations of organic and inorganic elements functioning in a certain territory (within a specific volume) with relative stability in the external environment. Similarly, in the social realm, social-economic ecosystems are formed and operate – spatially localized complexes of organizations (pre-enterprises), business processes, innovative projects, and infrastructural systems interacting during the creation and circulation of material and symbolic goods and values.

These ecosystems are capable of long-term, relatively independent functioning through the circulation of these goods and systems[1]. Such a system can be localized in physical, informational, sectoral, institutional, or any other life space; the general principles of the functioning of such systems in different spaces remain similar. The analogy between natural and social systems of this type was noted by ancient philosophers (Aristotle, Plato, Heraclitus, etc.), but it gained significant attention in the 1990s, particularly after the works of J. Moore,

[1] Ref.: Kleyner G. B. Socio-economic ecosystem in the light of systemic paradigm // System analysis in economics – 2018 : Collection of works of the V International Scientific and Practical Conference Biennale / edited by Kleyner G. B., Shepetova S.E.. – M. : Prometey, 2018. – C. 5–14. – DOI: 10.33278/SAE-2018.rus.005-014

leading to the establishment of the ecological approach in socio-economic science. It's essential to highlight that the concept of a system, one of the cornerstone ideas of modern science, underlies the notions of natural, socio-economic, and business ecosystems. Therefore, the study of socio-economic and business ecosystems presented in this textbook, alongside the examination of the peculiarities of natural ecosystems, addresses a crucial task in the education of a modern economist – it fosters a culture of systemic analysis in designing and programming socio-economic phenomena and processes.

In this context, it is crucial to highlight an important feature of the book offered to the reader – its organic inclusion in the contemporary discourse on the state and development of economic science. The authors openly present to the reader the presence of a wide range of definitions for the most basic concepts of the discourse, such as business ecosystem, clusters, networks, platforms, management, and so on.

On one hand, this removes the straightforward didacticism from the text, and on the other, it sparks interest in the dialectics of economics and, equally importantly, the dialectics of the language of economics. In particular, the authors encourage the reader to ponder the importance and autonomy of the linguistic description of ecosystems and the ecosystemic description of language. As known, quantitative, qualitative, mathematical, and verbal descriptions of economic phenomena are necessary components of modern economic science. Acquiring the skill to craft and interpret such linguistic descriptions should seamlessly integrate in to the training process for economists.

Currently ecosystem analysis of ecosystems has become a significant part of the literature on economic topics. Many believe that the idea of a socio-economic ecosystem could rightfully be named the term of the decade in socio-economic science, spinning from the mid-2010s to the mid-2020s.

The remarkable surge in the number of ecosystems over the last three decades is linked to a mix of historical, technological, economic, and social factors. In Russia, the trend of fragmentation economic structures which emerged in the mid-20th century and peaked (term "individual's economy") by the early 1990s, has reached the point of exhaustion. Economy and society have seen an increasing demand for the establishment of both formal and informal integration structures. These aim to substitute the abolished sectoral and territorial management and information structures.

The development of information technology and the Internet has reduced transaction costs, eliminated intermediaries from value chains, and facilitated the transformation of value chains into aggregates of interacting economic entities. These units play a crucial role in enhancing the competitiveness and resilience of enterprises in market, business, and administrative environments[2]. During the shift in the early 1990s from centralized to free pricing, businesses lost their pricing and informational guides. This forced them to navigate the turbulent and unpredictable market ocean on their own.

Global innovation processes sped up pushing enterprises to rely on imports for technologies, raw materials, and components; globalization became an imperative. Simultaneously, economic needs underwent restructuring. Various economic entities had distinct needs (inter-subject differentiation of needs), yet each entity's diverse needs grouped together, necessitating collaborative fulfillment (intra-subject integration of needs of different types).

How are business ecosystems formed? In uncertain conditions enterprises seek to enter the business ecosystem aiming to enhance their positions and boost bargaining power. There is a mutual interest as enterprises aim to improve their situation, while the business ecosystem

[2] Ref.: Kleyner G. B., Rybachuk M.A., Karpinskaya V.A. The development of ecosystems in the Russian financial sector// Manager. – 2020. – T. 11. – № 4. – C. 2–15. – DOI: 10.29141/2218-5003-2020-11-4-1

seeks to reduce the risk in its environment. Rising uncertainty frequently triggers the creation of business ecosystems, improving their capacity to address the varied needs of counterparts.

System analysis of the formation and operation of socio-economic ecosystems systemically allows conceptualizing the ecosystem as a universal blend of four fundamental subsystems: organizational, infrastructural, communication-network, and innovative[3]. The organizational subsystem, incorporating participants in the ecosystem's activities, shapes the organizational framework of the system; the infrastructural subsystem includes the means of transporting material and informational goods; the communication-network subsystem enables relevant transfers within the ecosystem; the innovative component secures the flow of technological, product, and organizational innovations, influencing the dynamics of ecosystem development.

The organizational component of systems comprises individual organizational units, each formed in connection with the implementing functions shared by the ecosystem and functionally linked to several other similar units. Also, because the ecosystem is localized in space, all components of its organizational aspect have relationships of territorial proximity. This implies that the organizational component of the ecosystem is nothing more than a cluster. The infrastructural component of the ecosystem aims to facilitate unimpeded (direct) interaction among ecosystem participants, especially within the cluster elements of the ecosystem. Thus, the infrastructural component of the ecosystem plays the role of an environment necessary, primarily, for the efficient functioning of the cluster.

The communication-logistics component of the ecosystem ensures the implementation of opportunities provided by the infrastructural component to support the exchange of material, informational, symbolic, and other goods between organizational units. Finally, the innovative component, involving activities related to various innovations, practically serves as an innovative incubator. Collectively clusters, platforms, networks, and incubators within one ecosystem complement each other, providing the ecosystem with the ability to function independently through the unlimited repetition of production-reproduction cycles (the cycle of resource and product circulation).

Hence, managing the activities of an ecosystem should involve regulating the cluster, platform, network, and business incubation subsystems, coordinating their actions. The management structure of the ecosystem should include control centers for each of the four mentioned subsystems: objective office, environmental office, process office, and project office. Coordination of these offices can be carried out by the so-called systemic office, focusing on implementing the ecosystem strategy. For a business ecosystem, the systemic office executes the ecosystem's business strategy.

The management of ecosystem is specific due to the multi-agent nature of the ecosystem structure. The autonomy boundaries of organizations within the ecosystem are subject to dynamic regulation. The goal of this regulation is to determine the delicate balance between intra-organizational decisions aimed at the organization's development and decisions made at the ecosystem level as a whole. Inconsistency between these two decision ceilings poses a risk for both – the organization and the ecosystem. In essence, managing an ecosystem involves three main components: ensuring the socio-economic development and growth of the ecosystem; maintaining the integrity of the ecosystem in a changing world and balancing the functioning of ecosystem participants to prevent excesses and constant dominance by individual participants. Addressing these challenges requires, alongside administrative management methods, active engagement of social regulation within the intra-system space.

The management of an ecosystem should be based on a matrix structure. On one hand, each systemic component of the ecosystem should have its administrative structures, enabling

[3] Ref.: Kleyner G. B. "Systemic Economics, development steps: monograph" – M. : PH «Scientific library », 2021. – Part 2. Systemic Economics: theory and methedology.

management, ensuring cluster unity, platform functionality, network effectiveness, and business incubator activity. On the other hand, in the context of innovative development, management should rely not only on administrative levers but also on social energy and interactions[4]. In other words, the functioning of each of the four mentioned subsystems should be regulated by two controllers: an administrative leader, part of the formal management structure and a social leader reflecting the interests and concerns of individuals - participants in the ecosystem's activities and integrated into the informal management structure. The crucial point here is to identify, within the diverse social space of the ecosystem, four characters capable of addressing the triune management task: ensuring the development, integrity, and internal homogeneity of the ecosystem.

Therefore, on one hand, it is important to establish the administrative management structure of the ecosystem, which includes positions like the head of the object subsystem (cluster), subsystem (platform), process subsystem (network), and project subsystem (business incubator). At the same time, there should be a structure of social interaction, at the top level of which are the positions of four social leaders. The inspirational leader - the scope of influence, the social space, clusters. The spiritual leader - the scope of influence, the platform components of the ecosystem.

The cultural leader - the scope of influence, the methods, procedures, algorithm, actions of the ecosystem personnel. And the intellectual leader - the scope of influence, innovative solutions in all areas of ecosystem activity. The inspirational leader is someone who can influence others through their natural qualities, such as charisma, persuasiveness, and so on. The cultural leader shapes the correct technology, methodology, and problem-solving culture. The intellectual leader determines the composition and structure of the tasks to be solved. The spiritual leader forms the higher meanings of the ecosystem's work and ensures, based on this, the commitment of ecosystem participants to its goals and principles of operation. It is important to warn against underestimating the role of the spiritual leader, whose responsibility is to define and disseminate the value orientation of the ecosystem. The spiritual leader is indeed a kind of standard-bearer for the ecosystem. They embody its values, principles, and aspirations, guiding others by example.

The intellectual leader provides the answer to the question «What should be done?» The inspirational leader answers, «Who should do it?» The cultural leader addresses «How should it be done?» Finally, the spiritual leader answers, «Why is it necessary to do it?»

Thus, the most rational approach is a two-tiered management concept for the business ecosystem. The first tier implements management based on formal institutions and corresponding formal leadership. In the second tier, regulation is based on informal institutions and informal social leadership. For effective management, these institutions need to be coordinated with each other.

The above allows for the following conclusion: Systemic management of the ecosystem involves a combination of formal administrative management structure and informal social leadership structure. Such an approach will ensure maximum efficiency in utilizing unique specialists whose intellect can solve tasks that arise under external constraints.

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The economy of ecosystems, where ecosystems are the primary form of economic organization, has a significant history and equally promising prospects in Russia. In fact, the entire trajectory of the Soviet economy can be seen as a process of initial aggregation and subsequent fragmentation of organizational and managerial units, from inter-industry complexes, industries, and sub-industries to associations, enterprises, cooperatives, and so on,

[4] Ref.: Kleyner G. B. "Social leadership, power division and inclusive organization management // Economics questions – 2022. – № 4. – С. 26–44. – DOI: 10.32609/ 0042-8736-2022-4-26-44

down to "individual economics" [5]. Since the late 1990s, there has been a growing trend towards the consolidation of management entities, giving rise to systemic formations akin to natural and biological ecosystems. Consequently, ecosystems can be regarded not only as the culmination of construction but also as the most progressive form of organizing economic activities. Management of ecosystems, which integrate market, technological, social, and cognitive factors and processes, should be viewed as a model of integrated regulation across socio-economic space and time.

From a methodological standpoint, using ecosystems as an example allows us to trace the variations in the relationships between the key systemic characteristics of economic entities: discreteness and continuity, quantity and quality, diversity and homogeneity. The inter-ecosystem space itself is discrete and competitive, while the intra-ecosystem space tends towards continuity and cooperativeness. The ecosystem structure of the economic space is deeply individualized and primarily subject to qualitative analysis, while the intra-ecosystem structure can be explored and measured using quantitative methods. Overall, an economic space equipped with a well-developed ecosystem structure serves as a versatile arena for demonstrating and studying the processes of quantitative change leading to qualitative transformation. The ecosystem structure of the economy is instrumental in fostering a balance between processes of differentiation and heterogenization, as well as variability and stabilization within the economy. This highlights the pivotal role of ecosystems in the evolution of economic space-time.

In recent years, the concept of continuous and uniform evolutionary development of the natural and social environment, as proposed by Charles Darwin in the form of a chain of sequentially emerging species, has started to give way to the theory of punctuated equilibrium. This theory suggests that the formation of new species of organizational units and groupings is primarily associated with discrete and rare events in the surrounding environment, as proposed by Stephen Jay Gould and Niles Eldredge. In simpler terms, two competing concepts are at play here: punctuated equilibrium and continuous equilibrium. An economically rich ecosystem-based space-time can be seen as a model that combines these two processes: punctuated equilibrium characterizes the interactions between ecosystems, while continuous disequilibrium characterizes the dynamics within ecosystems. By further developing the theory of ecosystem management, we enhance our ability to organically regulate economic development.

This highlights the importance of enhancing the management of ecosystem development, placement, and interaction as a key factor in ensuring the sustainable development of the domestic economy. Studying this process, cultivating an ecosystemic worldview, and acquiring the necessary competencies and skills are crucial steps in preparing economists and managers for the challenges ahead.

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[5] Kleyner G.B. "From «individual economics» to systemic economics" // Questions of Economics. – 2017. – № 8. – C. 56–74. – DOI: 10.32609/0042-8736-2017-8-56-74

INTRODUCTION

This textbook focuses on exploring business-economic systems not only in European countries and America but also in rapidly developing countries in the Asian region. From a business standpoint, sustainability entails implementing strategies, initiatives, and operations that fulfill the present requirements of the company and its stakeholders, while also safeguarding, supporting, and enhancing the human and natural resources necessary for the future. Digital innovations entail the use of digital technologies to tackle existing business challenges, while also fostering strategies, culture, and human resources within the company to sustain such utilization, particularly in addressing sustainability issues.

The Chinese e-commerce giant Alibaba Group conducted the largest initial public offering (IPO) in history. This milestone event attracted considerable attention from researchers and business entities, many of whom of course have commented on the evolving dynamics of the global economy and the increasing impact of digitalization[6]. However, these comments largely overlooked another important indicator of the future. In its prospectus detailing its vision, philosophy, and growth strategy, Alibaba employed the term «ecosystem» no fewer than 160 times[7].

The study of business ecosystems (BE) has attracted significant interest over the past decade. However, much of the research has been concentrated on leaders and conditions within Western ecosystems. For example, in a recent review of business ecosystem[8] research, only two studies related to Asia stood out. Nevertheless, in practice, leading Asian firms, such as Rakuten (Japan), Naver (South Korea), and Alibaba (China) have taken leading positions in the ecosystem. There are also other examples where innovative-oriented Asian firms follow suit and deviate from the traditional way of doing business in Asia[9].

Asian economies are well known for the intricate relationships between social and business interactions, which is relevant when considering the traditional value creation chain[10]. Therefore, it was also recommended to explore the dynamic relationships between social networks and value networks[11]. Additionally, the development of networks is closely

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[6] Ref.: Moritz Michael. Alibaba and the Rise of China's Internet Giants. – URL: https://agenda.weforum.org/2014/09/alibaba-ipo-china-us-internet/ (accessed April 2, 2015); Schuman Michael. 4 Things Alibaba's IPO Tells us about a Changing World Economy. – URL: http://time.com/3401924/china-alibabaipo-world-business-trade-internet-economy/(accessed April 2, 2015)

[7] Ref.: Alibaba Group. – URL:http://hsprod.investis.com/shared/v2/irwizard/sec_index_global.jsp?ipage=9812765&ir_epic_ id=alibaba (accessed March 17, 2015).

[8] Ref.: Jacobides Michael, Carmelo Cennamo, Gawer Annabelle. Towards a Theory of Ecosystems // Strategic Management Journal. – 2018. – Vol. 39. – P. 2255–2276.

[9] Ref.: Freeman Christopher. Japan: A New National System of Innovation? // In Technical Change and Economic Theory. – London : Pinter, 1988. – P. 330–348; Greve Henrich R. Japan's Network Economy: Structure, Persistence, and Change // Administrative Science Quarterly. – 2005. – No. 50. P. 140–143; Imai Ken-ichi, Hiroyuki Itami. Interpenetration of Organization and Market. Japan's Firm and Market in Comparison with the U. S. // International Journal of Industrial Organization. – 1984. – No. 2. – P. 285–310; Witt Michael, Redding Gordon. Oxford Handbook of Asian Business Systems. – Oxford : Oxford University Press, 2014; Nolan Peter, Xiaoqiang Wang. Beyond Privatization: Institutional Innovation and Growth in China's Large State-Owned Enterprises // World Development. – 1999. – No. 27. – P. 169–200.

[10] Ref.: Avgerou Chrisanthi, Boyi Li. Relational and Institutional Embeddedness of Web-Enabled Entrepreneurial Networks: Case Studies of Netrepreneurs in China // Information Systems Journal. – 2013. – No. 23 (4). – P. 329–350; Ou Carol Xiaojuan, Pavlou Paul, Davison Robert. Swift Guanxi in Online Marketplaces: The Role of Computer-Mediated Communication Technologies // MIS Quarterly. – 2013. – No. 38 (1). – P. 209–230; Martinsons Maris G. Relationship-based E-commerce: Theory and Evidence from China // Information Systems Journal. – 2008. – No. 18 (4). – P. 331–356.

[11] Ref.: Shang Tianjiao, Yongjiang Shi. The Emergence of the Electric Vehicle Industry in Chinese Shandong Province: A Research Design for Understanding Business Ecosystem Capabilities // Journal of Chinese Entrepreneurship. – 2013. – No. 5. – P. 61–75; Rong Ke, Wu Jinxi, Yongjiang Shi, Liang Guo. Nurturing Business Ecosystems for Growth in a Foreign Market: Incubating, Identifying and Integrating Stakeholders // Journal of International Management. – 2015b. – No. 21 (4). – P. 293–308.

linked to the development of platforms, whether it's a technology platform or simply a space for virtual or in-person meetings, which is crucial for the business ecosystem. The study found that Asian firms demonstrate a high level of innovation and that these firms have proven to be competitive against global companies[12].

Using the example of an Asian country like Singapore, we see that it has adopted a cluster approach to economic development and aims to maintain its relevance and usefulness in the global value creation chain. This new approach to economic development has provided an enhanced foundation for stimulating industrial growth and development, primarily based on trade and foreign investment. This has improved planning in terms of strategically selecting industries for development and promotion, capitalizing on inter-industry interdependencies, and investing in the appropriate infrastructure, technologies, and institutions to achieve better outcomes and higher profits[13]. The cluster approach is often discussed in terms of creating an ecosystem around a specific industry or sector. For example, in the electronics cluster and related companies, an ecosystem can be established. These companies exhibit interdependence and coexistence. Their relationships are synergistic, resulting in positive externalities or agglomeration effects that foster further growth. This established development philosophy remains unchanged as the digital age progresses.

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[12] Ref.: Fuchs Christian. Baidu, Weibo and Renren: The Global Political Economy of Social Media in China // Asian Journal of Communication. – 2015. – No. 26 (1). – P. 14–41; Jiang, Min. The Business and Politics of Search Engines: A Comparative Study of Baidu and Google's Search Results of Internet Events in China // New Media & Society. – 2013. – No. 16 (2). – P. 212–233; Shi Xianwei, Xingkun Liang. Understanding Latecomer Strategy from a Business Ecosystem Perspective // Academy of Management Proceedings. – 2015. No. 1. – P. 18506; Entrepreneurship in China: Let a Million Flowers Bloom. – URL: https://www.economist.com/node/18330120.

[13] Ref.: Abdurakhmanov K. H. "Singapore's Experience in Formation and Development of Human Capital and Socio-Labor Relations." Strategic Decisions and Risk Management, 2023, no. 14 (2), pp. 188–197. DOI: 10.17747/2618-947X-2023-2-188-197..

CHAPTER 1. CONCEPT AND ESSENCE OF ECOSYSTEMS IN BUSINESS

1.1. Theoretical foundations of the formation and development of business ecosystems (Russian and foreign experience)

The theory and practice of modern perspectives on business ecosystems have undergone a long evolutionary journey, stemming from interdependent natural relationships in the biological world to external and internal socio-economic systems. The transition from natural ecological systems to modeling a developing economic environment has occurred. As production business processes are the driving force behind the economy, they have become the cornerstone of business ecosystems. Business ecosystem thinking integrates natural and biological evolution with economic development through innovative technological and digital processes.

As per the United Nations' International Convention on Biological Diversity, ratified in Rio de Janeiro on June 5, 1992, "Biological diversity" refers to the variability among living organisms from all sources, encompassing terrestrial, marine, and other aquatic ecosystems, as well as the ecological complexes of which they are part"[14].

According to this Convention, an “Ecosystem” refers to a dynamic complex of plants, animals and microorganisms along with their nonliving environment, interacting as a cohesive functional unit[15].

The conceptual groundwork for the development of the ecosystem concept was established through the research conducted by biologists in the late 19th century. Their studies revealed the patterns of interaction within biological systems.

Before G. Tansley's first used term "ecosystem"[16] in his publication in 1935, the concept of ecosystem construction was already present in scientific discourse. Later, Tansley defined an ecosystem as a "recognizable autonomous entity"[17] and for the first time he distinguished this concept as an original and independent matter for scientific inquiry.

Since the 1950s, ecosystem theory has become a framework for ecological research. Notably, English scientist E.D. Willis, in his work "Ecosystem: An Evolving Concept in Historical Perspective. Functional Ecology," summarized over 30 years of research, which led to the development and systematization of fundamental principles of ecosystem functioning. He also identified their characteristics and patterns of development[18].

In his work " The Ecosystem Approach in the Teaching of Ecology Illustrated with Sample Class Data" American ecologist Eugene P. Odum provided conceptual recommendations for implementing the ecosystem approach in biodiversity monitoring. He emphasized the importance of integrating foundational Darwinian principles to consider significant and valuable ideas about the natural self-development of living organisms, which were previously overlooked. The scientist insisted that this was necessary to overcome barriers between specialized research areas and to integrate new scientific advancements into these fields. In particular, E. Odum believed that the primary

[14] URL: https://www.un.org/ru/documents/decl_conv/conventions/biodiv.shtml
[15] URL: https://www.un.org/ru/documents/decl_conv/conventions/biodiv.shtm
[16] Ref.: Tansley A. G. The Use and Abuse of Vegetational Concepts and Terms // Ecology. –1935. – Vol. 16. – P. 284–307
[17] Ref.: Tansley A. G. The British Islands and their Vegetation. – Cambridge : Cambridge University Press, 1939.
[18] Ref.: Willis A. J. The Ecosystem: an Evolving Concept // Functional Ecology. – 1997. – Vol. 11. – Iss. 2. – P. 268–271. – URL: https://doi.org/10.1111/j.1365-2435.1997.00081.x

purpose of his theory was to identify essential patterns and cause-and-effect relationships[19]. In his other book, "The Energetic Basis of Man and Nature," he demonstrates that during periods of scientific and technological progress, questions related to the rational use of the planet's energy resources and its interaction with humanity become central. Additionally, the book examines economic development issues in various countries, focusing on the impact of different energy sources on the environment and human life.

The book explores future trends in energy and economic development, which he associates with business ecosystems[20]. In the fourth chapter of this work, the author examines in detail the business ecosystem of monetary flows. Although he doesn't explicitly use this term, finances are viewed by him as a necessary and determining factor in the efficiency of economic functioning, which forms the essence of the business ecosystem. E. Odum discusses how the circulation of money happens cyclically, with a growing mass, as it requires production growth in both quantity and quality.

The classical formula of Karl Marx, "commodity-money-commodity", "money-commodity-money ▲"[21],…commodity ▲-money ▲ ▲ commodity ▲ ▲ money ▲ ▲ ▲-commodity ▲ ▲ ▲-money ▲ ▲ ▲ ▲ … illustrates the unconditional process of economic self-development. But where does this growth energy come from? The author suggests that the "flow of energy enables the circulation of money, and monetary transactions, in turn, can regulate the flow of energy. By delving into the intricacies of money, energy, and their interplay, we gain a deeper understanding of how the economic system operates, as well as how external sources of energy influence monetary transactions and the dynamics of inflation[22]". In their discourse, the author employed both energy and money as measures of value.

The subsequent discussion explores intriguing arguments about how the movement of money and energy is diametrically opposed to each other. A simple example is given where a farmer produces food and brings it to the city market. The city dwellers, purchasing these products, pay for them with money, which the farmer then brings back to the farm, using it to buy the goods he needs, leaving this part of money with those who produced the goods he required.

There are expenditures of labor, energy and other activities associated with logistics, paperwork, banking operations, fuel costs, electricity, and so on. We refer to this entire complex of human activity as the biosphere, where humans are just a part of it. Without the energy of the biosphere, which includes the surrounding nature, atmosphere, oceans, rivers, mountains, soils, forests, human economic activity would be impossible[23]. In modern conditions, harnessing the energy of the biosphere without money is not feasible because there would be no commodity exchange, hence no turnover of goods. Therefore, money serves as the driving force of the economy.

However, individuals can only leverage money to pursue their interests when they possess it. Furthermore, monetary circulation occurs only when energy flows within a given business ecosystem are directed towards sustaining the required level of production and employment, thereby shaping a comprehensive financial market. The key

[19] Ref.: Odum E. The Ecosystem Approach in the Teaching of Ecology Illustrated with Sample Class Data // Ecology. – 1957. – Vol. 38. – P. 531–535

[20] Ref.: Odum G, Odum E "Energy basis for Man and Nature" – M. : Progress, 1978

[21] Ref.: Karl Marx Capital. T. 1. – M. : AST, 2001. – C. 328, 412, 429. – URL: http://www.litres.ru/pages/biblio_book/?art=172324

[22] Ref.: Odum G, Odum E "Energy basis for Man and Nature" – M. : Progress, 1978 – P 85

[23] Ref.: Odum G, Odum E "Energy basis for Man and Nature" – M. : Progress, 1978 – P 87

point here is the relationship between biosphere energy and the flow of money. The more it is utilized, the greater the demand for money in circulation.

This is the primary cause of inflation. Keynesianism and monetarism, in various forms, also developed this concept. In the late XIX to early XX centuries, the concept of the physiological nature of the economy was prevalent, suggesting that the economy resembles the human organism.

Just as the skeleton is the foundation of the human body, machinery serves as the foundation of the economy, enabling the production of all consumer goods. Like the human brain controls the body, the brain of the economy consists of science, education, and government administration. In the human body, the stomach serves as the foundation for sustaining life through food, muscles, and warmth. Similarly, in the economy, the branches responsible for life support are agriculture and the fuel and energy complex. In the human body, blood serves as the fundamental, constantly moving logistical resource supplying all necessary substances, while in the economy, monetary flows serve as such a resource. It is well-known that money is the lifeblood of the economy. The health of the financial system depends on the ease with which energy and money flow from one sector of the economy to another.

Despite the metaphorical nature of this physiological approach to economics, its original rationality cannot be denied.

Thus, the natural-scientific approach forms the basis for the modern concept of a business ecosystem. However, the peculiarity of this approach lies in the fact that in business ecosystems, all interdependent relationships are realized within the socio-economic and socio-economic environment.

Russian scientists also addressed issues related to the formation of natural systems. A. A. Bogdanov (Malinovsky, 1873–1928), a Russian philosopher, economist, political figure, scientist, and writer, was the founder of such an approach. He was the first among Russian scholars to explore management as a comprehensive system of control.

In his philosophical works, he developed an original concept called "empiriomonism" (from Greek "empirio" - experience, one, single) - a type of subjective-idealist philosophy. The concept suggests that the surrounding world is as one perceives and feels it. Therefore, "nature" consists, firstly, of lower, inorganic, and simplest organic combinations, and secondly - of higher organic combinations. Hence, the ecosystem is fundamentally based on the unity of living and non-living elements[24]. Later, A. A. Bogdanov developed a theory known as "Tektology" (from the Greek "tektonikos" meaning construction).

This is a science that studies general laws of how all aspects of life are organized. It asserts that all phenomena in nature develop based on a systemic approach. The foundation of human life lies in systematic thinking. According to his view, Tektology combines all sciences into a cohesive system. There are organizational principles that form the basis of all types of systems and all relationships between biological elements have a systemic nature.

He substantiated his research in the three-volume work "Tektology: Universal Organizational Science" (1913–1922), in which he laid the groundwork for this "metascientific system"[25]. In this work, he integrated natural, biological, and social sciences. He anticipated fundamental concepts of cybernetics by Wiener and the general systems theory by Bertalanffy, as well as the main directions of catastrophe theory by the French mathematician R. Thom, and some assertions of synergetics theory. Without using

[24] Ref.: Bogdanov A.A. . Empiriomonism: Articles on Philosophy. – Bk. 1. – M., 1904; Bk. 2. – M., 1905; Bk. 3. – M., 1906.
[25] Ref.: Bogdanov A.A. . Tektology. Universal organizational science : in 2 books – M.: Economy, 1989

the term "business ecosystems", A. A. Bogdanov developed a theory of systems in the economic field through unified organizational processes.

Any human activity - be it social-economic, managerial, technical, scientific, or creative - represents a combination of physical-chemical, biological, and socio-social laws and principles. This has even been demonstrated over theoretical and practical work on rejuvenation through blood transfusion.

Another Russian scientist, Academician V.I. Vernadsky (1863–1945), also made a significant contribution to the development of the modern concept of the business ecosystem.

The main tenets of his doctrine revolve around the constancy of the amount of living substance on Earth, with living matter being dependent on the energy from the Sun and volcanic heat.

The scientist also demonstrated that modern life on the planet is genetically linked to life in past eras. The Earth's “biosphere” is an independent ecosystem, where everything is interdependent and evolves. Moreover, he introduced the concept of the "noosphere," which has practical applications today.

Before that, scientists and biologists considered the plant and animal worlds as independent areas of life. However, V.I. Vernadsky demonstrated that all living and non-living entities on the planet are interconnected and constantly evolving, coming together into a single planetary-scale ecosystem, which was called the biosphere.

In the ecosystem, living organisms play the leading role, with humans at the top of this chain. Although all living organisms constitute less than 0.1 percent of the Earth's mass, they serve as a transitional stage towards the creation of a qualitatively different shell around the Earth, known as the noosphere, distinct from the biosphere. While the term "biosphere" originates from the Greek word "life”, term "noosphere" comes from two Greek words and signifies "sphere of mind"[26].

V.I. Vernadsky argued that the noosphere represents the convergence of nature, society, and culture, and that scientific and technological advancements, along with economic and industrial developments, alter the nature of the global ecosystem. This transition signifies a tangible evolution of the biosphere into a new state, a transformation driven by mankind's conscious engagement with life. "Through their labor and conscious awareness, humans transform the Earth's shell, the biosphere, into the noosphere, both through its work and its consciousness. The face of the planet is undergoing profound changes. This state of cultural humanity is linked to its spiritual growth, primarily based not on unconscious mass creativity as it was before, but on technology closely associated with science.

Our entire culture, which has encompassed the entire surface of the Earth, is a product of scientific thought and scientific creativity. This force of a social being lays in his mind and his directed and organized will” [27].

Therefore, V.I. Vernadsky came to the conclusion that the noosphere is the biosphere where intelligent life constitutes the foundation: human society, civilization, and each individual separately. Consequently, the driving force of nature becomes humanity, its intellectual and socio-economic activity shaping the ecosystem of modern society.

[26] Ref.: The World Encyclopedia: Philosophy/ Chief Editor and Compiler A.A. Grizanov – M. : AST, Mn. : Harvest, Contemporary writer, 2001

[27] Ref.: Vernadsky V.I. Biosphere and noosphere. – M., 1989. – P. 166, 299

Russian scientists of the 1950s and 1960s, V.N. Sukachev and N.V. Dyly's, made a significant contribution into the research elucidating the patterns of ecosystem development[28].

However, only in the middle of XX century concepts of ecosystem were first considered as a practical model for economic development by social scientists. Since then, researchers have started to study the global economy as a whole, where organizations, consumers, and the environment function as living organisms[29].

In theory and management practice, the concept of ecosystems was closely linked to evolutionary economics[30]. The integration of biological-ecological approaches and business process modeling occurred within the framework of systems management while studying industrial and economic development.

The technocratic approach to organizing the production process, in conjunction with socio-economic systems, is attributed to a group of foreign practitioners and researchers, including H. Ford, F. Taylor, H. Gantt, W. Rostow, J. Galbraith, D. Bell, and A. Toffler. They believed in and practically applied principles of scientific and technological progress, shifts in production paradigms, and innovative development within industry. They regarded these principles as foundational to the transition of societal formations and socio-economic systems.

For instance, W. Rostow's theory of stages of growth establishes the following sequence of transition among socio-economic formations: initially, traditional society is replaced by a transitional one, then transitions to an intermediate society, followed by the era of industrial socio-economic formation. At present, as he believes, we live in a stage of raising standards of living, which should transition into a stage of quality of life. This final stage will replace the socio-economic direction of development – the society of mass consumption[31].

Several management theorists attempted to combine the biosphere and the economy, including Bruce Henderson[32], the founder of the Boston Consulting Group (BCG) in 1963, Michael Rothschild[33], Richard Nelson[34], Sidney Winter[35], Michael Hannan[36] and John Freeman[37], F. Dyson[38]. These and other foreign researchers and practitioners made significant contributions to the development and implementation of the business ecosystem concept.

But it was the American researcher J.F. Moore who provided the most comprehensive insight into these principles. As a result of his research, the concept of the

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[28] Ref.: Basics of forest biogeocenology / Ed. By V.N.Sukachev, N.V.Dylys – M. : Science, 1964.

[29] Ref.: Rotschild M. Bionomics: Economy as Ecosystem. – New York : Henry Holt and Co., 1990

[30] Ref.: Moore J. F. Predators and Prey: a New Ecology of Competition // Harvard Business Review. – 1993. – Vol. 71. – Iss. 3. – P. 75–86

[31] Ref.: Rumyantseva S.Y., Nureev R. M. Development economics: models of the emergence of a Market Economy: textbook for students of economic universities and faculties. – 2-nd edition. – M. : Norm, 2008 // Bulletin of St-P University. Economy. – 2008. – № 4. – P. 185–191

[32] Ref.: Bruce Henderson "Brinkmanship in Business" URL: https://hbr.org/1967/03/brinkmanship-in-business; The origin of strategy. – URL: https://hbr.-org/1989/11/the-origin-of-strategy

[33] Ref.: Rotschild M. Monopolistic Competition and Preference Diversity // Review of Economic Studies. – 1992. – No. 59. – P. 361–373.

[34] Ref.: Nelson R. R. Winter S. G. An Evolutionary theory of economic change – M.: Delo, 2002

[35]Ref.: Ref.: The nature of the Firm. Origins, evolution and Development Series «Modern Institutional- evolutionary theory » / edited by O. I. Williamson, S. G. Winter; translation made by M Y Kazhdana – M. : Delo, 2001.

[36] Ref.: Hannan Michael T., Freeman John. Organizational Ecology and Strategic Management: An Evolutionary Process Perspective. – Stanford University, 1986. – URL: https://books. google.ru/books?id=UVHDye2683gC&redir_esc=y

[37] Ref.: Dyson F. Disturbing the Universe. – New York : Basic Books, 1979

[38] Ref.: Moore J. F. The Death of Competition : Leadership and Strategy in the Age of Business Ecosystems. – URL: https://www.researchgate.net/publication/31744644

“business ecosystem” has firmly integrated into the conceptual framework of business strategy and entrepreneurship.

Since the late 1990s, the term «business ecosystem» has been widely used instead of the term «industry». The author of this change was the researcher of business processes and business technologies, J.F. Moore, who explains this substitution as follows: «This term signifies a microeconomy where intensive co-evolution occurs, revolving around innovative ideas”.

Business ecosystems span across diverse industries. Companies within these ecosystems co-evolve around innovations, engaging in collaboration and competition to support new products, meet customer needs, and drive the next wave of innovation. For instance, Microsoft established an ecosystem that integrates four major industries: personal computing, consumer electronics, information, and communication sectors. The Microsoft ecosystem is built on innovations in digital technologies, bringing together a vast network of suppliers, including thousands of customers across various market segments.

Contemporary management focuses not on acknowledging the global shifts in the economy rather on crafting effective management strategies. Only a few management teams have successfully developed systematic approaches to navigate the new business landscape. The majority of them grapple with problems to varying degrees of effectiveness, lacking a clear understanding of how to interpret and overcome new strategic challenges. The majority deal with challenges to varying degrees of success. Many lack a clear understanding of how to interpret and address emerging strategic issues effectively.

What is most needed is a new language, strategic logic, and new methods of its implementation. Many previous ideas no longer work. For example, diversification strategies that focus on seeking «attractive» industries often assume the stability of industry structure, yet our experience tells us that industry structures change very rapidly.

What is most needed is a new language, logic, strategies, and new methods of its implementation. Many previous ideas no longer work. For example, diversification strategies, which focus on finding attractive industries, often assume the stability of industry structure. However, our experience tells us that industry structures change very quickly. Traditional notions of vertical and horizontal integration no longer work in the new world of collaborating communities. Competitive advantages are no longer solely the result of economies of scale and production volume. Many firms can achieve sufficient levels of production required to be efficient. Flexible systems are widely used, enabling companies to adapt their offerings, increase diversity, and do so without significant additional costs. In the new world, scale and scope matter, but only if they contribute to a continuous innovative trajectory, enabling the company to constantly reduce costs while simultaneously increasing productivity.

The crucial question for management today is not whether such changes are approaching us, but how to develop a strategy in this new world. Only a few management teams have been able to develop systematic approaches to dealing with the new business complexity.

The special task of leadership in business is to create communities with shared goals and vision. In a strictly biological sense, the definition of leadership is not applicable to business.

Unlike biological communities consisting of coevolving organisms, business communities are social systems. And social systems consist of real people making decisions.

A powerful collective imagination, focused on envisioning the future, develops within a business ecosystem that is unlike anything in biology. Conscious choice indeed plays an important role in ecology. Animals often choose the habitats of their peers and their own behavior. However, in the world of economics, strategy, and politics, investors spend a lot of time understanding the big picture and finding productive ways to either follow the rules or change them. This awareness occupies a central place in economic relationships.

Thus, we see that natural ecosystems vary greatly in their resilience and ability to withstand challenges. Despite developing fairly complex relationships, ecosystems that evolved in conditions of relative isolation and protection from invasion do not acquire effective defense mechanisms. Such ecosystems are highly susceptible to invasive species and often face difficulty in recovering from catastrophes. In contrast, ecosystems experiencing a continuous influx of new participants develop almost invincible resilience.

Similarly, enterprises shielded by high tariffs, traditional industry boundaries, or government regulation typically lack the arsenal of defensive measures inherent in more openly competitive ecosystems.

What is a business ecosystem? It's an economic community driven by interacting organizations and individuals, entities that form the framework of the business world. It produces goods and services valuable to customers, who themselves are members of the ecosystem. Member entities also include suppliers, retailers, manufacturers, competitors, and other stakeholders.

Over time, they collectively develop their capabilities and roles, usually aligning with directions set by one or several central companies. Companies in leading positions may change over time, but the function of ecosystem leadership is valued by the community as it enables its members to move towards a common vision, coordinate their investments, and find complementary roles themselves.

From the second half of the XX century, the initial focus on resources, reflecting trends in vertical integration, conglomerate formation, and budget optimization, has shifted towards achieving a competitive market position, reflecting processes of diversification and differentiation. During the period from 1960 to 1990 Soviet management science was focusing on seeking ways to develop economic systems of socialist economic organization.

The eminent Russian scholar, Academician Y. V. Yaremenko, highlighted the distinctiveness of the national economic organization: “our system cannot be considered within the framework of purely economic theory. Here, a theory addressing the existence of a large-scale production system is needed.” [39]

Academicians of the management school of Moscow Institute of National Economy (now the Plekhanov Russian University of Economics) [40] took a somewhat different approach to the prototype of the ecosystem approach in socialist economic systems. They elaborated on the concept of long-term direct production connections. The organization of material and technical supply had a significant influence in the Soviet management model. Though the Soviet Union economic management system was based on administrative-command mechanisms, it was constantly developing. The introduction of processes that facilitated direct and long-term resource provisioning relationships

[39] Ref.: Yaremenko Y. V. Economic discussions. – M. : Center of Science Research and Statistics, 1998. – P. 87

[40] Ref.: Fasolyak N. D. Inventory management. – M. : Economy, 1972

disrupted the unified vertical hierarchy and created a new, more flexible vector of economic interactions. The concept of direct economic links also found reflection in the transformation of hierarchical management models into ecosystem models.

However following the collapse of the Soviet Union many ideas proposed by domestic scientists remained unrealized. At the turn of the century, the focus in strategic management shifted towards the search for key competencies and business models. Economic systems transitioned from searching for new values to the widespread adoption of new information technologies and the construction of knowledge-based business processes. This laid the groundwork for a high demand for ecosystem models in business, as they prove to be most effective when leveraging new technological platforms and artificial cognitive systems.

During this period, there was also extensive consideration of the possibilities of utilizing cluster-based organizational forms which laid the groundwork for the domestic perspective on the relationship between the concepts of network-cluster-ecosystem.

The authors believe that networks are the fundamental category for examining clusters and ecosystems in business and support the perspective that "cluster organizations are merely one narrow variation of interfirm networks"[41]. Industrial clusters, including high-tech and innovative ones, have less flexibility compared to ecosystems and are limited territorially, whereas business ecosystems, though formed on the basis of the interconnected activities of participants, do not have clear boundaries. The primary goal of cluster members is to enhance competitiveness, while ecosystems function by uniting participants to achieve a shared mission.

Currently there is no standardized terminology for defining ecosystems in the economy. An ecosystem is described as both "cooperation between companies, where individual offerings are merged into a cohesive, customer-oriented solution"[42], and as "a self-organizing, highly adaptive network complex within the natural, institutional, social, and political environment. It consists of freely cooperating, interacting, and mutually influencing elements - organizations, processes, projects, and services[43]".

In 1996, Lu Lin introduced the concept of the enterprise ecosystem, defining it as the holistic environment essential for the enterprise's survival. He also advanced the theory of the enterprise ecology indicating that it is the science of the relationships between the enterprise and its environment[44].

M. Peltoniemi and E. Vuori emphasized that a business ecosystem is a flexible and dynamic structural system comprising organizations in specific relationships. Any founding organization capable of influencing the entire system, such as enterprises, universities, research institutes, and social service institutions, can initiate such a system[45]. The niche refers to the combination of resource utilization and the ecological adaptation of a biological unit[46]. Both R. Levin and M. Yancity noted that business ecosystems are promoted by companies from different niches but that are interconnected

[41] Ref.: Smorodinskaya N V Globalized economy: from hierarchy to network structure – M. : IE RAS, 2015. – C. 89.
[42] Ref.:Adner R. Match your Innovation Strategy to your Innovation Ecosystem // Harvard Business Review. – 2006. – Vol. 84. – Iss. 4. – P. 98.
[43] Ref.: Popov EV Typology of regional innovation ecosystem models/ E V Popov, V L Simonova, I P Chelak // Regional economy: theory and practice. – 2020. – T. 18. – № 7 (478). – C. 1336–1356.
[44] Ref.: Lu Ling. On the Principle of Enterprise Ecology // Science in the World. – 1996. – No. 3. – P. 44–46
[45] Ref.: Peltoniemi M. & Vuori E. Business Ecosystem as the New Approach to Complex Adaptive Business Environments // Proceedings of eBusiness Research Forum, 2004
[46] Ref.: Peltoniemi M. & Vuori E. Business Ecosystem as the New Approach to Complex Adaptive Business Environments // Proceedings of eBusiness Research Forum, 2004.

with each other. Changes in one of them will lead to changes in the other[47]. Based on the company's niche and corporate strategy within the business ecosystem, R. Levin and M. Yancity categorized the company into "key enterprises that sustain health of the ecosystem, influencing specific behaviors within the system and acting as a regulator of the business ecosystem," "dominator enterprises that manage and control the most important centers of the business ecosystem through vertical or horizontal integration," and "niche players that concentrate their ability to differentiate from other enterprises in specific niches and utilize them with key resources provided by other companies for commercial activities." They point out that corporate strategy addresses the business network not as a combination of traditional supply chain partners, but as an organic ecosystem. This has become the connecting link between two business ecosystems. Nearly all healthy ecosystems can be characterized by specific functions performed by certain types of key enterprises[48].

The business ecosystem in the Asia-Pacific region is dominant in countries focused on efficiency, such as China, Indonesia, Malaysia, and Thailand. Interestingly, innovation-oriented countries in the region score higher only in terms of physical infrastructure compared to their efficiency-focused counterparts. Additionally, economies in the region focused on factors of production also demonstrate relatively strong performance compared to their innovation-oriented counterparts. Cultural and social norms significantly influence entrepreneurship in the Asia-Pacific region, as does the dynamics of the domestic market. The current economic development in the region, characterized by above-average GDP growth rates and governments' efforts to support economic growth, creates a generally favorable context for entrepreneurial growth.

One of the studies relevant to this topic is "Managing a Sustainable Business Ecosystem in Taiwan's Circular Economy: A Case Study of Glass Recycling for Spring Pools[49]." In this study, the authors aim to uncover the multitude of mechanisms employed by a company in a circular economy to manage its business ecosystem. They provide a practical example applied longitudinally in a glass recycling company in Taiwan. The findings reveal that the mechanisms include: utilizing stakeholder networks to develop the business ecosystem, securing long-term profitability for entry into emerging markets, corporate social responsibility and brand image, the company's potential, research and development in waste recycling, and adaptation to government policy.

In Central Asian regions, the primary focus of economic development has shifted towards establishing strong business ecosystems for key sectors, improving the productivity of companies and individuals, and fostering trade to promote growth, prosperity, and inclusivity.

Digital platforms in Central Asia facilitate the development of new products and services within emerging ecosystems. It’s worth noting that this approach aligns perfectly with the ideology of Industry 4.0, both from a business and educational perspective. Additionally, innovators across the globe can contribute to shaping these ecosystems, transcending geographical boundaries. A main focus for Central Asian countries should be on stimulating innovation within the real sectors of their economies by fostering

[47] Ref.: Iansiti M, Levien R. The Keystone Advantage: what the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability // Future Survey. – 2004. – No. 20 (2). – P. 88–90.
[48] Ref.: Iansiti M, Levien R. The Keystone Advantage: what the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability // Future Survey. – 2004. – No. 20 (2). – P. 88–90.
[49] Ref.: Hsieh Y. C., Lin K. Y., Lu C., Rong K. Governing a Sustainable Business Ecosystem in Taiwan’s Circular Economy: the Story of Spring Pool Glass, Sustain // Times. – 2017. – No. 9 (6). – P. 1068. – URL: https://doi.org/10.3390/su9061068.

ecosystem-based partnerships that involve collaboration between businesses, academia, education, government, and the general population.

The analysis conducted suggests that businesses operating in Central Asia predominantly possess or show the interest to adopt basic business ecosystem profiles.

The modern period represents the second stage of digital transformation, transitioning from the digitization of individual elements to the digital transformation of entire business processes and social services within the space of value creation.

The framework of this new stage of development has become the emergence and ongoing evolution of digital platform-based business ecosystems. These formats facilitate cooperative-networked, clustered, and business ecosystem interactions, ensuring the attainment of network effects and enhancing competitiveness among participants and systems as a whole. They possess the characteristics of large-scale systems, enabling the adoption of new technologies and markets, and ultimately leading to optimal outcomes.

According to the European Bank for Reconstruction and Development (EBRD), Uzbekistan stands out as the fastest-growing country in Central Asia in terms of economic indicators and business development. A conceptual framework has been developed within Uzbekistan to identify mechanisms through which the development of business ecosystems can meet the needs for joint prosperity and sustainable economic growth in the country.

The Government of the Republic of Uzbekistan and Uzbek companies have various options to effectively use opportunities provided by the emerging ecosystem.

According to academy members of Plekhanov Russian University of Economics, evolution of business development model research can be defined as a sequence of concepts "strategy," "business model," "ecosystem," "platform". However, there is still ongoing debate among scientists regarding the degree of conceptual alignment or fundamental differences between them[50]. General theory of ecosystems, developed by a team of Russian scientists led by G. B. Kleiner, explores the communications, connections, and relationships within the ecosystem through the lens of spatial and temporal development characteristics[51].

Current typology of ecosystems distinguishes three types, which can either exist independently or evolve into one another:

1. Organizational ecosystems.

Organizational ecosystems are viewed as a combination of economic entities of various types, scales of activity, and levels of management, interacting with each other and developing under the influence of a variety of external factors, to which, in turn, they have an impact.

2. Innovation ecosystems.

Innovation ecosystems are characterized by collaboration, enabling the provision of holistic solutions to consumers. These ecosystems facilitate the development of consumer-centric products representing a unique value. In innovation-driven ecosystems, success is achieved not only through direct interactions but also through "complementors" that supplement and amplify core innovations.

3. Platform ecosystems.

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[50] Ref.: Mazhitova S.K. Management of a business activity: "ecosystem" as a new representation of economic relations / S.K. Mazhitova, B.K. Dzhazykbaeva, I.V. Denisov [etc.] // Economics, entrepreneurship and law. – 2020. – T. 10. – No. 3. – pp. 601–614.

[51] Ref.: Yan J. Biophysical Economics as a New Economic Paradigm / J. Yan, L. Feng, G. Kleiner [et al.] // International Journal of Public Administration. – 2019. – Vol. 42. – Iss. 15–16. – P. 1395–1407. – DOI 10.1080/01900692.2019.1645691.

Platform ecosystems represent a stage in the development of digital systems. Platform ecosystems represent the next stage in the evolution of knowledge ecosystems, as knowledge is generated and capitalized more swiftly, often taking the form of innovations. Ecosystem platform development model is based on transaction of knowledge and generation of value. Platform ecosystems are integrated into higher-level "smart" ecosystems, such as the «smart City» ecosystem. According to the Moscow City Department of Information Technologies, "the most popular sectors for digital platform usage are: financial (78%), online shopping (76%), transportation (67%), media and entertainment (62%)[52]."

The prerequisites for ecosystem business strategy.

This approach, geared towards leadership ecosystem, and strategy development, relies on four essential conditions:

1) Amidst the disintegration of traditional industries the only sensible way to compete is to outperform your competitors in creating new ecosystems, rather than just products. As a matter of fact, once you grasp the concept of ecosystem creation, you will never be able to fit into the framework of the "industry". There is an expression which defines a goal as not to win someone else's game, but rather to change the game so that you can win. That is, the goal is not to become an industry leader, but to disrupt old industries and create new ones.

2. The reason for the existence of these new business communities lies in offering customers bold innovations. When we talk about innovations, we don't mean just product or process enhancements, or what emerges from research and development efforts. That is not enough. We are talking about a totally different outcome. This is a new set of advantages available to customers, which are clearly superior to those they are replacing. Otherwise, it is impossible to justify the costs of maintaining the business ecosystem. These expenses include the costs of developing the new processes, allocating new assets, establishing a network of allies, and convincing clients to transition to the new level.

3. The scope of what is considered "contained" within the business ecosystem is a core of a central strategic decision. It is possible to create a comprehensive, end-to-end economic community that includes tens or, in the case of the personal computer business, hundreds of thousands of people and organizations. On the other hand, it is possible to limit the business ecosystem to a narrow goal and still meet the main criterion of solving important problems and rewarding its organizers. The scope and boundaries of the business ecosystem are not dictated by traditional practices, but must be managed decisively. Otherwise, we would never take advantage of the benefits of innovation. When a new strategy manager decides to consider a set of activities as part of a business ecosystem, he is counting upon that the benefits will significantly outweigh the costs, at least over the life of the enterprise.

4. Competitive advantage in the new world is determined by knowing when and how to create ecosystems, and the ability to direct them towards long-term growth and continuous improvement.

Certainly, these principles may seem simple, but their execution is a completely different, much more challenging matter. It requires close attention to the demands of both cooperation and competition. New ecosystems require leaders who can work across traditional organizational and cultural boundaries to create a compelling vision that transcends company, industry, and often national boundaries.

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[52] Ref.: Moscow digital ecosystems: research // Department of Information Technologies of Moscow. – URL: https://ict.moscow/static/cifrovye-ekosistemy-moskvy.pdf (access date: 10/17/2023).

And finally, one last point to note: the most crucial aspect that has gained paramount importance since the 1990s - competitive advantage. Competitive advantage in the world of business ecosystems. Remember that not all ecosystems and roles are equally profitable. For example, IBM created the ecosystem for personal computers (PCs), but struggled to profit from it. It's not enough just to create business ecosystems. If you want to achieve financial success, you must create a new form of dynamic competitive advantage within and through participation in business ecosystems. Competitive advantage in the XXI century implies having a leadership position embedded within a successful business ecosystem.

According to the scientific school "Labor Economics and Human capital" of the Tashkent branch of the Russian Economic University XXX under the management of Kalandar Abdurachmanov, recently the concept of "ecosystem" is has started to gain popularity in Uzbekistan within the framework of the global information and innovation economy. This concept is attracting interest from both theorists and practitioners across various fields of activity. This trend is driven by increasingly complex challenges of modern markets, which require the search for new ways of interaction between participants in economic relations and the generation of innovative ideas. It is not surprising that in these circumstances, researchers have turned to such an economic analysis unit as the ecosystem, which, at first glance, appears as a network of cooperating and competing firms offering interconnected products and services.

The main purpose of the development and prosperity of Uzbekistan is the exaltation of people's honor and dignity, ensuring interests of the population with that being based on building a strong economy. In light of this the year 2024 has been declared in Uzbekistan as the "Year of Supporting Youth and Business".

As illustrative example we can use Walmart's [53] competitive advantage which is determined by its position within a larger system of which it is a member and the owner.

Walmart success is determined by a well-organized network of business processes, the community that manages those processes, and, as a result, the business ecosystem. By no means it has a guaranteed secured position within the industry. Retail trade in North America is one of the least protected and most fiercely competitive industries.

It is the sole provider of management, retail stores, wholesale sales, information services, purchasing, marketing expertise, workforce planning and more to its own wide network. And because Walmart is so customer-oriented and innovative, crowds of its customers are almost religiously devoted to it, especially in the somewhat isolated small towns where it is most powerful. There is no need to say that this is a very favorable position.

Intel provides another rather dramatic example of competitive advantage. From 1991 to 1995, Intel was one of the most profitable companies in the world, alongside diamond monopoly DeBeers, Malaysian oil and gas monopoly and leading pharmaceutical companies. During the same period, the average profitability of the semiconductor industry was less than a quarter of Intel's. How can we explain this? Was Intel really that much more efficient than its competitors? Unlikely. Personal computer buyers in those days were increasingly thirsty for more processing power.

Year after year, they craved increasing processing power to handle new software. Only Intel specialized in providing such capabilities. Semiconductor clone manufacturers,

[53] Walmart, Inc. («Уолмарт») – An American company that operates the world's largest wholesale and retail chain under Walmart brand. The main regions are the USA and Mexico, with a significant presence in Canada, Chile, Central America, African countries and China (also until October 2020, Walmart owned ASDA chain in the UK). The company has held 1st place in the Fortune 500 since 2003, regularly leads the Global Powers of Retailing ranking compiled by Deloitte, Walmart accounts for 10% of the total revenue of Top 250 companies in the rating.

like Advanced Micro Devices, could supply processors for client software, but these clones were always left behind by Intel. Intel sold what was in high demand and what only it could offer.

Moreover, the ecosystem of personal computers, driven by Intel and Microsoft, brought immense benefits to many other ecosystems.

Therefore, Intel's significant success during this period was largely attributed to its position as the sole supplier within a larger ecosystem that provided crucial productivity gains to virtually every business sector in the world. It was precisely when this role came under threat from alliances of companies eager to get into the ecosystem that Intel had to fight hard to maintain its positions.

The new source of competitive advantage lies in establishing a secure position within an innovative ecosystem - an ecosystem that so effectively leverages and organizes resources in a favorable environment that buyers prefer it over competing ecosystems. Protection means that it is extremely difficult to displace the company from its role in the community, and that this role gives it enough bargaining power over other ecosystem participants for the company to generate high profits. Thus, at least one truth from the provisions of traditional strategy remains valid:

"All other things being equal, the bargaining power that comes from having something that others actually want and for which you are the only or one of the few practical sources, increases profitability. But it must be kept in mind that in the new world the bargaining power rarely mirrors industry characteristics. It stems from dynamic contributions rather than static barriers. Security is ensured not by regulation or heritage, but by leadership and innovative contributions into the interaction with ecosystem clients".

The structure of section 1.1 is shown in the subsequent diagram.

Figure 1.1. Visual representation scheme of the section “Theoretical background” formation and development of business ecosystems (Russian and foreign experience")

Control questions

1. Why is the concept of biological diversity addressed within business ecosystems?
2. Specifics of business ecosystem thinking.
3. Difference between an ecosystem and a standard production system.
4. What distinguishes a business ecosystem from a biological ecosystem?
5. Positive and negative aspects of co-evolution in business.
6. Differences between co-evolution in business and co-evolution in biological systems.
7. The structure of economic physiology.
8. The essence of biological empiriomonism.

9. Basic principles of tectology.
10. Competitive advantage criteria.
11. Contents and features of artificial cognitive systems.
12. Difference between a business cluster and a natural cluster.

Practical immersion material

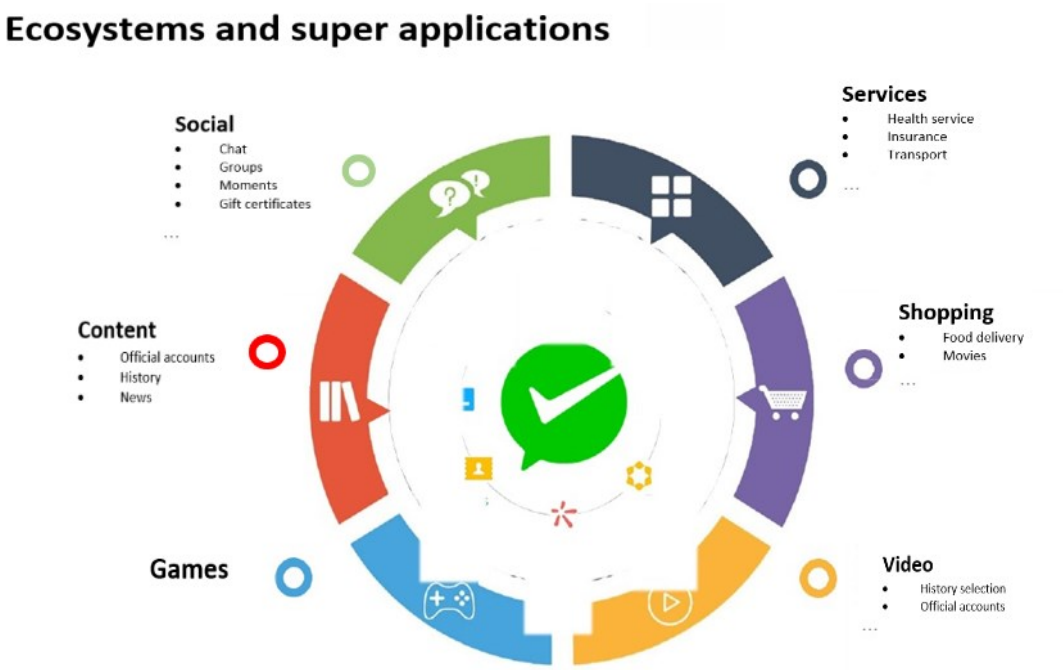
Task

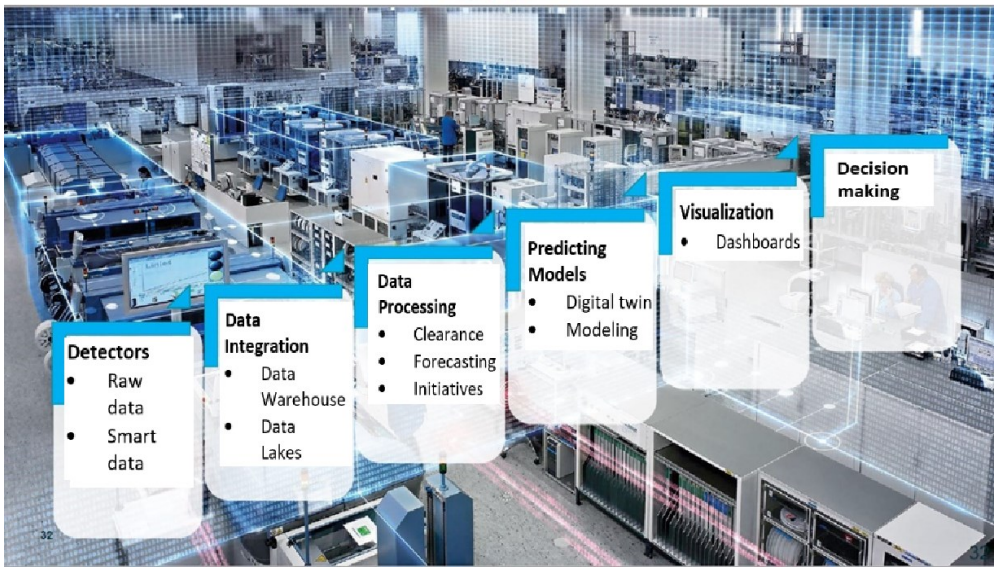
Consider the illustrations provided below. Answer following questions:

1 Define what is an ecosystem and ecosystems can be classified as business ecosystems.

2 What systems can be classified as artificial cognitive systems?

3 What processes in the development of artificial intelligence does the “Human VS artificial intelligence” diagram discuss?





Human VS Artificial Intelligence

- Human success
- Artificial intelligence success

1914
Chess robot
by Leonardo
Torres Quevedo

1956–1962
IBM 701 by Arthur
Samuel, playing
checker

1988
Deep Thought, chess computer
first ever playing against
Garry Kasparov

1996
Deep Thought II, later renamed
To Deep Blue
Playing again against
Garry Kasparov

1997
Modernized Deep Blue
Third time playing against
Garry Kasparov

2015
AlphaGo - Google DeepMind
neural network
playing against
Europe champion

2017
Renewed AlphaGo
playing against
World's champion

2017
DeepStack and Libratus
Playing poker against
professional players

2017
Open IA by Ilon Mask
Plays Dota2 with the
world's best payers 1 on 1

1.2. The contribution of Russian scientists to the development of the ecosystem approach to organizational management

Introduction

Many scientific publications on business ecosystems begin with mentioning the works of botanist A. Tansley [54], who described the coexistence of organisms inhabiting a specific place on Earth under certain natural conditions, forming together an ecological system (ecosystem). The term "ecosystem" in such a context was introduced into scientific circulation in the 1930s.

Then commonly reference is made to another foundational work of J. Moore [55], who draws an analogy with business that is characterized by increased competition, mentions predator and the victim, and introduces the concept of "business ecosystem."

In this section, we will try to understand in more detail, the definitions and concepts. According to the opinion of R. Descartes, it is crucial to accurately define the terms used: "…if philosophers always agreed on the meanings of words, almost all their disputes would cease" [56].

Term "ecological system" comes from ancient Greek concepts of "dwelling", "abode" (οἶκος) and "system" (σύστημα) and is a complex of co-living biotic organisms and abiotic conditions of their existence, which are interrelated in a systematic manner. Thus, communities of various living organisms interacting with each other and with the environment - air, water, earth and other inanimate objects – are described.

The energy for the existence of this diversity comes from the Sun. In order to coexist, organisms cooperate somewhere (symbiosis), while elsewhere they compete with each other for available resources.

The energy for the existence of this diversity comes from the Sun. In order to coexist, organisms cooperate somewhere (symbiosis), while elsewhere they compete with each other for available resources.At the same time, all participants of the ecosystem collectively adapt and gradually evolve. Ecosystems can encompass lakes, rivers, the world's oceans, or, for instance, tropical or deciduous forests (Figure 1.2).

The concept of an "ecological system" began to form in the late XIX century, during a time when many sciences were accumulating knowledge and attempting to systematize it by formulating new theories and introducing necessary concepts.

Thus, the German biologist K Möbius [57], while describing an oyster bank and the organisms associated with it, defined it as a community of organisms and gave it the name "biocenosis." The biocenosis refers to the community of plants, animals, and microorganisms inhabiting a specific area of the environment and characterized by specific relationships among themselves and with the abiotic factors of that environment. Thus, a biocenosis is a community of interconnected organisms, including plants, animals, fungi, and microorganisms, in a homogeneous living space, as well as the surrounding external environment.

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[54] Ref.: Tansley A. G. British Ecology During the Past Quarter-century: the Plant Community and the Ecosystem // Journal of Ecology. – 1939. – Vol. 27. – No. 2. – P. 513–530.

[55] Ref.: Moore J. F. Predators and Prey: a New Ecology of Competition // Harvard Business Review. – 1993. – Vol. 71. – No. 3. – P. 75–86.

[56] Descartes R. Règles pour la direction de l'esprit. – Vrin, 1970.

[57] Ref.: Möbius K. Die Auster und die Austernwirtschaft. – Berlin : Hempel & Parey, 1877.

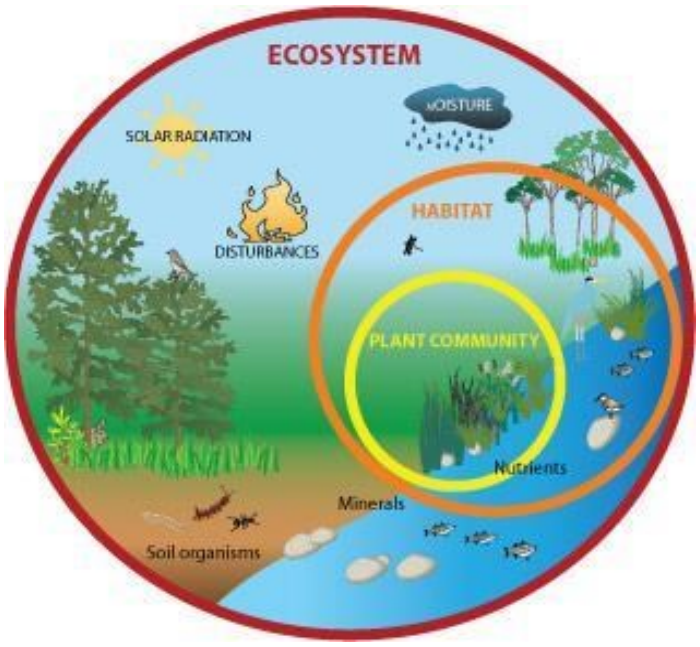

Figure 1.2. An example of picturing an ecological system [58].

In a sense, the further development of this concept is biogeocenosis. This term was developed in the first half of the 20th century in the USSR by V.N. Sukachev [59].

The biogeocenosis - is a system that includes a community of living organisms and the closely related set of abiotic environmental factors within one territory, interconnected by the cycle of substances and energy flows. It represents a stable, self-regulating ecological system in which organic components (animals, plants) are intricately linked with inorganic components (water, soil). For example, animals, plants, fungi, which are introduced into any ecosystem (forest, savannah, tundra, river, lake, and so on).

The concept of biogeocenosis was actively used primarily in Russian biological scientific literature.

Biogeocenosis is characterized by territorial limitation associated with terrestrial vegetation cover. This is clearly seen on site of the transition from forest vegetation to desert (various types of phytocenosis). Thus, the presence of soil cover is typical of biogeocenosis.

With the development of interdisciplinary research, the concept of "ecosystem" begins to play an increasingly important role as the most comprehensive and multifaceted. Ecosystems vary in complexity, size, and origins.

Biogeocenoses are autonomous entities in terms of nutrient supply. In a biogeocenosis, there is a complete cycle of substances (similar to the cycle of substances in nature on Earth) and they do not require external input from another biogeocenosis.

With the development of interdisciplinary research, the concept of "ecosystem" begins to play an increasingly important role as the most comprehensive and multifaceted.

Ecosystems vary in complexity, size, and origins.

[58] Ref.: URL: https://socratic.org/questions/can-you-define-ecosystem

[59] Ref.: Sukachev V.N. Biogeocenology and phytocenology // Scientific Reports of the Academy of Sciences USSR. – 1945. – T. 47. – № 6. – pp. 447–449.

A tree represents a microecosystem. A small grove is a mesoecosystem. Forest stands for a macroecosystem. Each of these systems includes a variety of microelements, plants, fungi, and animals, with the quantity of all elements varying in volume and contribution to the ecosystem.

From a nutrient provision perspective, ecosystems are more open to new elements, able to incorporate and accumulate new nutrient force brought in from outside.

Therefore, the concept of "ecosystem" is broader than "biocenosis." Any biocenosis can be called an ecosystem, but only terrestrial, soil-based ecosystems can be called biocenosis.

In this respect, a more detailed examination of ecological issues is needed, given that the subject of our study is the trope of a "business ecosystem."

Since our chapter aims to describe the contribution of Russian scientists, let's focus on the comprehensive concept of the "noosphere" by the Russian scientist V.I. Vernadsky.

Noosphere

For a better understanding of V.I. Vernadsky's concept of the noosphere, it's crucial to explore his studies on the biosphere. The biosphere represents an earlier phase of evolutionary development and reflects a holistic interpretation of the interaction of living and nonliving matter.

At the early stage of his intellectual life V.I. Vernadsky received his education from such eminent scientists as A.M. Butlerov, V.V. Dokuchaev, and D.I. Mendeleev. Each of them was an authority in their field - D.I. Mendeleev and A.M. Butlerov in chemistry, and V.V. Dokuchaev in mineralogy and soil science.

It is safe to say that the holistic approach characterizing work of the V.V. Dokuchaev on soil formation, and so conservation in the desert region of Russia was an important stimulus for the further development of V.I. Vernadsky's understanding of natural systems.

At the end of the XIX century, at the beginning of his academic career, V.I. Vernadsky demonstrated a great interest in mineralogy and crystallography, studying them at European universities.

At the end of his scientific career, V.I. Vernadsky was deeply engaged in extensive international networks of scientific collaboration and dialogue.

This allowed him to incorporate into his theory the collective knowledge prevalent across Europe at that time. It was during this period that he became acquainted with the works of the Austrian geologist Eduard Suess, who is credited with introducing the term "biosphere" into scientific discourse. The Austrian geologist used this term to describe the designation of the Earth's zone of organic life.

However, later on, V.I. Vernadsky significantly expanded and developed this concept, elevating it to a new scientific level. The main results of his research were published by him in 1926 in the book "The Biosphere" [60]. The research was presented in two separate parts (essays).

In the first part, titled "The Biosphere in Space," V.I. Vernadsky defines the biosphere as a complex phenomenon receiving energy from the Sun and closely linked to ongoing geological processes (changes) on Earth. Here is when the scientist's initial interest in geology and mineralogy comes into play.

V.I. Vernadsky views the biosphere as a realm of transformations capable of converting cosmic radiation into active energy in various forms – electrical, chemical, mechanical, thermal, and so on. Moreover, it is precisely the production of free energy

[60] Ref .: V.I. Vernadsky The Biosphere. – T. 1-2. – L. : Scientific-chemical-technical publishing house. – 1926.

that gives the biosphere an exceptionally important role on our Earth, unlike other planets in the Solar System.

To V.I. Vernadsky, the significance of living matter comes from its ability to transform solar energy into active chemical substances, providing the opportunity for diverse forms of life to exist on Earth.

The second part of the Biosphere, titled “The Realm of Life,” is dedicated to exploring the scale and range of life within the biosphere, from the deepest layers of the ocean to the upper layers of the atmosphere.

At a broader level, in his study of the biosphere, V.I. Vernadsky attempted to establish a framework that integrates the Earth's living layer and biosphere with the geological processes taking place on the planet. The scientist signified that the conception of life being just a process of adaptation of living organisms to the geological and chemical characteristics of the earth is quite unilateral. By surviving and reproducing, living organisms alter the chemical composition of the Earth. Multiple living organisms populating the planet in this way form the living matter of the Earth, transforming it at a geochemical level.

V.I. Vernadsky introduces the concept of “life as a geological style,” suggesting that on planet Earth, there is a widespread global reutilization of essential chemical substances and active maintenance of chemical imbalance within living organisms. This once again emphasizes the importance of the geochemical influence of living matter.

Moreover, for V.I. Vernadsky, it was important to indicate that the concept of “life” in the scientific conceptual framework corresponds to the notion of “living matter,” thus, the scientist opposed it to philosophical, religious, or common perception of the world. Thus, he aligned his argumentation with a natural-scientific worldview.

As previously mentioned, V.I. Vernadsky considered the biosphere within the context of the evolutionary processes taking place on Earth.

Scientists suggest that V.I. Vernadsky's conception of the biosphere implies that the process of evolution unfolds in directions typically conducive to life. Throughout evolution, the perceptual capabilities of living organisms and the intellectual abilities of humanity have been shown to increase. To support this, he was referring to the research of European scientists, whose work he continued to follow from the Soviet Union.

V.I. Vernadsky believed that the development of human beings, their consciousness, and intellect, including the evolution of collective intelligence, began to play a significant role in the evolutionary and geochemical processes occurring on Earth.

Furthermore, V.I. Vernadsky pointed out that the evolution of humanity and the emergence of social and scientific activities led to the transformation of the biosphere into the noosphere. It is worth noting that while the scientist associated the increasing geological influence of humanity with the emergence of socialized scientific thought, he simultaneously questioned the role of philosophical and religious thought in human development due to its lack of scientific basis and provability.

The term "noosphere" was first introduced in 1927 by the French philosopher Edouard Le Roy, who drew on the similarity of his views to those of Pierre Teilhard de Chardin. Le Roy argued that the noosphere was a phase of Earth's evolution, marking the emergence of Homo sapiens. However, Pierre Teilhard de Chardin's views differed from those of Le Roy, as he believed that the emergence of intellect was not a natural process but had a religious origin.

The collaboration between V.I. Vernadsky and P. Teilhard de Chardin, as well as with the philosopher Edouard Le Roy during V.I.Vernadsky's time at the Sorbonne in the 1920s,

is well known. It was under the influence of these scholars that V.I. Vernadsky began to use the term "noosphere."

As mentioned earlier, it was Le Roy who first introduced the concept of the "noosphere" into the scientific world. However, it was the ideas of Pierre Teilhard de Chardin that attracted the most attention in Europe.

The spiritual and religious rationale of the noosphere which PT de Chardin provided in his book “The phenomenon of the Man” [61] in 1959, caused a mixed reaction from leading scientists of his time. In his later works, Pierre Teilhard de Chardin defines the noosphere as the "earthly sphere of thinking substance" and links it to the evolutionary development of humanity.

Despite some differences in their understanding of the noosphere, it is worth noting that there is a strong similarity between the approaches of those three mentioned scientists.

All of them tried to explain the phenomenon of human development on Earth within scientific frameworks, trying to avoid philosophical terminology and worldviews.

In the late 1920s, Le Roy noted a significant discrepancy of the human species between the relatively insignificant biological figure of the evolutionary field of living organisms and the significant human capacity to influence and alter the environment. He suggested that "humanity is systematically far more biologically powerful than it should be." [62]

V.I. Vernadsky and P.T. de Chardin were interested in creating a comprehensive theory of life based on an empirical scientific generalization of facts. V. I. Vernadsky based most of his work on an understanding of biogeochemistry, P. T. de Chardin referred to a paleontological vision.

Therefore, European and Russian scientific views of understanding the concept of noosphere share many similarities. It is also worth noting that the ideas of V.I. Vernadsky did not become popular in the West but was in demand in the Soviet Union.

Noosphere by V. I. Vernadsky

The subject of discourse is the two concepts of the noosphere: by Vernadsky and by P.T. de Chardin's.

Vernadsky's portrayed noosphere as a new state of the biosphere and the natural evolutionary emergence of a new planetary sphere, while de Chardin's defined noosphere as the result of evolution: molecule - cell - organism - social group - planetary consciousness - Omega point.

Both scientists believed that life on Earth can be viewed as a type of “superorganism”, whose development culminated in the formation of reflective consciousness in humans. Both were convinced that science should play a significant role in the construction and development of the noosphere. However, the differences between their concepts began with their views on the biosphere.

If V.I. Vernadsky, for example, visioned an inscrutable division between living and non-living matter, in P.T. Chardin's view that such a clearly defined difference did not exist. P.T. Chardin envisioned the noosphere as a distinct additional layer of cognitive activity generated by processes of consciousness. A new shell alongside the biosphere, which, since its formation in the tertiary period, has spread to the world of plants and animals.

V.I. Vernadsky’s concept of the noosphere differs from the one of P.T. de Chardin’s. The starting point for the Soviet scientist was the assertion that humans were on the verge

[61] Ref.: Teilhard de Chardin P. The Phenomenon of Man. – New York : Harper, 1959.
[62] Le Roy É. Les origines humaines et l'évolution de l'intelligence. – France : Bolvin & cie, 1928.

of becoming a powerful geological force, transforming the entire face of the planet and nature. He cultivates new plants and animals, extracting millions of tons of raw materials from the earth and incorporating them into his life cycle.V.I.Vernadsky views humans as part of the biosphere, where they perform a specific function, namely, the creation and development of the noosphere as the culmination of Earth's development. At the same time, the noosphere is the life space of humans. Despite the absence of a strict scientific definition of the noosphere in Vernadsky's texts, the essence of this concept is clearly discernible.

On a philosophical level, V.I. Vernadsky defines the biosphere as a specific biological form of mass movement, in which billions of tons of substances are transformed. At a certain stage of biosphere evolution, humans endowed with intellect emerge. Living matter forms the biosphere system, while humanity and the natural environment encompass the emergence of the noosphere system.

V.I. Vernadsky introduces several biogeochemical principles.

According to V.I. Vernadsky's first biogeochemical principle, living organisms strive for the maximum transformation of evolutionary, old, and obsolete matter. This can be compared to the principle of the aggression of life or living matter towards the biosphere.

The second biogeochemical principle is related to the direction of evolution. Species with a strong adaptability evolve, meaning that in a given environment the most aggressive species will have a better chance of evolving and surviving. On Earth, humans play the role of such species. The evolutionary factors of survival in this case included the development of the brain and cooperative activity. A similar concept of human evolution would later be developed by the Russian psychologist A.N. Leontiev [63].

V.I. Vernadsky argues that humans evolved through cooperative activity efforts, despite all attempts by the environment (such as climate conditions, scarcity of resources, dangers including those posed by animals and plants) to eliminate humanity. But thanks to brain development and intellectual activity, humans managed to resist the prevailing circumstances.

The idea of the noosphere suggests the integration of humanity through intellect to facilitate successful and effective interaction with the environment.

Those are the fundamentals of the noospheric mindset, which today give rise to numerous civilizational models where human intellect is an essential element. The main feature of noospheric thinking is the belief that consciousness can alter natural processes in a positive, constructive direction. Human intellect is capable of effective interaction and cooperation with nature on a planetary scale.

In the most recent models of civilization, humans are perceived naturalistically, due to natural selection, and are considered to be the advanced animals. Human essence should not contain anything specific and distinct from natural laws. His anatomy and morphology clearly predetermine all his functions. A human can only act as his structure determines. The spiritual element is left out. The highest values (truth, goodness, beauty, justice) are narrowed to plain natural processes. All typically human traits - selfhood, freedom, creativity, higher spiritual potentials - are considered through the lens of the action of biological laws. But at the same time, it turns out that this spiritual element is the guarantor of the stability of the entire biosphere on a planetary scale and a condition for its existence. Human survival is impossible without highest spiritual values. It is in human spirituality that makes it possible to find ways to salvation from the ecological destruction of the planet.

[63] Ref.: Leontyev A. N. et al. Activity. Consciousness. Personality. – M.: Politizdat, 1975..

Spirit ensures the stability of the existence of the matter. The process of building up the model of strategic survival is accompanied by the silent assumption of the existence of higher values in humans. Man is meant to be capable of cooperating, changing his attitude towards nature, being just and kind, etc., as he possesses tremendous spiritual potential. The idea of the genesis of the noosphere arises from the concept of a man as a Demiurge, rather than as a perfected animal. It is based not on a biological belief in his nature, but on his spiritual characteristics. In other words, to create a noosphere-like model that withdraws the world from ecological destruction, it is necessary to abandon the biological image of man and instead to adopt an alternative view that does not derive solely from naturalistic principles.

V. I. Vernadsky apparently sees the primary trend in the development of the noosphere in the optimization of human living conditions. Through comprehensive systematic activity, humanity will attain control over nature, achieve fair wealth distribution, and ultimately develop a harmonized global community. However, one could also argue that this interpretation may not capture all aspects of V.I. Vernadsky's views, and that his concept of the noosphere may have been closer to the ideas of Pierre Teilhard de Chardin than initially apparent.

V.I. Vernadsky compared the significance of the development of the noosphere to major geological events of the past, such as the emergence of calcium-rich organisms and green forests. However, there's a qualitative distinction in the emergence of humans as a distinct species on Earth - the evolution of the human brain, and the resulting evolutionary movement forward of humans as species.

V.I. Vernadsky argued that the collaborative activity of humans has the ability to transform the biosphere, meaning to alter the environment according to its needs. He referred to this human capacity (as species), as "the energy of human culture" or "cultural biogeochemical energy".

V.I. Vernadsky saw a radical transition from the biosphere to the noosphere as only possible with the simultaneous emergence of scientifically grounded reason. The accompanying process of cultivation forms the basis for the transformation of the biosphere into the noosphere and has led to conspicuous changes in the Earth's appearance, such as the disappearance of forests and the emergence of fields for cultivating agricultural crops.

Thus, for V.I. Vernadsky, the noosphere is not just an abstract concept associated with changes in the biosphere. Noosphere is associated with a new evolutionary stage, determined not only by human development but also by various bio- and geochemical interactions occurring over a certain period of time. For example, in 1938, the scientist suggested that the restructuring of the biosphere, linked to human activity by scientific thought, is not a random phenomenon dependent on the will of humanity, but an elementary natural process with deep roots prepared by the evolutionary process over hundreds of millions of years. Based on this, the evolution of the biosphere into the noosphere is not solely linked to human activity. Noosphere provides humans with the opportunity to transform the biogeochemistry of the Earth, develop its potential, and play a leading geological role.

It is likely that V.I. Vernadsky was clearly optimistic about humanity's ability to handle such a complex evolutionary role, while also acknowledging some uncertainty, ambiguity in humanity's stance regarding impending evolutionary changes. V.I. Vernadsky acknowledged that it's difficult to determine the final state of the noosphere, the direction of its movement, whereas the biosphere appears to move along a path favorable for life.

Nevertheless, later works by V.I. Vernadsky are associated with moral excellence and optimism. For example, in a letter not long before his death in 1945, the scientist wrote that humanity can and should reconstruct the realm of its life through its labor and thought, radically transforming it compared to the past. He further concludes that our democratic ideals are balanced with spontaneous geological processes, the laws of nature, and are responsible towards the noosphere. Therefore, we can confidently look towards our future. It's in our hands. We won't miss it.

As a result V.I. Vernadsky's attempts to validate the supposedly inevitable process of transforming the biosphere into the noosphere faced scientific criticism, including in Soviet Russia.

V.I. Vernadsky himself was ambivalent towards the Soviet regime and was more inclined to anti-Bolshevik views.

In the 1920s, the Soviet government showed a keen interest in V.I. Vernadsky, both as a scientist and for his scientific views. His materialistic ideas were closely aligned and entirely compatible with Marxist philosophy.

In many respects, the works of Vladimir Vernadsky had common views with such Russian scientists as the positivist philosopher A.A. Bogdanov (Tektology), K.E. Tsiolkovsky's (Cosmic Philosophy), and A.L. Chizhevsky's (Critical Realism). It is likely that N.I. Bukharin, in his attempts to develop practical materialism for I.V. Stalin was significantly influenced by Vernadsky’s research on the biosphere, particularly regarding the interconnectedness of living matter with the environment and human’s role within it.

V.I. Vernadsky died in 1945, but his ideas continued to motivate and inspire Soviet scientists. In the 1950s and 1960s, his works on the biosphere were utilized to address environmental issues. However, as noted by scientists, V.I. Vernadsky's ideas about the biosphere were often used selectively to fit a particular viewpoint. The same fate befell V.I. Vernadsky's ideas about the noosphere.

The concept of the noosphere continues to actively evolve in the post-Soviet period, especially as new pathways for Russia's development are sought. Researchers are once again turning to V.I. Vernadsky's scientific ideas.

Noosphere today

In this section, we revisit the modern utilization by the Russian government of Vernadsky's concept of the noosphere as an emergent property marking the final stage of Russia's transition towards sustainable economic, political, and social development. Since V.I. Vernadsky and the concept of the noosphere were first mentioned in the presidential decree of 1996, subsequent policy statements mainly just repeat each other.

It is worth noting two of the most important documents that mention the research of V.I. Vernadsky: the project of the State Strategy for Sustainable Development of the Russian Federation in 1998 and the preliminary agreement on sustainable development, prepared for the Johannesburg World Summit in 2002, relating to the scientific basis of the sustainable development strategy.

These documents begin with examining the historical development of society in relation to the biosphere, noting a trend towards increased ecological decay over the past century. Meanwhile, sustainable development itself is viewed as a necessary forward movement within an evolutionary perspective. It should be noted that evolutionary changes still have a directive, proclamatory nature and are not based on any scientific evidence. The final stage of societal evolutionary change is associated with a shift in the value structure of Russian society, characterized by a transition from a society based on material values to one based on spiritual and moral values.

It is important to note that this final shift precisely corresponds with the noospheric orientation of social development. Thus, one could argue that there is a certain equivalence between the final stage of moving towards sustainable development and the emergence of the noosphere or the “sphere of mind”.

Indeed, in the mentioned documents, it is assumed that the noosphere is the final stage of sustainable development, the desired future state of society that will ensure ecological interaction and convergence between human race and the surrounding world.

Modern politicians actively utilize the idea of sustainable development in their rhetoric, discussing topics such as social, economic, and political development, interaction with the environment, and the integration of new technologies into the world around us. However, as mentioned above, these ideas do not have the foundational, revolutionary, and materialistic views of V.I. Vernadsky based on the biosphere-noosphere concept of the Earth.

Secondly, these two concepts differ in their scientific and conceptual frameworks. V.I. Vernadsky does not use the concept of "balance" in his research as equilibrium between nature and society. There is no mention of possible balance in his concept. Meanwhile, in the concepts of sustainable development, the notions of "balance" or "equilibrium" are almost fundamental.

However, the notion of a “harmonic balance”, which permeates much of the contemporary literature on the environment, does not correspond to the actual functioning of global ecological systems.

It is also impossible to equate the occurrence of noosphere and achieving a balance between society and nature. Despite VI Vernadsky's optimism and faith in human development, his concept does not indicate mandatory achievement of harmonious coexistence of man and the environment.

The scientist believes that the noosphere is a qualitatively new state of the biosphere, in which humanity plays a primary geological role. However, he does not specify what role exactly humans, as a species, fulfill, meaning that a balanced state is not obligatory.

Thirdly, according to V.I. Vernadsky, the noosphere is not something that should be initiated, created, or introduced by deliberate human action. On the contrary, more precisely, it is an emergent property of the evolutionary process of living matter and, as such, entirely independent of human will.

At the same time, achieving sustainable development is entirely dependent on human actions. The main guiding role in this concept is indeed assigned to humans. Human actions determine whether balanced and harmonious coexistence with nature is achieved or not.

Therefore, it seems inaccurate to equate these concepts. The emergence of a noospheric state does not necessarily lead to the attainment of sustainable development.

In this case, it might be more logical to try to comprehend Russia's gradual transition to sustainable development, taking as a basis, the development of intellectual, spiritual and moral quality of people. And this is precisely where the concept of the V.I. Vernadsky, and his thesis that humanity actively influences, the state of the biosphere could be particularly beneficial.

Vernadsky's biosphere-noosphere concept provides an opportunity to view contemporary issues from a different perspective. For example, human impact on the environment doesn't just begin in the industrial period; it has a rather long history. Geologists also acknowledge the impact of humans on Earth's geological processes. The concept of the noosphere enables us to describe the increasing level of

interconnectedness in the modern world due to the significant rise in communication technologies.

One can also consider references to the concept of the noosphere in relation to achieving the presumed balance between the environment and humanity. This aspect was specifically used as scientific validation in Russian political documents concerning sustainable development.

Currently, the noosphere is viewed more as a utopia, characterized by the harmony between nature and society, which, in turn, contradicts V.I. Vernadsky's scientific concept.

At the same time, the introduction highlighted that V.I. Vernadsky's concept enables the development of ecological approaches in Russia's development. V.I. Vernadsky's research on evolutionary changes over geological time provides insight into humanity's potential to transform the environment. It should be noted that V.I. Vernadsky's evolutionary structure of the noosphere recognizes the ambiguous nature of human activity, which in turn, may lead to significant adverse consequences. At the same time, V.I. Vernadsky's later works were generally optimistic in their belief that humanity would effectively respond to the potentials revealed by the formation of the noosphere.

The section structure is shown on the following block diagram, Picture 1.3.

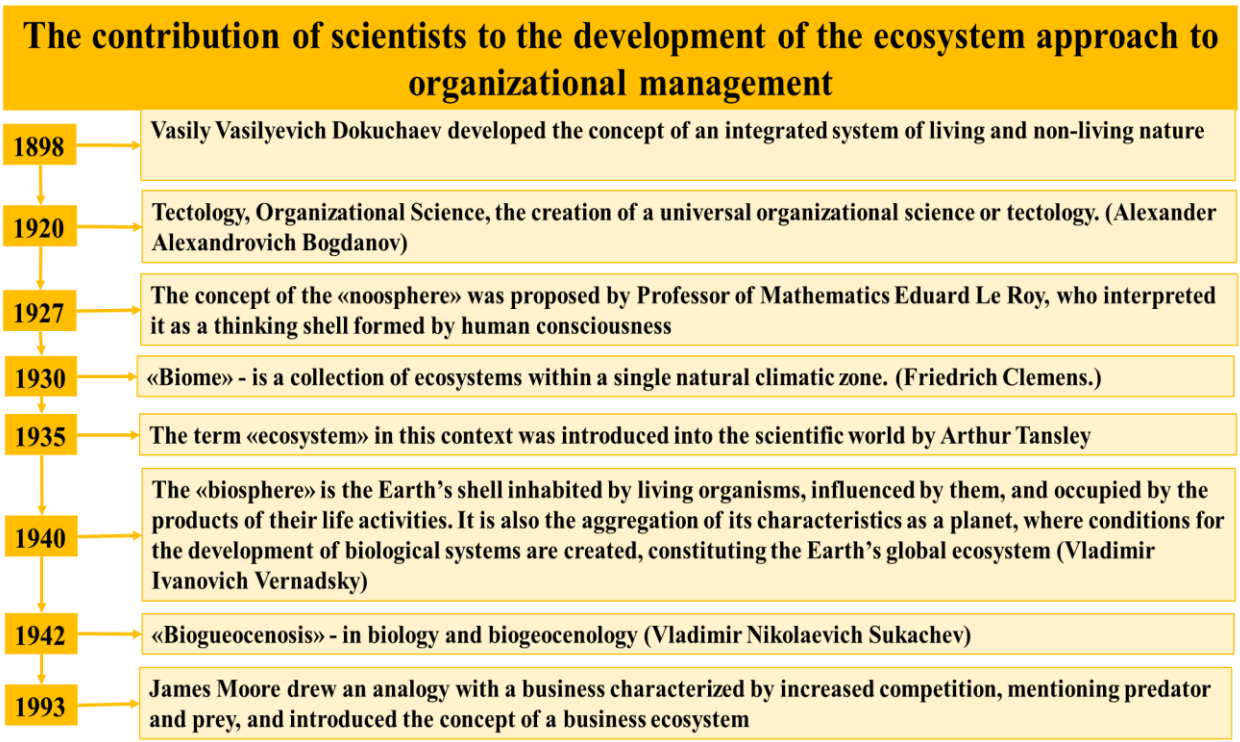

Figure 1.3. Visualization diagram of the section "Contribution of domestic scientists in the development of an international ecosystem approach to the management of organizations"

V.I. Vernadsky's approach to the increasing activity of humanity towards the environment contrasts with some contemporary, ecological interpretations of the interaction between humans and nature. In these concepts, the main idea is to limit human activity towards the environment. Humanity is only associated with a negative impact on the planet, and its interaction is assumed to change from active to passive. The metaphorical image of humans as "lightly, scarcely touching the Earth". A scientist would hardly agree with such a statement.

V.I. Vernadsky's ideas are relevant not only from the perspective of biogeochemistry but also to philosophy, economics, and social sciences. V.I. Vernadsky's concept of the biosphere and the noosphere allows for a new level of understanding of the dynamic relationships between society and nature.

Control questions:

1. What does the term "ecosystem" mean?
2. Who proposed the term "ecosystem"?
3. Who owns the scientific definition “ecosystems are the basic natural units on the earth's surface”?
4. What is the difference between an ecosystem and a natural ecosystem?
5. What is the main condition for the existence of ecosystems?

Practical immersion material:

1. Who first introduced the term "ecosystem"?
a) V. Sukachev;
b) A. Tansley;
c) V.I. Vernadsky.

2. Which ecosystem is the most stable?
a) biosphere;
b) noosphere;
c) biomes.

3. What is included in an ecosystem?
a) biotope;
b) biome;
c) biocenosis.

4. Who first introduced the term "noosphere" in 1927?
a) A. Tansley;
b) Eduard Le Roy;
c) V. Vernadsky.

5. Biogeocenosis is:
a) A system that includes a community of living organisms and a closely related number of abiotic environmental factors within one territory interconnected by the cycle of substances, and the flow of energy;
b) a collection of ecosystems within a single natural climatic zone;
c) the Earth’s shell, inhabited by living organisms, influenced by them, and occupied by the products of their life activities. It is also the collection of its characteristics as a planet, where conditions for the development of biological systems are created.

1.3. Evolution of business models

Introduction

As of now, the term "business model" has become widely used in academic literature and business publications.

Quite often the concept of a "business model" is associated with one of the approaches - the concept of A. Osterwalder, which links a company's business processes with its strategy. The author views the business model as a convenient tool for both managers and entrepreneurs. The popularity of this concept in the modern business world allows the author to present his vision of the model not only as a scientific concept but also as a marketable software product (Fig. 1.4).

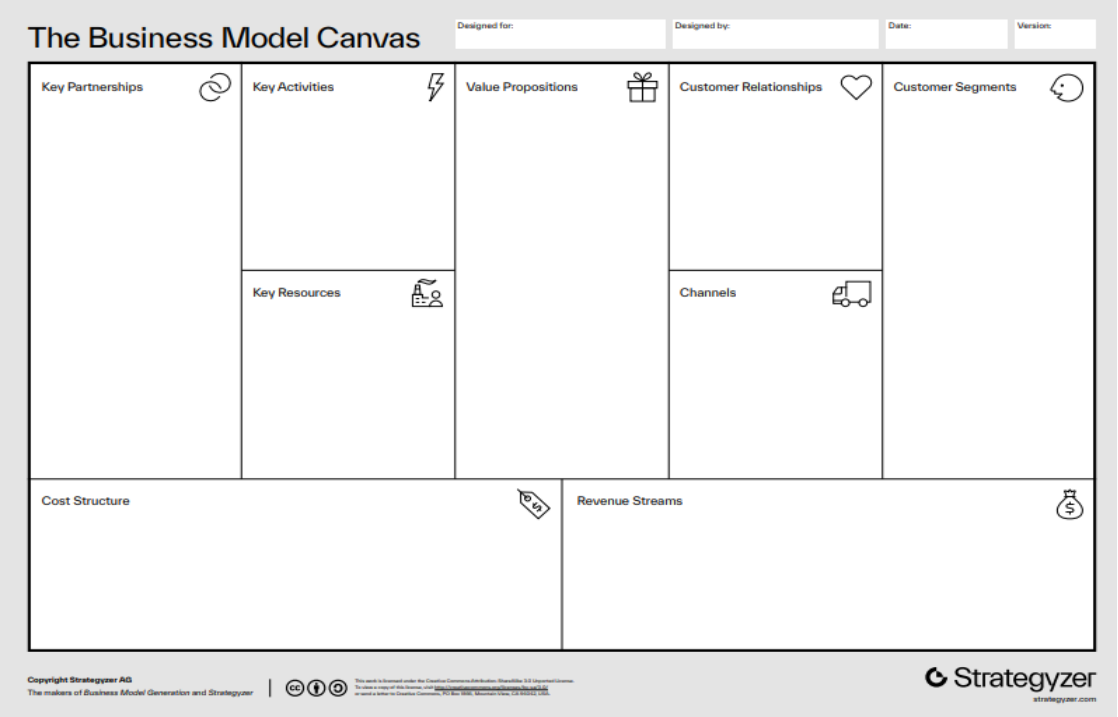

Figure. 1.4. Business Model Canvas [64]

The existing variety of views on the concept of "business model" allows foreign and domestic scholars to provide various definitions of their own. For example, a business model can be represented by a variety of company processes, linked to innovations, or a management tool for business. According to A. Osterwalder and Pigneur, a business model is a concept, a template for transforming of the strategic objectives into specific goals; it is a model of how a business operates [65].

Additionally, researchers occasionally engage in discussions regarding the possibility of turning the term "business model" into a specific existing area, for example, such as the strategy of a commercial organization. In this connection, there arises a natural question about the identity of these concepts. Most researchers insist that these categories share common features but exist separately from each other.

[64] Ref.: URL: http://alexosterwalder.com/ (ref date: 2 October 2023 r.).

[65] Ref.: Osterwalder A., Pigneur Y. An eBusiness Model Ontology for Modeling eBusiness. – Université de Lausanne Switzerland, 2002.

Based on various scientific opinions with notes that the methods for determining the concept of "business model" vary. The definitions are so ambiguous that they range from conceptualizing this concept as a strategy to a full-fledged organizational theory.

The development of the management science

The global changes occurring in the economy of the XX and XXI centuries inevitably influence and continue to influence management theory, as a science of managing the production of goods and services, or, in modern scientific language, managing value creation. It also involves optimizing resource utilization to attain predetermined objectives.

We'll outline the primary approaches that management theory has reached by the beginning of the third decade of the 21st century, as a result of the evolution of various scientific schools accompanying the development of the economy over the past century and a half.

Characterizing the period of scientific management in the first half of the XX century, L Koskela notes that during that time, management was almost a technical discipline focused on rational factory management for goods production. Within this theory, three important concepts were developed, wherein production was viewed as "transformation", as "flow", and as a "value creation chain" [66]. It's worth noting that this was the era of mass serial production of new and diverse consumer goods, such as automobiles, telephones, washing machines, dishwashers, air conditioners, televisions, and so forth. The main task was cost minimization, as price competition played a crucial role in the then-unsaturated market.

By the end of the 20th century, modern management approaches had emerged, drawing on Oliver Williamson's [67] concept of transaction costs, which complemented the work of Ronald Coase, focused on the nature of commercial organizations [68]. Additionally, there was the process approach, established as a tool for quality management (ISO 9000) [69], and Michael Porter's [70] idea of value chain creation.

M. Kotamäki and others understand management as the process of creating value for the consumer. Researchers believe that there are four theories of commercial organization. It is considered as an industrial organization; as a resource-based approach; as organizational identity; and as a transaction cost-based approach [71]. Thus, as customer needs grow, the concept of effective management in value creation emerges.

The era of increased competition at the beginning of the XXI century and the increased speed of global change described in the concept of the fourth industrial revolution [72] or industry 4.0 created the need to develop flexible business models for the steady development of innovative products.

Speaking about management theory, it can also be noted that in the 21st-century views on management are changing. Thus the concept of business ecosystem, the concept of "orchestrator" (kind of "first among equals" amongst employees of the commercial

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[66] Koskela L. Why is Management Research Irrelevant? // Construction Management and Economics. – 2017. – No. 1-2. – P. 4–23.

[67] Ref.: Oliver Williamson Economic institutions of capitalism: firms, markets, "relational" contracting. – St. Petersburg: Lenizdat, 1996.

[68] Ref.: Ronald Coase. Nature of the Firm. – M. : Delo, 2001.

[69] Ref.: GOST R ISO Quality management systems. Fundamentals and Vocabulary (ISO 9000:2015, IDT). – M.: Standartinform, 2015.

[70] Ref.: Michael Porter Competitive advantage: how to achieve high results and ensure its sustainability. – M.: Alpina Publisher, 2016.

[71] Ref.: Kohtamäki M. Digital Servitization Business Models in Ecosystems: A Theory of the Firm // Journal of Business Research. – 2019. – No. 5. – P. 380–392.

[72] Ref.: Shwab K. Fourth Industrial Revolution. – Litres, 2021.

organization) appears, facilitating the creation of value and determining the rules and parameters of profit taking.

The time business model began to spread in the era of the rapid development of the IT industry on the eve of the millennium (dot com boom). Currently the concept of "business model" is widely used. Together with the approaches described above, which fully form the basis of modern management theory, it is also considered as a comprehensive approach to describing the commercial activities of an organization. In this case we can say that all activities related to managing a commercial organization are characterized by the concept of a "business model."

The term itself has multiple interpretations, as mentioned earlier, but most researchers agree with the scientific views of J. Richardson proposed in 2008. A business model implies "three main components of the scheme: value proposition, value creation and delivery system, and revenue generation." All these components together reflect the logic of strategic thinking about value [73] . The essence of a commercial organization's strategy is to "create higher value for customers and capture more of that value than competitors."

It is evident that the term "business model" is the most appropriate concept for describing the activity of creating value for customers and the most adequate means of describing business and, consequently, management.

Therefore, our study is dedicated, firstly, to providing evidence that the concept of "business models" can become a fundamental concept in management, and secondly, to exploring the prospective directions of created business models.

Business model definitions

The researcher D. Teece, who is the most cited in the management literature, points out that "there are almost as many definitions of business models as there are business models themselves." [74]

In this study, we will touch upon several definitions. For example, O. Feldstad et al. in their work "Business Models and Organizational Design" identify not three, but five elements that make up a business model: customers, value propositions, product/service offerings, mechanisms for creating value, and revenue mechanisms [75]. However, these authors, like others, tend to interpret the concept put forth by J. Richardson in a slightly expanded manner, generally confirming the overall approach.

It is also obvious that the main components of the concept of "business model" make it possible to characterize this concept as the most general, which describes all four management models: the activities of individual commercial organizations, supply chains, business ecosystems, and "assembly production" based on procurement in the open market.

We incline to the approach of T. Ritter and colleagues, who came to a conclusion that studying business models is not necessarily "a theory in itself"; it is important to understand what theoretical mechanism each one emphasizes. "The business model, as both a concept and the associated construct, in the research by A. Ghaziz and colleagues [76], largely refers to the architecture of business value. This involves how a commercial

[73] Ref.: Richardson J. E. The Business Model: an Integrative Framework for Strategy Execution // Strategic Change. – 2008. – No. 17 (5–6). – P. 133–144.

[74] Ref.: Teece D. J. Business Models and Dynamic Capabilities // Long Range Planning. – 2018. – No. 1. – P. 40–49.

[75] Ref.: Fjeldstad Ø. D., Snow C. C. Business Models and Organization Design // Long Range Planning. – 2018. – No. 1. – P. 32–39.

[76] Ghezzi A., Cavallo A. Agile Business Model Innovation in Digital Entrepreneurship: Lean Startup Approaches // Journal of Business Research. – 2020. – No. 3. – P. 519–537.

organization creates value, delivers this value to its customers, and encourages them to pay, ultimately converting these payments into profit." [77]

Business model is an indicator of a company's performance

During the process of its operational activity, a commercial organization determines the following: the types of activities it will undertake, the timelines for these activities, responsible performers, resource sources, and the organization's own capabilities. The result of such actions is the creation of value.

Within this approach, the sources of creating fixed value include efficiency, complementarity, the need for interaction, supply chains, and product novelty.

However, the business model is not only related to creating fixed value for the company but also to innovation and intellectual property. With the advent of electronic markets, business models incorporating elements of novelty have become more successful as organizations enhance their competitive strength through innovation. For instance, twenty-six companies on the Fortune list have achieved significant success by innovatively transforming existing business models or creating entirely new ones.

Additionally, successful implementation of a business model may be associated not only with innovation but also with establishing a correlation between the choice of the business model and the creation of competitive advantages. A number of researchers have identified a quantitative relationship between a company's business model and its competitiveness, based on economic indicators. When choosing a particular business model for a commercial organization, it is important to focus on specific economic indicators, such as customer service or the adoption of new technologies, while maintaining the existing business organization. Subsequently, the growth or decline rates of the company's profitability and other economic indicators are evaluated when choosing a particular focus. Companies that mainly focused on innovation and mass production have demonstrated higher than average value and profitability growth. This emphasizes considering the business model as an attribute of the commercial organization.

When examining the characteristics of business model activity in a commercial organization, special attention in scientific literature has been devoted to the competition between two simultaneously existing business models.

For example, many companies react to the emergence of a new different approach of doing business by incorporating a new business model into the existing one, rather than fundamentally altering the outdated business practices.

Such actions lead to a number of strategic problems and issues as managing two parallel business models will inevitably lead to conflicts.

One model often contradicts the other. Various problems can arise, but the most obvious one is the risk of damaging the already existing and functioning business model. Such an example can be trading companies which lost most of their distributors in an attempt to organize online trading. To avoid these contradictions, researchers have proposed four possible strategies: division, integration, phased division, and phased integration.

ESG business models

The logic of global economic development has led to ESG factors – Environmental, Social, and Corporate Governance – becoming dominant in determining companies' prospects. Let's not delve into the detailed definition of ESG criteria as it is not the subject

[77] Ritter T., Lettl C. The Wider Implications of Business Model Research // Long Range Planning. – 2018. – No. 1. – P. 1–8.

of our study, but let's consider how ESG is related to the concept of business models. In this section, we provide the full titles of the articles, as they largely define and explain the research issues.

In the article 'Business Models and Supply Chains for the Circular Economy' by M. Geisendorfer et al., the authors discuss indicators of resilience of circular business models and supply chains, crucial for implementing the concept of a circular economy at the organizational level. The structure of integrating circular business models and managing circular supply chains for sustainable development is also being discussed. The research shows that self contained business and supply chains help to achieve sustainable development [78] . So, we see that there is scientific and practical examination of business models that correspond to sustainability criteria.

The study by M. Pieroni et al. titled "Innovative Business Model for Circular Economy and Sustainable Development: Review of Approaches" provides a systematic review of academic literature and methodologies, based on practical insights, demonstrating approaches to innovative business models for a circular economy and/or sustainable development." [79]

The research by M. Pieroni et al. "Innovative Business Model for Circular Economy and Sustainable Development: Review of Approaches" provides a systematic review of academic literature and methodologies based on practices, also demonstrating approaches to innovative business models for a circular economy and/or sustainable development.

The study by D. Nascimento et al. "Exploring Industry 4.0 Technologies for Implementing Circular Economy Methods in a Manufacturing Context: Proposal for a Business Model" examines the integration of Industry 4.0 development technologies with circular economy methods to create a business model capable of reusing and recycling waste, such as metal scrap or electronic waste.

The results indicate a positive impact of increasing business resilience through the reintroduction of waste into the supply chain for production of goods[80].

K. Manninen et al. in the article "Do Business Models of Circular Economy Reflect Assumed Ecological Value Propositions?" focused on the ecological benefits of circular economy business models. The biggest challenges in implementing these business models were related to assessing the environmental benefits derived from ecological value propositions at a systemic level [81].

C. Jabbour et al. in the publication "Opening the Circular Economy through New Data-Driven Business Models: Integrative Structure and Research Program" provide reasoning for the necessity of integrating the circular economy and leveraging big data [82].

E. Pedersen et al. explore the relationships between innovative business models, corporate sustainability, and essential organizational values in the article "Exploring the

[78] Ref.: Geissdoerfer M., Vladimirova D., Evans S. Sustainable Business Model Innovation: A Review // Journal of Cleaner Production. – 2018. – No. 198. – P. 401–416.

[79] Ref.: Pieroni M. P. P., McAloone T. C., Pigosso D. C. A. Business Model Innovation for Circular Economy and Sustainability: A Review of Approaches // Journal of Cleaner Production. – 2019. – No. 215. – P. 198–216.

[80] Ref.: Nascimento D. L. M. Exploring Industry 4.0 Technologies to Enable Circular Economy Practices in a Manufacturing Context: A Business Model Proposal // Journal of Manufacturing Technology Management. – 2019. – No. 30 (3). – P. 607–627.

[81] Ref.: Manninen K. Do Circular Economy Business Models Capture Intended Environmental Value Propositions? // Journal of Cleaner Production. – 2017. – No. 10. – P. 413–422.

[82] Ref.: Jabbour C. J. C. Unlocking the Circular Economy through New Business Models Based on Large Scale Data: an Integrative Framework and Research Agenda // Technological Forecasting and Social Change. – 2019. – Vol. 144. – P. 546–552.

Interplay between Innovative Business Model, Corporate Sustainability, and Organizational Values in the Fashion Industry."

They come to a conclusion that companies with innovative business models are more likely to address corporate sustainability issues and that innovative business models and corporate sustainability are often found in organizations based on values of flexibility and discretion. Additionally, the research also identifies a positive correlation between fundamental organizational values and financial indicators [83] (Pedersen, Gwozdz, Hvass, 2018).

More detailed analysis of innovative business models will be discussed in the following section; however, here we acknowledge their inseparable connection with ESG approaches.

G. Hayes et al. in the article "Developing and Implementing Circular Economy Business Models in Customer-Centric Technology Companies" note that the service sector can play a significant role in transitioning to a circular economy due to its strategic position between producers and end-users. However, the authors note a shortage of supporting methodologies and practical applications demonstrating how customer-focused companies can integrate circular economy principles into their everyday business practices [84].

A. Ip and N. Boken in the article "Patterns of Sustainable Business Models for the Banking Industry" note that innovations in sustainable business models are increasingly viewed as levers for systemic changes to ensure the stability of enterprises and industries [85].

M. Franceselli et al. explore how a food industry startup can develop an innovative business model, taking into account the importance of social and environmental issues, in the article "Innovative Business Model for Sustainable Development: A Thematic Study of a Food Startup." The conclusion emphasizes that in the food industry, especially for startups, the development of sustainable innovative business models is particularly crucial because the industry itself is inherently linked to nature and humanity [86] .

Innovative business models (BMI) and prospects for management theory

As can already be seen from the previous section, innovation has become one of the most important areas in the field of business model (BM) research. Let us take a closer look at the most cited articles dedicated to innovative business models (BMI), or as often referred to in Russian literature, innovations in the field of business models. In our sample, they rank second in citation frequency.

At the beginning of our review, we should take the note of the words of the senior partner of the largest American management consulting firm BCG, N. Kahaner, who stated that over the past 50 years, the average "lifespan" of a business model has decreased from about fifteen to less than five years. Nowadays, the ability to develop an innovative business model has become a vital skill for organizations striving for rapid, exponential growth, overcoming weaknesses in their core business, or protecting themselves from negative changes or downturns in their industry.

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[83] Ref.: Pedersen E. R. G., Gwozdz W., Hvass K. K. Exploring the Relationship Between Business Model Innovation, Corporate Sustainability, and Organizational Values within the Fashion Industry // Journal of Business Ethics. – 2018. – No. 2. – P. 267–284.

[84] Ref.: Heyes G. Developing and Implementing Circular Economy Business Models in Service oriented Technology Companies // Journal of Cleaner Production. – 2018. – Vol. 177. – P. 621–632.

[85] Ref.: Yip A. W. H., Bocken N. M. P. Sustainable Business Model Archetypes for the Banking Industry. – DOI:10.1016/j.jclepro.2017.10.190

[86] Ref.: Franceschelli M. V., Santoro G., Candelo E. Business Model Innovation for Sustainability: a Food Startup Case Study. – URL: https://dx.doi.org/10.1108/BFJ-01-2018-0049

According to BCG experts, an innovative business model enables the accumulation of advantages and the creation of value through simultaneous and complementary changes in both the value proposition for customers and the organization's operational model. At the level of offering value to customers, changes may involve targeting specific segments, offering goods or services, and revenue model. On the operational model level, the focus is on creating value, increasing profitability, and achieving competitive advantage.

N. Foss and T. Saebi in the article "Business Models and Innovative Business Models: Between wicked and Paradigmatic Issues," observe that despite decades of research on innovative models, there is a tendency to borrow ideas from neighboring fields rather than develop a generalizing theory. The authors argue that the lack of cumulativeness is associated with a lack of clarity in theory construction due to the absence of a clear definition of the concept of "innovative business model." In turn, the absence of a clear definition of this concept prevents the development of a theory based on hypothesis and subsequent empirical testing. At the same time, the authors argue that BM and BMI frameworks primarily concern the mechanisms of creating, delivering, and generating revenue for commercial organizations [87].

At the same time, the key aspect of BM is the complementarity of actions underlying these mechanisms, whereas BMI refers to the newly emerged changes in these complementary relationships and such a conception not only integrates various scientific contributions but also fosters new insights.

Research conducted by I. Rachinger et al. studies the phenomenon of digitization and its influence on business model innovations. They discovered that digitization has affected various areas of activity, such as altering company business models, adding new forms of cooperation between the companies, and led to introduction of new products and services as well as new forms of company relationships with clients and employees.

At the same time, digitalisation is forcing companies to review their current strategy and systematically explore new business opportunities. The research findings indicate that the nature of the value proposition and the role in value creation within the network determine the potential options for innovative business models when utilizing digital technologies. Additionally, organizational capabilities and employee competencies have been identified as future challenges that both business model (BM) and business model innovation (BMI) directions will encounter [88] .

M. Anwar, in his article “Innovative Business Model and Small and Medium-Sized Business Efficiency – Does Competitive Advantage Mediate?” observes that in the era of globalization and dynamic market conditions, commercial organizations seek competitive advantage that will foster further development by utilizing various sources and resources. He also notes that previous research has shown that an innovative business model is a key factor for the survival and high performance of commercial organizations, especially in growing industries. The research results indicate that BMI has a significant positive impact on the competitive advantage and performance of small and medium-sized businesses (Anwar, 2018).

Conclusion

Analysis of the most cited publications reveals that the current impact of external socio-economic systems on the evolution of management theory is evident in the

[87] Ref.: Foss N. J., Saebi T. Business Models and Business Model Innovation: Between Wicked and Paradigmatic Problems // Long Range Planning. – 2018. – No. 1. – P. 9–21.

[88] Ref.: Rachinger M. Digitalization and its Influence on Business Model Innovation. – DOI:10.1108/JMTM-01-2018-0020

prioritization of "green" elements within company operations, which span across all dimensions and phases of ESG (Environmental, Social, and Governance). In other words, all business processes that form the value creation chain for an individual commercial organization must meet the criteria of ecological sustainability, social responsibility, and be based on corresponding corporate practices.

However, management still faces the challenges of minimizing costs in production and delivery of goods and services to consumers, developing and implementing innovations, as well as monetizing profits.

To tackle these challenges, which evidently complicate business operations in the midst of increasing competition, the solution lies in the development and application of innovative business models. This entails conceptualizing and implementing fresh business models aimed at sustainable growth, utilizing a variety of digital and financial technologies, platforms, and others. This could involve developing entirely new business models, diversifying supplementary business models, acquiring new business models, and transitioning from one business model to another. Such constant transformation of business models will undoubtedly impact the entire business process, making it highly effective in new economic conditions.

The section structure is shown in the resulting block diagram (Figure 1.5.)

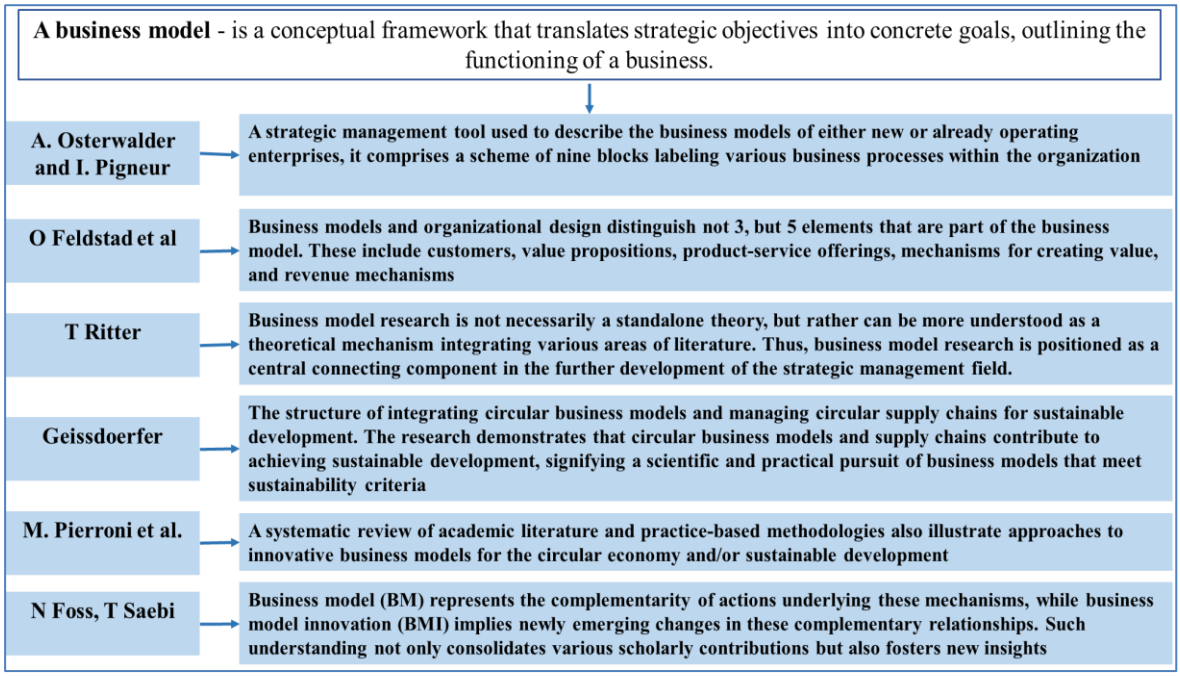


Figure 1.5. Visualization scheme of the section "Evolution of Business Models".

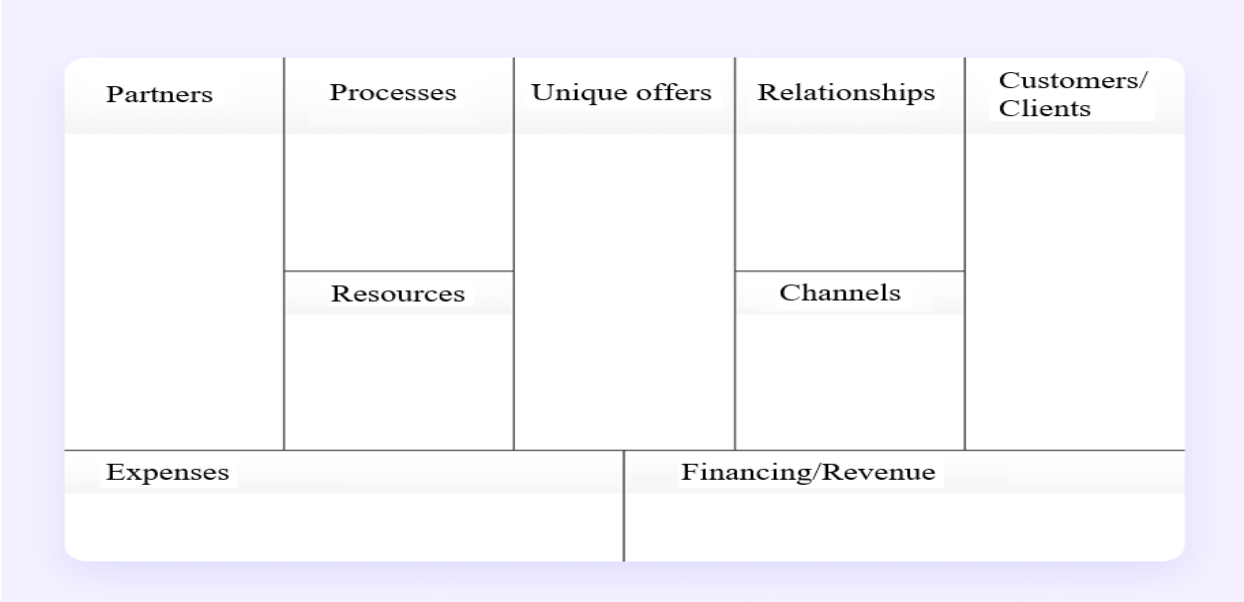
Control questions:

1. What is a business plan and why is it important? How to draft it?
2. What does a business plan cover?
3. The Osterwalder business plan and its application.
4. Innovative business models (BMI) and prospects of management theory.
5. ESG business models.

Practical immersion material:

Fill in the table template and describe the processes in the following order:

1	Customer Segments (Target Audience)	Defining specific groups of customers who are potentially interested in your product or service
2	Value offers for the target audience	Describing the specific benefits or values that your product or service offers to the target audience.
3	Channels for interacting with customers	Identifying the ways you will reach and interact with your customers - through the internet, retail outlets, direct sales, etc..
4	Methods of establishing and maintaining relationships with customer segments	Describing the methods you will use to maintain communication and strengthen relationships with your customers
5	Identification of partners and ways of interacting with them	Identifying key partners and determining how you will collaborate with them to ensure the success of your business
6	Sources of income	Describing the ways your business will generate income - product sales, subscriptions, advertising, etc..
7	Cost structure - expenses that need to be covered to avoid negative balance	Identifying all expenses associated with launching and maintaining your business, including salaries, rent, marketing, production, etc..
8	Key resources	Identifying the main resources needed for the successful operation of your business - technology, personnel, materials, infrastructure, etc...



1.4. Objectification of the business ecosystem as a subject of the market economy

The history of business is a narrative of the evolution of its organizational forms and innovative practices. Since the creation of commercial transactions, entrepreneurs have been in constant search of the most effective means of cooperation. Initially, efficiency came from the relationship between the organization and its external environment, focusing on reducing production costs. However, as innovation in production processes advanced, the key competitive advantages of management shifted towards technological advancements in production. By the mid-20th century, markets were being taken over through mergers and acquisitions of organizations. During transitional periods of economic development, especially when new technological paradigms were forming, significant increases in turbulence and instability in the external environment emphasized the importance of organizational adaptability in achieving and maintaining competitiveness (see Figure 1.6).

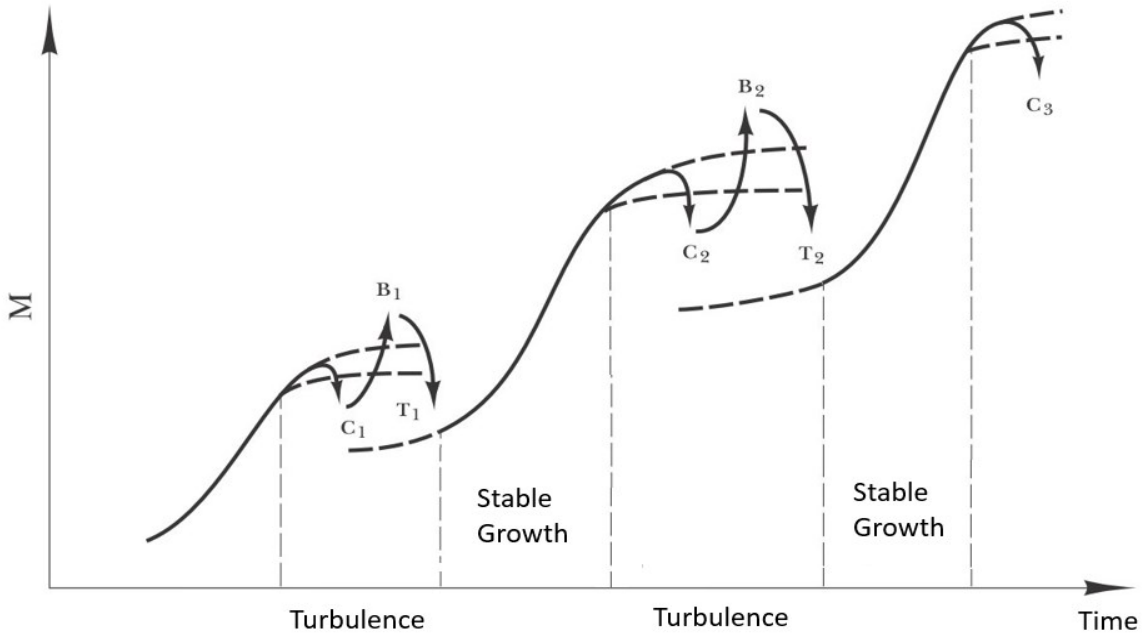


Figure 1.6. Mensch's Technological stalemate

During each industrial revolution, new technologies emerge, leading to tremendous growth in labor productivity. But the transition to the next industrial revolution is only possible with developing and scaling of the new form of organization of processes. At the same time, according to P.G. Shchedrovitsky, experimental methods reveal **organizational forms that contribute to the accumulation, simplification, and dissemination of new knowledge** related to the use of new technologies.

Once an effective form is discovered, it becomes a **building block** of the industrial revolution and is replicated extensively, similar to cells multiplying through division.

Currently, a process of digital transformation is taking place worldwide, with varying degrees of intensity, prompting a reassessment of core existential values. This process is reflected, in particular, in the development of the sharing economy, the adoption of conscious consumption principles, the rise of remote work, virtual communications, decreasing print volumes, and other related trends. The establishment

of a new technological paradigm entails a fundamental transformation of the division of labor system, both horizontally through intellectualization, robotization, and digitization of business processes, and vertically with the advent of new types of activities, leading to the complexity of functions and the structure of managing societal processes (P.G. Shchedrovitsky[89], D.N. Peskov, P.O. Luksha[90]). This transformation covers the three levels identified by Max Weber in the early XX century: the social, technological, and economic, along with the corresponding institutions of society [91]. The complexity of knowledge systems and the methods of their transmission has given rise to new concepts that have entered academic and business communities, such as inter-, multi-, supra-, and transdisciplinarity, technological platforms, and cross-technologies. These concepts are also associated with new forms of organizing processes.

For example, the territorial cluster became a building block of the zeroth industrial revolution in the XVI century, in the Netherlands according to P.G. Shchedrovitsky. The guilds of craftsmen in cities and workshop organizations acted as a barrier to technological progress; they were interested in maintaining the status quo. A new organization emerged "from scratch," or rather, in rural areas where there were no guild restrictions. As an example, P.G. Shchedrovitsky examined the cluster around the city of Zaandam, where shipbuilding was relocated from Amsterdam – land and labor were cheaper there.

The shipyards produced 100–400 ships per year. Due to the vast amount of timber needed for shipbuilding, a large number of sawmills were established nearby on a compact territory of 3 by 3 km. Thanks to the concentration of homogeneous production, there was an active exchange of information in pubs, cooperation contributed to the development of production, and exchange of new technical solutions took place. In the mid-XVIII century, the area accounted for 56% of all sawmills in the Netherlands.

The building block of the first industrial revolution was the factory. The most popular example is associated with Richard Arkwright's factory. Before the advent of the factory method of producing cotton fabrics, there existed the method of territorial clusters, where entrepreneurs combined the labor of home weavers. Arkwright built his factory on vacant land, rather than near existing weaving villages, so a factory village had to be built nearby for the workers. The production expanded widely as Arkwright sold licenses and engaged as a shareholder: the first factory was established in 1772, by 1780 there were already 15, and by 1788 - 143. Additionally, the sizes of the factories increased.

Building block of the second industrial revolution was the international transnational corporation which started from Henry Ford, whose corporation in 1920 included 80 diverse factories. Henry Ford explained it as follows: "If people who sell us goods won't agree to produce them at the prices we consider fair based on the information that we have, we start making those goods ourselves." Thus, the entire supply chain was encircled.

Ford operated in this manner to achieve his ultimate aim **for the consumer**: a cheap mass-produced car. However, the **principal knowledge accumulated by the corporation** is not about organizing the production process, but about the **customer knowledge** (see Figure 1.7).

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[89] Ref.: P.G. Shchedrovitsky Challenges of the III industrial revolution to engineering universities.– URL: www.gubkin.ru/departaments/educational_activities/advanced_training/retaining_effective_teachers/Shablon/Shchedrovitsky%20P.%20G.%20Lecture%2030.05.2016.pdf

[90] Ref.: D.N. Peskov, P.O. Luksha Report on the global agenda for the future of education: if change cannot be avoided, it must be led. – URL: www.asi.ru/news/25293/

[91] Ref.: Max Weber - Economy and Society: Essays on Understanding Sociology. – M.: Publishing house. house of the Higher School of Economics, 2016.

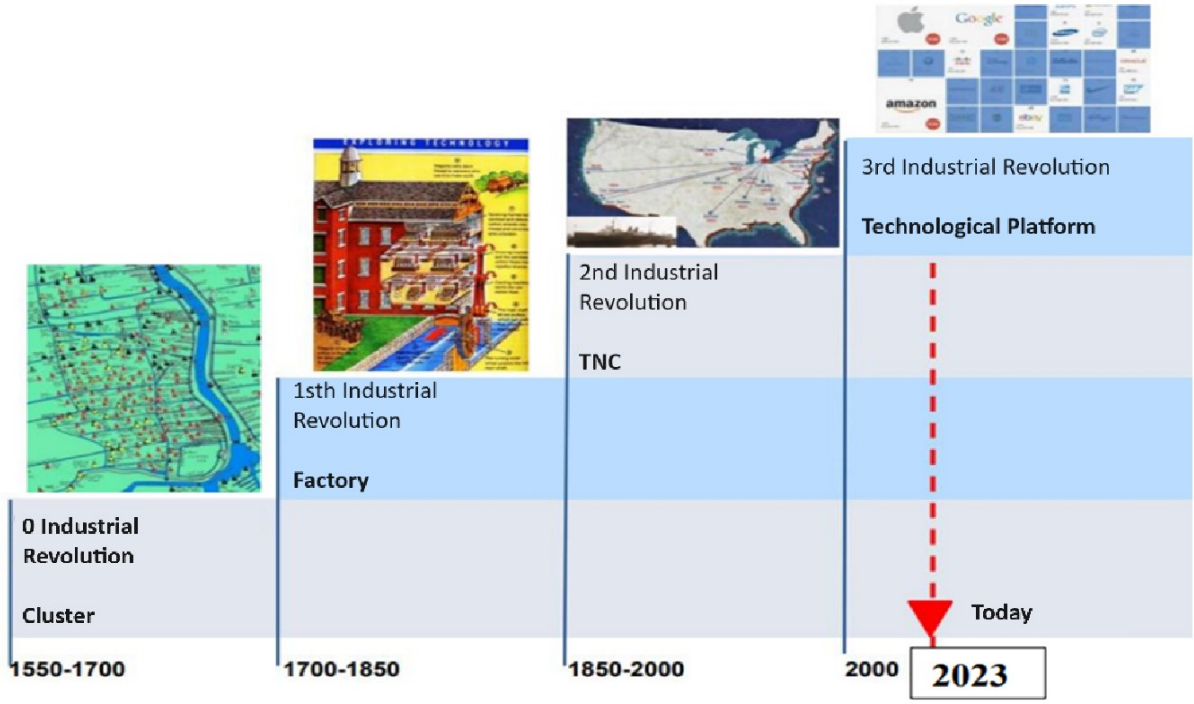

Figure 1.7. Organizational Form of Production, Accumulation, Dissemination, and Utilization of New Knowledge[92]

We now witness the third industrial revolution. The goals of maximizing economies of scale and optimizing material resources have been replaced by the ones of achieving network effects and developing technological systems. The spread of information technologies has contributed to the emergence of technological platforms as the most effective form of cooperation for entities involved in this process activity (see Figure 1.8).

Prior to the spread of the IT industry into all aspects of human life, the competitiveness of a business depended on the product itself. Success merely required a high degree of innovation, according to the authors of the book "Business Models: 55 Best Templates" (written by management theorists Oliver Gassmann, Karolin Frankenberger, and Michaela Csik). Over time, the growing importance of the innovative aspect of the product became a key competitive advantage. Subsequently, updating business processes emerged as a tool of competition, followed by the renewal of the business model.

[92] Ref.: P.G. Shchedrovitsky - Up and down the waves of industrial revolutions. – URL: https://shchedrovitskiy.com/app/uploads/vverh-i-vniz-po-volnam-promyshlennyh-revoljucij-1.pdf

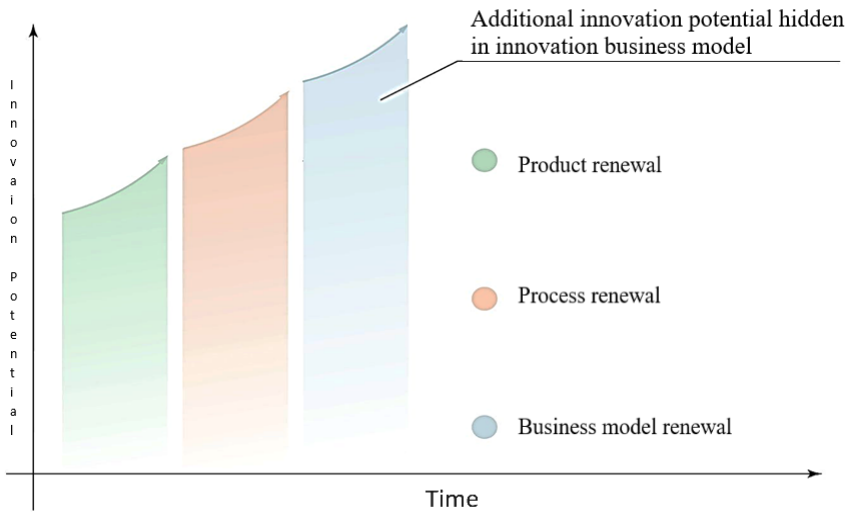

Figure 1.8. Rise of the innovative component importance in business efficiency [93]

In modern conditions, updating the organization's business model based on a technological platform enables maintaining a high level of innovation and adapting rapidly to changes, while constantly learning.

The constant adjustment of organizations to evolving external conditions in management theory has led to the popularity of the model of learning organization. The concept of a learning organization emerged in the late 1980s based on research conducted at the Massachusetts Institute of Technology.

Its planning director, Ari de Geus, published his famous article on this issue in Harvard Business Review in 1988. The theoretical origins of this concept were part of various theories, such as the theory of self-renewal (J. Gardner), organization theory and organizational renewal (G. Lippit), the concept of learning systems (D. Schon), organizational learning theory (C. Argyris), and others [94] .

The concept of "self-learning organization" was introduced into scientific world by Peter Senge, who defined learning organizations as "organizations where people continuously expand their capacity to create the results they truly desire, where new and expansive **patterns of thinking** are nurtured, where **collective motivation** is set free, and where people permanently exercise cooperative learning" [95] .

The conventional organization structure follows a vertical hierarchy model, which lacks the ability to swiftly adapt to evolving external circumstances. The vertical structure entails strict control over the performance of functional units, rigid budgeting of expenses, and a focus on skill enhancement, execution of routine tasks, structured in line with the management levels. In a learning organization, the core is made of self-managing teams where the boundaries between team functions become fluid rather than rigid. These teams are interdisciplinary in nature, enabling them to react promptly to emerging challenges and opportunities, thereby adapting the organization's business model swiftly.

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[93] Ref.: URL: https://skillbox.ru/media/base/biznesmodel-kak-s-eye-pomoshchyu-zapustit-startap-ili-spasti-pogibayushchuyu-kompaniyu/

[94] Ref.: Idrisova A.R. The concept of a self-learning organization // Vestnik VyatGU. – 2009. – № 1. – C. 115–117.

[95] Ref.: Senge P. Fifth Discipline: The Art and Practice of the Learning Organization. – M.: Olympus Business. – 2003. – C. 68–71.

Thus, the business model is complemented by a description of the value exchange processes among various participants in the business process. The business model clarifies how business components interact and integrate into a unified structure [96] (see Figure 1.9).

The concept of a business model itself is one of the least structured terms in modern scientific literature. Many authors in their articles provide a comprehensive overview of approaches to define this concept[97].

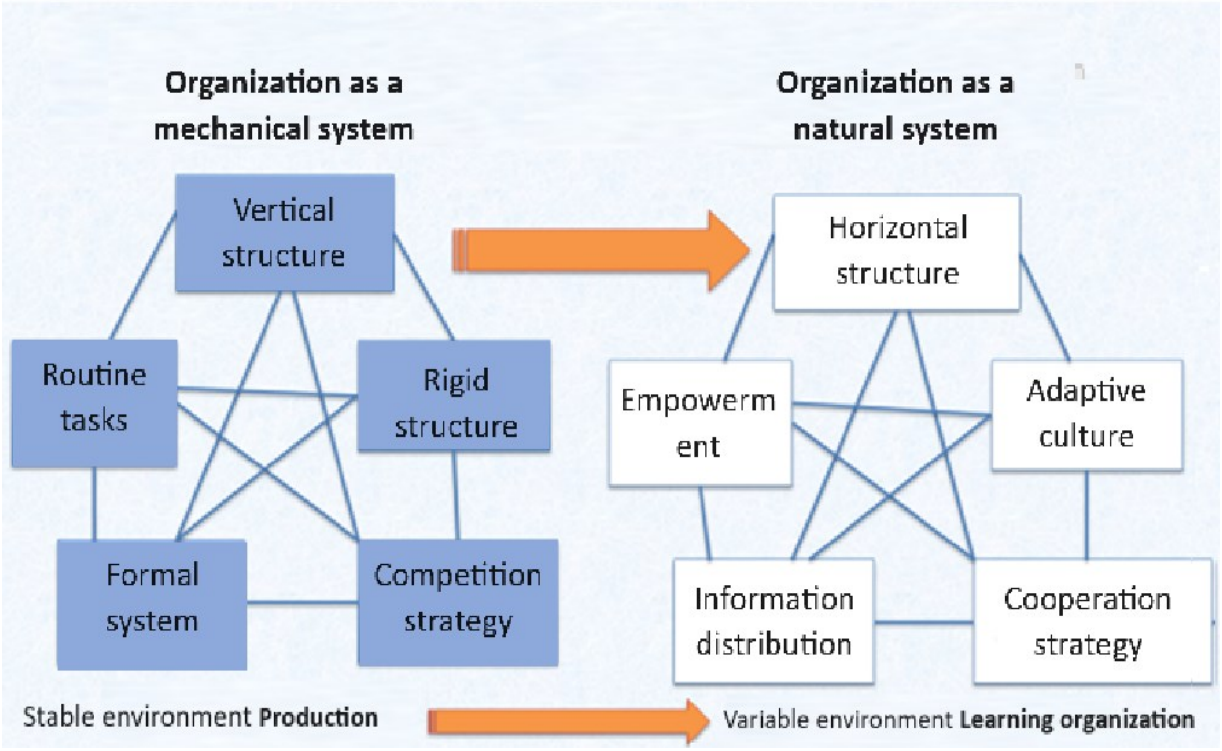

Figure 1.9. To approaches to creating an organization[98]

This section seeks to formalize the concept of a "business ecosystem" as a new business model within the framework of the market economy. We rely on the concept of "business model" introduced by Alexander Osterwalder, an entrepreneur and leading figure in business process modeling, and Yves Pigneur, an American scholar in information technology and systems, a professor, in their joint work "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers"[99].

Scholars note that the business model interprets how an enterprise **creates, delivers, and captures value**. In the era of digitization, the creation, transportation, and realization of value are carried out through targeted (personalized) marketing and online

[96] Ref.: Межов С. И., Болденков А. В. Понятие бизнес-модели: сущность, типология и основные принципы построения // Экономика. Профессия. Бизнес. – 2016. – С. 24–30.

[97] Ref.: Dmitriev V. An Exploration of Business Model Development in the Commercialization of Technology Innovations / V. Dmitriev, G. Simmons, Y. Truong, M. Palmer, D. Schneckenberg // R&D Management. Special Issue: Business Model Innovation. – 2014. – June. – Vol. 44. – Iss. 3. – P. 306–321; Baden-Fuller C. Business Models and Technological Innovation / C. Baden-Fuller, S. Haefliger. – URL: http://www.sciencedirect.com/science/article/pii/S0024630113000691

[98] Ref.: Daft Richard L. Organization Theory: textbook. – M.: UNITY-DANA, 2020; Andries P. Simultaneous Experimentation as a Learning Strategy: Business Model Development Under Uncertainty / P. Andries, K. Debackere, B. Looy // Strategic Entrepreneurship Journal. – 2013. – December. – Vol. 7. – Iss. 4. – P. 288–310; Oster S. Modern Competitive Analysis. – Oxford : Oxford University Press, 1990.

[99] Ref.: A. Osterwalder - Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers / A. Osterwalder, Y. Pigneur ; translation by. M. Kulnev. – 3rd edition. – M. : Alpina Publisher, 2013.

logistics (digital distribution channels). But the main focus in new business models that involve multiple participants is the aspiration to create shared value for the consumer. This trend has led to a shift from the traditional strategy of competition in business to a strategy of cooperation. Competitive behavior occurs when there is a goal that not all participants can achieve equally, while cooperative behavior occurs when all participants share a common goal, ideally amplifying the efforts of those involved. Hence, competition arises from the belief that goals are negatively correlated, meaning a goal can be attained only if others fail to achieve it. Conversely, cooperation occurs with the belief in positive goal correlation.

Amidst the current global industrial revolution, it has become evident from practical experience that business ecosystems, characterized by systemic attributes, have emerged as the most competitive form of organization. This statement is supported by the list of the world's top five capitalized companies in 2023, which includes Apple, Microsoft, Saudi Aramco, Alphabet, and Amazon, respectively[100].

James Moore, a business strategist who introduced the term "ecosystem" into the business lexicon, in the early 1990s developed the idea of cooperation and competition, proposing to view an individual company not as an independent player, but as one of the participants in a business ecosystem involving multiple stakeholders from different industries. "Like its biological counterpart, the business ecosystem gradually transitions from a random assortment of elements to a more structured community," noted Moore. His introduction of the term “business ecosystem” was featured in the Harvard Business Review in 1993, in his article “Predators and Prey: A New Ecology of Competition” [101]. Moore introduced the term "business ecosystem" to describe the economic community of market participants who produce goods and services, aligning their activities according to a common strategic direction set by one or several leading players.

Companies work together to create opportunities through innovation inside of it: they cooperate while also competing to develop new products, satisfy customer needs, and ultimately initiate a fresh cycle of innovations. Participants of the business ecosystem, as depicted in Fig. 1.10, are engaged in creating shared value in dynamic conditions. According to Deloitte, competition takes a middle ground here. Common goals and interests, and most importantly, the need to meet growing consumer demands, make collaboration the cornerstone of ecosystem-based business[102].

[100] Ref.: URL: https://ru.fxssi.com/top-10-samyx-dorogix-kompanij-mira
[101] HBR: Predators and Prey: A New Ecology of Competition, 1993. – URL: https://hbr.org
[102] Ref.: URL: https://trends.rbc.ru/trends/innovation/6087e5899a7947ed35fdbbf3

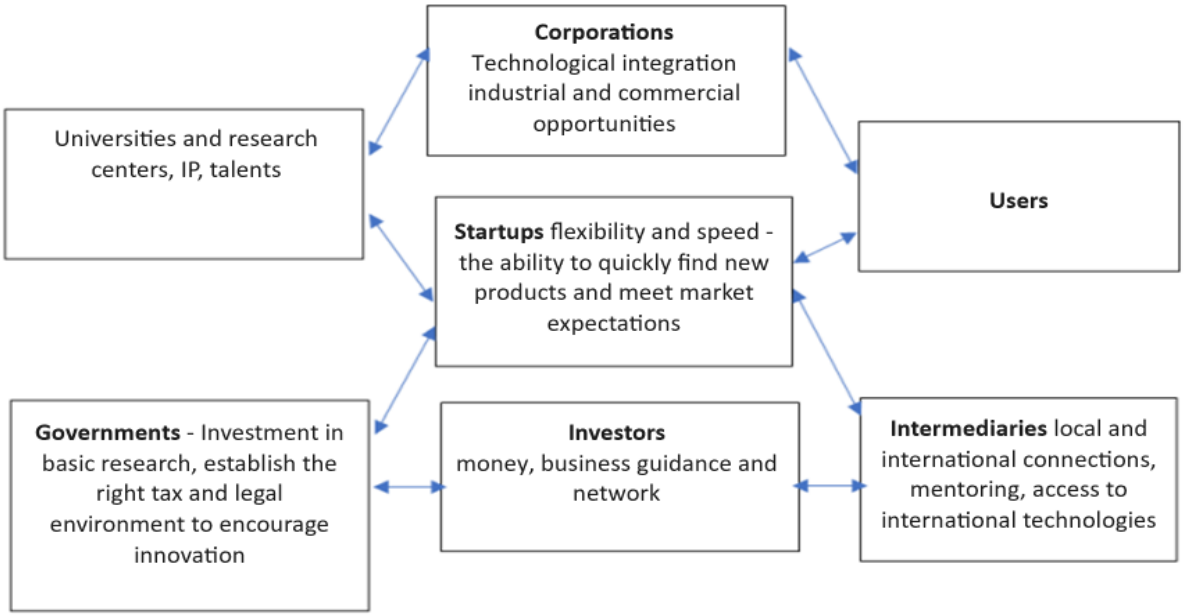

Figure 1.10. Participants of the business ecosystem[103]

And it relies more not on the center, that is coordinating it, but rather on the versatile interaction among participants, each with their own needs and priorities (see Figure 1.10). Startups are placed across the entire ecosystem perimeter because they play a crucial role in accelerating research, development, and commercialization of new technology or products, and sometimes in the emergence of thorough innovations too risky for other participants[104]. Investors not only provide funding, but also have expertise in corporate development and market entry strategies. Corporate partners fund supplies and perform many other necessary actions, including access to markets and potential clients, which is of great importance. Universities are important research partners and "startup accelerators" that help develop relationships with other participants. University involvement in the ecosystem is diverse and aimed at accelerating innovation and technology transfer, including conducting fundamental research to stimulate long-term innovations, assisting staff, students, and graduates in developing and testing new ideas, providing them with technical resources and entrepreneurship programs, establishing accelerators, and even venture funds. According to estimates by the Boston Consulting Group, approximately 1,500 universities and research laboratories worldwide are engaged in deep technical research and development.

The number of entrepreneurship courses has increased by 20 times: from 250 in 1985 to 5,000 in 2008; currently, approximately 400,000 students are enrolled in these courses annually. Research conducted by the OECD shows that the number of doctoral candidates has increased by large double-digit percentage from 1998 to 2014 in the top 15 doctoral markets[105].

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[103] Ref.: Portincaso M., de la Tour A. Soussan P. The Dawn of the Deep Tech Ecosystem // Boston Consulting Group & Hello Tomorrow. – URL: http://imagesrc.bcg.com/Images/BCG-The-Dawn-of-the-Deep-TechEcosystem-Mar-2019-R-2_tcm91-216221.pdf

[104] Ref.: Trofimov O.V., Zakharov V.Ya., Frolov V.G. Ecosystems as a way to organize the interaction of enterprises in the production sector and the service sector in the context of digitalization // Bulletin of the Nizhny Novgorod University. N.I. Lobachevsky. Series: Social Sciences. – 2019. – No. 4 (56). – P. 43–55.

[105] Ref.: Portincaso M., de la Tour A. Soussan P. The Dawn of the Deep Tech Ecosystem // Boston Consulting Group & Hello Tomorrow. – URL: http://imagesrc.bcg.com/Images/ BCG-The-Dawn-of-the-Deep-TechEcosystem-Mar-2019-R-2_tcm91-216221.pdf

Startups turn to the ecosystem to meet various needs. A 2017 survey revealed their priorities: 80% of respondents highlighted funding, 61% assistance in accessing the market, 39% technical expertise, and 26% [106] business experience and knowledge. Major corporations have been incorporating external innovations for quite some time using diverse mechanisms, including acquisitions, partnerships, joint ventures, licensing, and venture investments. As Industry 4.0 technologies emerged, the utilization intensity of deep platform technologies sharply increased for accessing new technologies and opportunities created outside the company, along with the diversification of options for their engagement and utilization. Many companies still struggle with the biggest problem, which is the mentality of rejecting innovations created outside of their own organization[107].

Often, active participants in business ecosystems are intermediaries who bring together entrepreneurs, research organizations, professional associations, and so on. The importance of different types of partners varies as technology evolves, prompting participants to engage with various interested parties only temporarily to access the necessary resources.

Ecosystems serve as major employers and taxpayers, closely interacting with government entities. Their size allows them to assume an institutional coordinating function within the market. For instance, Alibaba employs around 100,000 people, connects over 2 million sellers, and has over 600 million users registered on its platforms. Ecosystems also provide entrepreneurs with an environment where they can collectively mobilize resources. By becoming part of an ecosystem, entrepreneurs gain the opportunity to expand faster and launch new services, which would be more challenging to do alone[108]. The primary tool of modern business ecosystems, enabling high-speed cooperation, is digital platforms.

Digital platforms, like building blocks in the ongoing industrial revolution, are one of the key means of creating value in modern ecosystems. According to the Equinix Global Interconnection Index (GXI) 2023 research, companies with their own ecosystems have expanded their digital operations more in the last five quarters than in the previous five years. Specifically, the authors of GXI 2023 note that by 2025, 90% of companies on the Fortune 500 list will become providers themselves, both consuming and selling digital services. The technology for processing and managing big data has made it possible to consolidate and develop large networks of users, resources, and partnerships around it. In the modern world, companies and users are interconnected through networks, meaning value is transferred directly between them. Working with big data enables the creation of targeted marketing products and their development in line with evolving consumer needs. It is important that cooperation among companies based on information gathering and exchange creates a fundamentally new foundation for forming business ecosystems, which in turn creates new opportunities for business. According to the consulting company Boston Consulting Group, those are the following differences between digital ecosystems and traditional business alliances[109]:

- Focus on "smart," integrated solutions instead of concentrating efforts on the product.

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[106] Ref.: the above source.

[107] Ref.: Bringel M., Taylor A., Zablit H. Bringing Outside Innovation Inside. – URL: https:// www.bcg.com/publications/2017/growth-bringing-outside-innovation-inside.aspx

[108] Ref.: Trofimov O.V., Zakharov V.Ya., Frolov V.G. Ecosystems as a way to organize the interaction of enterprises in the production sector and the service sector in the context of digitalization // Bulletin of the Nizhny Novgorod University. N.I. Lobachevsky. Series: Social Sciences. – 2019. – No. 4 (56). – P. 43–55.

[109] Ref.: BCG: Breaking the Culture Barrier in Postmerger Integrations, 2016. – URL: https:// www.bcg.com

- Priority on innovation and speed of placing products and services on the market
- Highly adaptive networks instead of rigid value creation chains; collaboration across geographical and cultural barriers.
- Cross-industry collaboration with a focus on intellectual property.
- Development of new forms of cooperation, including flexible and short-term partnerships; joint and ongoing value creation for all ecosystem participants.

Classical examples of ecosystems offering complementary products include Apple with the App Store and Amazon with Amazon Web Services.They created conditions under which external participants (vendors and developers) can, together with the ecosystem owners, create value for customers.

As acknowledged[110] by one former top manager of Nokia, they lost to Apple in the competitive struggle precisely because of their incomplete ecosystem. Nokia had the potential to create a device similar to the iPhone, but the corporation lacked an understanding of how to develop partnerships with vendors and application developers based on the company's systems. Stephen Elop, the CEO of Nokia from 2010 to 2013, once noted: "Competitors are capturing our market share not with their devices, but with an entire ecosystem." [111]

According to McKinsey's forecast, by 2025, around 30% of global corporate revenue will be generated by digital business ecosystems[112]. The three largest ecosystems in China - Baidu, Alibaba Group, and Tencent (BAT) - bring together hundreds of businesses, compete in dozens of different industries both online and offline, constantly and very rapidly expanding and reorganizing - all for continuous, flow innovation. They not only respond instantly to evolving needs but also set market trends. Not surprising that their combined market capitalization exceeds $800 billion. For comparison, Alphabet's market capitalization is $741 billion, and Netflix's is $158 billion.

Table 1.1.

Examples of global business ecosystems, and their complementary products[113]

Ecosystem title	Name of the product
Apple	iPhone, iPad, MacBook, Mac Pro, iMac, Apple Watch, iPod, AirPods, Apple TV, HomePod, subscription to all services, HomeKit smart home, Apple Pay payment system
Xiaomi	Smartphones, laptops, watches, speakers, televisions, gaming consoles, electric scooters, Mi Home smart home products, including household appliances, lighting, smart locks, and even cat toilets
Huawei	The smartphone serves as the central device in the ecosystem, complemented by gadgets, smart home devices, office and household appliances, forming the Huawei Seamless AI Life intelligent ecosystem
Honor	Smartphone as the main hub of the ecosystem, laptops, watches, headphones
Alibaba	Retail trade, payments, credit scoring
Yandex	Smart speakers and smart sockets, integrated ecosystem of services: taxi, delivery, mail, music, virtual disk, search, voice assistant

[110] Ref.: The Guardian: Nokia's Chief Executive to Staff: We are Standing on a Burning Platform, 2011. – URL: https://www.theguardian.com
[111] Ref.: Statsenko V.V., Bychkova I.I. Ecosystem approach to building modern business models // Industrial Economics. – 2021. – No. 1. – P. 45–61.
[112] Ref.: URL: https://trends.rbc.ru/trends/innovation/6087e5899a7947ed35fdbbf3
[113] Source : URL: https://trends.rbc.ru/trends/innovation/6087e5899a7947ed35fdbbf3

Even though IT companies dominate as major global players in business ecosystems, companies from other industries are also pursuing this path of development. The auto giants BMW and Daimler have launched a joint project called “You Now”, involving several startups. They plan to develop urban mobility services for 60 million customers worldwide. This includes car-sharing services, parking, taxi hailing, electric vehicle charging, and a multimodal transportation app[114].

Compared to the global market, the Russian market is relatively small. But at least four ecosystems are already competing in it. In addition to the ecosystems of "Sber" and "Yandex," there are also Mail.ru Group, MTS, "Tinkoff," and other smaller players. The overview of Russian and foreign business ecosystems allows us to identify two main approaches to their creation. The first one is built around the following two solutions:

1) Participants create or provide a product to the user through the coordination of different companies. This can be illustrated by projects like BMW and Daimler, which collaboratively develop a product for consumers;

2) Participants and consumers are connected through transactions via a common (typically digital) platform. This includes ecosystems like those of Sber and Yandex.

In addition to its main financial focus, the Sber ecosystem encompasses 10 lines of activity (Figure 1.11), four of which are market-leading (finance, food/shopping, entertainment/media projects, technology).

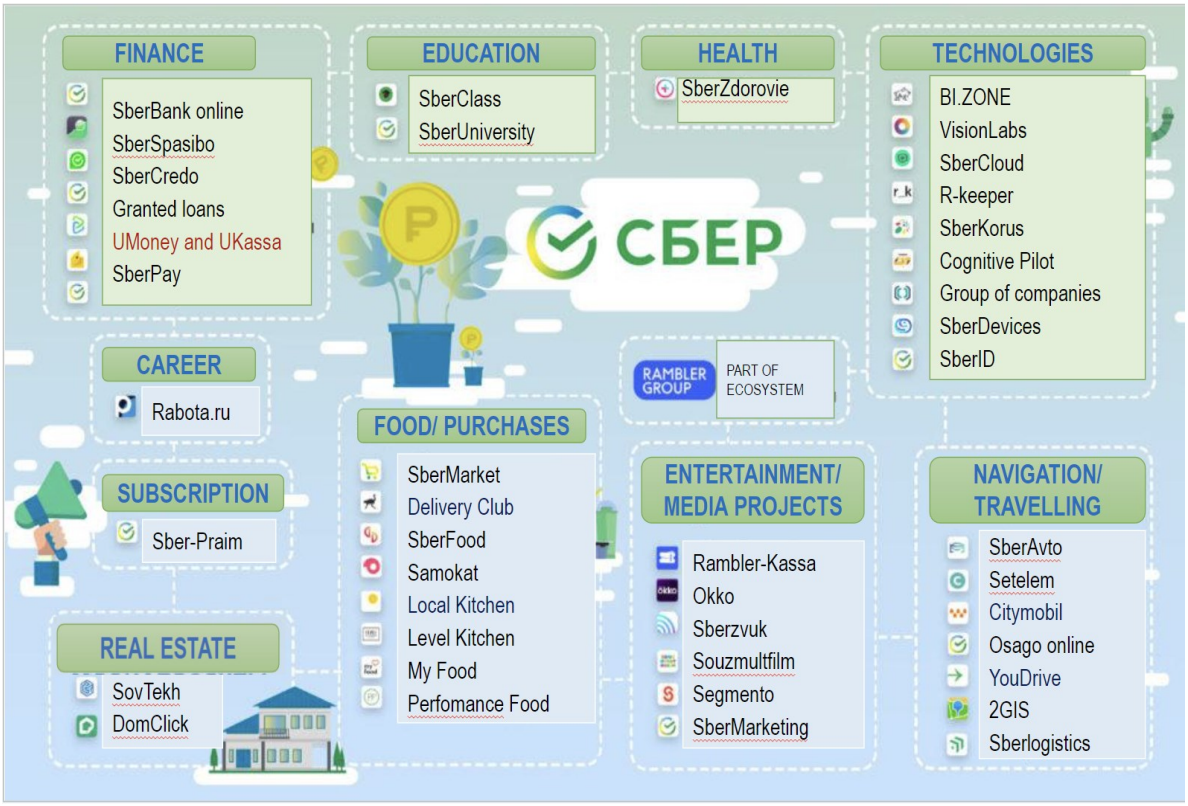

Figure. 1.11. Ecosystem «Sber»

Based on the Sber ecosystem, let's identify its components:

First and foremost, all companies involved in the Sber ecosystem in Figure 1.10 are incorporated under a single brand, which consumers associate with a high degree of

[114] Ref.: URL: https://trends.rbc.ru/trends/innovation/6087e5899a7947ed35fdbbf3

loyalty. Indeed, the brand serves as the primary marketing unifier. Most of these companies are already working with the prefix “Sber”.

The second important element is the ***user ID.*** For instance, SberID originated within the "Sberbank Online" application. You can use it to access Okko cinemas, take a taxi or rent a car, place an order on "SberMarket", and use other services as well. Besides, user IDs are paired with profiles. Based on them, more relevant offers are tailored to Sberbank customers, taking into account their preferences and behavior in the digital environment.

A centralized service or call center. For ecosystem users, it's also important to have the ability to get assistance and support for products in one place, without having to search for the contacts of different services. Today, when having an issue with the order on "SberMarket," you can receive assistance from the contact center, which advises clients on banking services.

Data security is crucial for the "Sber" business ecosystem since its primary profile is banking. Therefore, security serves as a unifying factor within the ecosystem. All services, not just financial ones, are secured at the banking level and transmit banking security standards to food, transportation, education, healthcare, and all other business verticals[115].

The objective analysis of the most effective business model of today, namely business ecosystems, leads to the conclusion that achieving competitiveness in the global market under unstable external conditions is challenging for one organization alone. The ongoing processes of digital transformation in leading countries around the world have led to the displacement of competitive thinking in the business environment, prioritizing collaboration in creating shared value. It is the digital platform that has been integrated into the modern ecosystem, becoming the building block of the industrial revolution. It represents the organizational structure that facilitates the concentration, simplification, and expansion of new knowledge. The primary knowledge accumulated on the digital platform within the business ecosystem is not about production organization but about the consumer.

Industry 4.0 technologies make it possible to synchronize diverse activities of modern business ecosystems under market dynamics to achieve “dynamic equilibrium,” as outlined by the founder of the tectology, A. A. Bogdanov[116] in the early XX century. He argued that society is in a constant state of development, wherein the transition from one stage to another brings changes not only in its organization and methods but also in the structure of its components.

[115] Ref.: URL: https://trends.rbc.ru/trends/industry/5f6c55219a79475398b841bd

[116] Ref.: Bogdanov A. A. Tectology. General organizational science: in 2 books. – M., 1989..

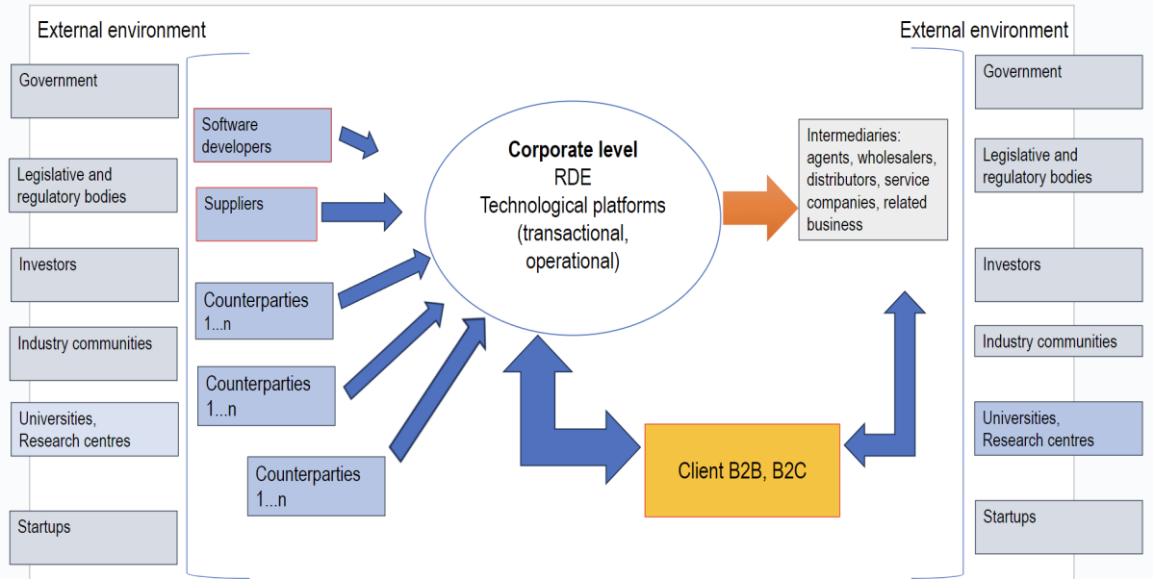

Figure1.12. Business Ecosystem as a Subject of Market Economy

According to the fundamental principles of tectology, when two or more elements are integrated into a single process, under special circumstances they can demonstrate better efficiency of these same elements functioning individually, acquiring the property of emergence, or in other words, competitiveness. Therefore, the analysis of participants in the business ecosystem has shown that achieving competitiveness in modern market conditions is not gained through centralization or the expansion of the main player (brand holder), but through the implementation of the "necessary variety" principle as proposed by W. Ross Ashby[117], applied in the design of mega-systems. Therefore, the driving factor for expanding the ecosystem approach in Russian conditions is the creation of institutional conditions for a variety of cooperation methods among ecosystem participants while maintaining priorities and meeting the needs of each participant.

Control questions

1. What caused the change in the organizational form of doing business in the conditions of changing technological structures?
2. Which building block is typical for each industrial revolution?
3. What is the difference between an ecosystem and a business alliance?
4. List the mandatory participants when designing a business ecosystem
5. List the approaches you know to creating business ecosystems and give examples.
6. What elements of the business ecosystem do you know?
7. How do you understand “complementary products”?
8. What ecosystems do you know that function on the basis of product complementarity?

Practical immersion material

[117] Ref.: Ashby W. R. Principles of Self-organizing Dynamic System // Gen. Psychol. – 1947. –Vol. 37 (2). – P. 125–128.

Case study

Apple Business Ecosystem Analysis

Apple Inc. is an American company that manufactures personal and tablet computers, audio players, smartphones, software, and digital content. It is one of the pioneers in the field of personal computers and modern multitasking operating systems with a graphical user interface. Apple was founded on April 1, 1976, with its headquarters in Cupertino, California. It was registered on the NASDAQ stock exchange on December 12, 1980. Its main lines of business include designing, developing, and selling consumer electronics, computer software, online services, and personal computers. For nearly 30 years, the company exclusively produced and sold personal computers. In 2001, the iPod was introduced, and by 2003, it was already linked to the iTunes digital music store. This decision was so successful that all subsequent Apple products were released as platform solutions right away. So, the first iPhone was presented in 2007, and in 2008, the iPhone was launched along with the App Store platform, demonstrating that the "device + platform + services" strategy is Apple's core business model. A more specific description of Apple's business model could be described as offering integrated solutions in the form of "electronic devices + software + digital services, supported by access to platforms - application stores or digital content stores." This business model is, in fact, a business ecosystem of solutions since the package for uses is provided not only by Apple, but also by a wide range of partners who play an important role in innovative development. It is worth noting that, in addition to hardware and online services, the company produces software, including the OS X and iOS operating systems, the multimedia browser iTunes, the web browser Safari, as well as creative and productivity suites like iLife and iWork.

Intellectual devices (hardware) make up a major part in Apple's product portfolio, accounting for just over 80% of sales. The sales share of the iPhone is particularly high, accounting for 54.73% in 2018 and 52.11% in 2022. Over the past four years, the share of services has increased slightly, from 17.79% in 2018 to 19.81% in 2022, representing a 2% increase. Despite the opinion that Apple has transitioned from being a supplier of electronic devices to a provider of digital services, sales data analysis shows that device sales form the foundation for the functioning and development of the Apple ecosystem, where services are derivative of smart devices (hardware). In other words, the Apple ecosystem is a solution ecosystem based on smart devices, not services. This fact explains why Apple is interested in shortening the life cycle of its devices and regularly updating them. This is a fundamental requirement of the current business model of the Apple solution ecosystem. The need for constant development and updating of solutions has led Apple to create a business ecosystem that includes not only traditional value chain participants (buyers, suppliers, intermediaries) but also providers of complementary products, software developers, network operators, and so on[118].

Case Study Questions:

1. What is the main approach to creating a business Apple ecosystem? Justify your position.
2. List the elements of the Apple business ecosystem.
3. List the key success factors of the Apple ecosystem compared to another business ecosystem, for example, Huawei.
4. What market strategy does Apple follow and which one does Huawei?

[118] Ref.: Information for discussion taken from the article: Yuldasheva O. U., Bekuzarova Z. V., Zhang S. Strategies for Building Business Ecosystems of Apple and Huawei Companies: a Case Study. – URL: https://doi.org/10.34130/2070-4992-2023-3-2-204

5. Analyze the Apple and Huawei ecosystems according to the following criteria: marketing strategy, target audience, company structure, partners.

6. Visualize the diagram of Apple ecosystem participants based on Fig. 1.11.

1.5. Business ecosystem as an institutional framework for the interaction of business units

Introduction

Business Ecosystem (BES) is an economic agent (or a group of agents united by coordinating mechanisms), which sets itself the task of satisfying various, including non-complementary, needs of the same consumer agent or group of such agents.

The degree of autonomy of business units within an integrated alliance can vary: from having full autonomy and operating on the principles of mutual subcontract with other similar units (a network structure in the absence of a single organizing and managing center) to being subsidiaries of the parent company or separate divisions of a conglomerate managed from a single decision-making center.

Thus, within a business ecosystem, there may be vertical links between the agents involved (relationship of subordination) and horizontal links (for example, joint development of specific standards for the provision of goods and services, including standards related to a specific set of technologies used). These connections can be represented by a system of formal institutions (such as uniform financial reporting standards) or informal ones (including the practice of temporary "secondment" of employees from one business unit to another, allied by its functions).

1. Business Ecosystems: Interacting with the Consumer

A lot of contemporary ecosystems are capable of scaling the technical and managerial solutions they have once found or applied to meet the needs of the same client, creating an area of efficient offering around them.

The nature of the needs to be satisfied by the agent may vary depending on the degree of their stability over time, their visibility or awareness, and their complementarity (interconnectedness).

This approach is illustrated in Figure 1.13. The agent expresses his needs into the surrounding business environment, and the business ecosystem, based on long-term interaction with it, surrounds it with attention, offering opportunities to meet these needs.

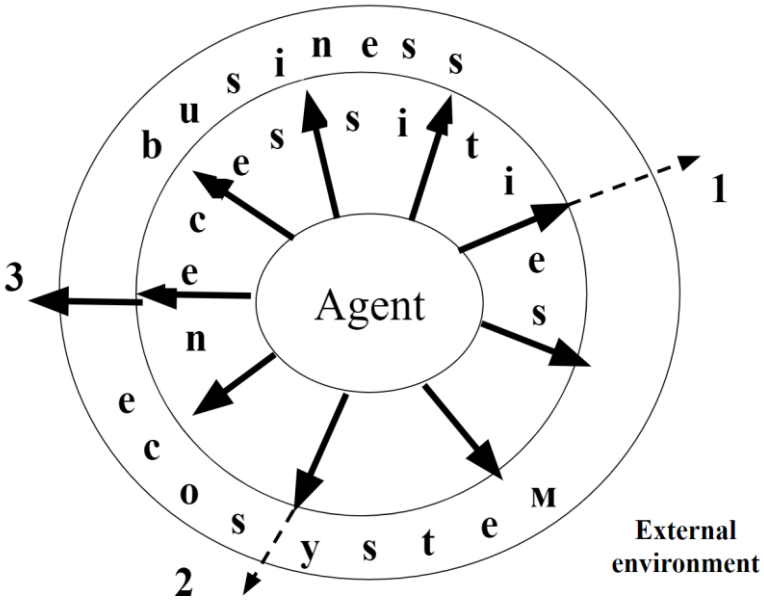

Figure 1.13 The concept of business ecosystem

At the same time, among the entire range of the agents' needs, there are those that this business ecosystem cannot satisfy, and often it does not even set itself such a task. It's as if it doesn't notice such a need of its regular customer, and he doesn't expect it will make an effort to meet this need. One such need is indicated by arrow 3 in Figure 1.13: it passes through the ecosystem surrounding the agent, not noticing it, and finding ways to satisfy it in the external environment.

For some other needs (arrows 1 and 2 in Figure 1.13), the agent considers the possibility of satisfying them through the efforts of this ecosystem, but ultimately prefers other options.

All other needs of the agent in this diagram are "absorbed" by this ecosystem, satisfied through coordinated efforts of its various parts (business units).

At the same time, the internal structure of business ecosystems and the logic of interaction among the business units forming them can be completely different. A wide range of possibilities exists, ranging from centralized management by the head company of its branches to the coordination of efforts among completely independent agents through a specialized information service (an independent company or a division of one of the participants in the business ecosystem). This may involve a shared customer database and possibly a centralized call center that potential consumers can reach out to.

2. Business ecosystem boundaries

According to several researchers, the concept of a business ecosystem is, in some sense, a generalization of the firm concept. It extends and expands the notion of a firm, which is considered central in modern microeconomics. On the basis of that, E. V. Popov and his colleagues argue: "Currently, the socio-economic ecosystem should become the main unit of economic analysis in modern economic theory." [119]

From this follows that the question of appropriate boundaries is applicable to ecosystems: to what extent can a business ecosystem incorporate new business units without compromising the control of the overall ecosystem—however, to the extent that the ecosystem itself can be considered a coherent entity. As the development of ecosystems does not imply the presence of a single decision-making center, but relies on maintaining a joint group of consumer agents, the issue of managerial unity within the business ecosystem poses an institutional challenge not addressed in the neoclassical synthesis paradigm. In other words, the question of incorporating additional business units into an existing ecosystem implies the presence of institutional, rather than cost-based, filters.

Hence, for different types of ecosystems, the answer to the question of optimal boundaries will vary.

For example, in vertically integrated business ecosystems, which unity is based on the existence of "through" value chains, management limitations is associated with the decreasing returns of homogeneous investments, which in this case demonstrates a functional saturation, reducing the efficiency of efforts to create and add value for the agents involved in this ecosystem.

In any ecosystem, you can find business units (independent firms or divisions) with different levels of economic efficiency. However, this is not a reason to get rid of the least efficient ones, as satisfying the non-complementary needs of the same groups of consumers should involve the presence of well-established and organized business processes with varying degrees of efficiency, inspired in particular by the state and

[119] Ref.: Popov E. V., Simonova V. L., Belyaeva N. F. Co-evolution of digital technologies and the development of the company's ecosystem // Creative Economy. – 2023. – T. 17. – No. 6. – P. 2188..

dynamics of the relevant industry markets, the possibility of technological renewal, established traditions of economic cooperation in these markets, the availability of resources (including qualified personnel), and the level of development of economic infrastructure.

In network-type business ecosystems, where agents are connected not by production functionality, but by the fact of following the same (or similar) managerial and/or technological standards, the limitations to the management process are associated with the need for different business units to follow similar institutions and rules of conduct. In cases where the costs of adaptation, associated with changing routines, appear too high for a potential participant of the ecosystem compared to the benefits they would gain from joining it, this agent will prefer to remain outside of this ecosystem.

The question of standardization is a question of institutional filters and barriers. Some benefit from these standards, while others prefer to follow different ones (as much as possible). Therefore, the potential limits of expanding a business ecosystem are not associated with the limits to the management process, but with the boundaries of standardization of business processes. Moreover, a standard, regardless of the area it concerns, is itself a network benefit, meaning that agents following the same standard create external benefits for each other.

At the same time, there are so-called mandatory standards imposed on economic agents from outside. Some of them relate to product quality standardization (for example, standard distances between holes in electrical sockets, standard voltage levels in power grids, standard chemical composition of milk, standard levels of impurities in table salt, etc.), while others are related to industrial standards (such as ergonomic parameters - ventilation of premises, lighting of workplaces, etc.).

The implementation of mandatory, imperative standards occurs when the marginal benefits of their implementation for the implementing entity (whether it is a government agency or a professional association) exceed the marginal costs of implementing these standards - primarily the costs of adapting business processes to the introduced imperative standards.

As an example, combining certain features of the two mentioned extremes (vertically integrated and networked business ecosystems), let's consider the Chinese corporation Huawei. During the COVID-19 pandemic, it developed its own ecosystem model[120], which was named "1+8+N."This is a three-layered model. The inner layer consists of just one group of products, which is crucial for the company - smartphones.

The middle layer consists of 8 other directions closely related to smartphones in their technical solutions: tablets, laptops, headphones, watches, speakers, etc. Finally, the outer layer is the most dynamic, as it can constantly change its structure. It includes product's technical execution which requires solutions different from the core product line of the company, (smartphone): printers, robotic vacuum cleaners, gaming consoles, transportation, computer games, etc.

In this ecosystem, the management limitations are determined by the standards of technological quality of production processes maintained by the corporation. Depending on shifts in demand focus from potential consumers, the company can easily part with business units from the "external" layer while retaining the "core" for the time being.

However, over time, this situation may change: in the event of adverse changes in industry markets, overloaded by units within the "core" products a review of the company's strategy and its radical restructuring may be necessary. Consequently, the

[120] Ref.: Zhao Di. Adaptation of development strategies of Chinese IT corporations in the context of the COVID-19 pandemic // Issues of the new economy. – 2023. – No. 2 (66). – pp. 68–78.

organized business ecosystem will undergo changes depending on the medium-term dynamics of consumer preferences.

3. The relationship between ecosystems and other types of organizations

Depending on the nature of goods in the modern economy, one can distinguish between markets of tangible goods (both material and immaterial – for example, reputation, trust, security), markets of services, and markets of patent rights. Each type of market corresponds to specific characteristics that shape the forms of interaction among economic agents in the respective markets. In this sense, broadly speaking and somewhat conventionally, one can speak of the economy of goods, the economy of services, and the economy of rights.

These three types of economies are not mutually exclusive but are partially embedded within each other, as shown in Figure 1.14. Let's consider each of these types separately.

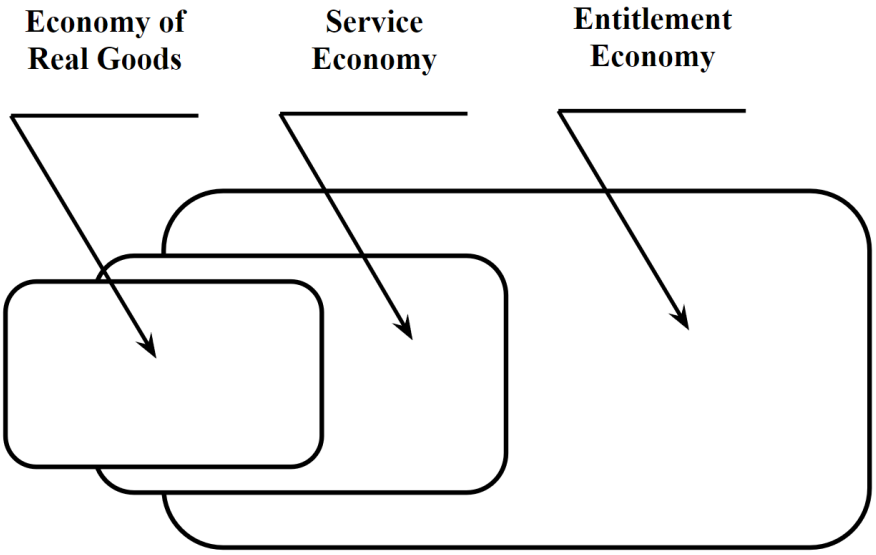

Figure 1.14. Three types of economies depending on the dominant type of assets circulating in them

1. Economy of tangible and intangible goods.

One of the leading forms of interaction between economic agents in such an economy is industrial clusters, both intra-industry and inter-industry. These clusters may include agents with varying degrees of geographical proximity towards each other; for example, it is reasonable to consider the nuclear energy cluster, which includes nuclear power plants and the infrastructure supporting their operation, allocated throughout the country.

At the same time, industrial clusters often include research and financial institutions, so they are not limited to the economy of goods. Additionally, industrial clusters frequently act as providers of services, not just tangible goods. For example, a space cluster provides remote sensing services of the Earth, the results of which are primarily used by various agencies for geo-environmental monitoring purposes.

Business units within the cluster create mutual external benefits by participating in the same value creation chains. Direct and long-term economic ties often arise between them, allowing savings on transaction costs—searching for suppliers and partners, as well

as close control over the fulfillment of current obligations regarding payment and delivery of goods and services (including delivery times and quality standards).

Territorial proximity of cluster participants creates broad opportunities for joint utilization of production facilities (sharing facilities), forming agreements on the involvement of economic resources in production, and creating informal cartel-like alliances among agents who formally compete with each other in the same local markets. Such agreements create external benefits for the business units within the industrial cluster.

2. Service economy

This type includes the entire economy of experience (tourism, sports, entertainment industry, consulting, education, healthcare, etc. – all of these, upon closer examination, involve creating experiences).

In fact, even when selling a tangible good, we still create an impression, meaning we provide a "service of sale" rather than just selling the good itself (at least that's what Jean-Jacques Lambin, one of the classics of modern marketing management, believed[121]). The outcome of such a transaction is the impact it has on the buyer.

A form of organizing business communications that is suitable for the service economy is networks. This is network economy, which brings together agents (heterogeneous and lacking a single strategy) in a way that the economic choices of these agents, associated with adopting similar behavioral patterns or technologies, enable them to create positive external effects for each other.

A significant amount of the external benefits among agents in the network arises from learning effects. For example, standards represent network benefits, the collective commitment to which allows agents to learn from each other, adopting best practices and replicating (and sometimes jointly utilizing) effective technological and managerial solutions adapted to the circumstances.

Relations of outsourcing and a portion of the sharing economy also fall under this type of economy.

3. Economy of rights.

Many allies of modern institutionalism agree that in the contemporary economy, it's not the goods themselves that are bought and sold, but rather the rights that arise in the process of the social movement of these goods (their production, circulation, distribution, and consumption). Moreover, the bundle of rights is split, so different elements can be bought and sold separately from each other.

This is an economy in which the central commodity is rights that grant access to assets. An agent pays not for ownership of the asset itself, but for the right to ownership, for the opportunity. It's a rent-oriented economy because the seller of tights lives off the receipt of rent. Rights that grant access to assets and institutional decisions are bought and sold. For example, a license for mineral extraction represents a specific set of rights that are sold and purchased as a package, bundled together. Similarly, the rent paid for the opportunity to use certain assets also characterizes a specific level of development of the titles market.

Franchising arrangements also fall under this type of economy. It usually does not imply technological compatibility of business processes between the franchisor and the franchisee, unlike outsourcing, which typically requires a certain standardization of technologies, especially in high-tech business processes.

[121] Ref.: Lambin J.-J. Strategic Marketing. – M.: Science, 1996.

The market for quotas (for supply volume, for volume of harmful emissions, etc.) is also a market of rights. This includes the patent-licensing economy, which legalizes access to the use of technical solutions.

A significant part of the sharing economy also falls into this category, as the joint use of any resources (production or infrastructure) implies the buying and selling of rights associated with access to the use of these resources within certain restrictions of space and time (for a specified period, for example) or under certain circumstances.

Let's emphasize once again that in the market of rights, an agent pays not for the good or service they have used, but for the opportunity to use it, similar to how buying a ticket for travel or theater does not obligate an individual to use the means of transport or attend the theater at the specified time on the ticket, but creates the opportunity to do so. Exactly the same way, an agent can rent, for instance, housing or a workspace in a coworking center, but utilize the opportunities provided by the rental with varying degrees of efficiency.

The form of interaction between agents that is adequate to the economy of rights is a business platform. It is an economic entity (an independent agent or a group of them) that sustains itself by selling rights that grant access to a specific environment, within which various agents (sellers, buyers, intermediaries, advertisers, etc.) can meet their needs through interaction with each other. Therefore, platforms earn rent from agents who pay for the opportunity to "join" this platform and become part of the group of agents already interacting on its basis.

If this interaction occurs exclusively in a virtual, digital environment, then the platform that provides agents with the access to this environment is considered digital.

It's important to understand that a business ecosystem sells goods and services, while a platform only sells rights. Therefore, its revenues have a rent-based nature.

The relationship between business ecosystems and various types of institutional frameworks that facilitate the interaction of private agents is schematically represented in Fig. 1.15.

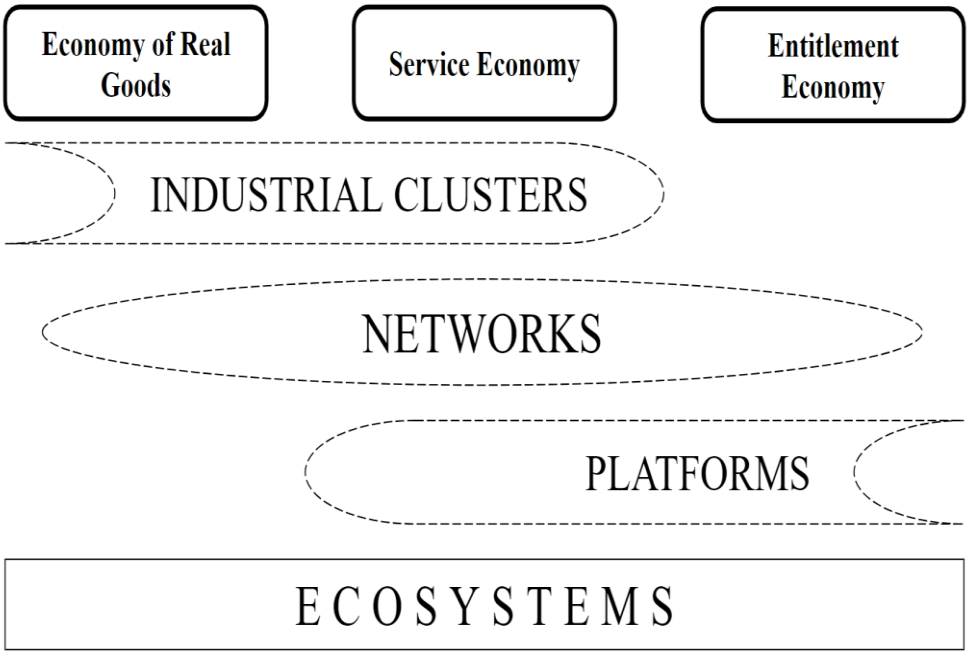

Figure 1.15. Ecosystems and other forms of agent interaction

The ecosystem, in a sense, is capable of integrating forms of business communication of different types (clusters, networks, and platforms) and adapting their actions into the tasks to be solved by this specific ecosystem. In particular, a business ecosystem enables:

- organize business communications between agents within the cluster and offer standardized algorithms for these communications;
- internalize the positive external effects created by agents within the network for each other;
- establish standards for the transfer of rights between agents within the same platform.

Conclusion

The institutional foundations on which business ecosystems operate are often characterized by the presence of a principal-agent problem because individual structural units within the ecosystem satisfy the client's needs, sometimes acting on their behalf and under their instructions, but still in their own interests.

The general principle is that both the organizational structure and culture, as well as the technologies of the firm providing goods and services, should work to satisfy the needs of the customer. In the case of business ecosystems, individual structural units typically have not only their own organizational structure but also organizational culture, and there is no need for their alignment. At the same time, the relative compatibility (or, more broadly, comparability) of technological processes allows for the integration of their efforts aimed at serving the same group of agents in various industry markets.

The ecosystem is not just the sale of individual goods or services, or even a combination of them. It's the sale of a certain lifestyle, consumption style, level of comfort in existence – demonstrated through a specific set of goods and services loosely connected to each other by the nature of the needs they satisfy and the level of technological consumption.

The structure of the section is illustrated in the resulting block diagram (Figure 1.16).

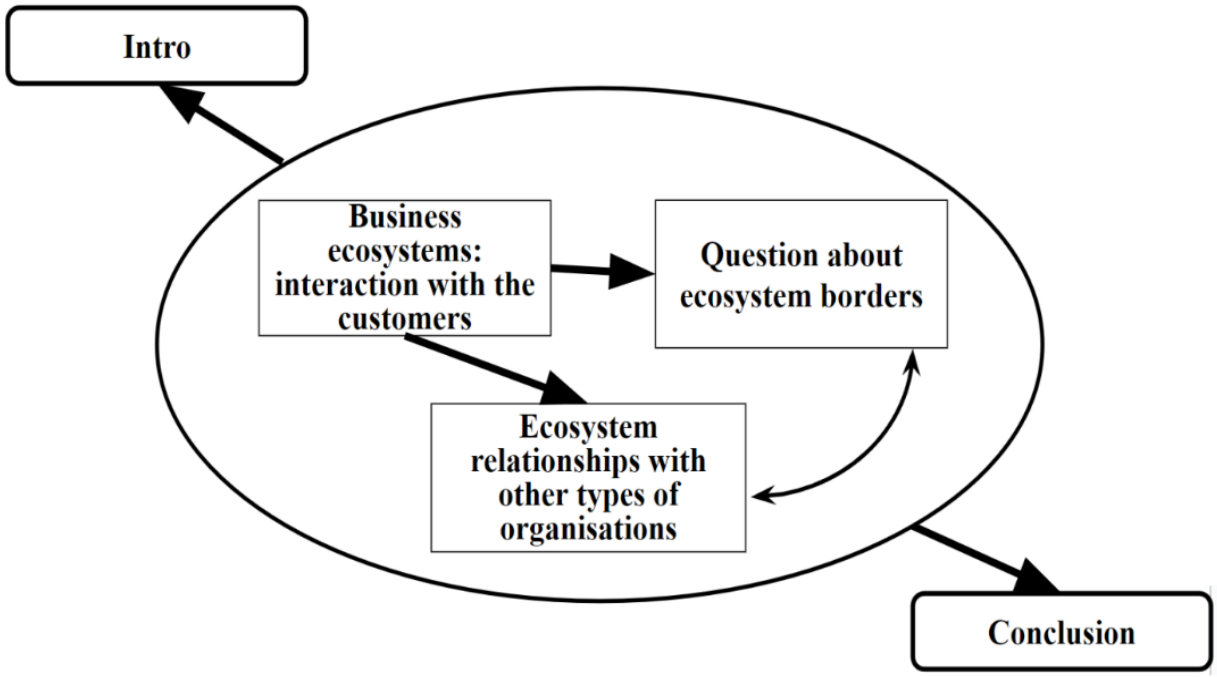

Figure 1.16. Diagram visualizing the section "Business Ecosystem as an Institutional Framework for Business Unit Interaction"

Control questions

1. What are the fundamental differences between a business ecosystem and business clusters, networks, and platforms?
2. Why might the question of boundaries for business ecosystems have different answers for different types of ecosystems?
3. Is it possible for business ecosystems to only sell rights, similar to business platforms?
4. How do business ecosystems internalize mutually created positive external effects of agents within the same network?
5. Does a business ecosystem imply the existence of unified technological standards for the business units within it?
6. In what cases and why does being part of a business ecosystem help private agents to realize their competitive potential, and in what cases and why does it prevent this?
7. Why is it relatively easy to form clusters such as nuclear power clusters in different countries on a national scale, while forming, for example, a "dental cluster" even within one municipality or local government area seems challenging?

Practical immersion material

A series of problematic situations is presented below. Try to find solutions (possibly more than one) using the methodology of developing and using business ecosystems and without its involvement.

Compare the results and the horizons at which the set goals are achieved.

1. What needs to be done to stop capital outflow from the country? Propose solutions to the problem.

2. What steps need to be taken to reduce the budget's dependence on world oil prices? Propose solutions to the problem.

3. How can the Baikal-Amur Mainline be brought to break-even? Propose solutions to the problem. 4. What is needed to create a global financial center in Russia? Propose solutions to the problem.

1.6. Ecosystem nature. Classification of existing business systems

We live in the times when the systemic restructuring of economic entities is changing the ways organizations are structured and the principles of competition among companies, erasing industry boundaries. This is happening due to the sharp rise in digitalization and the development of platforms that link various participants. These changes provide unique opportunities and challenges. Companies are increasingly creating new types of structures - business ecosystems, covering a wide range of activities and involving many different additional participants in order to gain significant competitive advantages. It is already evident that the development of ecosystems significantly changes the competitive landscape, requiring all market participants to rethink their approach to creating company's added value.

In business, an ecosystem (business ecosystem) is a structure of cooperating interdependent companies that create an integrated value proposition, in which end-users make decisions. Three key aspects are extremely important in this definition: the creation of an integrated value proposition by interdependent companies, the possible presence of additional participants in the ecosystem over which there may be limited control. The choice of ecosystem configuration is left to the consumer.

However, in the literature describing the process of building ecosystems, the term "platform" is quite often used, so it is necessary to define the relationship between platforms and ecosystems. The platform is a business model for creating interconnected structures that bring together suppliers of goods and services with consumers. Therefore, in our opinion, it is the starting point for the development of an ecosystem. As they develop and grow in size, ecosystems "accumulate" partners of various levels while maintaining key organizational characteristics of platforms: the presence of a platform owner, suppliers, and consumers. Another distinguishing feature of ecosystems is customer focus. All partnerships in ecosystems are built with the aim of creating the most comprehensive and holistic offering for customers.

Transforming a platform into an ecosystem shapes and complicates the interaction among participants. Typically, the value of the ecosystem and its key purposes are shaped by the owners and the stakeholders; they determine the formats and levels of interconnections, terms of participation in the ecosystem, and interdependencies. These are their "zones" of influence. Demand zone - are consumers, legal entities, or individuals interested in "consuming" value, utilizing the ecosystem.

Such zones may include manufacturers and partner companies.

Considering that there is currently no single classification of ecosystems, and the need to describe ecosystems as economic entities is increasing, we can consider the following classification of business ecosystems based on the levels of interaction among participants: micro-, macro-, meso-, and mega-. Table 1.2 provides examples of organizational solutions for ecosystems on different levels.

Table 1.2

Classification of ecosystems based on the level of interaction among participants

Level of Ecosystem Development	Type of organization	Examples
Micro	Partnerships that shape interaction at the company level Business hubs	Retailer supply networks: "Petrovich," "Magnit," "Perekrestok," etc. Educational and business hubs of universities (federal universities, RANEPA, HSE, Plekhanov Russian University of Economics, etc.) Macro-Industry platforms Customer-focused solutions Dom.Klik, "My Documents," Mos.ru, EMIAS, MTS, Beeline, etc.
Macro	Industry platform Client-focused solutions	Dom.Click, “My Documents”, Mos.ru, EMIAS, MTS, Beeline, etc.
Mezzo	Regional or cross-industry aggregations of micro- and macro-solutions	"Sber," "Yandex," "Tinkoff," VK, "Public Services"
Mega	International aggregations of mezzo-solutions	Amazon, Alibaba

As seen from the examples provided, various types of ecosystems establish relationships among participants at this level, but as they evolve further, they create opportunities for transitioning to the next level, thus ensuring the evolutionary development of ecosystems.

Key to the successful development of almost every modern company is understanding of the evolution of cross-industry structures as new types of organization structures that join players of various levels within ecosystems. A company must define its role within these structures and understand whether it should become a partner in someone else's ecosystem or create its own.

The most important questions become: forming a customer-focused value proposition of the ecosystem, selecting its contributing partners, and methods of management.

The contemporary notion of economic ecosystems is still evolving and undergoes a challenging path of evolutionary development – from understanding the complex nature of relationships within economic systems, transferring the model from the living nature, and creating a “living model” of the economic environment, to distinguishing the theory of general management in a separate subject of management with objects unique to particular ecosystems. In the article[122], the main patterns of forming business ecosystems in the context of transitioning to a new stage of technological revolution were examined. The characteristics of ecosystem development in the Russian Federation were analyzed,

[122] Ref.: Kulapov M.N., Pereverzeva E.I., Kirillova O.Y. Business ecosystems: definitions, typologies, development practices // Issues of innovative economics. – 2022. – T. 12 (3). – No. 3. – P. 1597–1612.

and approaches of different authors to the classification of business ecosystems were reviewed. By identifying connections with other management domains and combining various authors' approaches, three main types of ecosystems were distinguished[123], which can exist independently or transform into each other (see Figure 1.17).

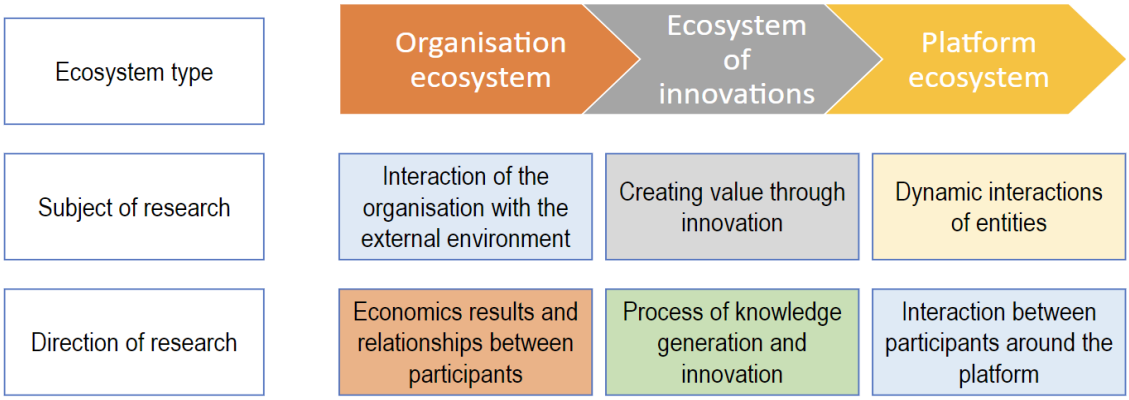

Figure 1.17. Main Types of Ecosystems and Lines in Research[124]

According to the definition by M. Jacobides[125], "ecosystems are considered as a set of economic entities of different nature, scale of activity, and level of management, interacting with each other and creating common value." They develop by forming products linked by value that address consumer needs. In this category of ecosystems, the main topic of research is focused on exploring the possibilities of developing interactions between enterprises, startups, projects, and all those who have an interest in interacting within the ecosystem. This type of ecosystem is often formed based on transactions, leveraging the opportunities of one or several players to quickly reach target user groups.

The ***innovation ecosystem*** is formed on the basis of knowledge, from which innovative solutions can be developed. It is built on collaboration, enabling the provision of comprehensive solutions to consumers. Innovation ecosystems allow for the creation of consumer-oriented products with unique value propositions. In such ecosystems, the effect is achieved not only through direct interaction between partner companies but also through the involvement of complementary companies, which contribute to complementing and shaping innovations as interconnected innovative solutions.

Ecosystems based on innovation are by their nature knowledge-based ecosystems, as they are built on ideas, know-how, or innovative developments resulting from knowledge generation, and the key players are joined by the desire to expand or complement the capabilities of the core product.

The research of knowledge ecosystems focuses on developing mechanisms for knowledge advancement and implementing innovations. As ecosystems operate based on the circulation of resource flows, knowledge serves as a key resource within these systems. It undergoes transformation from scientific research into innovations, typically complex solutions, through ecosystem interactions. This partnership offers additional advantages and serves as the foundation for ecosystem growth.

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[123] Ref.: Pereverzeva E.I. Key issues in the construction and development strategy of ecosystems // MIRBIS Bulletin. – 2022. – № 4. – C. 107–116.
[124] Ref.: same source.
[125] Ref.: Jacobides M. G., Cennamo C., Gawer A. Towards a Theory of Ecosystems // Strategic Management Journal. – 2018. – No. 8. – P. 2255–2276.

Typically, in ecosystems of this kind, data on the usage of ecosystem products by all participants is accumulated, and the primary concern might revolve around access availability or its absence for players of different levels.

Platform based echo systems are the most prominent and are often identified as ecosystems. It is within these ecosystems that knowledge-based ecosystems evolve as the number of partners grows and their interaction generates shared value. In such interactions, end-users also contribute to creating value and influence its evolution. These platforms can be both digital and comparable. The evolution model of a platform-based ecosystem relies on a structural shift, converting knowledge into innovations, essentially innovative products, thereby generating the platform's value. Ecosystem platforms define their boundaries based on the temporal dynamics scale and may operate as "semi-regulated marketplaces" or "multi-sided markets." [126]

The majority of ecosystem researchers aim to describe the principles of their creation. In the London Business School, M. Jacobides and others[127] attempted to develop a step-by-step guide - the White Paper on Ecosystem Creation. The concept was developed based on the experience of implementing consulting projects with real companies, which defined the parameters determining the success and failure of the ecosystem. However, there are no unique scenarios as contexts, situations, and values change. Therefore, Russian researchers should develop new ecosystems based on the methodological foundation developed by the London Business School, while also adding and enhancing its capabilities and describing the features that correspond to the current conditions and the features of Russia's economic development.

The guideline for creating an ecosystem is a step-by-step design process that covers all areas forming the ecosystem development strategy of the company. This approach helps to put together the right questions, make appropriate decisions, and implement the strategy effectively. Undoubtedly, this approach is interesting and applicable not only in the field of strategic planning for determining the strategic direction of development but also in shaping the structures themselves.

There are two distinct types of ecosystems: multi-product and multi-sided (often referred to as multi-actor) ecosystems. The minor difference has become a source of confusion in classifications.

Multi-product ecosystems are a format for organizing interconnected, integrated, or comprehensive products or services that represent solutions for customers. Such ecosystems are often built around a key organizer who has access to a large group of potential users. Examples of such ecosystems include Sber's ecosystem, offering a wide range of comprehensive products, Yandex's ecosystem, and many other smaller players. These ecosystems are also referred to as transaction-based ecosystems[128].

Another approach to forming ecosystems is ***multi-sided ecosystems***, where typically a network of partners creates the product. This partnership represents an alternative to using an open market, supply chains, or vertically integrated production. This type of ecosystem is based on knowledge as the foundation of technologies, know-how, and innovations, which are used to create a unique and diverse offer from those already existing on the market. An example of such an ecosystem is the capsule coffee

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[126] Ref.; Petrenko E. S., Denisov I. V., Mazhitova S. K., Dzhazykbaeva B. K., Polozhishnikova M. A. Management of entrepreneurial activity: "ecosystem" as a new representation of economic relations // Economics, entrepreneurship and law. – 2020. – No. 3. – P. 601–614.

[127] Ref.: Reeves M., Lotan H., Legrand J., Jacobides M. G. How business ecosystems rise (and often fall) // Sloan Management Review, 2019. – No. 60 (4). – P. 1-6.

[128] Ref.: Kulapov M. N., Pereverzeva E. I., Kirillova O. Yu. Business ecosystems: definitions, typologies, development practices // Issues of innovative economics. – 2022. – T. 12 (3). – № 3. – C. 1597–1612.

manufacturers, where coffee bean processing technology has led to a distinctive way of preparation and a whole range of unique products: coffee machines, capsules, and other complementary goods.

The originators of ecosystems, especially those from BigTech companies, often employ both of these approaches simultaneously. Moreover, these two types of ecosystems are interrelated in a cause-and-effect manner. The more products and services a company offers, the more challenging it becomes to cover them all, increasing the likelihood that the moderator will need to incorporate complementary companies into its orbit. Thus, the coordinator of a multi-product ecosystem will likely also require a multi-actor ecosystem for its creation. This is precisely how Google is structured, and this approach is typical for all firms in BigTech.

The stages of ecosystem development

A step-by-step guide to building ecosystems, taking into account their specifics in the Russian Federation, can be outlined as follows.

Stage One: Defining the ecosystem.

Step 1.1: Determining the scale.

One of the most important questions is how wide or narrow the ecosystem being created will be. It is necessary to decide whether there is potential to create a multi-sided ecosystem or whether it is worth considering the possibility of becoming part of a multi-product ecosystem.

Creating a multi-sided ecosystem is relevant in cases where a company has a wide range of activities and numerous offerings, as in the case of Sber's ecosystem. In such cases, a large number of activities are gathered, and multi-level participants in multi-sided ecosystems create their multi-product offerings. For companies with a limited scope of activities, they want to focus on a specific niche, it's necessary to consider the roles of partners in several or one multi-sided ecosystems. However, despite the scale and complexity, originators of ecosystem should give answers to key questions, namely:

- What role is most interesting for a company in a multi-participant ecosystem? Should it be an organizer, or is it better to be a partner (participant, complementing the value proposition)?
- What value are we offering to the end user, and what value does the company itself bring to the ecosystem?
- Which partners need to be engaged? What can interest them? How should the ecosystem be managed?
- If the company acts as a conductor, how should it determine the contribution of each ecosystem participant and establish interaction rules? If it is a partner, how to organize the cooperation with the originator(s)?
- Finally, what results does the company expect from joint activities, and how to choose KPIs to measure progress and to ensure plan execution? (Figure 1.18).

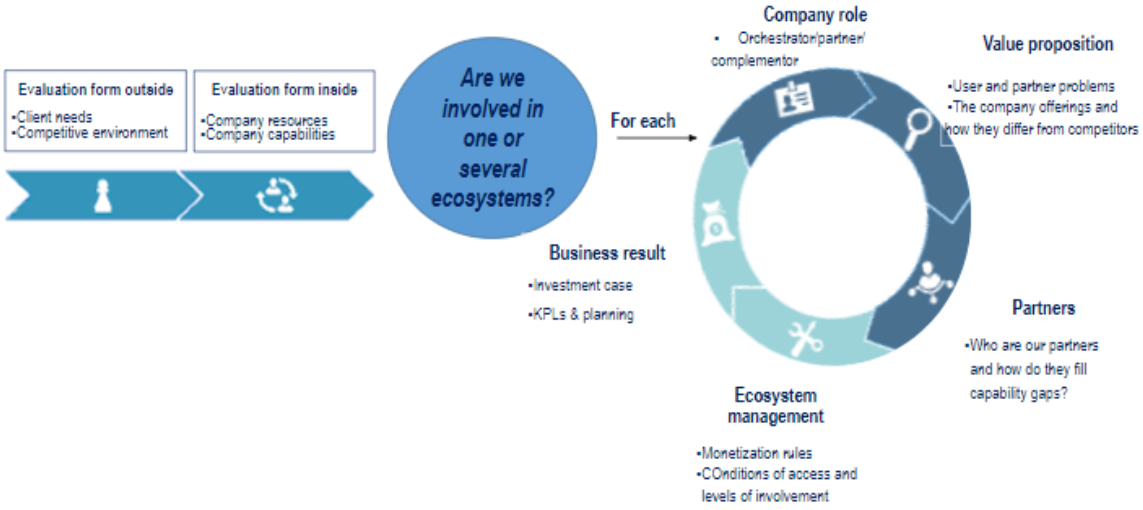

Figure 1.18. Key Questions for Building Ecosystems

Step 1.2. Defining the Scope of Activity, Competitive Landscape of the Ecosystem, and Ecosystem Structure.

The concept begins with defining the scope of the multi-product ecosystem. It consists of two stages: narrowing down the area in which the company should be active within the ecosystem and comparing it with the competitive landscape as perceived by customers and competitors.

When choosing the scope, it is necessary to determine which specific group of clients, with the most dire needs, the value proposition is being developed for. This allows focusing on the needs of the target group. For example, in the healthcare sector of Moscow during the COVID-19 pandemic, telemedicine centers were established - multi-product ecosystems aimed at meeting the needs of patients. By combining the interaction with patients, primary diagnostics, complex functional research and inpatient treatment, the system significantly enhanced patient service capabilities and enabled thousands of people to receive necessary medical assistance during the surge of epidemy. Such adapted ecosystems can create value because they respond to unmet needs.

However, what is desirable may not always be realistic. It is crucial to determine the contribution a company can make—not only as an originator but also as a potential partner or contributor. Utilizing both "inside-out" and "outside-in" analysis techniques helps to shape an understanding of the preferred extent of business growth.

Step 1.3. Determining the number of multi-actor systems in which the company can participate.

Let's consider the example of Sberbank[129], the leading financial institution in Russia, which has changed its name to "Sber '' to demonstrate its intention to transform from a bank with an ecosystem into a broader ecosystem player. Utilizing the approaches of the Chinese corporation Ant Group (WeChat) and aiming to meet all customer needs, Sber has focused on food delivery (Sberkitchen), restaurant booking (Sberfood), grocery delivery (Samokat), online healthcare (Sberhealth), logistics (Sberlogistics), car sales (SberAuto), taxi rides (CityMobil), and carsharing (YouDrive), job search (Rabota.ru), and virtual assistants (Salute). For each of these "verticals," Sber plays an unusual (and for many companies, not recommended) role as a moderator (orchestrator). Each company should

[129] Ref.: Pereverzeva E.I. Key issues in the construction and development strategy of ecosystems // MIRBIS Bulletin. – 2022. – No. 4. – P. 107–116.

analyze their multi-sided ecosystems potential, that support their value offerings and form multi-product packages.

In the field of ecosystem formation, a specific terminology has emerged, which defines the roles of participants, their functions, and the tasks they address.

Distribution of roles among ecosystem participants

The terminology used in practice for describing, analyzing, and managing ecosystems is still in the process of its shaping. Taking into account the established practices and the capabilities of the Russian language, the following role names for ecosystem participants can be suggested:

Moderator (Conductor, Orchestrator) - the organizer of the ecosystem, a company that solves the user's key task. Forms partnerships, defines participation conditions in the ecosystem. Solves the user's problems.

Partner - a participant in the process of creating value for customers, owns the process of interaction with customers, participates in the ecosystem on the orchestrator's terms, and solves a significant user task.

Complementor - complements the value proposition, contributes to solving the end user's task, creates goods and services for different ecosystems.

On Figure 1.19, the roles of ecosystem participants in solving tasks are presented.

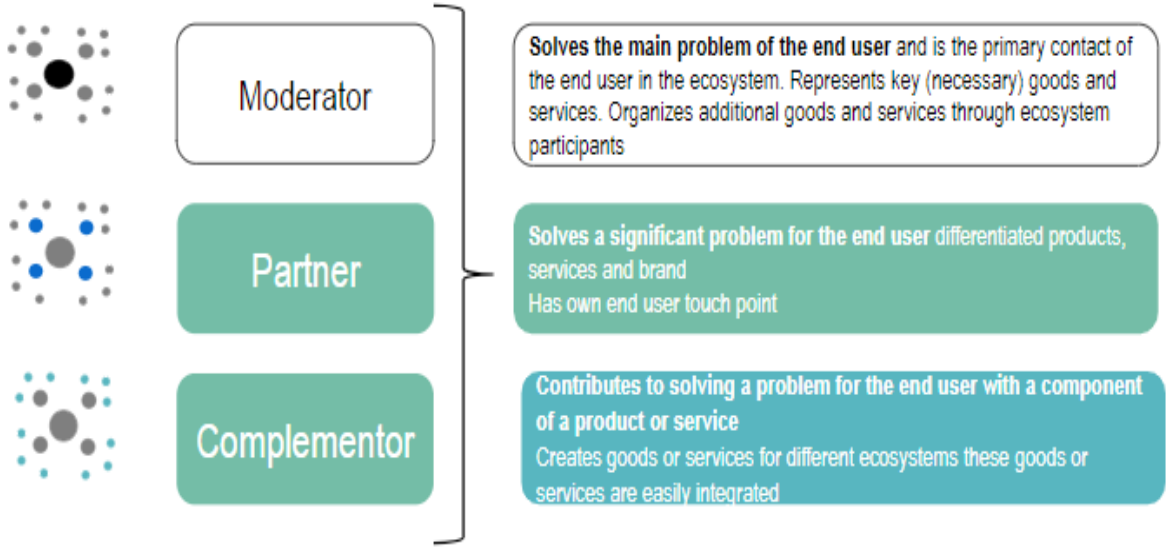

Figure 1.19. Roles of ecosystem participants[130]

When creating ecosystems, companies often consider the possibility of owning and managing only their own ecosystem, as if there is no other choice. However, it is important to carefully explore partnership opportunities, as in many cases, participating in other ecosystems as a partner—or, starting even more cautiously, as a complementor—can be a much more valuable step. It's essential to determine the best role—not necessarily the largest one. This role can be reconsidered if it proves to be too costly, complex, or risky. When forming a multi-product ecosystem, it's necessary to answer the question: "Should I organize this product pitch for the end customer or be a partner in this process?" To answer this question, we need to consider how each part of the added value should be formed: through vertical integration, traditional suppliers, or a multi-sided (multi-actor)

[130] Ref.: Jacobides M., Duke L. Haier's (2019) Ecosystem Revolution: From Rendanheyi 2.0 to Rendanheyi 3.0. – URL: https://publishing.london.edu/cases/the-haier-cases-c/

ecosystem. Large technology companies, such as "Yandex," act as organizers of both multi-product and multi-sided ecosystems. Smaller firms may choose one of these two options. For many small companies, especially startups with unique products, entering an existing ecosystem strategy may be more sustainable than building their own.

Studies indicate that companies willing to act as moderators need a distinctive resource that makes them unique in attracting both partners and customers. This could involve an existing customer base, similar to the approach employed by BigTech firms like "Yandex" and others, as well as "super apps". Alternatively, it could be a unique new offering that shapes their business model. For instance, Airbnb became famous by enabling private property owners to rent out their accommodations to users. In doing so, the company carefully addressed the needs of both hosts and guests, established a system of guarantees, and ensured quality control. This enabled the company to become a significant player in the real estate rental market, despite not owning any of the properties themselves.

Second Stage: Managing the Multi-Actor Ecosystem

The following three steps demonstrate how to bring together the ecosystem as a moderator and determine the contribution of each partner or Complementor.

Step 2.1: Developing the value proposition of the multi-actor ecosystem for both end-users and other ecosystem participants.

For example, the X5 Retail Group forms a value proposition where it offers customers access to goods through its retail centers, combining that with offering goods from partner stores. However, on the other hand, the company also creates its own value proposition for store owners, utilizing both physical and digital capabilities, shaping a business model: "reward at the retail center level," as they should be interested in being present in this space. Utilizing such a dual-metric system enables maintaining the strategic focus of the ecosystem, identifying problem spots that the ecosystem can address for the end user, developing value propositions for stakeholders, and encouraging potential loyalty among end consumers. Direct or indirect network interactions contribute to this, through which ecosystem members assess the presence of other participants, helping to retain customers during growth and leading to a breaking point. Direct network effects occur when an ecosystem participant values the presence of other members (for example, in Sber's "Dom.Click" service, various businesses' services are joined together to solve a complex customer task - purchasing real estate). Indirect network effects arise in the context of multi-sided platforms, where each ecosystem participant benefits from the presence of other participants.

Network effects emerge as ecosystems expand and members within the ecosystem impact each other. These effects may be observed at regional or sub-market levels rather than globally. It is essential for ecosystem owners and organizers (moderators) to comprehend their mechanics and methods to enhance them, as this can fortify the ecosystem's developmental strategy.

Step 2.2. Determining the company's capabilities and levels of its relationship with partners.

To become a partner of the ecosystem, it is necessary to consider what skills, resources, products, and opportunities are required by this ecosystem. Which companies can become partners and how to attract and motivate them to participate in the ecosystem? It is important to carefully consider the partner selection process, to work out incentives for them, and make a plan for engaging and developing partners. Much depends on the scale of the ecosystem, as well as whether the ecosystem is local, multinational, national, or global.

Step 2.3. Ecosystem Management.

It is necessary to establish rules and management roles for the ecosystem, which can describe the principles of its functioning, the distribution of decision-making rights, processes based on trust, selection, and purchase by stakeholders. This is an important area that has only recently attracted the attention of researchers.

Some interesting research on ecosystem management comes from the field of information technology, which has focused on managing software ecosystems; many approaches and attributes have been adopted from this area.

Managing any organization or group of organizations requires tools for monitoring the economic "health" of the whole ecosystem, which means it should have a specific set of indicators that, in turn, must be adapted to the set of goals and the specific position of the company. This is crucial if the company is initiating the creation of an ecosystem. This is also important for the partner or complimentary to ensure that the process guides the participating strategy. To shape the key meanings of interaction within the ecosystem, it's necessary to frame approaches that can form the basis for action plans.

Step 2.4. Translating the strategic intent into measurable objectives and organizational change.

Once the ecosystem creation plan is drafted, it is necessary to revisit the question: "What do we expect from the ecosystem we're building? What benefits do we hope to achieve?" This needs to be done for two reasons. First, to translate expected strategic benefits into tangible outcomes that can serve as a reality check. Special attention should be paid to the potential benefits monetization, as well as the ability to access customers, which is directly related to the efficiency of the entire ecosystem. Additionally, it is important to specify ecosystem performance indicators - key metrics that will indicate whether the organization is achieving its goals.

The goals of ecosystem development and its performance indicators will change and evolve over the lifecycle. However, it is important to develop measures to assess the contribution of the ecosystem and identify parameters that need to be tracked. It is also necessary to highlight the changes that the organization needs to make. The challenge lies in the fact that ecosystem development requires a much more flexible and adaptive organization than normally established, especially for non-digital companies with slower response times and more closed processes.

An interesting example is the company Haier, a leading manufacturer of home appliances[131], which demonstrates how restructuring a company that produces hobs and other household appliances created a "microenterprise ecosystem communities" from the bottom up. This required efforts to restructure the company aimed at driving innovation, including structural and organizational changes. Thus, transitioning to an ecosystem model may require significant changes in the company's structure and management style.

Forming an ecosystem is an iterative process. After completing a certain stage, it's important to take a step back and ask: "Now, based on what we know, do we consider this the best development option?" By using interim control approaches and evaluating efficiency, it is possible to shape a well-organized ecosystem with interconnected and complementary partners and contributors. Using the suggested framework in this way allows for the development of a strategy that can be reviewed as the environment changes.

Ecosystem strategy as a roadmap for company transformation (key findings)

The term "ecosystem" in the context of the economic practices of business entities raises many questions regarding its definition, place, composition, and role as an object

[131] Ref.: Tansley A. G. The Use and Abuse of Vegetational Concept and Terms // Ecology. – 1935. – Vol. 16. – P. 284–307.

of management. However, these integrative structures in business are becoming a practical reality, and science must find answers to the challenges associated with managing them. To navigate the landscape of new organizational structures effectively, science needs a common language, standard tools, and proven advanced approaches. Working out the terminology, classifications, and typologies of ecosystems is one of the most pressing tasks in contemporary management. Creating universal definitions to capture the distinctive features of different ecosystem types, including the distinction between multi-product and multi-sided ecosystems, will enable the developing of four distinct positioning strategies for multi-product ecosystems:

1) "Tabula rasa" (starting from scratch) - Wildberries;
2) Head-on (direct confrontation);
3) Unbundling (segmentation) - Sber, Yandex;
4) Enveloping (surrounding).

It is important to emphasize the importance of complementing the analysis "outside in" with work "inside out" on the company's "anchors". Equally interesting is the study of the interconnections and mutual transformation of multi-product and multi-sided ecosystems.

When forming ecosystems, it is crucial to choose the role that the organization should play within the ecosystem – whether it's a moderator (conductor, organizer), a partner, or a complementor. Each multi- stakeholder ecosystem requires due diligence to address the dual value proposition (end customer and partner), a process for selecting and developing partnerships, ecosystem management practices, metrics benefits, performance indicators, and organizational change requirements.

A theoretically grounded and practically tested strategy for developing ecosystems as mutually beneficial partnerships based on digital platforms enables a company to gain effective competitive advantage in a complex and evolving world on the principles of sustainable development.

The structure of the section is presented in Table 1.3.

Table 1.3.

Visualization diagram of the chapter “Ecosystem nature. Classification of existing business systems"

Name of the section	Review questions	Practical immersion material
Classification: - ecosystems of organizations; - ecosystems of innovation; - platform ecosystems	What are the characteristics of organizational ecosystems? How are innovation ecosystems different? What are the benefits of innovation-based ecosystems? How are platform ecosystems evolving?	
Multi-product and multi-actor ecosystems	What are the differences between multi-product and multi-actor ecosystems?	Give examples of multi-product and multi-actor systems within the Sber ecosystem
Roles of ecosystem participants	Describe the roles of ecosystem participants: moderator	*Business game* Divide the participants into three groups. Read case X5.

	(conductor), partner, Complementor. How to determine what role should be formed in the ecosystem?	1st group: it is necessary to describe the role of the moderator of the X5 ecosystem; Group 2: describe the role of ecosystem partners; Group 3: describe the role of complementors
Review of ecosystem strategies	What are the four strategies of multi-product ecosystems that you know?	Based on data from open sources, describe the ecosystem development strategy of Wildberries, Sber, Gazpromneft

Control questions

1. What classifications of ecosystems do you know? Name the main types and provide examples of ecosystems for each type.
2. What stages of creating ecosystems process do you know? Provide an example of an existing ecosystem and describe the roles of its key players.
3. How can a small business integrate into the existing ecosystem? Describe possible course of actions and the role that such a project could involve.
4. What ecosystem development strategies do you know? Provide examples.
5. Describe the key advantages of ecosystems compared to the traditional vertical organizational structures of companies. What are the pros and cons of the ecosystem approach?

Practical immersion material

Case X5 Retail Group

From supermarket to ecosystem: the revolution of domestic retail

Ultimately, all stores, all online delivery systems, along with their warehouses, drivers, accountants, programmers, managers, and innovators, follow demands of the human, the buyer. And the buyer is evolving, influenced by new technologies as well. For instance, the pandemic has forcefully pushed this buyer into the online ordering system. Another new trend - thanks to numerous services, the line between a store and a café is rapidly vanishing. In a big city, a restaurant meal will be delivered to your home as quickly as a basket of groceries. However, in any good store, you will be offered a full range of take away soups, cutlets, and salads. Everything is heading towards a single market - a large food market, which includes both ready-made meals and those that are yet to be cooked.

“We can no longer think about the customer from the perspective of sales channels. Because it's a very dangerous perspective in the modern world," says Vladimir Salahutdinov, Director of Strategic Development at X5 Retail Group. "Before, we knew that these customers came through online channels, and the other ones - through physical stores. Now, a person comes to the store, buys, for example, yogurt, but we can no longer say that this is an offline customer. Why? Because it is likely that before that, he spent a couple of hours on social media, saw what Yulia Vysotskaya recommends, read about

which diet is healthier, and how much fat should be in yogurt. He researched the specific dairy manufacturer. And only then did he come to the store and pick up the yogurt.

So, there's only one solution – to meet the customer at the beginning of his journey and bring him to your store, not to the competitor's. And ”at the beginning” means in the digital environment. That's why X5 is preparing to launch a media platform of informational and entertaining nature about food.

There will be recipes, blogs, celebrities, because nowadays if a well-known person writes in their blog about the benefits of a specific product, it will sell better. We will also develop selection services. The aggregator 'Okolo' already combines food from different suppliers, perhaps in the future it will add products from other retailers. Eventually, in the next 5-10 years, all players will have a choice: either to join external aggregators or to create their own.

X5 has a logic for building the customer journey, based on the food path. The idea is to allow the customer to go through the entire process from food selection to home delivery, and to receive related services without leaving the company's ecosystem. However, X5 is not very concerned about the lack of a single definition. In addition to the mentioned media platform, which according to the company's plan will meet the customer at the beginning of their customer journey, X5 is working on launching its own financial service so that the customer completes their journey within the framework of one company.

If we look back into 2020 where the X5 ecosystem started - the 'Okolo' delivery service is launched and couriers with salmon-colored boxes already deliver products from 'Pyaterochka' and 'Perekrestok' in large cities.

But we do not aim to become a courier company. All these people with boxes are self-employed workers or small courier companies. Essentially, the company operates here as a platform. Soon, the product range will expand, and through 'Okolo' delivery, you will be able to order products from partners, and even, probably, competitors. It is important not to deceive ourselves; in today's digital world, we cannot convince the customer not to use another store if they constantly buy something there. But we can add them to our service so that they order products through us.

The first in line to be added to "Okolo" are fast-food restaurants. In fact, some of them already collaborate with the service. One of them, the online food court "a lot of Salmon" even became part of X5 and was essentially acquired by the company. This allowed them to effectively enter the restaurant segment through the “dark kitchen format” (being food service networks focused solely on delivery without a dining area for visitors).

In some cases, these digital systems can afford more than X5, which only sells products. Therefore, X5's services should improve the interaction between the consumer and X5 to capture more of the consumer's attention. Without this, long-term development is impossible because today, there are hundreds of thousands of applications at the click of each individual and those that make it to the first two at the screens of a smartphone are the ones that are used. "Pyaterochka" already has about 10 million app users. Plus, there are several million users of the "Perekrestok" app. This is significant traffic, comparable to that of "Yandex".

X5 has two competitive advantages. Firstly, there are about 70-80 million people who shop at the network's stores, which is approximately 15 million people per day. Secondly, we have well-known brands with a wide range of loyal customers. Therefore online and offline are becoming closer to each other.

Finally, X5 has a huge infrastructure - 17 thousand of retail stores, which can cover the full cycle of the purchasing process and be a point of contact for customers. And based on regular stores, there is always an opportunity to offer people something new, to play on a completely different field. Igor Pletnev saw one such opportunity, at that time - the director of strategic business development at X5, and that's how the “5 Post” project for delivery of parcels through "Pyaterochka" and "Perekrestok" stores came up.

About 70% of Russia's population lives within 1km away from X5 stores," explains Pletnev. "At the same time, X5 has its own logistics. And we decided to develop postal services - to release parcels at the cash registers. The postal service handles 2 million parcels per day. Of these, 90% are goods from China. People specifically go to post offices to get them. And they already visit our stores once every three days. At the same time, our trucks are underutilized in terms of volume by 30%, so we could transfer parcels in them. The cargo is lightweight but bulky, making it convenient to place it on top of groceries in the car. Sorting points for parcels were organized at the distribution centers of "Pyaterochka." Agreements were made to collaborate with Ozon and AliExpress. Postamats were installed at the checkout counters in many stores. In other stores, parcels are simply handed out at the checkout. In total, 16.5 thousand retail outlets are already participating in the project.

In 2020, 5 Post delivered 8.6 million parcels. In April 2021, around 70 thousand parcels per day were handed out at the cash registers of "Pyaterochka" stores. Meanwhile, "Russian Post" started selling long-term storage products in their branches. In the era of ecosystems, the difference between a supermarket and a postal office is not that big.

1.7. The knowledge component as the core of forming an ecosystem in modern business

Modern business differs significantly in its structure from the realities that existed just a couple of decades ago. This phenomenon is largely driven by the development of modern information and communication systems, primarily the Internet. Information technologies, which have become dominant in almost all areas of human life, including entrepreneurship, have opened up a wide range of possibilities for transforming business processes.

One of the most actively developing approaches in the transformation of new business processes is the formation of ecosystems. In this work, the author examines the concept and the background for the emergence of ecosystems as one of the newest approaches to business development. The main features of this phenomenon as a business ecosystem are highlighted. The factors of origination and development of business ecosystems are presented and described, and the role of the knowledge component in the development of modern business ecosystems is analyzed.

Today, we can observe an active process of business development both domestically and globally. While in the past, the key direction of business development was the search for new types of products and new markets, today we increasingly see entrepreneurship moving towards the new business models rather than market expansion.

On the one hand, this approach is enforced by the rapid development of information technologies and their involvement in all areas of economic activity, as well as the increasing role of information and knowledge. On the other hand, modern entrepreneurs understand that building new business models is a much more promising and sustainable approach to development compared to previously used ones. However, the trend towards developing and implementing new business models does not mean that new types of products and services are not being developed today. On the contrary, these processes are happening in parallel with the development of entirely new business models.

In the light of ongoing business processes, the concept of "ecosystem" is becoming increasingly popular. The term "ecosystem" was first used in print by G. Tansley in 1935 and referred to as the description of basic units of nature with various types and sizes[132]. Later, the scientist described an ecosystem as a "recognizable autonomous entity," thereby distinguishing this concept as an independent subject for research[133]. In the second half of the XX century, the ecosystem concept became dominant in environmental research, and basic principles of functioning of ecosystems, their characteristics and patterns of development were determined[134]. Social sciences turned to the concept of ecosystem as a possible model for economic development at the end of the last century when they began to consider the global economy as a unified whole, in which organizations and consumers are living organisms[135]. In management, the concept of ecosystems was actively discussed in research that combined systemic thinking and evolutionary economy[136]. Modern management was first of all looking for the opportunity of using self organizing features of the natural ecosystem to ensure sustainable

[132] Ref.: Tansley A. G. The British Islands and their Vegetation. – Cambridge : Cambridge University Press, 1939.
[133] Ref.: Willis A. J. The Ecosystem: an Evolving Concept // Functional Ecology. – 1997. – Vol. 11. – Iss. 2. – P. 268–271.
[134] Ref.: Rotschild M. Bionomics: Economy as Ecosystem. – N. Y. : Henry Holt and Co., 1990.
[135] Ref.: Moore J. F. Predators and Prey: a New Ecology of Competition // Harvard Business Review. – 1993. – Vol. 71. – Iss. 3. – P. 75–86.
[136] Ref.: Briscoe G., Sadedin S. Natural Science Paradigms // Digital Business Ecosystems: the Results and the Perspectives of the Digital Business Ecosystem Research and Development Activities in FP6 / ed. by F. Nachira et al. Luxembourg : European Commission, 2007. – P. 48–55.

development and resistance to adverse external influences[137]. The alignment of the ecological approach and business development modeling occurred based on the development of a systemic approach as the basis for studying socio-economic phenomena.

During the development of the systemic approach in science, the concept of a complex system was refined, which most closely corresponds to the characteristics of an ecosystem both in living nature and in socio-economic relations.

Each ecosystem is considered as a self-organizing, self-regulating, and self-developing system. The main characteristic of an ecosystem is the presence of relatively closed, spatially and temporally stable flows of resources. An ecosystem is open and characterized by input and output flows which make the basis of the system's existence.

Currently, there is no single terminology for defining ecosystems in economics. An ecosystem is defined both as "collaboration between companies, where individual product offers are combined into a coordinated, customer-oriented solution"[138] and as "a self-organizing, highly adaptive, territorially restricted network complex within the framework of the natural, institutional, social, and political environment, incorporating freely cooperating, interacting, and influencing elements such as organizations, processes, projects, and services."[139]

In essence, an ecosystem is a community of diverse elements that actively interact with each other and form a single living space.

However, as modern economic relationships evolve, the concept of ecosystems has expanded to other areas of life as well. Today, there are large companies that offer the population a wide range of different goods and services, each of them can be considered as a separate type of economic activity. At the same time, this offered range is closely interconnected, causing the development of interdependence (such as the production of software for digital devices and the development of digital platforms for the implementation of such software products). In order to balance and maximize the efficiency of such progress, enterprise leaders are establishing modern business ecosystems, which are complex systems that combine the productive and implementing functions of companies.

The concept of ecosystems was first introduced to the business community by James Moore[140], who proposed to distinguish an ecosystem as "an economic community supported by a network of interacting organizations and individuals."

According to the concept put forward by James Moore in one of his early works dedicated to the emergence of ecosystems in the economy, competition began to take on new forms. Instead of direct rivalry, companies tend towards mutually beneficial cooperation. In this context, companies are viewed not as part of a specific industry or economic sector, but as elements of a single ecosystem incorporating at the intersection of multiple businesses. For illustration, we can look at the example of the domestic company "Yandex".

The company "Yandex" was launched in 1997 and initially focused on the development and implementation of a search engine system on the Internet, operating

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[137] Ref.: Adner R. Match your Innovation Strategy to your Innovation Ecosystem // Harvard Business Review. – 2006. – Vol. 84. – Iss. 4. – P. 98.

[138] Ref.: Popov E.V., Simonova V.L., Chelak I.P. Typology of models of regional innovation ecosystems // Regional Economics: Theory and Practice. – 2020. – No. 7 (478). – C. 1336

[139] Ref..: Moore J. Predators and Prey: a New Ecology of Competition // Harvard Business Review. – 1993. – Vol. 71. – Iss. 3. – P. 75–86.

[140] Ref.: Markova V.D., Kuznetsova S.A. Ecosystems as an innovative tool for business growth // EKO. – 2021. – No. 8 (566) – URL: https://cyberleninka.ru/article/n/ ekosistemy-kak-innovatsionnyy-instrument-rosta-biznesa (ref date: 03.05.2023).

solely within the Internet domain. Today, "Yandex" is a large multinational corporation that includes a wide range of companies from completely different sectors of the economy: "Kinopoisk" (Film industry), "Yandex Taxi" (Taxi), "Yandex Drive" (Car sharing), "Yandex Business" (Advertising), "Yandex Market" (Marketing and trade), "Yandex Maps" (Cartography), and others.

All the above companies are integrated into a single ecosystem and expand thanks to each other. Although some of these companies may be competitors, albeit indirectly (for example, "Yandex Taxi" and "Yandex Drive").

Today, there is no universally accepted definition of an ecosystem in business. V.D. Markova and S.A. Kuznetsova define a business ecosystem as a new tool for business development in an unstable external environment with a focus on comprehensive satisfaction of customer needs through a "single window" approach, supported by a constant flow of innovations[141].

Other authors, such as O.M. Kulikova and S.D. Suvorova view the ecosystem as a new business format based on cooperation among companies in collecting and exchanging information. This alliance facilitates the emergence of new opportunities, allowing entry into the markets with minimal costs and establishing effective combinations of resources and innovative products[142].

According to academician Kalandar Abdurakhmanov, a business ecosystem represents a specific type of network structure with the following characteristics:

- Presence of a specific core (foundation) of the ecosystem, often represented by a platform or platform technology combining various components;
- Presence of different types of agents (multi-agent community).
- Special architecture of the ecosystem. Vertically oriented platform is aimed at one industry, while horizontally oriented platform targets several market sectors;
- Set of standardized rules governing the functioning of the ecosystem.

From the many authors' definitions of the concepts of business ecosystems appearing in the scientific space, several main aspects can be identified. Firstly, modern ecosystems developing in business can be attributed to entirely new phenomena that were not previously encountered in entrepreneurship. This is primarily due to the development of information technologies and their adaptation to business conduct. Consequently, the development of modern digital technologies will directly correlate the evolution of ecosystems in business and entrepreneurship in the long term. Therefore, some researchers, including Salim Ismail, argue that the future of the economy lies in platform businesses[143].

Secondly, an ecosystem implies interaction between various structural divisions within a single large company, as well as different companies within a single platform. This means that consumers will be able to purchase various goods and services through a "single window" approach, using one platform. Such an approach introduces challenges to shaping the competitive policies of enterprises. Whereas previously companies competed directly by offering identical goods and services, now there is a need to compete by promoting complementary types of goods and services.

Thirdly, the development of ecosystems assumes an increasing role of information and knowledge in sales. We live in the era of the Internet of Things, where massive

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[141] Ref.: Kulikova O. M. Ecosystem: a new format of modern business / O. M. Kulikova, S. D. Suvorova // Bulletin of the Academy of Knowledge – 2021. – № 42 (1). – C. 200–205. – DOI 10.24412/2304-6139-2021-10909

[142] Ref.: Ismail S., Malone M., Geest Y. Explosive growth: why exponential organizations are tens of times more productive than yours (and what to do about it). – M.: Alpina Publisher, 2017.

[143] Ref.: History of Internet of things. – URL: https://www.sap.com/cis/products/artificial-intelligence/what-is-iot-internet-of-things

volumes of data reflecting the behavior of potential consumers is generated daily. The task for companies in this case is to use tools for accumulating and processing this data to obtain insights for helping management decisions. For example, in 2021, there were over 10 billion Internet of Things devices worldwide, and by 2025, according to IDC forecasts, the global data generation volume will exceed 73 zettabytes, or 73 trillion gigabytes[144]. This once again confirms the important role of the knowledge component in the development of business ecosystems.

Based on the above, it can be argued that the development of a modern business ecosystem is impossible without several specific components, among which we can highlight: information, knowledge, technology, and the Internet.

Modern large companies have highly developed ecosystems. With Google, Apple, and Amazon standing out amongst such companies. On the Russian market we have "Yandex," "Sber," "Tinkoff," and others. Each of the listed companies has built a sufficiently developed ecosystem over a relatively short period by integrating a wide range of diverse services, providing various services and goods to the general public. However, it is necessary to note that a particularly significant success of the ecosystem development of these companies is the development of a business ecosystem that to the greatest possible extent meets the demands of society and consumers. Hence, we see that the biggest success has been achieved by those companies that quickly adapted their capabilities to the needs of the population: ensuring comfort (Yandex, Apple, Google), security (Sber, BMW), providing food products (Sber, Yandex), medicines (Sber), and all necessary life technologies (Google, Apple, etc.).

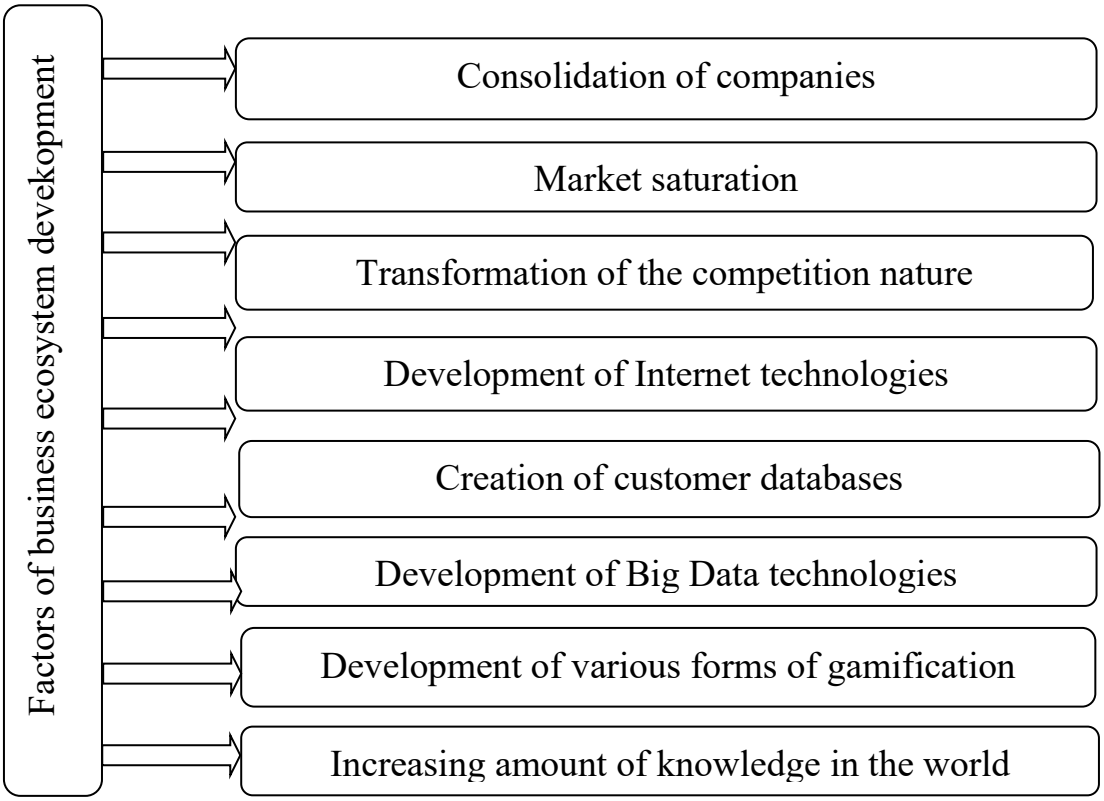

Figure 1.20. Factors of business ecosystem development

[144] Ref.: Schwab K. The Fourth Industrial Revolution: monograph / translation from English – M. :Publishing house «E», 2017.

These results would have been impossible to gain if companies ignored the importance of analyzing the knowledge obtained from data processing. Knowledge, acquired from all participants in business ecosystems, serves as the foundation for all levels of planning further development of business ecosystems. In conjunction with a range of factors affecting the development of modern business ecosystems, the knowledge component shapes the future vector of ecosystem development as a phenomenon in entrepreneurship overall. The emergence of business ecosystems in the context of the development of digital technologies and internet communications is primarily triggered by a certain set of factors, the most significant of which are reflected in Figure 1.20. Let's look at them in more detail.

Company consolidation: Today, there is a trend of consolidating small enterprises operating within the same segment into groups of companies, syndicates, etc. Large companies also seek to acquire smaller enterprises. This particularly applies to companies with high innovation potential (pharmaceutical manufacturers, IT, etc.). Consequently, the consolidation of companies entails expanding the capabilities of enterprises and diversifying the range of products and services they offer. To leverage their potential more effectively, companies form business ecosystems.

Market saturation. The total number of producers in the markets is increasing. Every day, new companies emerge and disappear, offering similar types of goods and services. Consequently, markets become saturated with various types of products, leading manufacturers to either seek new types of goods and services for production or focus their efforts on new approaches to organizing business processes. In this case, the ecosystem is considered as a phenomenon that has emerged in response to the prevailing circumstances, whereby the focus of entrepreneurs has shifted from new products to new approaches in organizing business.

Transformation of competition format. This factor is closely related to the factor mentioned above and represents its logical consequences. The rising number of various producers has led to certain changes in the nature of competition. While in the past, the main levers were price and quality, now companies start focusing more on service provided. This implies that companies, which previously relied on enhancing the quality of their product and reducing costs, are now selling advanced service that supports products they produce.

The development of internet technologies. The emergence of the Internet itself was the starting point for a huge number of changes that took place in the economy. The advent of the Internet is considered the "fourth industrial revolution,"[145] leading to a significant leap in the development of economic processes. The key results of the development of internet communications are - globalization processes, vanishing of geographical, financial, cultural, and linguistic barriers in communication between producers and consumers, which provide great opportunities for the development of new forms of business processes. Hence, the development of business ecosystems largely relies on the Internet.

Given the spread and ease of internet access among the population, many commercial transactions have shifted to the virtual realm. Just in 2021 alone (according to data from the analytical company Kepios), the number of internet users in Russia increased by almost 5%, and this trend remains stable[146].

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[145] Ref.: Digital trends in Russia in 2022 : Report «Digital 2022 Russian Federation». – URL: https://cpa.rip/stati/digital-2022-russian-federation/

[146] Ref.: Moore James. Predators and Prey: A New Ecology of Competition // Harvard Business Review. – 1993. – No. 71. – P. 75–86.

Building of customer databases is becoming increasingly significant in the context of the above. The use of communication technologies in business has greatly expanded the possibilities for creating customer databases, which can also be expanded through the acquisition of additional data from external companies. With extended customer data and the availability of internet technologies resources the most effective approach is to integrate this data into new business models. In this context, ecosystems represent one of the most suitable forms of interaction between companies and potential consumers.

Development of Big Data technologies. The term "Big Data" itself means large volumes of data. There is no single understanding of the term "Big Data." However, this technology has two distinctive features: firstly, the ability to integrate data from different sources, and secondly, the emergence of fundamentally new methods of analyzing large datasets. Therefore, when it comes to the development of modern business ecosystems, one of the main drivers of this approach to business organization is precisely Big Data technology, which significantly expands the speed and volume of processing unstructured information. This is particularly relevant for large companies operating in a wide range of industries.

Development of various forms of gamification. Gamification today is an integral element of the development of modern digital platforms. The competition for consumer attention assumes the implementation of innovative forms of interaction between companies and potential consumers. One of them is the creation of gaming interactions between the producer and the consumer, and this approach is one of the most effective within the framework of business ecosystem development.

The increased amount of knowledge in the world. The volume of knowledge generated in society tends to constantly increase in volume. This phenomenon was first noted and described in the second half of the XX century and was called the information explosion (D.A. Ursul)

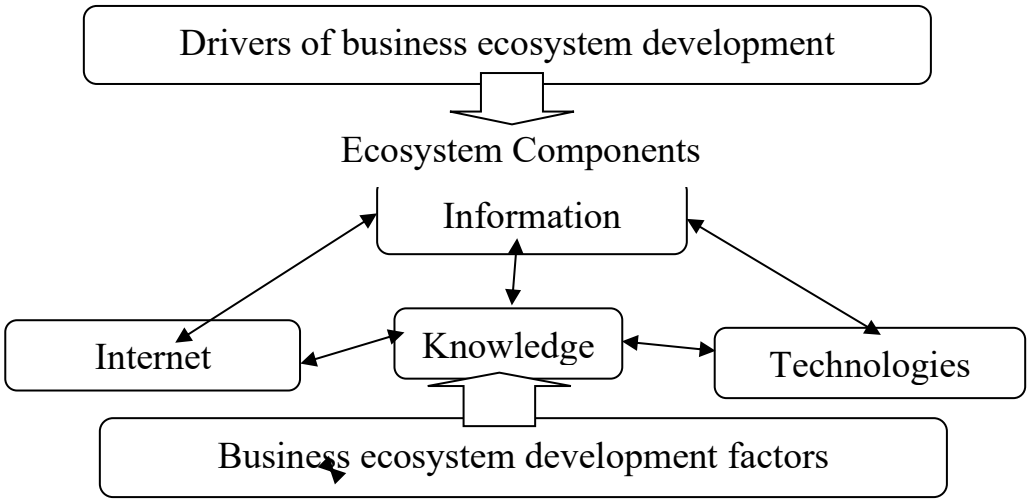


Figure 1.21 development, model of a modern business ecosystem

The information and knowledge environment, in which business ecosystems develop, involves utilizing the volumes of generated information to maximize the efficiency of new business models. This means that the volumes of data generated in society daily are processed using Big Data technologies to extract useful information regarding the overall behavioral patterns of consumers at the present moment. This means that the main subject for analysis is the informational footprint left by each individual Internet user.

Based on the above, we can suggest a model for the development of modern business ecosystems (Figure 1.21)

As seen from the above figure, the key components of modern business ecosystems include information, digital technologies, the Internet with a special emphasis on the knowledge component. This is because modern ecosystems progress and develop over time through the acquisition of knowledge.

The development of modern ecosystems is significantly influenced by factors described in detail earlier in the chapter.

Among the drivers of business ecosystem development are: enterprise development strategy, corporate culture, investment volumes, as well as the internal and external conditions of the company on which the ecosystem is based.

As mentioned earlier, an ecosystem is formed through the interaction of multiple companies or multiple divisions of one company. To better understand the process of ecosystem development in entrepreneurship, let's visualize this process (Figure 1.22).

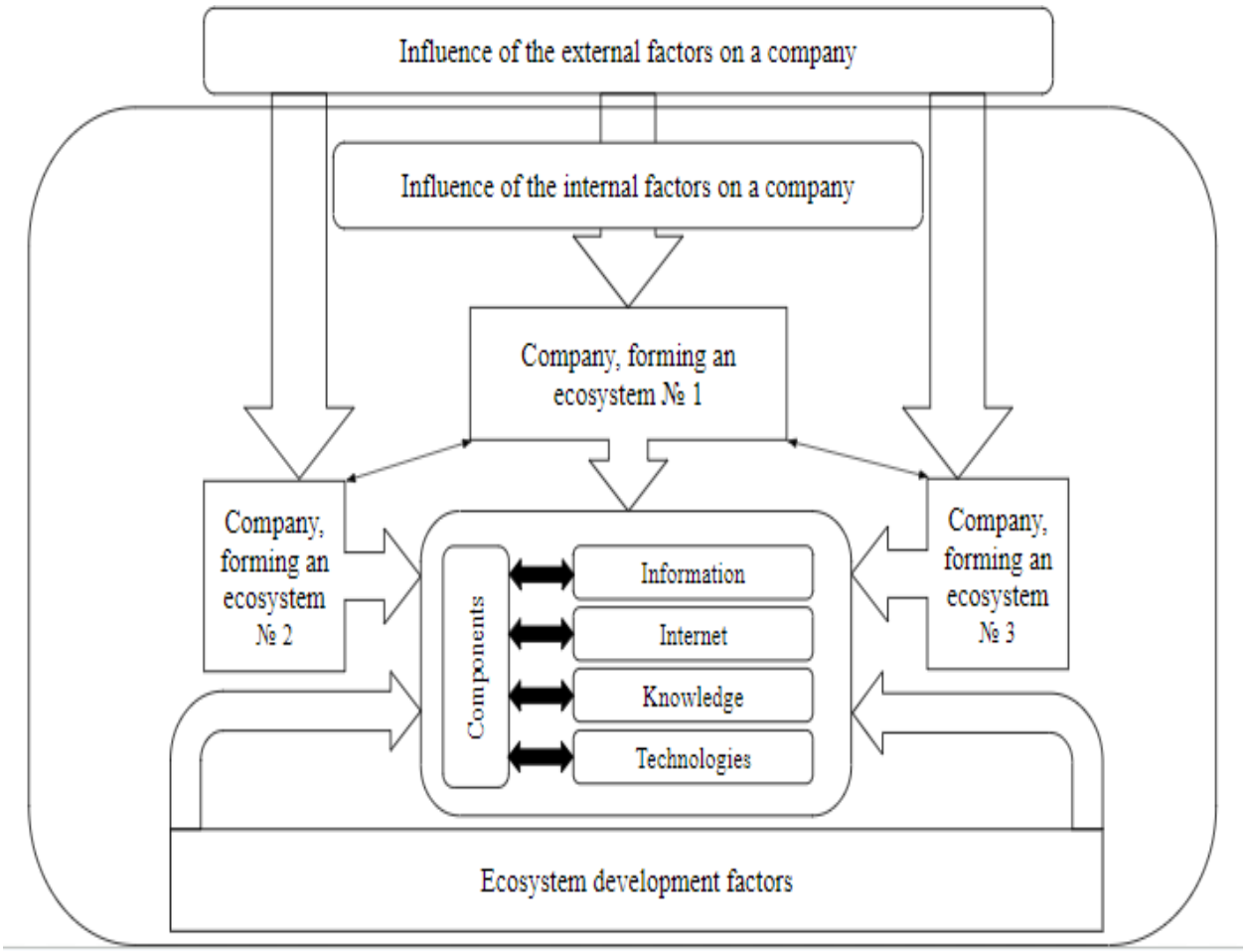


Figure 1.22 Development of a modern business ecosystem

From the diagram, it is evident that a certain platform is formed through the synergistic effect of various interacting components (such as information, the Internet, knowledge, and technologies), which progress under the influence of ecosystem development factors. Each enterprise or individual division of a large enterprise may also undergo changes due to the influence of external and internal environmental factors.

Summarizing this, we can make several conclusions:

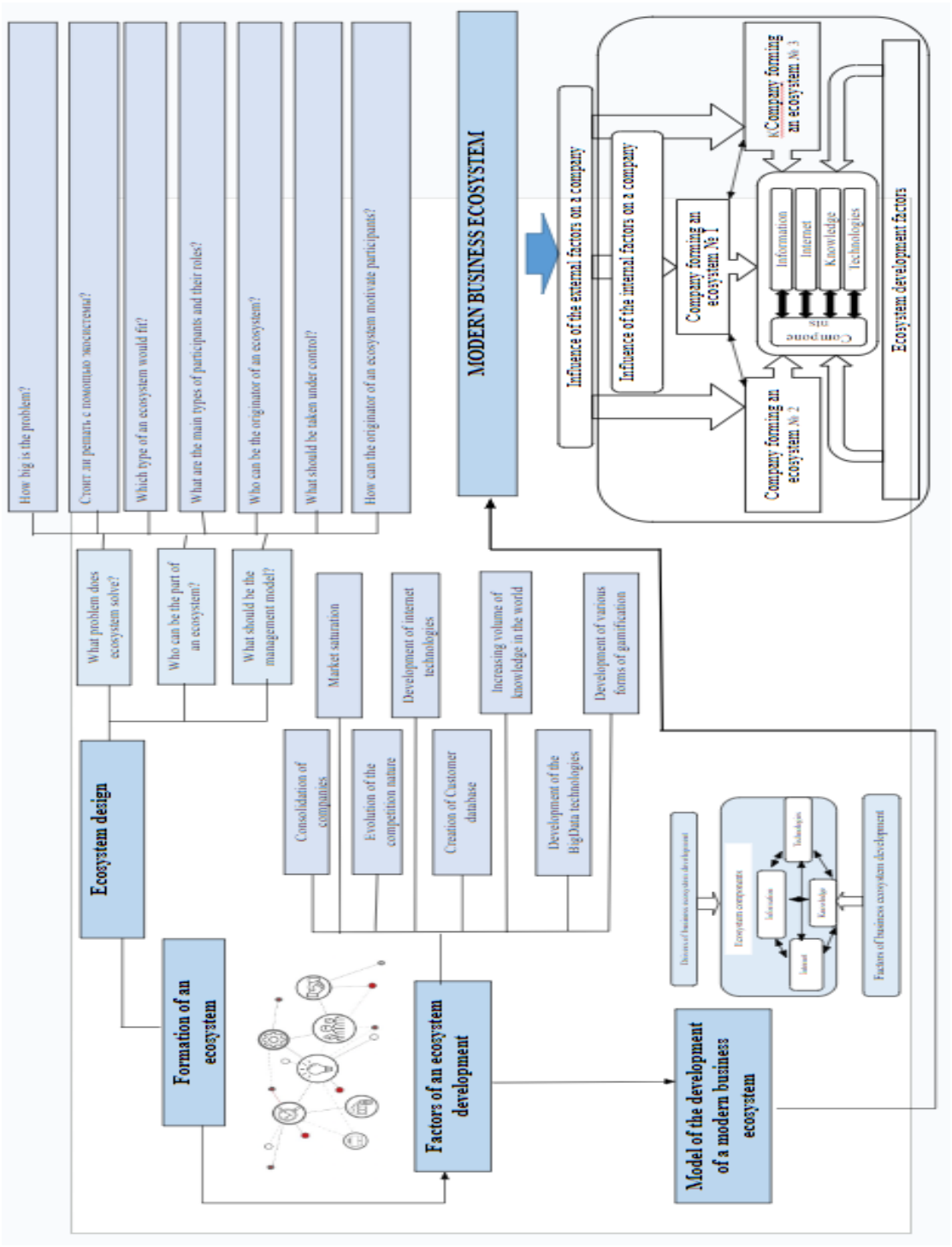


Figure. 1.23. Visualization scheme for the chapter “The knowledge component as the core of forming an ecosystem in modern business "

1) Ecosystems in modern business are a relatively new phenomenon, largely driven by the development of digital technologies and communication systems (such as the Internet). Based on the realities characterizing the development of modern ecosystems, it can be assumed that in the near future, the number of such ecosystems will only increase, and their architecture will deepen and become more complex, getting deeper into consumers’ lives.

2) Ecosystems as a phenomenon represent a multi-component structure, with knowledge playing one of the main roles, obtained by the company and forming the basis

for the further development strategy of the business ecosystem. The knowledge component in this case serves as the core of modern business ecosystems.

3) The development of modern ecosystems in business is shaping new approaches in the competition among companies. Whereas companies previously competed directly by offering identical goods and services, there is now a need to compete by promoting complementary types of goods and services.

The structure of this section is illustrated in the resulting block diagram (Figure 1.23).

Control questions

1. What do you understand under “an ecosystem”?
2. Define a business ecosystem.
3. How is an ecosystem different from other business models?
4. What are the key components of modern business?
5. What factors can you name for the development of business ecosystems?
6. Which companies can create their own ecosystem?
7. When did the first business ecosystems appear?
8. What do ecosystems give to the business?
9. What positive effects does the development of ecosystems bring to society?
10. How can we describe the development model of a modern business ecosystem?
11. How do ecosystems change the market situation?
12. How do ecosystems benefit consumers?
13. Are ecosystems always profitable?
14. Are there possible risks to ecosystem development?
15. What do you think determines the success of ecosystems?
16. What conditions are needed to create a successful ecosystem?
17. What future awaits the ecosystem in Russia?

Practical immersion material

Task 1

Objective: to study the nature, structure, financing specifics, main risks and performance of the ecosystem using the example of Yandex.

1. Study the information material on the sites below, as well as additional materials on the ecosystem:

a) URL: https://ir.yandex.ru/about/ecosystem

b) URL: https://ict.moscow/news/russian-ecosystems/?ysclid=lhhcji5wiy215775845

c) URL: https://www.forbes.ru/milliardery/362021-yandeks eksperimenty-kak-poiskovik-prevratilsya-v-ekosistemu-i-chto-eto-takoe?ysclid= lhhckngsuo363432875

2. It is necessary to identify which services are included in the ecosystem.

3. Identify and define the main partnerships, business system groups, and characterize partner organizations.

4. Establish the connection of financial flows within the business system, the logic and purpose of financial flows.

5. Identify the style of financial behavior of consumers of digital services and virtual products.

6. Explore what sources of financing are available for the business system, what are the horizons of business growth.

7. Identify the main business risks of the digital ecosystem and classify them.

8. Determine how stable the ecosystem is.

9. Assess the effectiveness of the ecosystem.

Task 2

Explore what services are included in the ecosystem

Service	Service characteristics	Pricing	Pricing	Service prospects

Conclusions on Task 2: …

Task 3

Identify and define the main partnerships, business system groups, and characterize partner organizations..

Partner	Partner characteristics	Partner relationship characteristics

Conclusions on Task 3: …

Task 4

Establish the connection of financial flows within the business system, the logic and purpose of financial flows.

The conclusion on Task 4: ...

Task 5

Identify the style of financial behavior of consumers of digital services and virtual products.

Conclusions on task 6: ...

Task 6

Explore what sources of financing are available for the business system, what are the horizons for business growth.

Conclusions on task 6: ...

Task 7
Identify the main business risks of the digital ecosystem and classify them.
Conclusions on task 7: ...

Task 8
Determine how stable the ecosystem is.
Conclusions on task 8: ...

Task 9
Assess the effectiveness of the ecosystem.
Conclusions on task 9: ...

Based on the results of the practical task, it is necessary to combine the conclusions for each task into a public speech with a multimedia presentation.

CHAPTER 2. ECOSYSTEM APPROACH TO ORGANIZATIONAL MANAGEMENT IN THE BUSINESS ENVIRONMENT

2.1. Evolution of business ecosystems: critical examination of conceptual and methodological gaps

The debate around the development of ecosystems as business models can be seen as a classic case of increased interest in new successful business practices. The success of newcomers always seems extremely important and requires immediate application. We can say that a kind of "fashion" is emerging on the wave of mass interest. At the same time, practice traditionally is ahead of the theory, with mistakes and victories accumulating, providing material for methodological reflection. Until now, there has not been a single conceptual framework or a methodological unified basis for studying and developing ecosystems as a form of economic relationships.

In an era where innovations significantly influence economic paradigms, the phenomenon of business ecosystems stands at the front of modern research and practices. This elusive "fashion" born out of a collective desire for success and innovation, is now one of the most dynamic and interesting subjects for analysis in both academia and industry. By expanding the boundaries of traditional business planning and strategic management, business ecosystems are designed to address the challenges of the modern world, where resilience, interconnection and innovative cooperation are becoming key factors for success.

The transition from scattered strategies to conscious formation of interdependent business communities underscores the relevance of business ecosystems.

Let's consider the origin and spread of the concept, underlining the fact of fundamentally important contradictions and basic gaps. The concept of "business ecosystem" became popular after the work of James F. Moore[147]. James F. Moore's publication was crucial for the development of the business ecosystem and served as a research foundation for studies in this field. However, after this article, numerous other scientific publications appeared, expanding and extending the concepts of business ecosystems. A study by the French business school ESSEC provides the following overview of the evolution of the concept of a business ecosystem (Table 2.1.).

[147] Ref.: Moore James. The Death of Competition: Leadership & Strategy in the Age of Business Ecosystems. – New York : Harper Business, 1996.

Table 2.1

Business ecosystem definitions (in chronological order)

Definition	Source
Economic community supported by a found of interacting organizations and individuals - organisms of the business world	J F Moore[148]
Ecosystems can be defined by sharing tools and technology components, as in the Microsoft Developer Network (MSDN), or the interaction of buyer and supplier, as in the Walmart Supplier Network	Iansiti M., Levien R. [149]
A network of organizations, institutions and individuals influencing the company, its customers and supplies	Teece D. J.[150]
A network of interconnected organizations organized around a focus company or a platform and including both manufacturing and user participants	Thomas L. D. W., Autio E.[151]
A group of companies - and possibly other organizations, including individuals - that interacts and shares a set of characteristics as it produces goods, technologies and services that customers need	Zahra S. A., Nambisan S. [152]
Ecosystem is defined by an alignment structure of a multi-stakeholder partners that must interact to materialize the core value proposition	Adner R. [153]

Since then, the concept of a business ecosystem gained wide acceptance and is used to analyze various industries and business models. However, its recognition was not as rapid, and it took two decades to gain wide support. Let's look at the growing popularity of the concept itself in the global internet space, using the capabilities of Google Trends[154].

The graph shows the dynamics of internet search on this topic (Figure 2.1).

For comparison, search requests submitted included the wording “business ecosystems” and “ecosystems in business”. The Russian-language versions specified in the request did not produce a significant result.

[148] Ref.: Iansiti M., Levien R. The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability. – Brighton, Ma : Harvard Business School Press, 2004a.

[149] Ref.: Teece D. J. Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance // Strategic Management Journal. – 2007. – No. 28 (13). – P. 1319–1350.

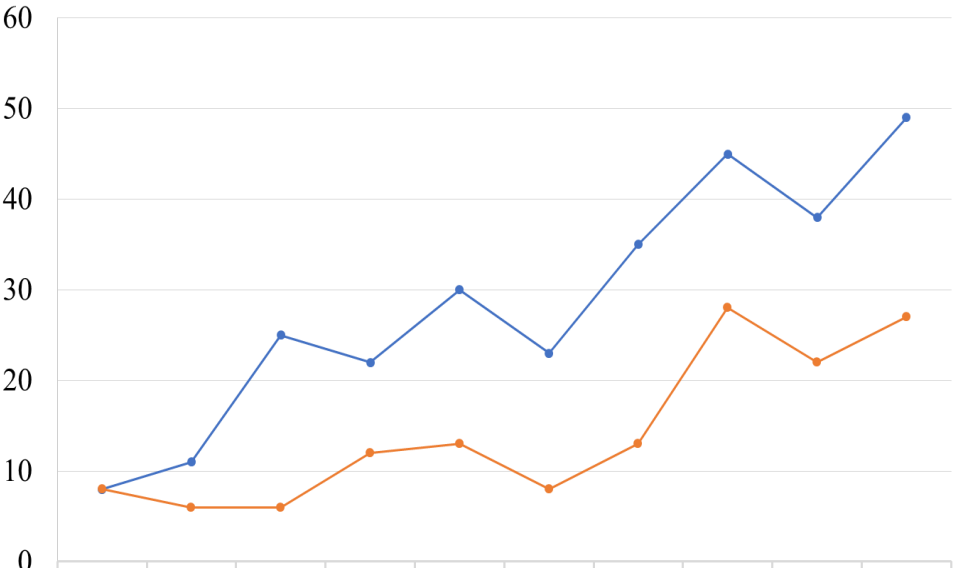
[150] Ref.: Thomas L. D. W., Autio E. Modeling the Ecosystem: a Meta-synthesis of Ecosystem and Related Literatures. – URL: http://druid8.sit.aau.dk/druid/acc_papers/3j47kk0b5qlck1 ghyor6f8osorh8.pdf

[151] Ref.: Zahra S. A., Nambisan S. Entrepreneurship and Strategic Thinking in Business Ecosystems // Business Horizons. – 2012. – No. 55 (3). – P. 219–229.

[152] Ref.: Adner R. Ecosystem as Structure: An Actionable Construct for Strategy // Journal of Management. – 2017. – No. 43 (1). – C. 39–58.

[153] Ref.: URL: https://trends.google.com/trends?geo=&hl=ru

[154] Ref.: The data represents the average annual popularity scores of queries in Google Trends analysis. The numbers indicate the level of interest in the topic relative to the highest score in the table for a specific region and time period. A score of 100 indicates the highest level of query popularity, 50 represents half the popularity level compared to the first case, and 0 indicates a location with insufficient data on the queried topic. – URL: https://trends.google.com/trends/explore?hl=ru. Numeric values of popularity dynamics denote the level of interest in the topic relative to the highest query levels in the "science" section, with 100 points representing the highest level of query popularity.



	2006	2010	2015	2016	2017	2018	2019	2020	2021	2022
business ecosystems	8	11	25	22	30	23	35	45	38	49
ecosystems in business	8	6	6	12	13	8	13	28	22	27

FIgure. 2.1. Popular trends of global Google queries[155]

As the graph shows, up until 2015, interest in business ecosystems was increasing but overall was significantly lower compared to other topics on economics and management.

Significant rise in popularity (with reaching average scores of 40 points and above) happened in recent years, as interest in the ecosystem approach multiplied against adverse external market conditions. It is evident that this form of economic activity became most popular after the breakdown of rigid connections and demonstrated greater resilience to high volatility compared to traditional hierarchical structures. (Picture 2.1.)

It spiked in late February - early March 2023. In global practice, two terms are still being used, but the term "business ecosystems" is becoming more popular and we believe it will become the standard definition. For the Russian transcription, we suggest it is appropriate to use the phrase "business-ecosystems".

[155] Ref.: Kovalenko E. D., Shtofer G. A. Business ecosystems: theory and practice of development // Innovative paradigm for the development of economic mechanisms of management: collection of scientific papers of the VII All-Russian scientific and practical conference with international participation. – Simferopol : Arial, 2022.

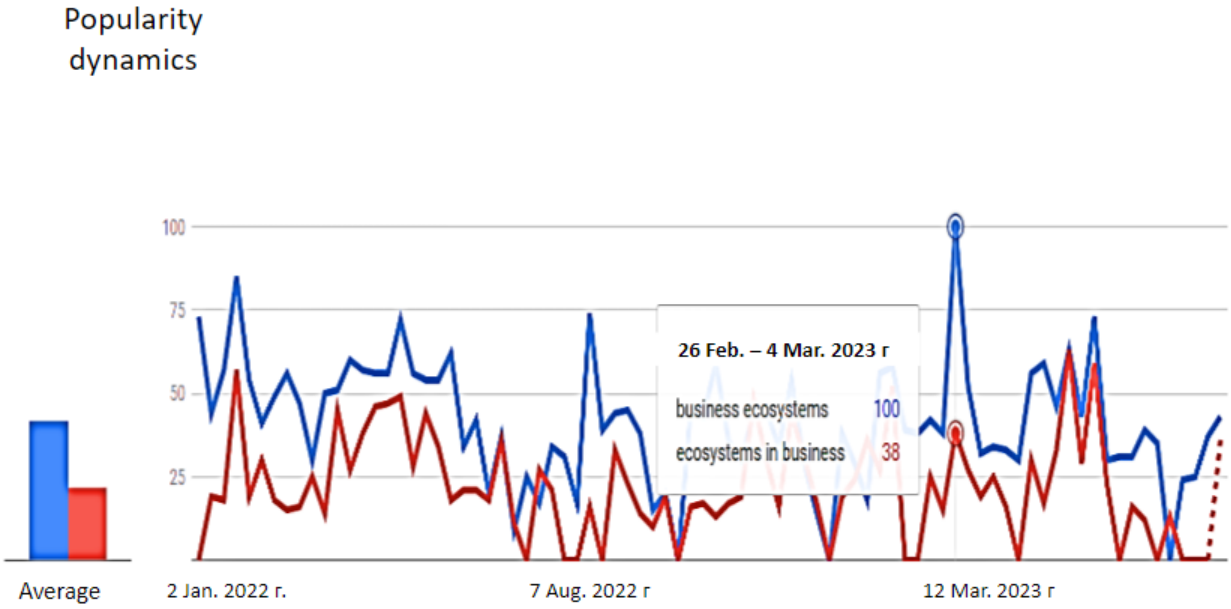


Figure. 2.2. Popular trends of Google queries for 2022–2023.[156]

Both of these word combinations are used in the context of research of the organizational dynamics, strategic management, digital economics, and innovation. They are used to describe complex network structures and relationships among various companies, customers, suppliers, competitors, and other market participants within a specific industry or sector of the economy.

Raising interest for business ecosystems can be related to a number of factors, among which the most important, in our view, are:

1. *Synergy of interaction* among system participants: Business ecosystems enable companies to cooperate, to share values and manage resources for mutual benefits. This is crucial to developing interaction among companies that leads to the emergence of strong partnerships. It strengthens competitive advantage and contributes to more effective growth and development of each participant in the system.

2. *Digital transformation* has become a driver for realizing the benefits of ecosystems and has allowed the synergistic effect to reveal itself to the maximum extent. Digital transformation has lowered entry barriers into the system and reduced transaction costs. With the new opportunities provided by digital technologies and the Internet, cooperation and research opportunities have become more accessible. Digitalization enables the free flow of data and resources, facilitating the development of business ecosystems.

3. *Increased innovation efficiency*. In business ecosystems free and multilateral exchange of experience, knowledge, and demands stimulates innovation and stimulates the creation of new products and services. This allows to reduce the timeframe of idea to product implementation, which is important in conditions of rapid technological progress and a dynamic market. It fosters the development of new innovative solutions and reduces the development costs.

4. *Globalization* acts as both the development factor and a derivative from the ecosystem spread in business. Business ecosystems are initially created with open

[156] Ref.: Kovalenko E. D., Shtofer G. A. Business ecosystems: theory and practice of development // Innovative paradigm for the development of economic mechanisms of management: collection of scientific papers of the VII All-Russian scientific and practical conference with international participation. – Simferopol : Arial, 2022.

boundaries and operate at a global level, allowing companies to expand geographically and culturally and increase their presence in the global economy.

The increased attention to business ecosystems and the resulting economic and innovation advantages highlight the demand for a deeper methodological and terminological analysis in this field. Accuracy and consistency in definition and research approaches become essential for assessing the true contribution of business ecosystems to modern economy and management. It is here where the multiplicity of interpretations of the concept of "business ecosystem" comes to the forefront, raising questions regarding the scientific accuracy and practical efficiency of existing concepts.

This highlights the importance of detailed analysis and critical evaluation of the variety of approaches documented in research studies and provides a basis for creating universal and comprehensive methodologies that contribute to progress in understanding and developing of business ecosystems.

The problems and conflicts associated with the development of the theoretical and methodological basis of business ecosystems are reflected in the diversity of definitions of this concept. In literature, one can find various terms such as "theory," "concept," "model," "methodology," "approach," "business conduct form," "structure," "aggregate," and so on, which can be misleading. An analysis of 105 sources made by French researchers using the Google Scholar system reveals a variety of definitions in this area and emphasizes the need for clarification and standardization of concepts for further research (Table 2.2).

Table 2.2.

Distribution of definitions by keywords in the title

Definition	Application frequency
Business ecosystem	53
Innovation ecosystem	20
Ecosystem	22
No mention of ecosystem in a title	10

Researchers come to a conclusion that the most common term is "business ecosystem," while "innovation ecosystem" is often used as a synonym, which authors may apply when emphasizing innovations. Some studies simply refer to ecosystems without a qualifier, which may seem ambiguous.

The author's aim is to acknowledge the business ecosystem as a specific and independent concept. In our view, a business ecosystem is a concept that describes the economic relationships of a network of interconnected companies, customers, suppliers, and other market participants who interact with each other and jointly create value. As an independent concept, it should include the fundamental principles, structure, and nature of interaction among participants, as well as strategies for Corporation and innovation that ensure the success of the ecosystem. The concept of a business ecosystem allows for a better understanding of its characteristics and regards it as a holistic system rather than just a collection of network connections among individual participants.

Let's critically examine the concepts used in various domestic sources, demonstrating their lesser applicability (in our opinion) for describing business ecosystems. Definitions such as "theory," "model," "methodology," "service," "aggregate," "structure," and "marketplace" also have their logical applicability, but they are limited in the context of describing business ecosystems (Table 2.3).

Table 2.3

Critical analysis of the use of concepts

Concept	Critical analysis
1	2
Theory[157]	Often used to highlight a system of common principles and concepts that explain phenomena and patterns in a certain area. In the case of the business ecosystem, although there are certain principles and trends, they have not yet reached the full status of scientifically based theory, but rather are an evolving concept.
Model[158]	Provides a simplified description or abstraction of a real system. In the context of a business ecosystem, the use of the concept "model" may not fully capture the complexity and interaction of participants, since the ecosystem is a more dynamic and flexible entity
Methodology[159]	Indicates a system of methods, techniques and approaches to solving certain problems. In relation to a business ecosystem, the term "technique" may be limited to describing only certain aspects or practices that are applied within the ecosystem, but does not allow a holistic approach to describing the entire system
Service[160]	Indicates the provision of a service or subject matter. In the context of a business ecosystem, the term "service" may be too narrow and does not fully cover all aspects of interaction between participants
Combination[161]	Represents a combination of various elements or components into a single integrity. However, in the case of a business ecosystem, the more appropriate concept is the concept, which places more emphasis on the interaction and interdependence between elements, rather than simply combining
Structure[162]	Refers to the organization or order of elements in a system. In relation to a business ecosystem, this may be too narrow a term that does not reflect the complexity and dynamics of interaction between companies and ecosystem participants
Marketplace[163]	In some cases, a business ecosystem can be considered a marketplace, but not always. Some business ecosystems may have

[157] Ref.: Isaeva A. E., Voronov A. S. Business ecosystem and its influence on public management of entrepreneurial activity: theoretical review of the subject area // Public Administration. Electronic newsletter. – 2023. – Issue № 97. – C. 138–153.

[158] Ref.: Chen Hsi Tsai C. H., Zdravkovic J., Söder F. A Method for Digital Business Ecosystem Design: Situational Method Engineering in an Action Research Project // Software and Systems Modeling. – 2023. – No. 22. – P. 573–598.

[159] Ref.: Katyrin S. Business ecosystems as reality. Head of the Chamber of Commerce and Industry Sergei Katyrin on the role of ecosystems in the Russian economy and prospects for new players. – URL: https://iz.ru/1262583/sergei-katyrin/biznes-ekosistemy-kak-realnost

[160] Ref.: Kobylko A. A. Prospects for the development of business ecosystems: competition, cooperation, specialization // Russian Journal of Economics and Law. – 2022. – T. 16. – № 4. – P. 728–744.

[161] Ref.: Kulapov M. N., Pereverzeva E. I., Kirillova O. Yu. Business ecosystems: definitions, typologies, development practices // Issues of innovative economics. – 2022. – T. 12. – № 3. – C. 1597–1612.

[162] Ref.: Samiev P. A., Zakirova V. R., Shvandar D. V. Ecosystems and marketplaces: review of the financial services market // Financial Journal . – 2020. – T. 12. – № 5. – C. 86–98.

[163] Ref.: Dementyev V. E., Evsyukov S. G., Ustyuzhanina E. V. Hybrid forms of business organization: on the issue of analyzing inter-firm interactions // Russian Journal of Management. – 2017. – T. 15. – No. 1. – P. 89–122.

	marketplace elements, and they represent a broader range of interactions and partnerships, making them more complex and differentiate them from just a marketplace
Form of doing business[164]	Unlike traditional forms of business, such as single companies or vertically integrated corporations, business ecosystems are more flexible and adaptive structures. Ecosystem participants can focus on their strengths, and the necessary resources and competencies can come from other companies through collaboration. This is a transformed form of doing business
Cluster[165]	A cluster is a group of companies within the same industry with the same geographical position, while a business ecosystem more broadly encompasses a network of interconnected and interdependent organizations and participants, including suppliers, customers, competitors and other stakeholders operating in different industries and areas

To overcome methodological and terminological gaps, it is necessary to determine whether business ecosystems are independent fields of research or part of existing economic theories, which may require a more abstract approach to their study. If business ecosystems share economic essence with well-known economic models, they should be considered as an applied phenomenon, integrated into the fields of economics, management, and marketing, starting the analysis by clarifying key terms.

In summary, it can be noted that theory - a broader view, concept - is an abstract idea or generalized representation, and model - is a simplified real representation of a system or phenomenon that helps in its understanding and analysis. The most debated, in our view, for business ecosystems is the difference between "concept" and "model."

At first glance, the concept of "model" has distinct features for describing business ecosystems, as it defines the process of production to be tailored to the specific requirements of individual clients. Moreover, a model serves as an abstract representation or simplification of the real system, helping to understand its characteristics and functioning. Models are dominating in the analysis and forecasting of system behavior based on certain rules or parameters. In the context of a business ecosystem, mathematical models can be developed to study interactions between participants or graphical models can be used to visualize the ecosystem's structure (Figure 2.3).

Modern research on business ecosystems covers a broader subject area. The nature of business ecosystems lies in the new value of interaction, thus requiring a higher-order generalization. The author's hypothesis is that modern business ecosystems accumulate a set of qualities and characteristics described by a single concept. A concept represents a general understanding or an idea about a particular phenomenon or system. In the case of a business ecosystem, it is a concept about the relationships and interactions between different companies, customers, suppliers, and other market participants who cooperate and interact to achieve common goals and create value for all participants. Thus, a business ecosystem is a concept that describes the relationships and interactions between

[164] Ref.:Androsik Yu. N. Business ecosystems as a form of cluster development // Proceedings of BSTU. Economics and Management. – 2016. – No. 7. – P.. 38–44.

[165] Ref.: Sustainable development: new challenges: textbook for universities / ed. by V. I. Danilova-Danilyana, N. A. Piskulova. – M.: Aspect Press, 2015.

companies and market participants, rather than a specific mathematical model for analyzing or predicting their behavior.

To support our position, let's provide a few examples of concepts that have transformed into distinct systems of views and established themselves as scientific notions.

1. The concept of sustainable development entails the integration of economic, social, and environmental aspects into company management. Sustainable development prioritizes long-term outcomes and protection of the environment[166].

2. The concept of CRM (Customer Relationship Management) focuses on improving customer relationships. The CRM approach helps companies to better understand and meet the needs of their customers, thereby enhancing loyalty and increasing sales[167].

3. The concept of design thinking involves actively using a creative approach to problem-solving and developing new products and services. Design thinking allows companies to go beyond traditional approaches and find innovative solutions[168].

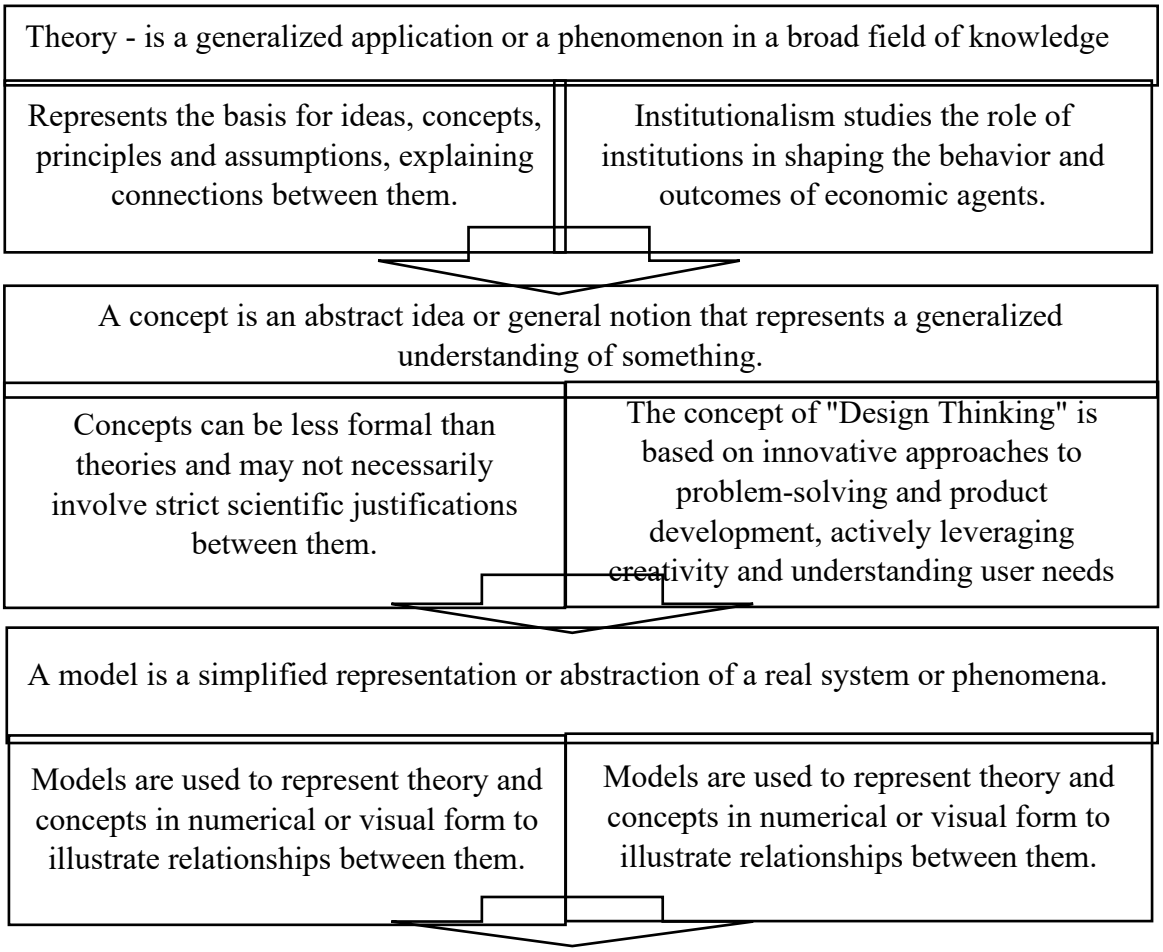


Figure 2.3. Hierarchy of conceptual notions

[166] Ref.: Temporall P., Trott M. Romance with the buyer: managing relationships with customers as a way to maximize brand value. – St. Petersburg. : Peter, 2002.

[167] Ref.: Vasilyeva E. V. Design thinking: methodology of creative development: textbook. – M.: KnoRus, 2023.

[168] Ref.: Gueguen G., Torrès O. La dynamique concurrentielle des écosystèmes d'affaires. Linux contre Microsoft // Revue Française de Gestion. – 2004. – No. 30 (148). – P. 227–248.

Each of these concepts represents a unique approach to business management and organization and can be successfully applied depending on the company's specifics and goals. Examples like Windows and Linux illustrate the blend of collaboration and competition, which is a key topic in the literature on business ecosystems. The concept of business ecosystems aims to capture the complex interactions between collaboration and competition over time. Researchers Gueguen and Torres presented a new perspective on competition in business ecosystems, integrating previous theories taking into account timing aspect, based on the example of Windows and Linux[169]. In business ecosystems, companies compete and collaborate simultaneously, and weaknesses within the ecosystem can lead partners to switch sides. At the ecosystem level, collaboration in innovation involves both cooperative and competitive behavior. Firms open their assets to partners to stimulate collaboration but also seek to maintain a competitive advantage by choosing assets for disclosure and adapting the degree of sharing with partners. Platforms represent formalized processes that organize these strategies.

It should be noted that business ecosystems have a number of limitations that have to be acknowledged:

1. *Lack of a general theory*: Currently, there is no single overarching theory of business ecosystems, limiting the development of unified approaches to analyzing and managing ecosystems. The theoretical foundation is accumulating and evolving, and recognition and consolidation of the concept may arise from various practical situations.

2. *Uncertainty and dynamics*: Business ecosystems are characterized by a high degree of uncertainty and dynamics. Interactions between participants can change depending on changes in the external environment, technological breakthroughs, or competitive actions. Such uncertainty complicates planning and requires flexibility from companies to effectively adapt to changes.

3. *Context limitations*: Context is critically important for applying the concept of business ecosystems. Business ecosystems are highly exposed to contextual risk and industry characteristics. What works on one market may be ineffective or inapplicable on the other. Such contextual factors as legal, regulatory, and cultural market characteristics can also significantly influence the applicability of the business ecosystem model and its effectiveness.

4. *Complexity of modeling* is a dialectical component of the diversity and dynamic nature of the business ecosystem. Each participant has their own interests and goals, and interactions within the system can be unpredictable because, in addition to aligning interests, conflicts and contradictions inevitably arise. Additionally, ecosystem participants differ in size, scope of activity, and resources, creating unequal conditions for active participation. Unreliable partnerships and changing strategies can lead to ecosystem instability. Limited access to information about other companies reduces level of trust and complicates the process of making informed decisions within the ecosystem.

5. *The need for coordination*, evolving into the formation of a management system. As the number of participants in the business ecosystem rises, the complexity of management and coordination also increase. The need to maintain overall system efficiency leads to the development of management mechanisms capable of ensuring consistency and achieving common goals. Insufficient management and coordination can lead to duplicated efforts, conflicts, and the loss of potential benefits from cooperation.

6. *Dependency risk*. Relying on a business ecosystem can be risky, especially if a company is entirely dependent on partners or a platform. Changes in the ecosystem or relationships with participants can significantly impact a company's business activities

[169] Sometimes the intermediate form is called the substantive theory

and survival. If a key partner leaves or changes its strategy the company may find itself in a difficult position, facing losses of resources and market position. Some companies may receive more favorable business conditions or access to resources, leading to dissatisfaction and inequality among participants. This can result in conflicts and reduced trust, which will negatively impact cooperation and ecosystem efficiency overall.

It is important to understand that the theory of business ecosystems is not a universal framework for all situations and is limited by its scope. Using it requires a comprehensive approach, consideration of the context, and involvement in changing market conditions. A business ecosystem does not necessarily replace other business development models, but it can become one of the primary frameworks for bringing companies together in the private sector. Different business development models can coexist, and business ecosystems can be integrated into external contexts. Business ecosystems benefit from networks of customers, partners, and other market participants who cooperate and engage with each other to create new value. This approach can be particularly effective under conditions when a company has high interdependence and complementarity, and where cooperation can lead to a synergistic effect.

Business ecosystems may not be suitable for all companies and sectors. For example, in some cases, competition restrictions and regulations may make It is difficult for companies to cooperate within the ecosystem. Additionally, implementing a business ecosystem may require aligning the interests of various stakeholders and developing sustainable cooperation models. Thus, while business ecosystems offer an important and promising approach to organizing business, they are not the only model for business development. The right choice of a model depends on the specific conditions and strategic goals of the company.

This transition from the status of a concept to the status of a distinct theoretical position in the form of a concept[170] is an important step forward. By gaining the status of a substantive theory, the concept of business ecosystems establishes its own position in relation to other theories, allowing for a deeper understanding and explanation of the characteristics of the area of interest. It is necessary to work out a comprehensive concept of business ecosystems. We anticipate that social network theory, new institutional theory, and decision-making theory will provide the theoretical foundation for the ecosystem approach. Based on these theoretical foundations, it is necessary to develop schemes and processes for research, management, and design/redesign of both new and existing ecosystems. As for methodology, the development of measures to assess the coherence of business ecosystems is crucial for evaluating their effectiveness.

The structure of the section is shown in the block diagram (Fig. 2.4).

[170] Ref.: Makarov V. M. Theory of management: textbook. – St. Petersburg : Publishing House Polytechnic. university, 2012. – C. 10.

Figure. 2.4. Diagram illustrating the section "Evolution of business ecosystems: critical examination of conceptual and methodological gaps "

Control questions

What is a business ecosystem?

a) an individual company operating in the market; b) a network of interacting companies and clients creating shared value;

c) an organization engaged in environmental business;

d) a group of competing companies.

What is meant by the term "digital transformation" in the context of business ecosystems?

a) transferring paper documents into electronic format;

b) updating a company's computer equipment; c) using digital technologies to change business models and structures;

d) implementing internet marketing.

Which term describes the result when the combined action of elements within a business ecosystem creates more value than they could individually?

a) competitive advantage;

b) operational efficiency;

c) synergistic effect;

d) strategic planning.

What is key in collaborative strategy within business ecosystems?

a) independence of companies from each other; b) mutual benefit and achieving common goals; c) isolation from competitors;

d) autonomy in decision-making.

What role does competition play in business ecosystems?

a) complete removal of cooperation between companies;

b) stimulating innovation through competition;

c) reducing market diversity;

d) expanding monopolies.

What factor does not contribute to the rise of popularity of business ecosystems?

a) increasing transaction costs;

b) synergy of participant interaction;

c) digital transformation;

d) globalization of business processes.

How does an "innovation ecosystem" differ from a "business ecosystem"?

a) an innovation ecosystem focuses only on technological startups;

b) a business ecosystem does not include innovative processes;

c) an innovation ecosystem is focused on innovation and the development of new products;

d) there are no differences; these terms are interchangeable.

What is "sustainable development" in the context of business ecosystems?

a) constant raise of company profits;

b) business development with consideration of economic growth and social responsibility;

d) resilience to economic crises;

g) the ability of a company to continuously increase market share.

What is the goal of a cooperation strategy in a business ecosystem?

a) monopolization of the market by a single company;

b) temporary partnership for a specific project;

c) ensuring mutual benefit and achieving common goals;

d) distributing market risks among a greater number of participants.

What consequences can poor management have in a business ecosystem?

a) increase in participants' autonomy;

b) reduction in production costs;

c) strengthening of strategic positioning;

d) conflicts of interest and loss of synergy.

Practical immersion material

Case 1

Entering the Online Education Market

You are an analyst at a company specializing in educational software development. Your task is to research and suggest a strategy for entering the online education market, which is showing rising interest and number of investments in it. You must identify potential partnerships and interaction models.

Initial data:

Market segment: online education for adults.

Key players: universities, private educational platforms, corporate training programs.

Current trends: rise in popularity of mobile applications for learning, growing demand for skill enhancement courses, interest in education using virtual reality.

Tasks:

1. Identify the main participants of the implied ecosystem, including competitors, partners, and customers.

2. Evaluate how digital transformation can affect interaction within the ecosystem.

3. Propose innovative approaches to creating a unique offering on the market.

Case 2

Sustainable Development Strategy in the Automobile Industry.

You are a project manager at an automobile company aiming to develop and implement a sustainable development strategy. The company has recently adopted an ecosystem approach, involving interaction with suppliers, dealers, and consumers.

Initial data:

Market segment: production and sale of electric vehicles.

Main objectives: carbon footprint minimization, efficient resource utilization, development of recyclable and sustainable materials for vehicles. Industry trends:

transition to electric vehicles, use of artificial intelligence to enhance production processes, expansion of charging station networks.

Tasks:

1. Determine how sustainable development can be integrated into the company's existing business model.

2. Propose measures for synchronizing the economic, environmental, and social aspects of the company's activities.

3. Describe how the company can use the globalization of business ecosystems to enhance its sustainability.

Business Game

Ecosystem builders

Goal of the Game: Participants must create a viable and sustainable business ecosystem that leads to innovative and synergistic cooperation between different companies.

Game Principle:

Participants are divided into teams, each representing a separate company in different industries (such as technology, finance, retail, etc.).

Each team develops a strategic development plan for their own company within the ecosystem.

Teams present their strategies and discuss how they can interact with other companies to ensure synergy and innovation. The game consists of several rounds during which teams identify common grounds for cooperation and negotiate partnerships, investments, and joint projects.

The winners are those who can build the most sustainable and innovative ecosystem, ensuring rapid growth and development for all its participants.

Game Results:

Participants will demonstrate their understanding of the conceptual foundations of business ecosystems and apply strategic thinking to create sustainable partnerships.

Evaluating the results may include an analysis of the sustainability of the developed ecosystem, its innovative potential and ability to adapt to changes in the market environment.

2.2. Essence of the ecosystem approach and its differences from traditional approaches to organizational management

The relevance of the ecosystem approach to organizational management is dictated by the necessity to search for a new theoretical and methodological basis, their integration and the development of tools for the practical implementation of this approach.

The framework of classical traditional approaches of studying modern organizations are becoming narrow due to the increasing complexity of organizing business processes, driven by their transition to the electronic environment, digitization, and the integration of artificial intelligence. This circumstance put forward the importance of making a clear distinction between characteristics of the ecosystem approach and other well-known approaches in science: systemic, process-oriented, and functional. Let's consider their fundamental principles, properties, similarities, and differences.

If we make a parallel with biological ecosystems, the following properties of the ecosystem approach to organizational management can be outlined:

- Self-organization;
- Adaptability;
- Self-regulation;
- Self-tuning.

Self-organization refers to the interaction of subsystems, leading to the emergence of more efficient structures of various kinds. This quality fundamentally distinguishes the ecosystem approach from all others, with the latter undeniably taking a leading position in terms of efficiency, as biological ecosystems are, in fact, among the most efficient existing systems. It is evident that the transmission of this concept to organizational management within the ecosystem approach is seen as a significant step forward.

Adaptability is another quality of ecosystems and represents the ability to change rapidly, restructure, and adapt to changing conditions. The significance of this characteristics is difficult to overstate due to boosting transformational processes affecting virtually all areas of modern human society. It is interesting that the same fundamental characteristics of adaptability can be applied to business ecosystems as well as to biological ecosystems:

- Multiplicity of forms;
- Species diversity;
- Geographical distribution;
- Presence of dynamic processes.

Self-regulation and self-adjustment should be distinguished from self-organization, which can be seen as the continuity and cyclical nature of processes without external intrusion.

At the same time, the ecosystem approach is still at the stage of formation, and its exact characteristics can be hardly considered as “established” due to the ongoing development of the concept of business ecosystems.

To highlight the differences between the ecosystem approach and traditional approaches to organizational management, let's provide brief descriptions of each, outline their advantages and disadvantages, describe the history of their emergence, and discuss the conditions under which these approaches originated and developed. This is crucial because external (and sometimes internal) conditions were the exact factors that

affected the formation of one approach over another, and changes in these conditions led to the decrease in effectiveness of one approach and the emergence of another.

In general, when speaking about the approaches to managing organizations, it should be noted that different authors identified different number of them. For example, V. M. Makarov mentions "three main and most common approaches in management theory: process, systemic, and situational"[171]. In turn, N. E. Ryabikova[172] considers a total of 13 approaches, namely: marketing, functional, reproductive, normative, complex, integrative, dynamic, process, optimization(quantitative), directive (administrative), behavioral, situational, and systemic.

At the same time, within the framework of this chapter, we will focus on such classical approaches as systemic, functional, and process-oriented, as they are not only the most feasible in management science but also the most prevalent in management practice.

1. The systemic approach to organization management

The systemic approach to organization management is believed to have been first drafted by a Russian scientist Alexander Alexandrovich Bogdanov (real surname - Malinovsky) (1873–1928) in his work "Tektology: Universal Organizational Science," published during the period 1910–1920. Bogdanov's interests and life experiences were very diverse and included management, economics, philosophy, medicine, biology, and much more. The revolutionary political processes taking place in Russia at the time, in which he was an active participant, undoubtedly influenced Bogdanov's ideas.

In his foreword to the German translation of "Universal Organizational Science (Tektology)," the scientist's idea about the application of the systemic approach already becomes evident. He suggests that applying the systemic approach simplifies solving management tasks because "the possibility and probability of solving tasks increase when they are put together in a generalized form,"[173] as "generalization at the same time is simplification[174]."at the same time, the organizational structure of any company, which is a kind of embodiment of the systemic approach, is nothing more than its greatly simplified and generalized image, allowing management actions to be appropriately structured.

In general, according to the systemic approach, "any organization is a system in the fullest and strictest sense of the term[175]".

Some authors, including L.S. Ruzhanskaya, see the systemic approach as the most applicable and effective. According to the author, the systemic approach " is based on considering the object as an integral set of elements in a set of relationships and connections between them, that is interpreting an object as a system"[176].

N.E. Ryabikova sees the systemic approach as the most complex, noting that "the established opinion about the systemic approach is based on the study of the functioning and development of an organization as an open system, that is, interacting with the external environment"[177].

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[171] Ref.: Ryabikova N. E., Ryabikov R. I., Kashchenko E. G. Fundamentals of management: textbook. Part I. – 3rd ed., add. and processed – Orenburg: Orenburg State. university, 2011. – P. 65.

[172] Ref.:Bogdanov A. A. Tectology. General organizational science: in 2 books. - Book 1 / hole ed. L. I. Abalkin. – M.: Economy, 1989. – P. 46.

[173] Same source.

[174] Ref.: Makarov V. M. Theory of management: textbook. – St. Petersburg : Publishing House Polytechnic. university, 2012. – P. 10.

[175]Ref.: Ruzhanskaya L. S. [and others]. General management: textbook / under general. ed.
I. V. Kotlyarevskaya. – Ekaterinburg: Ural Publishing House. university, 2017. – P. 40.

[176] Ref.: Ryabikova N. E., Ryabikov R. I., Kashchenko E. G. Fundamentals of management: textbook. Part I. – 3rd ed., add. and processed – Orenburg: Orenburg State. university, 2011. – P. 76.

[177] Ref.: Ruzhanskaya L. S. [and others]. General management: textbook / under general. ed.
I. V. Kotlyarevskaya. – Ekaterinburg: Ural Publishing House. university, 2017. – P. 41.

According to a number of sources, the first person to scientifically established and published this approach was Herbert Simon, who "suggested a simple 3-stage scheme as the basis for searching and making managerial decisions: thinking, working out scenarios (generating alternatives), choosing"[178]. Later he developed this scheme to a 6-stage one: "sense the problem; define and specify the goal; define the criteria that a successful solution must meet; design solution alternatives (generate alternatives); compare alternatives with criteria; choose the best option"[179].

When talking about the systemic approach, it is necessary to mention the main concepts characterizing the structure of any system, namely:

- element - the smallest component of a system in terms of solving tasks and achieving goals for which the system exists;
- subsystem - a part of the system with relative independence and also representing a system with its own subtasks and subgoals;
- connection - essentially the degree of limitations to freedom of the system elements, thanks to which the system receives the ability to function as a unit, solve designated tasks, and achieve goals;
- structure - a relatively stable arrangement over time and the nature of the relationships between the elements of the system, ensuring its functioning;
- goal - the end result or the process of the system's functioning within a certain framework.

When considering the management system of an organization, it is necessary, among other things, to explore such concepts as:

- Input - necessary resources (including financial, material, human, informational);
- Output - the result (finished products, provided services);
- Feedback - signals through which information about the state of the output is received, enabling the adjustment of the system's operation and its elements;
- Internal environment - the elements of the system, as well as the processes that occur within the organization;
- External environment - conditions and factors that arise and exist independently of the organization's activities and having an impact;
- Boundary - a conditional line between the internal and external environments, separating the area of direct management influence from the area not subject to management influence and control.

Table 2.4.

The advantages and disadvantages of the systemic approach are reflected in the following

Systemic Approach	
Advantages	Disadvantages
– Has complexity and structural integrity; – Provides the opportunity to rely on systems theory; – Allows for building a unified picture of what is happening and	– Has a general scientific nature and primarily serves as a means of setting a general direction; - Assumes its main goal to identify system elements and establish intra-system connections, without

[178] Ref.: Ruzhanskaya L. S. [and others]. General management: textbook / under general. ed. I. V. Kotlyarevskaya. – Ekaterinburg: Ural Publishing House. university, 2017. – P. 41.

[179] Ref.: Ryabikova N. E., Ryabikov R. I., Kashchenko E. G. Fundamentals of management: textbook. Part I. – 3rd ed., add. and processed – Orenburg: Orenburg State. university, 2011. – P. 66.

identifying the strongest and weakest elements of the system for their use in achieving goals or strengthening to prevent negative consequences; – Provides an opportunity to study interactions of system elements with each other, based on an analysis of factors and consequences of this interactions, synergy	considering the relationship between set goals and the means of achieving them; – Does not provide the opportunity to study the connection between the main elements of the system and management functions; – Does not involve examining after effect of the external environment on management and the results of organizational activities; – Is more directed towards the examination of self-regulating systems.

When making a comparative analysis of approaches to managing an organization, in addition to examining their essence, it is necessary to reflect positive and negative aspects of each approach.

2. Functional Approach to Organizational Management

The functional approach is considered to be a part of the administrative (classical) school of management. Representatives of this school held high managerial positions in large industrial companies and viewed the management process primarily from the perspective of practice and improving the efficiency of production processes. For example, the Frenchman Henri Fayol (1841–1925) worked as a director of a large mining company for over 30 years, while the American Alan Reiley (1869–1947) was a top executive at General Motors, and his associate James Mooney (1884–1957) held managerial positions at Remy Electric Company, GM Overseas, and Willys Overland Motors.

It should be noted that the origins of the functional approach can be traced, in part, in the works of Frederick Taylor (1856–1915), who first proposed separating managerial functions from production and introduced functional supervision by separate groups of workers. Additionally, the works of Adam Smith (1723–1790), who observed the division of production operations into basic functional components as a means of significantly increasing efficiency, also contributed to the development of this approach.

Within the functional approach, a demand is considered as a set of functions performed to satisfy the requirements of a particular object. "After establishing the functions, several alternative objects are created to perform these functions, and the one requiring the minimum total cost over the object's lifecycle per unit is selected."[180]

The core of the functional approach to management is that "the organizational activities are represented as a set of specific functions assigned to specific functional departments,"[181] and "to perform various processes, it is necessary to develop the necessary mechanism for implementing these predefined functions."[182]

A classic way to visualize the functional approach to organizational management is through the linear-functional organizational structure of the company, reflecting the same management structure. The linear-functional structure of the enterprise includes linear and functional departments accordingly (see table 2.5).

[180] Ref.: Sterligova A. N. Production and Operations Management: educational and methodological manual for students of the MBA program studying in the specialty "Strategic Management'' - M.: Business Alignment, 2012. - P. 167.
[181] Same source.
[182] Ref.: Sterligova A.N. Production and Operations Management: educational and methodological manual for students of the MBA program studying in the specialty "Strategic Management'' - M.: Business Alignment, P 2012. – C. 164.

Table 2.5

Advantages and Disadvantages of the Functional Approach

Functional approach	
Advantages	Disadvantages
Clear distribution of functional responsibilities between departments and employees, clear working conditions. Quick adaptation and involvement of newly hired employees. High speed of task assignment by the manager considering strict hierarchy based on the principle of absolute authority. Absence of duplication of managerial functions. Any use of materials is allowed only with a hyperlink. Relative stability and transparency.	Orientation of each department towards relatively isolated execution of its functional responsibilities without considering the interests of both intermediate (internal client) and final consumers. Probability of conflicts, competition, and disputes between functional departments. Difficult communication between departments, increased time and financial costs for communication with a high probability of distortions. High additional charges due to breaking of a single process into several functions (operations) and separate management of each function with the mediation of the management body, the need for intermediate approvals. High workload on the administrative management body. Limited opportunities for the manager to manage employees under direct subordination - low manageability ratio.

It's interesting to note that "the functional approach to management often refers to tools related to process vision.[183]" Historically, the process approach can be considered the next stage in the development of approaches to managing an organization.

3. Process Approach to Organizational Management

The development of the concept of the process approach belongs to Henri Fayol (1841–1925) – a French engineer, manager, and scholar. In 1888, Henri Fayol took the position of director at the struggling mining company Compagnie de Commentry-Fourchambeau-Decazeville, which under his leadership emerged from the crisis. Fayol himself left the company only in 1918, and his extensive managerial practice undoubtedly influenced his views on management theory. According to him, "to manage means to forecast and plan, to organize, to command, to coordinate, and to control."[184]

Henri Fayol publicly spoke of the concept of the process approach in 1900, and this was not coincidental. In the XIX century, France was significantly ahead of other European countries in terms of industrialization, while many others remained largely agrarian, placing France second after England.

The development of the process approach to organizational management was stimulated by the recognition of the shortcomings of the functional approach, which

[183] Ref.: Meskon M. Kh., Albert M., Khedouri F. Fundamentals of management: trans. from English – M.: Delo, 2000. – P. 48.

[184] Ref.: Sterligova A. N. Production and Operations Management: educational and methodological manual for students of the MBA program studying in the specialty “Strategic Management'' - M.: Business Alignment, 2012. – P. 163.

primarily focuses on developing the organizational structure. While the functional approach answers the question "what to do?" and determines the capabilities of the organization and its functional departments, the process approach addresses the question "how to do it?" and defines the technology for achieving targeted goals and tasks.

Today, the process approach is seen by many authors as "the most effective approach to organizational management, recorded in the international ISO standard."[185] This approach began to develop in the 1980s, expanding "the capabilities of the operational approach, shifting the focus from individual operations to processes as a whole. Moreover, the processes themselves were considered at the functional, cross-functional, or interorganizational levels of integration."[186]

When discussing the process approach, it's important to note that "from the perspective of the process approach, management functions are considered not as autonomous but as organically interconnected, forming a single management process."[187] N.E. Ryabikova, in turn, points out that "the process approach involves studying the rational order of implementing management functions, carried out according to a certain technology, aimed at achieving the goals of the socio-economic system."[188]

The process approach is also seen when "the decision-making process appears to be a continuous series of interrelated, managerial functions: goal setting, planning, organizing, motivating, and controlling."[189] The list of functions within the process approach varies significantly among different authors—we will closely adhere to the original interpretation by Fayol, combining only goal setting and planning within one function.

Therefore, the management process can be represented by the following four interconnected functions:

- Planning: defining the organization's goals and actions required to achieve these goals by thoroughly answering questions such as "Where are we now?", "Where do we want to go?", and "How do we plan to get there?";
- Organization: creating an effective structure consisting of elements such as work (specific activities) and people (performing this work through delegation mechanisms);
- Motivation: encouraging people (members of the organization) to perform work according to the plan and in accordance with their delegated responsibilities;
- Control: ensuring that the organization achieves its goals while considering internal and external circumstances that may lead to deviations from the original plan.

In general, the key concept of the process approach to organizational management is the business process, which consists of elements such as input, output, resources, owner, internal or external clients. Moreover, for the business process, the main components are technology, personnel, materials, equipment, and the production environment (Table 2.6).

Table 2.6

Advantages and disadvantages of the process approach

[185] Same source. – C. 52.
[186] Ref.: Makarov V. M. Theory of management: textbook. – St. Petersburg : Publishing House Polytechnic. university, 2012. – P. 10.
[187] Ref.: Ryabikova N. E., Ryabikov R. I., Kashchenko E. G. Fundamentals of management: textbook. Part I. – 3rd ed., add. and processed – Orenburg: Orenburg State. university, 2011. – P. 71–72.
[188] Ref.: Ruzhanskaya L. S. [and others]. General management: textbook / under general. ed.
I. V. Kotlyarevskaya. – Ekaterinburg: Ural Publishing House. university, 2017. – P. 40.
[189] Ref.: Kobylko A. A. Management functions in business ecosystems // ECO. – 2021. –№ 8 (566). – P. 129.

Process approach	
Advantages	Disadvantages
Increased manageability compared to the functional approach. Operational management is carried out through the connection between individual processes. All organization processes are aimed at achieving the final result. Ability to promptly improve organization's business processes involving multiple departments. Transparency of the management system. Improved opportunities for motivating employees by binding their work process to its final, rather than intermediate, result through key performance indicators. Quick adaptation and training of newly hired employees. Possibility of implementing automated systems engaged in working with business processes.	Difficulty in implementation and execution due to the need for strict regulation of each business process. In the case of transitioning from a functional to a process-based model, there is a need for substantial retraining of organization employees. Requires high involvement of top management in the organization.

4. Ecosystem Approach to Organizational Management

When speaking about the characteristics of the ecosystem approach to organizational management, it is necessary to focus on defining the concept of an ecosystem due to its stage of formation. Thus, the concept of an ecosystem was only transferred to the field of economics in the late XX century, yet by now, at least three definitions have emerged.

The first approach defines an ecosystem as a collection of enterprises - an "economic community of entities that interact through their activities.[190]" The second and third approaches define it as a "technological platform,""mechanisms of cooperation through which enterprises combine their goods and services to create fundamentally new complex products.[191]" A holistic approach is highlighted by G. B. Kleiner, defining an ecosystem as the "primary method of systemic self-organization of economic entities, innovative projects, and business processes in economic space and time."[192]

There is also a definition close to the standard one of an ecosystem as an economic community, "which consists of a set of interconnected organizations and individuals[193]." It is noted that the goods and services produced by this economic community are also part of the ecosystem, and "each party, with its individual demands, goals, and boundaries, engages in the exchange of resources and flows, forming “points of impact” on the ecosystem."[194]

[190] Same source.

[191] Ref.: Kleiner G. B. Strategic planning and development of enterprises: plenary reports of the Nineteenth All-Russian Symposium / ed. Corresponding member RAS
G. B. Kleiner. – M.: CEMI RAS, 2019. – pp. 6–13.

[192] Ref.: Roadmap for the development of end-to-end digital technology “Distributed Ledger Systems”». – URL: https://digital.gov.ru/uploaded/files/07102019srr.pdf (ref date: 02.04.2023).

[193] Ref.: Mishina K. A., Yussuf A. A. Advantages of the ecosystem approach in organizational management // Bulletin of Moscow University. S. Yu. Witte. Series 1: Economics and management. – 2021. – № 1 (36). – P. 65.

[194] Same source.

In this context, we can highlight the first characteristic of the ecosystem approach to organizational management – the presence of "points of impact" through which the parties of the ecosystem have an effect on it. Undeniably certain "points of impact" can also be identified in organizations that were built and are operating on the basis of classical management approaches; however, their existence would not be defining for them. Within the ecosystem approach, managing through "points of impact" is one of the striking distinctive characteristics due to the absence of mechanisms for direct influence, which are typical for other approaches.

In author's view "traditional companies focus on internal development processes and the company's growth,"[195] where the key concept is "the process" which reflects the most popular approach at present being the process-oriented approach. At the same time, a distinguishing characteristic of any ecosystem is aimed at external development, wherein "successful ecosystems operate like an orchestra, managing the entire surrounding world."[196]

Another distinctive feature of the ecosystem approach to organizational management can be considered the "blurring" of boundaries not only between companies but also between industries[197]. Such "blurring of boundaries" and the presence of "points of impact" form an extremely interesting concept of distributed management, which is "internal" to the ecosystem but "external" to the organizations within it, and does not have a centralized controlling center. At the same time, if we consider the ecosystem as a "technological platform,"such role of a controlling center can be either allocated to the owner(s) of the technological platform or the person(s) managing the configuration of the processes taking place within it.

From this perspective, the process approach can be considered as an element of the ecosystem approach that "extends beyond" the boundaries of individual organizations, serving as an "external" management system.

It is also worth mentioning that the ecosystem approach can be used to describe at least "two levels" of management within any ecosystem, which are determined depending on the subject of management: organizations within the ecosystem and the ecosystem itself as a collection of organizations or a technological platform.

It's clear that the process of managing an ecosystem can neither be described within the framework of the existing classical approaches – systemic, functional, or process-oriented – nor by using individual elements of these approaches. With this in mind, we can be certain of the emergence of a distinct, ecosystem approach to organizational management, which includes at least two levels of management.

The first level involves managing the organization within the ecosystem, where control actions are carried out on the basis of a "technological platform", for which the process approach is most applicable. For the organization within the ecosystem, this management is considered "external", which is not typical for any of the classical approaches, and refusal of such "external management" would mean that the organization would exit the ecosystem.

The second level involves managing the ecosystem itself, which is carried out through "points of impact", where the subject of impact will be organizations within the ecosystem.

Thus, the ecosystem approach to management can be described as a continuous counter mutual influence of the ecosystem and its elements, where the basis of the

[195] Same source. – P. 66.
[196] Same source.
[197] URL: https://center-yf.ru/data/Marketologu/Sistemnyi-podhod-v-menedzhmente.php

ecosystem's impact on its elements is the processes occurring on the "technological platform", and the elements of the ecosystem influence the ecosystem itself through "points of impact".

5. Comparative analysis of ecosystem and classical approaches to organizational management

When performing a comparative analysis of ecosystem and classical approaches to managing organizations, it is important to note the following essential point.

No approach to managing an organization can be considered isolated with clearly defined boundaries that separate it from other approaches. When studying the development of management practices from a historical perspective, it is apparent that every subsequent approach often not only represents a natural sequel of its previous version but may also contain its special elements.

This also applies to the ecosystem approach, which includes elements of the process approach that best describes the work of the "technological platform," which is at least an element of the ecosystem and, according to some authors, the ecosystem itself. There is a particular interconnection between ecosystem and systemic approaches, as the structure of the ecosystem can be best described within the framework of the systemic approach.

The main traits of the ecosystem approach to management include presence of "external management," "points of impact," and two levels of management, which are not present in any of the classical approaches to organizational management.

One of the main advantages of the ecosystem approach is the ability to forecast and model the economic development of both the ecosystem itself and the organizations within it in the medium and long term. This forecasting is based on a comprehensive dataset of financial and managerial processes happening within the ecosystem, as well as external environmental data. This becomes possible because ecosystems and the organizations within them are significantly more stable and predictable compared to individual organizations operating outside of ecosystems. This strength and predictability are the result of the following factors (Table 2.7).

Table 2.7

Comparative analysis results of basic approaches to managing the organization

Examples	Approaches		
	Systemic	Process	Ecosystem
1	2	3	4
Subject	The essence lies in the idea of the organization as a system, that is, as “a set of interconnected elements that has an input, an output (goal), a connection with the external environment, and feedback.” The basis for presenting a systems approach is	The essence lies in viewing the organization as a collection of business processes. The foundation of the process approach is the matrix structure	The essence lies in the idea of an organization as an interaction of business units. The basis of ecosystem approach is a special structure based on the mutual influence of elements with absence of system hierarchy

	organizational structure[198]		
Main components of the concept	Elements, connections, boundaries, external and internal environment, goal, task, technology	Input, output, resources, owner, consumers and suppliers, indicators, stages, terms, function, operations, sequence and structure of stages, schedule	Moderator, partner, Complementor, interaction, digital platform
Basic principles	Integrity, compatibility of elements of system, functional-structural structure of the system, development, functional specialization, iterativeness, probabilistic assessments, variability[199]	Interconnection of processes, process demand, processes documentation, process control, responsibility for the process.	Competitive cooperation, coordination, self-adaptation, self-organization, creation of value, goal alignment, modularity, multidimensionality, scaling, co-evolution, cyclicality, dynamic transformation, continuous innovative development[200].
Advantages	Complexity and structural integrity, the ability to build a unified picture of what is happening and see the strengths and weaknesses of the system to leverage them in achieving goals.	In-depth specialization of departments combined with managing cross functional business processes, enhanced span of control, transparency of the management system.	The ability to predict and simulate the economic development of both the ecosystem itself and the organizations included in the ecosystem in the medium and long term.
Authors	R. Johnson, F. Kast, D. Rosenzweil, S. Optner, S.	M. H. Meskon, A. Fayol	D. Moore, G. B. Kleiner, M. N.

[198] Ref.: Sharshun A. L., Sirut E. D. Systematic approach to management. – URL: https://libeldoc.bsuir.by/bitstream/123456789/39288/1/Sharshun_Sistemniy.pdf

[199] Ref.: Gritsevich S. A. Methodological foundations of the formation of the ecosystem approach: theoretical analysis.– URL: https://cyberleninka.ru/article/n/ metodologicheskie-osnovy-formirovaniya-ekosistemnogo-podhoda-teoreticheskiy-analiz

[200] Ref.: URL: https://center-yf.ru/data/Marketologu/Sistemnyi-podhod-v-menedzhmente.php

	Young, J. Riggs, M. H. Meskon		Kulapov, E. I. Pereverzeva O. Yu. Kirillova, I. V. Denisov
Methods	System analysis, system modeling, system design, system diagnostics, (progressive selection)[201].	Six Sigma (Six Sigma, 60), Project Management, Balance a Score Carel (BSC), Total Quality Management (TQM), Continuous Improvement Process CIP), change management, the concept of “lean production” (Lean Production), which originates from the Toyota Production System.	Business modeling, hybrid structuring, network and cluster design, technology integration.

The ecosystem functions as an external environment for its constituent elements, which, under any of the classical management approaches, create a high-risk zone for these organizational elements due to unpredictability and often hostile processes within it. However, with the ecosystem approach, the "external influences" affecting the organization within the ecosystem not only become more predictable but also are counteracted by the organization's management influence on the ecosystem through "points of impact."

Considering what was mentioned earlier, the systemic, functional, and process approaches, while somewhat effective for assessing the performance of individual organizations, fall short in providing comprehensive forecasting that takes into account all factors of the external environment, which is necessary given modern macroeconomic realities.

The structure of section 2.2 is illustrated in the resulting block diagram (Fig. 2.5).

[201] Ref.: Busalova A. D., Fomenko N. M., Gaponenko T. V. Managing changes in an organization during the transformation of business processes // Current problems of science and technology: materials of the All-Russian (national) scientific-practical conference / resp. ed. N. A. Shevchenko. – Rostov-on-Don, 2022. – C. 60–61.

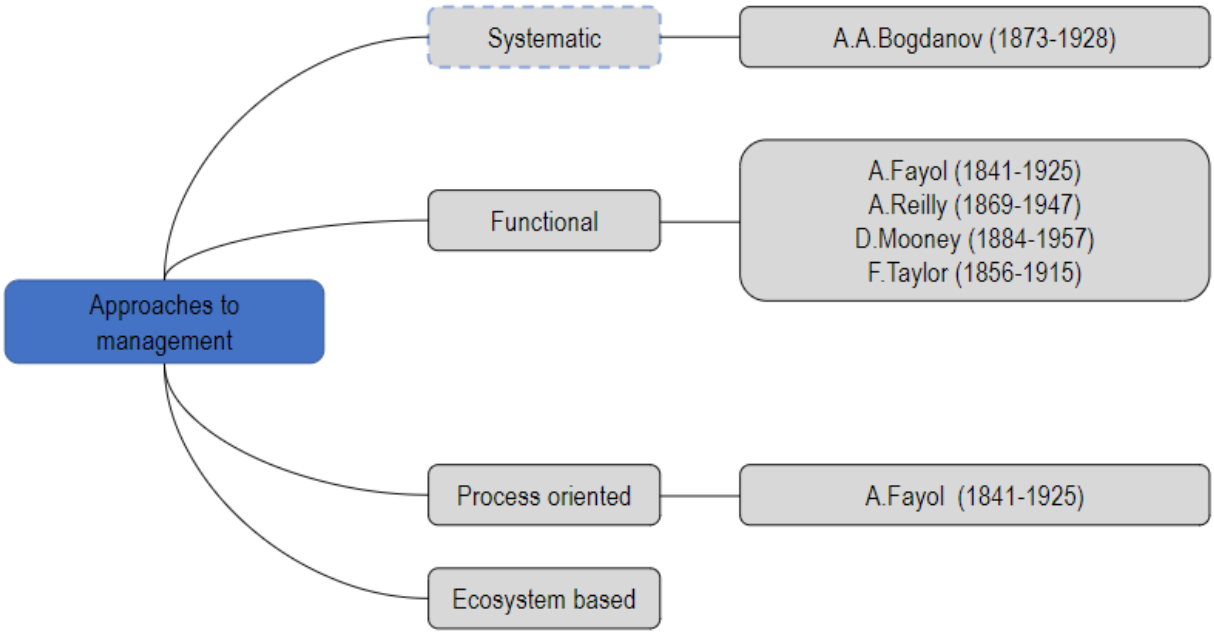

Figure. 2.5. Diagram illustrating the section "The Essence of the Ecosystem Approach and Its Differences from Traditional Approaches to Organizational Management"

Control questions

1. What is the relevance of the ecosystem approach?
2. What are the main characteristics of the ecosystem approach?
3. What does adaptability mean within an ecosystem?
4. What management approaches, besides systemic, functional, process-oriented, and ecosystem-oriented, do you know?
5. What are the main distinctive features of the process-oriented approach?
6. How does the functional approach differ from the systemic one?
7. Who can be considered the founder of the systemic approach?
8. To which management school does the functional approach belong?
9. In what year was the concept of the process-oriented approach first announced?
10. What interconnected functions can represent the management process?

Practical immersion material

Case

Management structure design

Organization: JSC Industrial Systems.

Main activities: design, development and production of technological equipment for industrial use.

Manufactured products: fish protection devices (5 models), sludge scrapers (18 models), suction pumps (18 models), debris retention grates (3 models), pipeline sanitation devices (2 models).

Location: Moscow (including two production sites).

Average number of employees: 218 people.

Functions to be supported by the management structure:

1. Marketing analysis.

2. Scientific and technical preparation of production.
3. Product manufacturing.
4. Product sales.
5. Personnel management.
6. Accounting and management of financial flows and securities.
7. Property management.
8. Information technology management.
9. Ensuring information security.

The company operates in a competitive environment, with the market characterized by moderate rate of change and innovation adoption.

Task: based on the available data, design a management structure that is most suitable for the company.

2.3. Digitization of business processes as the basis for forming ecosystems

Since the XVIII century, mankind has accumulated vast experience in running business successfully. We have mastered tools and technologies that allow us to improve work, starting from small operations and covering all stages of the production cycle. Scientists have produced numerous scientific works dedicated to efficient management, which help us organize work where each employee and resource has its niche and brings maximum benefit.

In the XXI century, we have technologies to automate nearly all routine operations. In the sales department manual data collection has been replaced by specialized services. The accounting department no longer requires full-time accountants, as one person with a computer can handle the workload. In logistics, we are able to swiftly and efficiently plan routes with maximum efficiency. There are no longer any losses in the warehouse because we trace the location, quantity, and potential storage time of goods, and if supplies run low, the system automatically places an order.

However, high competition between organizations generates competition for resources. To meet these demands, organizations must constantly review and optimize their business practices and adapt their information systems and applications to support evolving business processes. Workflow technology facilitates this by providing methodologies and software to support:

1. Business process modeling - to document business processes in the form of workflow specifications.
2. Business process reengineering - to optimize the identified processes.
3. Workflow automation - to create workflow implementation processes based on workflow specifications.

When working with business processes, it is important to implement a common methodology for all the departments. This consistency will help to distribute areas of responsibility more clearly and effectively among employees[202].

It is worth noting that any change is followed up by a series of actions, both positive and negative. On one hand, we free up resources, optimize their usage, and reduce financial costs of production, but on the other hand, there is a fear among people of losing their jobs.

Today, new management models are emerging in the business environment, such as ecosystems, which also involve a vast number of cross-functional business processes that ensure that needs of an end consumer are satisfied. Let's examine how business development and digitization of business processes influence the creation and evolution of ecosystems.

Let's address the history of management. A significant contribution to the history of it was made by F. Taylor, who defined four fundamental principles that formed the basis of the process approach:

1. Scientific analysis of each part of the work, determines the most effective method of its execution. To achieve this, all necessary tools and instruments are examined together with determining the maximum volume of work that a first-class specialist can accomplish in a day. This norm is then assigned as the expectation for all employees.
2. Selecting the most suitable person is selected for the job using a scientific approach. Employees are trained to perform the work using a method that is specifically and scientifically developed.

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[202] Ref.: McKillop M.; McKillop A. D. Methods for increasing efficiency: an introduction to scientific management. – London : George Routledge & Sons, Ltd, 1920.

3. cooperation between managers and staff, which ensures the completion of work using scientific methods.

4. The need for clear division of labor and responsibility between managers and employees. In this case, the manager takes on tasks that they perform better than the employees (such as planning and control), while the staff carry out the actual implementation of the objectives[203].

Those four rules are the basis for working with business processes to this day. Indeed, the development of science and technology has changed approaches to organizing work and its evaluation. Creating business processes is one of the fundamental tasks of any organization, as a wrong technological process can lead to enormous losses, and its relative effectiveness will not yield results for the organization.

Before moving on to modern approaches and process digitalization, let's also revise the Deming-Shewhart cycle.

The PDCA quality cycle is an abbreviation of the process approach to business management. It was developed by W. Shewhart and later refined by E. Deming during the implementation of the Total Quality Management system.

E. Deming designed a formula for business success: ensure quality and improve quality. If you are working on constantly improving quality, it means you are constantly working on the process that creates that quality (Figure 2.6).

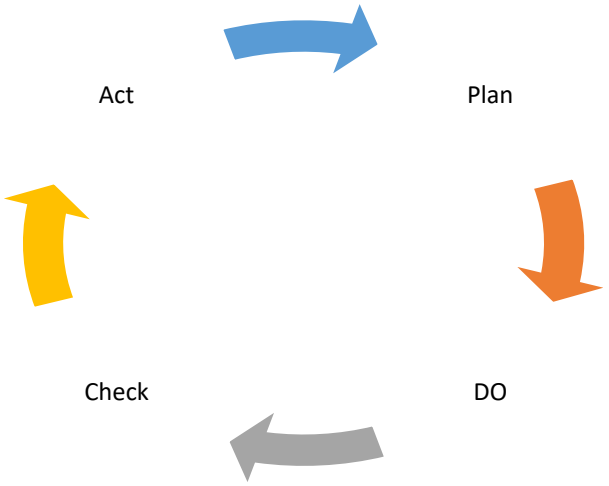

Figure. 2.6. Cycle PCDA

Constant changes undoubtedly require new tools and approaches for organizing work. The trends of the last 10-15 years leading us towards digital transformation of everything around us, which requires a review of a large number of processes.

Digital transformation itself entails changes in business technologies for further fundamental transformations. These changes are unique to each organization and often enhance operational efficiency, enable creating better value for end consumers, and foster adaptability to a wide range of changes. Of course, all these changes require a considerable amount of effort and identification of alternative scenarios that can facilitate the implementation of new digital technologies and modify the organization's business processes. This requires a team of associates within the organization who will work on the changes.

[203] Ref.: Millar M. Global Supply Chain Ecosystems. Strategies for Competitive Advantage in a Complex, Connected World. – London, UK : Kogan Page Limited, 2015.

The process approach to management views the entire company's work as a complex of business processes. Ideally, each of them should increase the value of the product produced for the consumer. Handling customer inquiries, preparing commercial proposals, hiring new employees, quality control at the production input - these are all examples of business processes. It's easy to imagine how many of them take place in an organization every day.

At the heart of the process approach lies a cycle similar to the familiar PDCA cycle, a cycle that now includes Modeling -> Execution -> Control -> Optimization. Let's review it on Figure 2.7.

This cycle allows working with business processes and constantly modernizing them, which is the basis of continuous improvement of the organization. This constant cycle enables the improvement and development of all processes. An important feature of any organization's activity is continuity. Business continuity is a process that ensures closely linked logical steps and consequences for each process. To ensure this, any organization is looking to define the goals and objectives that need to be achieved, as well as the overall strategic agenda.

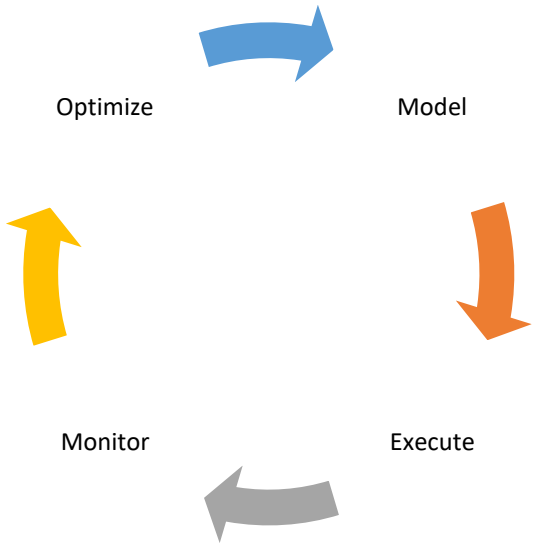

Figure. 2.7. Business process cycle

Once the main objectives are specified, preliminary modeling can be done, taking into account all factors that may directly affect the process of achievement of these goals.

Next, it is necessary to plan a course of actions that allows us to define the necessary steps for achieving desired outcome. All business processes should be taken into account. Like any regular project work, dates may be subject to change.

The optimization process is always complex and critical for the organization; many employees worry about redundancies. This makes it complicated for the specialists who are involved in making changes within the organization. Employees may resist changes. On the other hand, if we consider this process as optimization, it involves automation and reducing losses by carefully managing the organization's resources. The goals of optimizing and digitizing business processes can include the following:

1. Reducing time of a single business operation.
2. Decreasing production costs for goods or services.
3. Improving quality.
4. Transparency of business processes.

5. Freeing up resources.

6. Enhancing management systems.

Indeed, the goals and objectives of optimization depend on the company's strategy. One such strategy could be the origination or participation in an ecosystem, which requires a sufficiently high level of maturity of business processes; they need to be described and understood throughout the entire exercise. These processes typically affect all departments within the organization, making it time consuming and expensive to bring the organization to an acceptable level. The following criteria can help to determine when a review of business processes is required within an organization:

1. Significant time input with minimal productivity.

2. Lack of control over execution of operations.

3. Unclear boundaries between processes.

4. High rate of defects or errors.

5. Challenges with cross-functional cooperation.

Ultimately, it is necessary to make a comprehensive analysis of all business processes and make management decisions regarding the optimization and automation of these processes. Automation is now actively becoming a part of the process in a large number of organizations, contributing to reduction of production costs and simplification of tasks.

Automation incorporates three important principles required for effective implementation in organizations:

- Principle of coherence: all steps of the process should be logically interconnected and work together seamlessly.

- Principle of integration: the process should be linked to all organization processes.

- Principle of independence: each automated process should operate with minimal human involvement. This principle underlies fully automated production, allowing for a reduction in the time and resources required to complete tasks.

When automating business processes, there may be certain issues such as - reduced quality, increased costs, and decreased employee motivation. However, analyzing business processes and optimizing the system can reduce costs, streamline operations, and standardize work. It is important that the system is not overly bureaucratic. The future success of the organization will ensure mobility, transparency, and a clear structure without unnecessary paperwork, unjustified losses, and with clearly defined boundaries for employees in the automated process.

Having examined the classical approach to creating business processes, let's consider what happens when the model transforms and transitions into an ecosystem. Unlike other types of ecosystems (such as knowledge or innovation ecosystems), business ecosystems are focused on generating profits from their activities. It is also worth noting that ecosystems allow diversifying the organization's range of services, thereby increasing its attractiveness to end consumers. The ecosystem becomes a convenient platform for other organizations, which in turn receives additional benefits from this interaction through shared resources, flexibility, speed of decision-making, cost-sharing, and the use of a common brand, enabling them to work with an expanded target audience.

The ecosystem serves as a beneficial platform for organizations seeking to enhance their welfare. Integration into the ecosystem provides access to a vast knowledge base and interaction with specialized experts when needed. Overall, the integration of the processes of one organization into the processes of another helps to establish clear channels of exchange, which in turn contribute to reducing monitoring costs and

improving decision-making processes, learning, and adaptation. This networking can be a significant step for organizations in their evolution.

All these benefits can contribute to the development of organizational, managerial, technical, and strategic capabilities and skills over time, defined as supply chain competencies. According to Millar[204] - "Working in ecosystems allows firms to trade more efficiently and effectively, and supply chain management opportunities become a source of competitive advantage." In some industries, ecosystems facilitate cooperation with other stakeholders to create efficient supply chains. Thus, when firms are incorporated in business ecosystems, they gain experience in managing relationships with other participants and can simultaneously combine skills to create a system of capabilities. This ecosystemic interaction allows for more quality relationships with a larger number of participants, thereby maintaining economic balance.

Having examined the background and the important aspects of business processes in the process of digitization, let us turn to the approach of how processes can be created within an ecosystem.

Figure 2.8 shows a business process flow within an organization. It includes inputs, outputs, and steps that lead to the implementation of particular activity. Overall, business processes are needed to represent complex information in a simple form for further analysis and decision-making.

Description of business processes has two purposes:

1. Business analysis: Graphical representations clearly illustrate the internal structure of the company, helping to control and measure organizational activities.

2. Formalization of actions: Systematizing and describing all functions that take place within the organization.

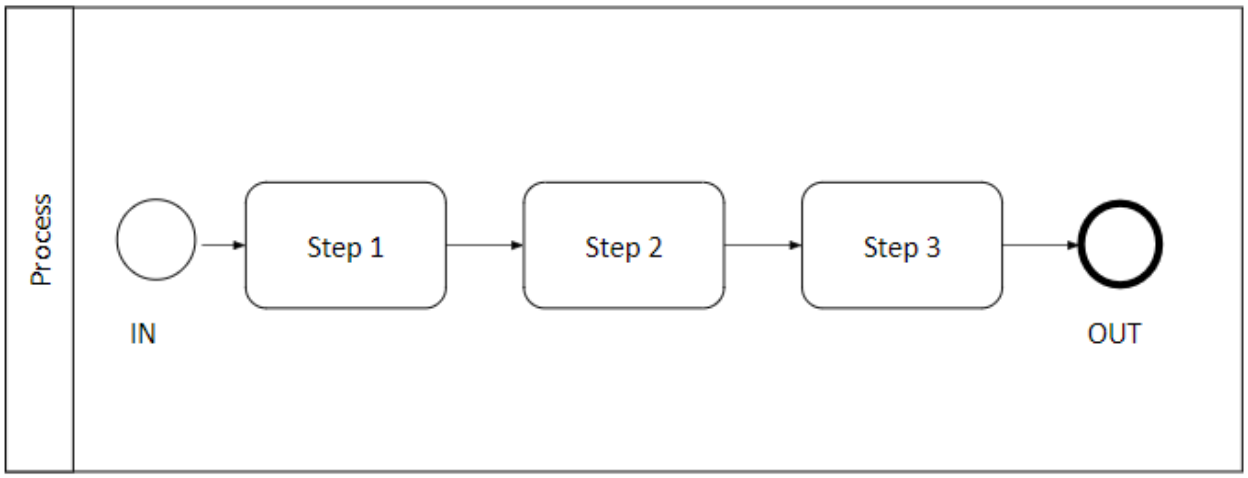

Figure. 2.8. Business process

There are several types of business processes:

- Core processes
- Supporting processes
- Auxiliary processes
- Providing processes
- Managing processes
- Development processes

[204] Ref.: Palchevskaya T. S. Methodological foundations for assessing the effectiveness of the innovation process in the supply chains of an organization // Bulletin of Polotsk State University. Series D. Economic and legal sciences. – 2021. – № 6. – P. 58–62.

All these processes are present in any organization and can be described using the following scripts for business process modeling: VAD, TPC, BPMN, IDEF.

Commonly used tools in organizations include:

- Bizagi Process Modeler
- ELMA
- Visual Paradigm
- ARIS Express
- Camunda

Next, let us consider the integration of processes between organizations (Fig. 2.9), where the diagram shows the integration between business processes. Interaction between organizations allows creating joint values that bring value to the end consumer.

After many years of gradual progress, supply chain management is ready for serious changes in its requirements and capabilities. Organizations that aim to compete in the conditions of new trends and market factors must review their supply chains to assess the complexity of the process. By implementing effective ideas and intelligence, companies now have the opportunity to succeed in the rapidly changing modern digital economy.

Turning to expert views in this industry, it is worth noting that authors have different opinions. For example, Olga Ovechkina outlines the importance of building an effective management system:

“To organize an effective management system for virtual supply chains, it is necessary to develop the following processes:

- New organizational and economic interaction schemes of participants - organizational design;
- Rules and principles of interaction (conditions for receiving and placing orders, planning and operational process management, risks, profit distribution);
- Information support systems (concepts of a joint information and communication environment for cooperative relationships);
- Methods, models, and algorithms for optimizing business processes."

In her work, T. Palchevskaya pays special attention to the importance of building up the supply chain and its compliance with the innovative environment: "The application of the synergy effect to form an innovative environment in an organization aligns with the main principle of the supply chain management concept. By enhancing of interaction between organizations, they have more focus on a common result which allows increasing the efficiency of the entire supply chain. The process of developing an innovative environment (IE) of the organization consists of the following stages:

- Collecting data on external and internal factors of IE;
- Working on strategy for developing the IE;
- Optimizing the strategy in terms of managing consumer loyalty;
- Implementing the IE management strategy;
- Monitoring and evaluating the efficiency of actions related to the development of IE.[205]”

Modeling processes between organizations helps to save resources by assessing and stimulating process feasibility in advance. This also allows predicting potential losses when implementing integrated business processes.

[205] Ref.: Ganin A. N. Digital transformation of Russian enterprises: Industry 4.0 // Creative Economy. – 2022. – T. 16. – № 2. – PP. 493–502.

For ecosystems, working with business processes becomes more complex, it requires constant application of a systemic approach and rearrangement by the organizer company, which implies detailed development and adjustment of IT systems.

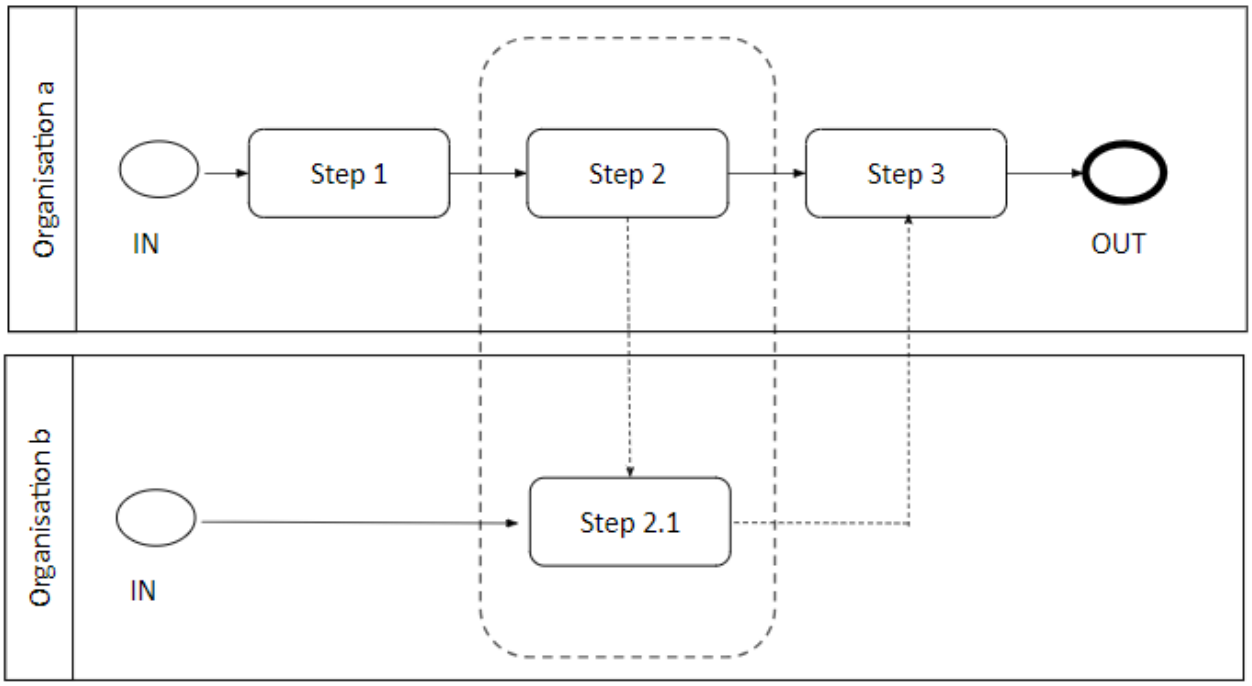

Figure. 2.9. Building cross-organizational processes

When organizations interact, all common steps are usually documented in contracts and work orders. However, when it comes to partnership and especially creating an ecosystem, organizations need to focus not only on legal obligations but also on common processes. In management accounting, in addition to financial indicators, it is crucial to understand what value streams exist in the ecosystem, how they are interconnected, and what inputs and outputs happen between them.

Figure 2.10 shows the interconnections of business processes within the ecosystem.

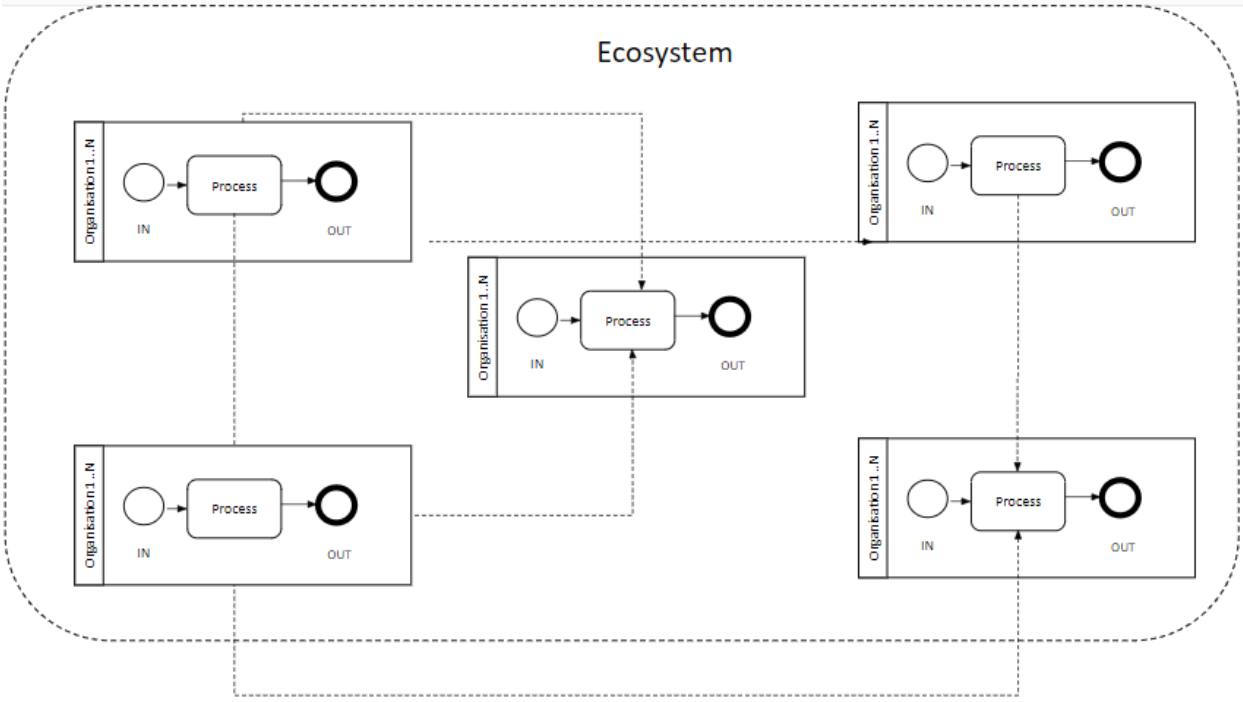

Figure. 2.10. Connecting cross-organizational processes in an ecosystem

To illustrate the authors' interest in this topic, let's examine the number of articles written by them over the last 5 years. The data from the RSCI database provided following results (Table 2.8). Over the period, the number of articles remains stable, averaging 5,500 articles per year.

Table 2.8

Data on the number of publications from Y2017 till Y2021.

Year of publication	Number of articles
2017	6 380
2018	5 880
2019	5 860
2020	5 610
2021	4 850

However, it is worth noting a decrease in authors' interest in this topic since 2020, which is a consequence of the COVID-19 epidemic and a decrease in interest in supply chain management topics in general. Attention is focused on issues related to working in the current limited conditions.

In the new reality, all industries and business sectors are changing their approaches to tasks. Due to the widespread digitization of processes and businesses of various levels, there is pressure on traditional supply chain models to align with the "now" generation. To avoid disruptions, companies must provide customers what they want, when they want it, and how they want it. In the face of rapid innovation, modern supply chains must evolve to provide end-to-end visibility, enhanced analytics, and cross-functional cooperation.

The structure of the section is provided on diagram (Figure 2.11).

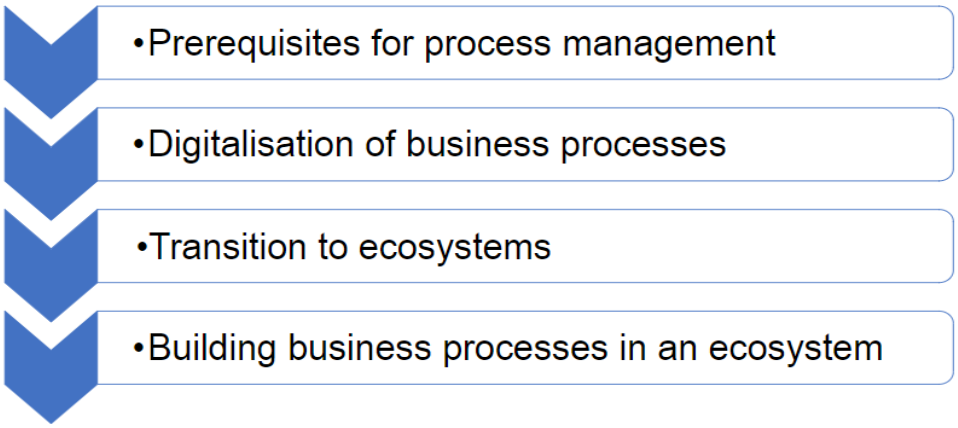

Figure. 2.11. Visualization diagram of the section “2.3. Digitization of business processes as the basis for forming ecosystems"

Control questions

1. Why is digitalization necessary?
2. What is the role of business processes in organizational activities?
3. What are the main attributes of a business process?
4. What are the main challenges that an organization faces when optimizing business processes?

Practical Immersion Material

Exercise

Model the process of mutual creation of value to the end consumer. Show on the graph the flow of value adding breaking the tasks into understandable steps. There must be at least three participants in the network.

2.4. Digital ecosystem as a form of business transformation

The digital ecosystem is a widespread trend gaining popularity worldwide.

Digital transformation provides both opportunities and an imperative for growth.

However, not all organizations are ready to implement new solutions onsite and to the scale required to keep up with the developments of Industry 4.0[206]. As a result, market leaders in the digital space increasingly rely on business ecosystems to offer and develop a full range of solutions. Well-structured and managed business ecosystems have become a source of competitive advantage for those who can operate effectively, as customers demand comprehensive, well-integrated solutions.

One of the most promising digital business models today is digital ecosystems[207]. A digital ecosystem (DE) is a solid network of cross-industry services that satisfies diverse user needs. Access to these services is provided through a single user profile, mutual advertising campaigns, bonus systems, and a shared customer database. To use all the benefits of digitization, it is necessary to keep in mind all components of the digital ecosystem. Focusing on managing the four key components of the digital ecosystem will facilitate a comprehensive digital transformation of the business (Fig2.12).

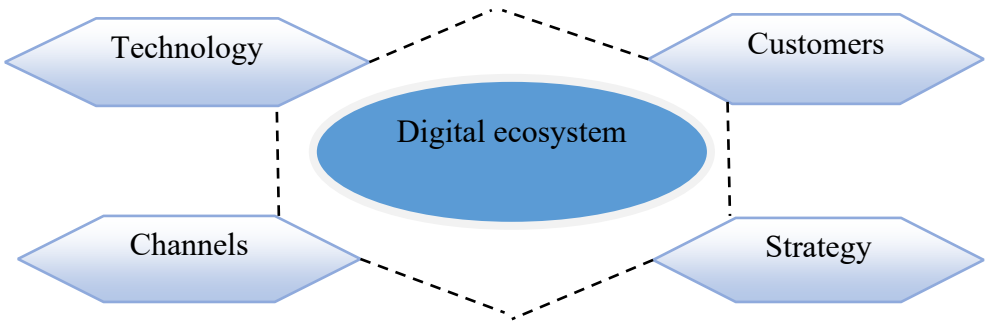

Figure. 2.12. Key components of the digital ecosystem

Features of a digital ecosystem include[208]:

- Having at least one digital platform among the services offered by a company or a government agency
- Presence on more than two markets and/or industries
-Integration of services with each other (both technically, for example, through a single technical solution, shared subscription, loyalty program, single ID, or super offer, and substantively – benefits from receiving multiple services for the consumer)
- Significant role of the user data and their actions, as well as methods of their collection, storage, and processing, play a role in the business models of companies.

Based on the above, one can conclude:

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[206] Ref.: Digital ecosystems in Russia: evolution, typology, approaches to regulation. – URL: https://www.iep.ru/files/news/Issledovanie_jekosistem_Otchet.pdf

[207] Ref.: Zakharov V. Ya., Trofimov O. V., Frolov V. G., Novikov A. V. Ecosystem management: mechanisms for integrating companies in accordance with the concept of "Industry 4.0" // Leadership and Management.– 2019. – T. 6. – № 4. – PP. 453–468.

[208] Ref.: It is the world's largest retail hardware cooperative and the largest American non-grocery retail cooperative.

Ecosystem = a platform + multiple markets with different types of participants + service integration + big data

DEs cover various markets, from finance to home improvement, often combining services across various industries. Companies adopt this development model to outperform competitors by creating additional value for customers. Ultimately, the created ecosystem promotes the interests of all of its participants. For example, Ace Hardware[209] has the largest number of physical stores across the United States. In 2022, there were over 4,000 Ace Hardware stores in the US. The company is a retailer -owned cooperative owned by retail dealers, which boosts its growth by opening more physical stores. Another player in this industry is Home Depot[210]. It operates over 1,994 physical stores in the US, significantly less than its competitor. Instead of opening new branches, the company focuses on creating a digital ecosystem for home improvement services. In 2021, the Home Depot ecosystem earned nearly 20 times more than Ace Hardware, despite Ace Hardware having twice as many physical stores but not developing an ecosystem[211].

Therefore, it is not really about the number of stores. It is more about exploring new markets and understanding the needs of different customers and providing tailored services.

The key characteristics of the digital ecosystem are shown in Figure 2.13.

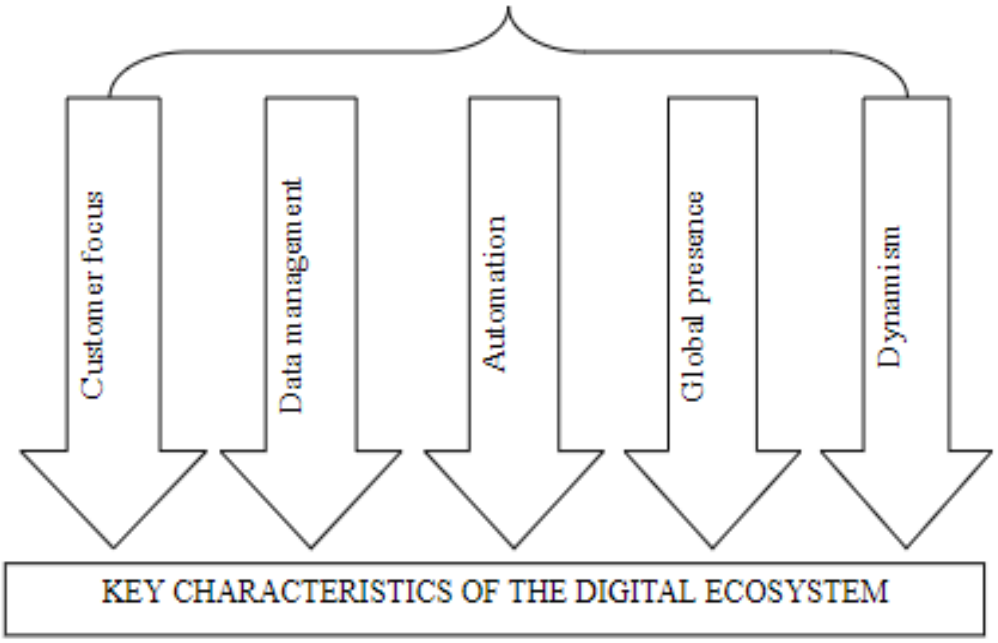

Figure 2.13 Characteristics of the digital ecosystem

The goal behind any digital ecosystem is to create a network effect, where integrated platforms and services cooperate to create a final product that excels the collection of its individual parts. Once companies start their digital transformation, it requires deliberate strategic planning and careful partner selection based on their full assessments.

[209] Ref.: An American retail chain that is the largest on the planet selling repair tools and building materials.
[210] Ref.: What Are Digital Ecosystems, and Why Are They Ruling the Market. – URL: https://www.heyinnovations.com/post/digital-ecosystems
[211] Ref.: Internet company developing software for online and retail stores (Canada).

Choosing the right strategy depends on the initial resources and future development plans. Depending on the initial resources and final goals, there are several ways to scale a business into an ecosystem.

Table 2.9

Methods to scale a business into an ecosystem

Method	Subject	Example
Independent development of the new services	The IT department will have to create a mini-business from scratch: from researching the market and identifying potential offerings to actually developing the new services and integrating them into the core platform. Usually, large companies have their own IT departments that can handle new tasks. However, sometimes this can jeopardize the support of existing projects, so, as a precaution, companies may outsource teams to execute such tasks	« Sportmaster » –is a sporting goods retailer that has developed its own ecosystem of providing service to professional athletes.
Purchasing of other companies or services	Another option - is to simply acquire companies that have the necessary services or technologies and combine them with the base platform. This is a great solution for ecosystems that cannot spend time or resources on development, and want to complement their offer with a specific service as quickly as possible	PayPal - buys small companies with relevant technologies to expand into new market sectors.
Establishing partnerships	When one company collaborates with another on contractual terms and create an ecosystem together. Requires minimal investments, but companies have very small control over each other: the deal can be terminated by either party, and the partner company can participate in other ecosystems as well. However, digital partnerships facilitated by these new ecosystems can make or break businesses. Therefore, it is crucial to understand not only which digital products are included in the ecosystem but also how to choose and develop effective digital partnership relationships with the right business partners.	Shopify[212] entered into partnership with the Yotpo marketing platform to create a smart and innovative ecosystem for sellers.
Becomming part of bigger ecosystems	A company may choose a different approach and become a partner of a larger ecosystem instead of creating its own platform. In this way, the IT department can leverage the extensive user base of the hosting ecosystem and its partners, finding new areas for further growth.	SpotHero – is a parking reservation platform that has integrated its services into Apple Maps to reach out more customers

Modern CEOs, HR business leaders, and managers must determine which type of ecosystem best suits their strategic goals and their company's capabilities. They must also

[212] Ref.: The Emerging Art of Ecosystem Management – URL: https://www.bcg.com/ publications/2019/emerging-art-ecosystem-management

be consistent in their decision-making regarding systems used in the ecosystem, and the providers of those systems to create mutually beneficial relationships.

The three most well-known types of digital ecosystems are digital device ecosystems, platform ecosystems, and super-platform ecosystems.

Digital device ecosystems are best suited for companies with powerful product capabilities, limited digital capabilities, and primarily internal focus. They are well-suited for organizations seeking to make their core product intelligent and connected. An example of a digital ecosystem is an automotive manufacturer which cooperates with other companies to acquire the technology and intellectual property (IP) needed to connect their vehicles to relevant digital services.

Platform ecosystems are more sophisticated than digital device ecosystems. Their goal is to seamlessly connect users and intelligent devices on the platform, while ensuring a high level of service and fewer barriers. Platform ecosystems are best suited for companies that already have strong digital capabilities and prioritize the customer experience. Established tech startups and companies are more likely to adopt this platform as their primary business model than non-tech companies.

Super-platform ecosystems offer a wide range of user data and even convert data into revenue streams using complementary business models. They are a great fit for companies with advanced digital capabilities and a well-established platform, as well as a willingness to work with external partners. Because of this, super-platform ecosystems are preferred by well-established technology companies.To achieve the best results, many companies prefer to use more than one type of ecosystem simultaneously. For example, Amazon Alexa uses all three types of digital ecosystems.

BCG[213] worked on a framework for ecosystem development and management that enables leaders to apply strategic severity to the process. Based on its research of over 40 ecosystems across eight industries, BCG developed ten guiding principles that enhance the likelihood of ecosystem success.

1. Choose the right type of ecosystem: The most effective management model will depend on the type of a chosen ecosystem.

2. Establish a management model: Every ecosystem should have an organizer.

3. Develop a monetization strategy: Consider how the ecosystem will create value and generate revenue or internal return on investment for the organizations.

4. Focus on creating mutual value: A strong, appealing ecosystem benefits all participants and aims to share the resulting value.

5. Make highly effective partnerships a priority.

6. Maintain turnover and flexibility: Establish flexible partnership agreements so the ecosystem can quickly respond to changes in the business landscape and form new partnerships or terminate existing ones.

7. Establish trust among partners.

8. Enhance solidarity: Organize meetings or conferences with partners to gather feedback, implement innovations, discuss planned changes, and create community spirit and cohesion.

9. Establish and track clear performance metrics.

10. Separate ecosystems from outdated companies: To ensure that ecosystems remain flexible and are not constrained by policies and procedures of outdated corporate environments, assign them to separate departments or have them report directly to senior management.

[213] Ref.: URL: https://cdo2day.ru/analytics/cifrovye-jekosistemy-v-rossii-perspektivy-razvitija/

Some of the above principles may be more applicable to organizations that have developed products or services and are seeking mutually beneficial alliances, resulting in a community that represents something greater than the collection of its parts. However, all of the above is also relevant and, therefore, can be applied in organizations that utilize multiple third-party systems to create digital business ecosystems for internal operations with maximum efficiency (Fig. 2.14).

Additional services add value to the core business and ensure loyalty among existing customers. New services help capture new market segments and attract more users to the ecosystem. Once interested by one service, users aim to explore others as they form a cohesive network. The ecosystem attracts many users through a single acquisition. Services benefit from the shared customer base and support each other during times of crisis. The ecosystem may not incorporate all its services into a super-app or website. A well-balanced network of complementary products and services is necessary to meet customer needs and generate profit for each other.

Amazon is indeed a prime example of such a system. As of 2022, it had a portfolio of at least 97 acquired subsidiaries and a developed ecosystem of its own services, catering to a multitude of user needs: Amazon Music, Amazon Pay, Amazon Kindle, Amazon Fresh, and others. Today, Amazon is the largest e-commerce company in the world, and it wouldn't have reached this status without employing an ecosystem strategy[214].

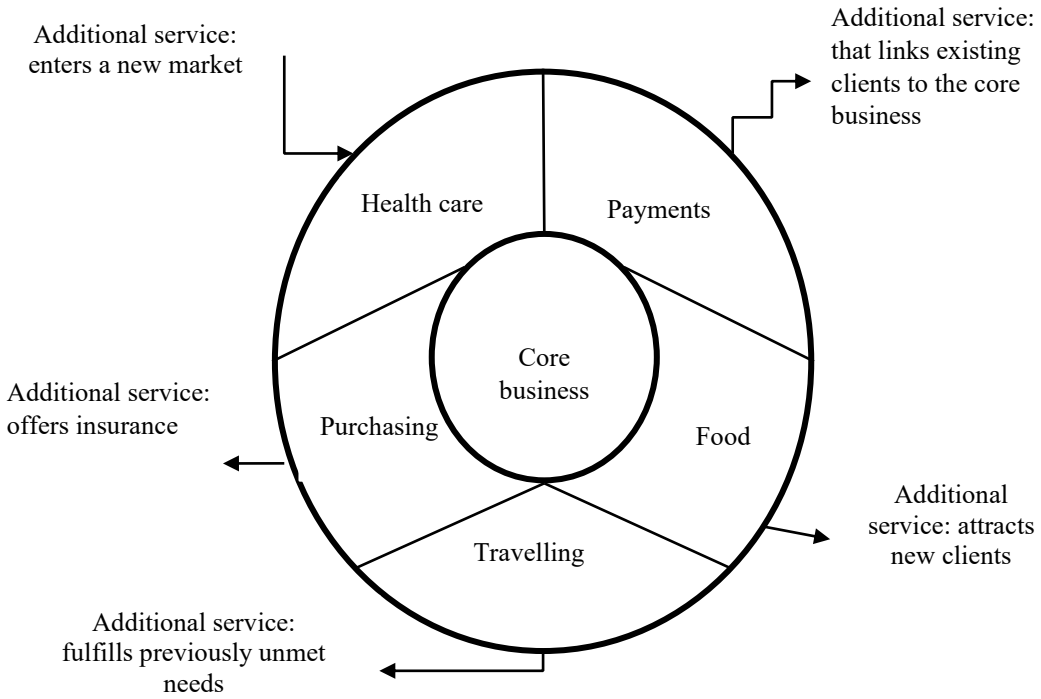

Figure. 2.14. How the digital ecosystem works

The digital ecosystem strategy creates value within the enterprise by removing redundancy, improving visibility and security, and reducing management complexity. Looking at the best practices for creating a digital ecosystem strategy will help to simplify the organization's transition to digital transformation.

[214] Competition in the digital era: strategic challenges for the Russian Federation // Report on the development of the digital economy of Russia. – URL: https://www.-vsemirnyjbank.org/ru/country/russia/publication/competing-in-digital-age (дата обраще-ния: 01.12.2022).

It is important to acknowledge that not all digital ecosystems are organized, planned, and managed effectively. For organizations, it is common to organically develop their digital ecosystems as they acquire, develop, and integrate new applications on an ad hoc basis. However, to realize the benefits outlined below, it is important to take a more systematic approach to building the digital ecosystem. This requires:

1. Defining and mapping each component of the digital ecosystem and tracking the data flow through all systems.

2. Evaluating the effectiveness of each asset and determining system and service priorities based on their value, sensitivity, and importance to your operations.

3. Utilizing third-party risk management to handle essential risks associated with third-party suppliers, partners, and platforms.

One way to simplify this process is to operate within a framework of an existing ecosystem of products and platforms that provide all or most of the necessary functionality. For example, Salesforce, Amazon, and Google offer extensive sets of integrated technologies and services that operate almost perfectly. This simplifies monitoring, management, and operation of the digital ecosystem.

Academics Kalandar Abdurahmanov, Saidakhor Gulamov, and Nabi Ziyadullaev note that, after studying Russia's experience in Uzbekistan, several programs have been developed and implemented to introduce digital ecosystems, including:

- The first digital platform of reviewed scientific journals in Uzbekistan - Uzbekistan Research Online;

- Huawei Enterprise digital platform;

- A new digital platform for young generation engagement - U-Report, launched in Uzbekistan by UNICEF and the Youth Association of Uzbekistan together with the Senate of the Oliy Majlis and the Ministry of Public Education of the Republic of Uzbekistan with the support of the Ucell mobile company, etc.

The electronic government service website is called my.gov.uz - UPIGS. UPIGS registers both individuals and legal entities. Currently, the number of services provided on the unified interactive portal of government services has reached 280.

In the world of new challenges and opportunities, members of the Shanghai Cooperation Organization (SCO) such as Russia and Uzbekistan have excellent prospects for transformation and growth not only through quantitative replenishment but also through opening of new strategic vectors. These include transport and interconnection, energy, food security, and environmental safety, as well as innovation, digital transformation, and business ecosystems.

In Uzbekistan, a company called Uzum is creating a national digital ecosystem that integrates IT products for millions of residents of the country. In addition to existing products, the ecosystem plans to launch classified services (online service where different ads from individuals and companies are segregated by topic), as well as new products for entrepreneurs, including fintech and last-mile logistics.

Therefore, the national digital platform will integrate services in all key IT areas for both consumers and businesses, providing residents, regardless of their size and distance from the capital, equal access to the most modern IT solutions.The development of the ecosystem contributes to the growth of small and medium-sized businesses in the country, as well as to the increased popularity of digital banking services, which, in turn, means a reduction in the share of cash payments in the economy and an increase in the level of financial literacy among the population.

By 2025, Uzbekistan plans to launch the digital ecosystem edu.uz in the fields of higher and professional education, science, and innovation. The main purpose of this is to

create inter-system integration to organize mutual exchange of data between information systems.

The "Digital Uzbekistan-2030" Strategy was approved by the President, outlining the main directions for the advanced development of the digital industry in the country and enhancing the competitiveness of the national economy. It includes programs for the digital transformation of regions and industries.

Russian-Uzbek relations in the field of digital ecosystems, aimed at creating joint innovative projects in various areas of activity, have significantly strengthened recently. Among other things they are also aimed at supporting the development of new digital capabilities and the implementation of new technologies in Uzbekistan.

One of the advantages of a digital ecosystem (DE) is the ability to automate processes. By improving the functionality of applications and software, companies ultimately spend less time on manual navigation between digital workspaces, saving time and reducing the number of errors that may arise from human involvement.

Integration with the ecosystem generates new revenue flows and allows organizations to track and analyze a wide range of data. They can use this data to develop new products and services of better value.

A reliable digital ecosystem strategy allows the security department to examine each application, service, and solution in the corporate network. This ensures that employees are aware of all sensitive areas and can apply appropriate security measures. Additionally, a digital ecosystem map can help to improve data management and ensure compliance with data privacy regulations.

Creating a digital ecosystem ensures adaptability, scalability, and self-sufficiency of digital processes – all of which are necessary to maintain competitiveness in the modern business world.

The digital ecosystem is formed by combining platforms – omnichannel architecture that provides value to the customer through personalized products and services, and strategic partnerships. The common elements of the digital ecosystem typically complement and magnify each other, leading to improved innovation, digital experience, and trust, as shown below (Fig 2.15).

Companies from different sectors can participate in the digital ecosystem as organizers, partners, or executors, and the decision on which role to take is a crucial aspect of the digital ecosystem strategy. These can be technological leaders or market leaders that use their capabilities and customer base to create platforms for serving customers across the entire value chain of the business.

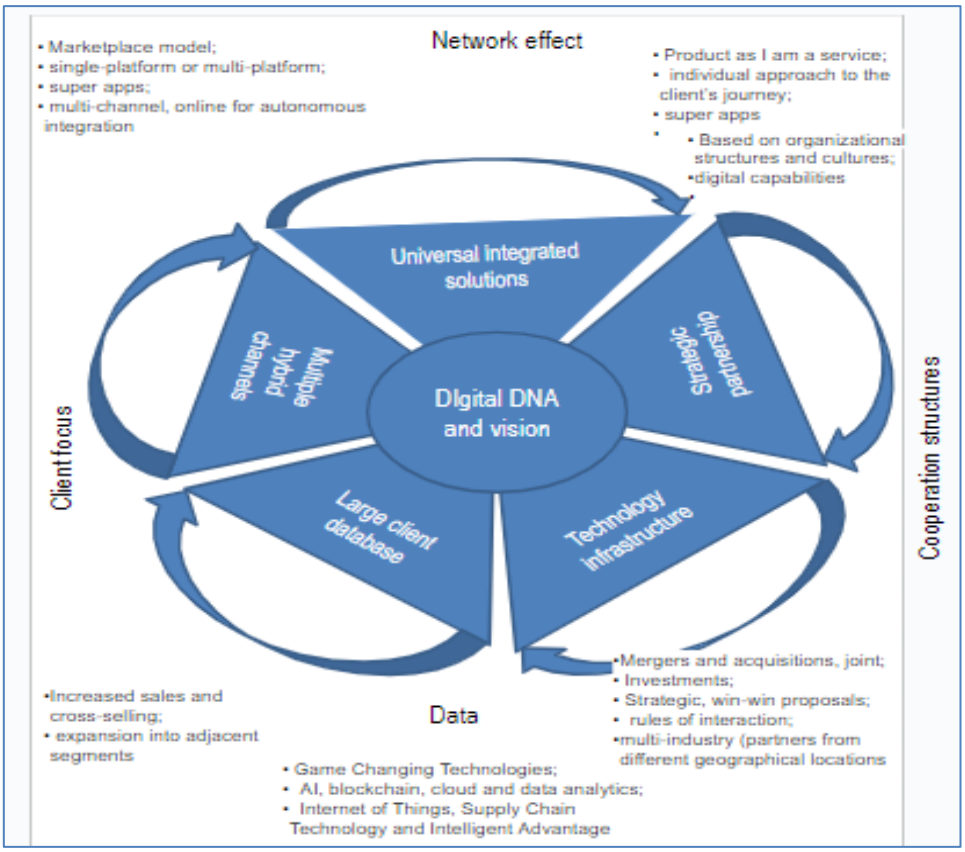

Figure 2.15 Common elements of Digital Ecosystem

Some of the biggest challenges that digital ecosystems are facing include service organization, delivery, and monetization, customer communication management (CCM), and customer data management (CDM). Some of the tools used to manage the digital ecosystem are illustrated in Figure 2.16.

Having a clear understanding of how all digital tools and platforms are connected (or not connected) is an important step towards ensuring that the right processes are in place to achieve business goals.

A proper digital roadmap is one of the most important planning tools, allowing you to determine which digital platforms best suit your needs, how they will be managed and optimized, and what resources and skills are necessary for success.

To create a digital ecosystem roadmap, you can use the following steps:

Create a list of tools. Make an inventory of all applications and systems used in organizations.

Document who uses the tools. Determine who uses each system and application, and who is responsible for each of them.

Categorize each tool. Determine what each system and application does, for which department, and for what purpose. Systems should be classified according to the ownership and departments.

Set up connections between the tools. Specify where data is transferred between tools and whether this is done automatically or manually. Note which tasks are duplicated and which systems have similar functionality.

Assess the effectiveness of each tool. Determine which tools are inefficient and require replacement, updating, or consolidation. Feedback should be provided by people who use the specific tool on a daily basis.

Set priorities for each tool. Assess each tool according to its importance to the organization. If tools are being replaced or added, consider their value based on their immediate need within the organization and establish the order in which they should be implemented.

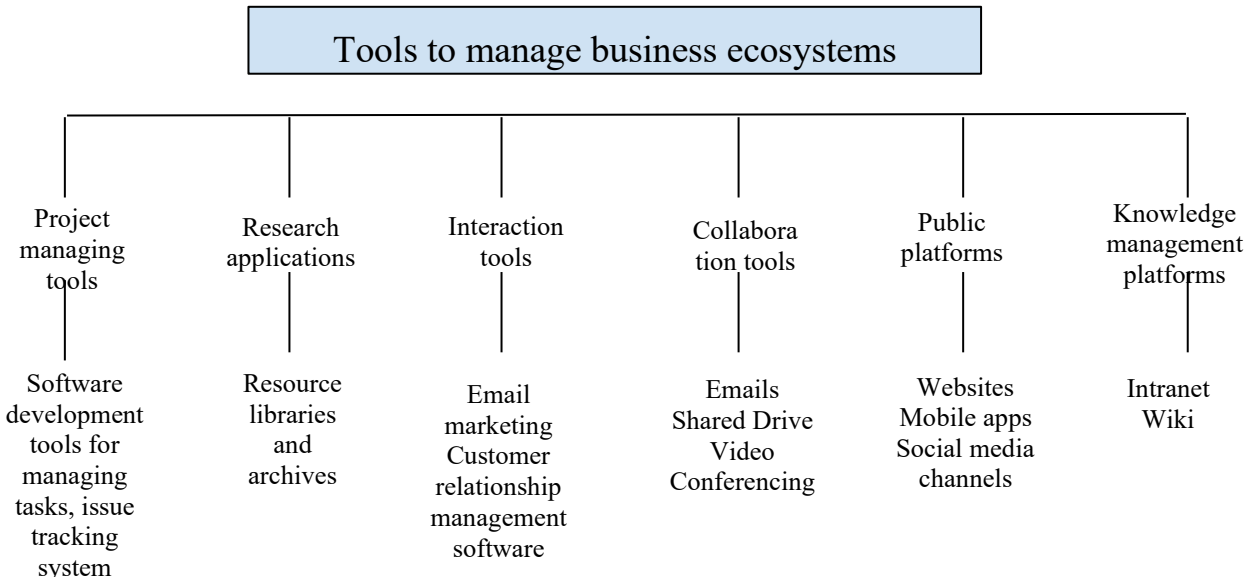

Figure 2.16. Digital Ecosystem Management Tools

The strategies of digital interaction are evolving rapidly, with new tools constantly emerging. Organizations want to stay updated on the most effective technologies and strategies to:

– Help their organization achieve success
– Efficiently operate within the budget

A digital ecosystem map enables organizations to measure their presence and ensure they are fully utilizing their operational budget.

The digital ecosystem map illustrates processes, how data moves between components, and whether it's automated or manual. Equally important, it also shows where systems are currently not connected or unable to exchange data with each other. A good digital ecosystem map can also provide the list of users of each system and those responsible for their servicing.

In the field of digital platforms, organizers are the key players and therefore can significantly benefit, as platform-based ecosystems increase market share and acquire potential profits of ordinary companies. However, while many companies participate in platform-based ecosystems – roughly 40% of the top 30 global brands and 70% of startups – only a few were able to benefit from this. Organizers often face challenges when scaling the ecosystem, expanding it beyond its initial framework, or simply in monetizing and extracting value. Those who successfully cope with these challenges will benefit from implementing and leading a digital business model built on a platform, as well as from the ecosystem partners (let's call them "complementors") who gain value by expanding the scope and attractiveness of the ecosystem. Below is a strategic guide for organizers to help them develop their platform-based ecosystems, attract and retain partners and customers, and maximize their share generated by the digital ecosystem. (Figure 2.17)

The first step is to expand the ecosystem by increasing the number of complementors on the platform and expanding the user base. Organizers can grow their existing business by using the network effects. These players can seek growth through moving to adjacent areas of business.

The second step is to improve the platform, which in a competitive environment can thrive only if it is maintained at the highest level of quality. This means that the platform must be technologically sound and constantly innovate, using technology to meet the needs and preferences of its users and their complementing entities.

Third step - platform management. Organizers must take the initiative in managing relationships with their customers and complementors to ensure they are following the right course.

Fourth step - maximizing ecosystem monetization. While the ecosystem consists of partnerships (albeit irregular), organizers can either gain or lose more than all other participants. They make the most significant financial investments and allocate substantial resources to ensure the survival and growth of the platform. Naturally, they will seek ways to increase their profit share generated by the platform. Following actions to improve platform monetization are identified to be most effective: increasing fees, encouraging competition, stimulating cross-selling, and more.

In a digital ecosystem, various tools and technologies work together to create more efficient workflows and business practices. For the strategy to achieve genuine success, it's crucial that employees within the organization collaborate effectively. This means changing the corporate culture of the organization to prioritize cooperation, removing information inconsistency, and implementing tools and policies that support cross-team interaction.

While digital ecosystems can be extremely beneficial for business processes and efficiency, an unhealthy digital ecosystem can significantly reduce productivity, capital, and the spirit. The best way to ensure ecosystem health is to perform ecosystem audits. Key questions to consider during the audit include the following:

1. How are tools managed? Is there an established management model to support the tools? Is there a roadmap for the future or the ability to meet evolving needs as they arise?

2. How do existing tools support the company's vision and goals? Are tools supporting consistent brand experience and individuality?

3. How does information flow through the organization? How can the digital ecosystem enhance support for the organization's operations and workflows?

4. How do people collaborate within the ecosystem? Who has access to what? What can people do, and how can they do it more efficiently?

Answering these questions and conducting a comprehensive audit of the digital ecosystem may take a considerable amount of time, but it will provide a deeper understanding of how the organization's digital ecosystem operates. This can then be used to ensure significant cost savings and impressive organizational growth.

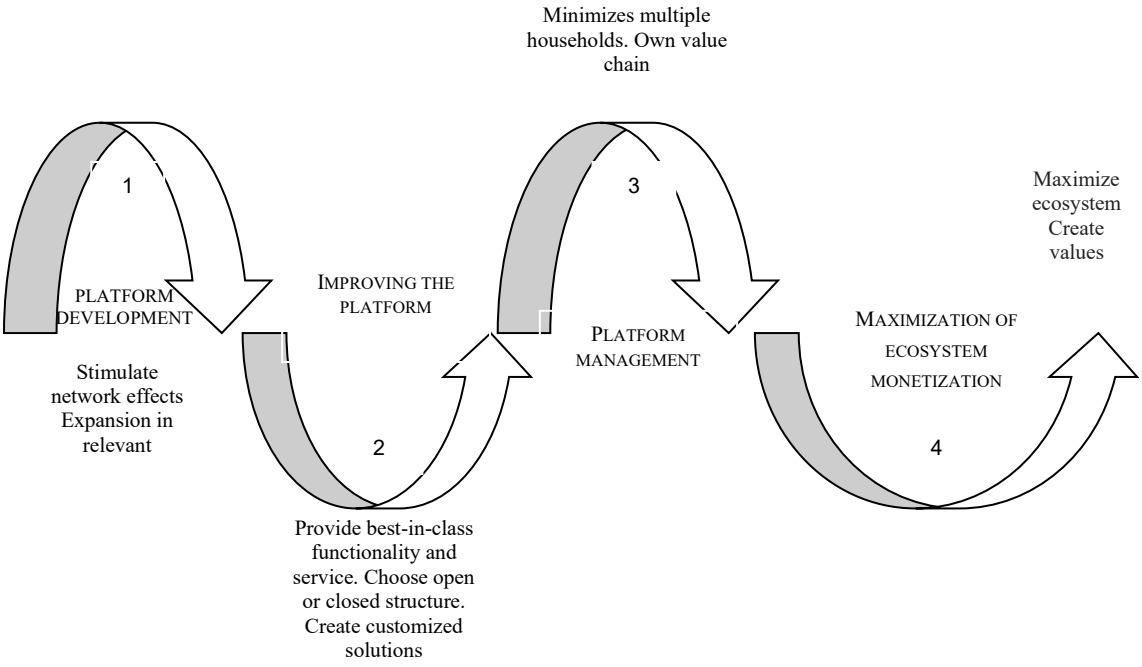

Figure 2.17. Strategic Guide for Developing Platform Based Digital Ecosystem

Conclusion:

1. The growth of technology partnerships will rapidly expand as companies worldwide transition to digital ecosystems. The goal is to enhance business outcomes by attracting customers through omnichannel sources, thereby offering them a relevant and consistent brand experience.

2. A digital ecosystem relates to a network of entities, platforms, and services that cooperate and interact digitally.

3. A digital ecosystem is essential as it enables smooth operation, innovation, and value creation between different organizations.

4.Hardware, software, networks, platforms, data, users, applications, and services are key components of a digital ecosystem.

5.Cooperation, scalability, enhanced user experience, access to global markets, and economic efficiency are significant advantages of a digital ecosystem.

6.An effective digital ecosystem strategy can help reduce operational and overhead costs by improving business processes, enhancing security systems, and providing customers with superior products and new sources of revenue.

7.To build a successful digital ecosystem, it is necessary to: establish clear goals and directives, prioritize user experience, encourage cooperation and partnerships, define roles and responsibilities, create a digital ecosystem map, implement third-party risk management, create a cultural shift within the organization, conduct ecosystem audits, and continuously monitor and update the ecosystem.

The structure of the section is shown in the diagram (Fig. 2.18).

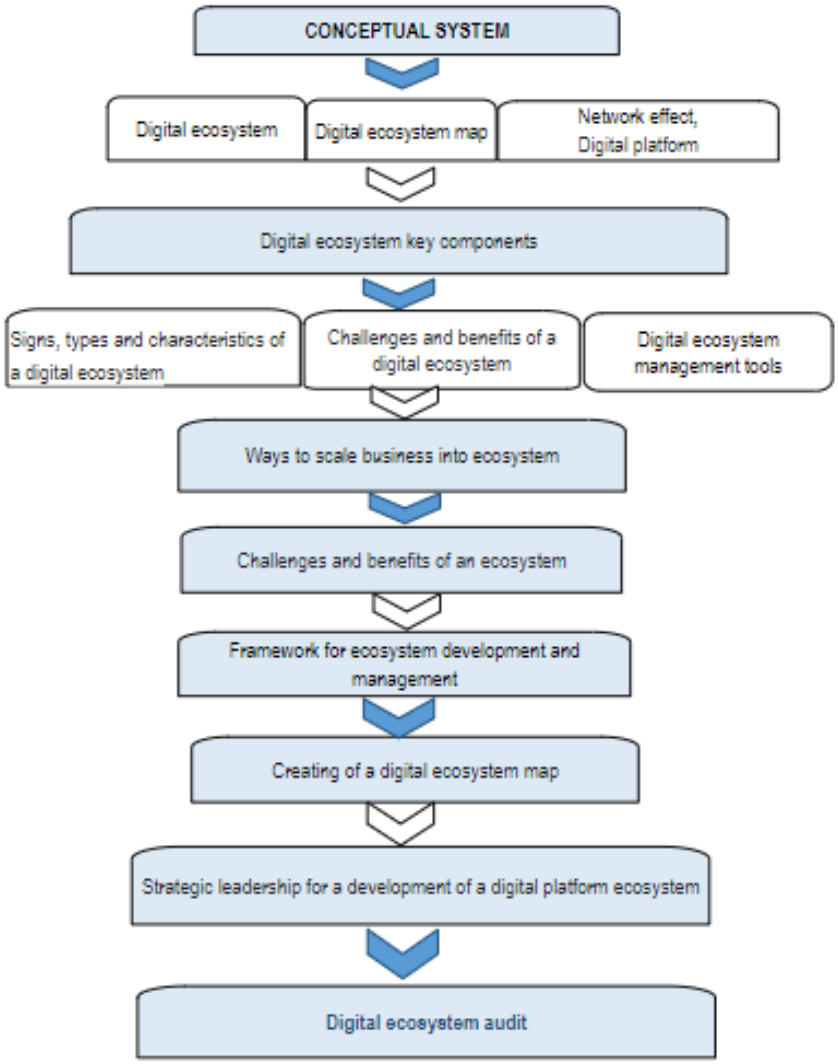

Fig. 2.18. Visualization scheme of the section "Digital Ecosystem as a Form of Business Transformation"

Control questions

1. What is meant by a digital ecosystem?
2. What are the advantages of a digital ecosystem?
3. How can organizations develop their platform based ecosystems?
4. What tools are used to manage the digital ecosystem?
5. What factors need to be involved for the emergence of a digital ecosystem?

Practical Immersion Material

Tests:

1. What is the core of the digital ecosystem?

a) Parent company;
b) Group of investors;
c) Digital constructor;
d) Digital platform.

2. What characterizes value creation in a digital ecosystem?

a) Value is freely distributed;

b) Value is created by the development team of the parent company;

c) Value is created through the efforts of platform users and ecosystem partners.

3. At which stage of the digital ecosystem lifecycle intensive innovations become necessary?

a) Scaling stage;

b) Maturity stage;

c) Self-renewal stage;

d) Emergence stage.

4. What is the role of the leader company in the digital ecosystem?

a) Ensures sales of goods and services;

b) Attracts buyers to the platform;

c) Acts as the main investor into the development of the digital platform.

5. What assets contribute to creating added value in a digital ecosystem?

a) physical assets;

b) labor force;

c) machinery and equipment;

g) digital assets.

6. What effects do platforms stimulate?

a) reduction of a service cost for the user;

b) increase in the number of intermediaries;

c) increase in waiting time;

d) reduction in transaction costs;

e) raise in the number of service users.

7. The more people use a phone, the more valuable the phone is to me. This is an example of ...?

a) the Streisand effect;

b) network effect;

c) the Dunning-Kruger effect;

d) the butterfly effect.

Practical Task:

1. Choose a digital ecosystem and define its niche.

2. Select one segment and create a profile of its user: social status, profession, characteristics.

3. What problems does this user solve using the services of the digital ecosystem?

4. Present the results in the form of a report.

Case:

Digital ecosystem "Own Farming" for agricultural enterprises

It cannot be said that the Internet introduced significant changes into the level of digital technology utilization in agriculture. It is actively used for information search, messaging, and to make preliminary orders. Furthermore, the process of getting

services/products remains largely unchanged from the one of 20 years back: "manual" drafting of contracts, invoices, and office visits.

Numerous electronic platforms and message boards were created for services/products, which in 80% of cases do not provide any value to consumers due to the cost of information and lack of digital processes. There is no single platform that would be the source for all data on agricultural services/products.

Limited access to the information on agriculture advanced technologies.

Task:

Describe which groups of services need to be created in the digital ecosystem for farms and agricultural enterprises that will automate work and provide necessary services in a user-friendly digital format.

2.5. Ecosystem approach to managing the life cycle of an organization

1. Economic Development Cycle

Life of organizations in an economic environment, similar to wildlife in a natural environment, follows stages of cyclical development. The most well-known are noted by P. Samuelson in his book "Economics":

- Monetary theory, which explains the cycle through the expansion and bank credit contraction (Hawtrey et al.);
- Innovation theory (Schumpeter, Hansen);
- Psychological theory that is interpreting cycle as the process of interchange between waves of optimism and pessimism (Pigou, Badgley et al.); - Underconsumption theory, explaining the cycle as the imbalance between savings and investments (Hobson, Foster, Catchings et al.);
- Overinvestment theory (Hayek, Mises et al.);
- Sunspot - weather - crop theory (Jevons, Moore).

The classic cycle of social reproduction includes four phases (Figure 2.19):

1) *Crisis* (recession): a reduction in production volume and business activity, falling prices, overproduction, rising unemployment, a sharp increase in bankruptcies;

2) *Depression* (stagnation). Can last from six months to three years. Characterized by a decline in the interest rate;

3) *Recovery* (recovery). Capital investments, prices, production, employment, and interest rates are rising;

4) *Boom* (boom). Emergence of new goods, new enterprises, rapid growth of investments, stock prices, wages, and prices. As a result, the economy reaches a new level of development, but at the same time forms the foundation for the next crisis.

Given the variety of reasons for cyclical reproduction and the frequent disruptions of traditional phases, scholars from various disciplines suggest the following types of cycles:

- Kondratiev cycles, or long term cycles lasting 40-60 years. Their main driving force is radical changes in the technological base of social production and its structural reorganization;
- Kuznets cycles. Their timeline is limited to approximately 20 years, and the driving forces are shifts in the reproductive structure of manufacturing(they are often called reproductive or construction cycles);
- Juglar cycles with a period of 7-11 years, which are the result of the interaction of various monetary and credit factors;
- Kitchin cycles lasting 3-5 years, generated by the dynamics of the relative size of inventories of material goods of enterprises;
- Private economic cycles covering periods from one year to 12 years and existing due to fluctuations in the investment activity.

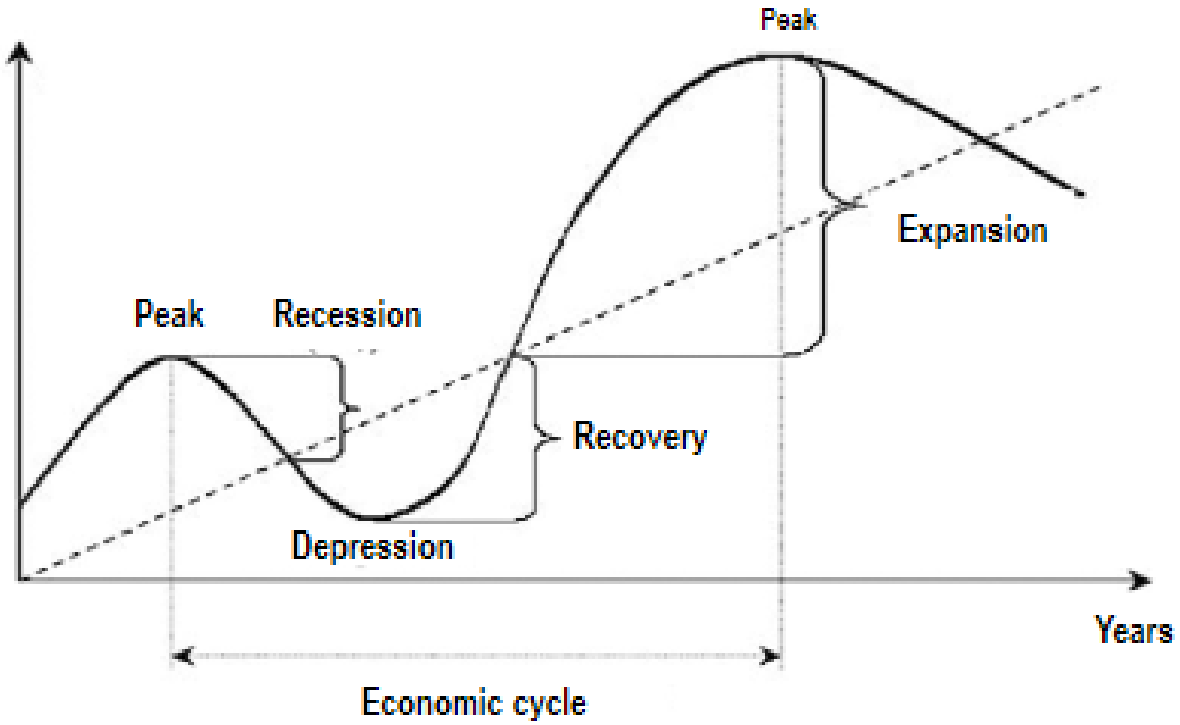

Figure 2.19. Business cycle phases

Patterns of social and economic nature cannot be understood without considering the influence of natural-ecological cycles, their synchronization, and interaction.

Particularly interesting are the cycles described by A. Kondratiev who studied vast statistical data. He identified two phases or waves in the cycle - an upward and a downward. According to his findings, the fourth major cycle was supposed to begin in the late 1940s and continue until the 1970s (upward wave), and from the mid-1970s to the mid-1980s - the downward wave. The transition to the upward wave of the fifth cycle was supposed to begin in the early 1990s, with the peak expected to be reached in the first decade of the 21st century.

In modern conditions, long waves have a significant impact on economic development. If a crisis occurs during the downward wave of the major cycle, it will predetermine its deep and lingering nature. At the same time, the upward wave of the major cycle can have a positive effect on overcoming the crisis.

Company crises are not a myth but an objective reality. They reflect their own development rhythms, sometimes not being consistent with the cycle of the macro-systems but changing their course under their influence. The patterns behind the crisis in organization are explained by the specific nature of its life cycle.

In general, considering the causes of economic cycles, they can be placed under two main categories (Table 2.10).

Table 2.10

Theories of Economic Cycle Development[215]

Theories, based on objective factors:	Theories, based on subjective factors:
1) Monetary theory, explaining the cycle by expansion and contraction of bank credit. 2) Innovation theory, interpreting economic fluctuations in terms of technical innovations and improvements, the utilization of new resources, and the exploration of new territories. In short, new revolutionary technology completely changes the character of the entire economy, providing the foundation for a significant raise of capital goods and investment growth. 3) Sunspot-weather-crop theory. These natural factors determine the demand of agricultural producers, which impacts service sectors.	1) Psychological theory, interpreting a cycle as a result of pessimistic and optimistic waves affecting population; 2) Underconsumption theory, where the cycle is caused by a disproportionately large share of income held by wealthy and unwilling to spend individuals compared to what could be invested; 3) Overinvestment theory - when a recession is caused by excessive investment.

2. Ecosystem Approach

Currently the Russian economy is experiencing an increase in the efficiency of organizations existing within the business environment of ecosystems. It is quite obvious that business ecosystems represent a new form of integration of companies. There is also a clear understanding of their correlation with digital platforms, which serve as an instrumental basis for communication.

The concept of "business ecosystem" was introduced into the scientific and business world in 1993 by J. Moore as a result of research made on the field of economic biology, which already operated with concepts such as "product and organizational life cycle," "organizational pathology," and others[216].

According to J. Moore's definition, business ecosystems are dynamic and co-evolving communities consisting of diverse entities that create and receive new content through both interaction and competition. He also explained that, similar to how an ecosystem in biology is a "community of organisms interacting with each other, combined with the environment in which these organisms live and interact," so too in business, an ecosystem is "...an economic community, based on a foundation that consists of interacting organizations and individuals, organisms of the entrepreneurial world..."[217]

By moving the term "ecosystem" from biology to economics, J. Moore also transferred its main structural components. "Any biological ecosystem is based on three components - cenoses (communities of organisms), biotopes (homogeneous in direct and

[215] Source: Tupchienko V. A., Krivtsova M. K. Key theories of the economic cycle // Financial analytics: problems and solutions. – 2014. – No. 3. – URL: https://cyberleninka.ru/article/n/klyuchevye-teorii-ekonomicheskogo-tsikla (date of access: 05/20/2023)

[216] Ref.: Kulapov M.N., Pereverzeva E.I., Kirillova O.Yu. Business ecosystems: definitions, typologies, development practices // Issues of innovative economics.– 2022. – T. 12. – № 3. – C. 1597–1612. – DOI: 10.18334/vinec.12.3.115234

[217] Ref.: Kreiner S. Business path: Jack Welch. 10 secrets of the world's greatest king of management. – St. Petersburg. : Krylov, 2004.

indirect environmental conditions), and communications that provide the ecosystem with energy and matter. In business ecosystems, we see associations of companies that have homogeneity in certain characteristics (most come together based on value propositions) and communications that integrate and connect participants in the system (usually financial transactions)."

Nowadays, widespread business ecosystems demonstrate high efficiency by completely restructuring approaches to organization of sales, including introducing digital technologies and electronic environments. The main characteristic of business in an ecosystem becomes customer focus, implying maximized comfort and knowledge advantages for all users.

When studying a business ecosystem, it's essential to examine the interaction and emerging connections of its components. We suggest exploring the origin of these connections by studying the life cycle of each organization appearing in the space of the ecosystem and determining the possible point of entry.

3. Life cycle of an organization

To identify the patterns of ecosystem formation as the most effective forms of company integration in the business environment, along with the mechanisms of their operation and development, as well as internal and external crises and risks, it is necessary to trace: at what point in the life cycle of a typical organization the need for inclusion in the ecosystem arises. Such an organizational form of an advanced organization implies a more sophisticated way of management and competitive advantages in business.

"The average lifetime of a typical company in Japan and Europe is not very long - 12.5 years, presumably even less in Russia, and increasing the organization's lifecycle is an extremely important task for its owner, its members, and for society as a whole. At the same time, a deep understanding of its characteristics at each stage of the organization's development is necessary."[218]

"During the time of their existence, all organizations go through certain stages of development, irrespective of the company: the transitions from one stage to another and the duration of these stages mainly depend on the efforts of its management. Throughout the course of cyclical development of an organization, different numbers of crisis points are identified, differentiating one stage from another, and the number of stages varies from 3 to 10."[219]

Looking at the organization from the perspective of its life cycle theory, we will regard it as an entity that evolves and operates not only within the business environment but also exists within certain time frames. It should be noted that the time intervals during which an organization exists are nonlinear, and depending on micro- and macroeconomic factors, they may increase or decrease. Within the ecosystem framework to the functioning and development of an organization, one can clearly draw a parallel between its lifecycle and any biological ecosystem. This approach allows us to clearly trace both the previously mentioned cyclical nature and various processes happening during the organization transition from one stage to another."

Itzhak Adizes was actively researching and working on the theory of the organizational life cycle, aligning it to a biological entity. Key aspects of his model indicate that "not all organizations survive until the point of dawn, and beyond this turning point, bureaucratic processes inevitably follow, resulting in closure of business (a parallel to the

[218] Ref.: Shirokova G.V., Serova O.Yu. Models of life cycles of organizations: theoretical analysis and empirical research // Bulletin of St. Petersburg University. Ser. 8. General and strategic management. – 2006. – Issue. 1.
[219] Ref.:.:Adizes Isaac. Corporate life cycle management. – M.: Higher School, 2017.

death of a biological unit)" (see Figure 2.20). The model does not address the crises that organizations encounter during their life cycle, nor does it describe the organization's parameters or a strategy aimed at extending the period of stable development.

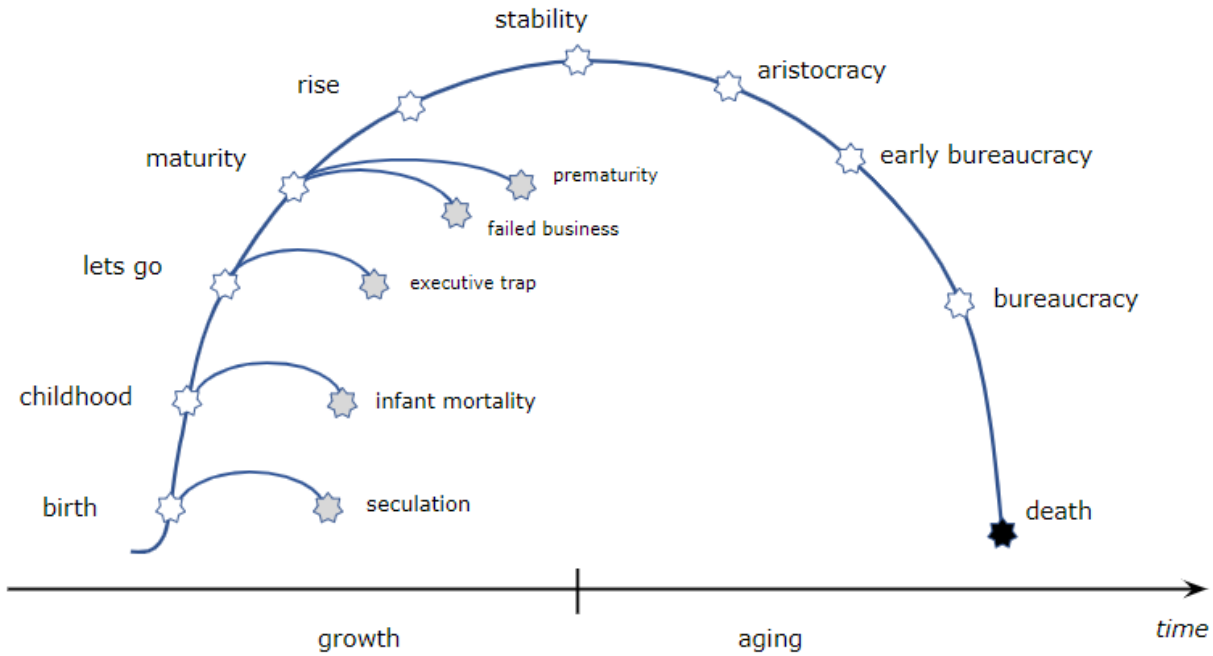

Figure 2.20. Graphic representation of Itzhak Adizes' lifecycle model[220]

In 1972, a theory of the stages of the lifecycle was published by L. Greiner, which, unlike Itzhak Adizes, clearly identified only 5 stages of growth in the development of the organization (see Figure 2.21).

Within each of the identified stages, the phases of evolutionary (progressive) and revolutionary (intermittent) development are clearly traced. The former are characterized by extensive sequential business growth, while the latter by a mismatch between content and form, being in a contradiction between the goals and management methods of the organization, as well as group and interpersonal conflicts. For the organization's management, such problematic situations serve as a signal to change management tools and strategic orientations.

According to L. Greiner's, the duration of the evolutionary phase ranges from 4 to 8 years. This range is explained by the maturity and specifics of the activities. Newly established businesses in sectors with highly demanded products tend to pass through this phase more quickly. Businesses operating in sectors with a traditional, repetitive over several years technological cycle tend to have a longer duration of the evolutionary phase.

Within the framework of his theory, L. Greiner considers five main stages of organizational development (Figure 2.21), with transitions from one stage to another occurring through organizational crises. It should be noted that both models demonstrate the cyclical nature of organizational development and describe typical stages of development, but Greiner's model emphasizes the similarity with processes in the biological world. Among them, the mechanism of transitioning to a new stage through a crisis should be highlighted, as it provides opportunity for development.

[220] Ref.: URL: https://hbr.org/1998/05/evolution-and-revolution-as-organizations-grow

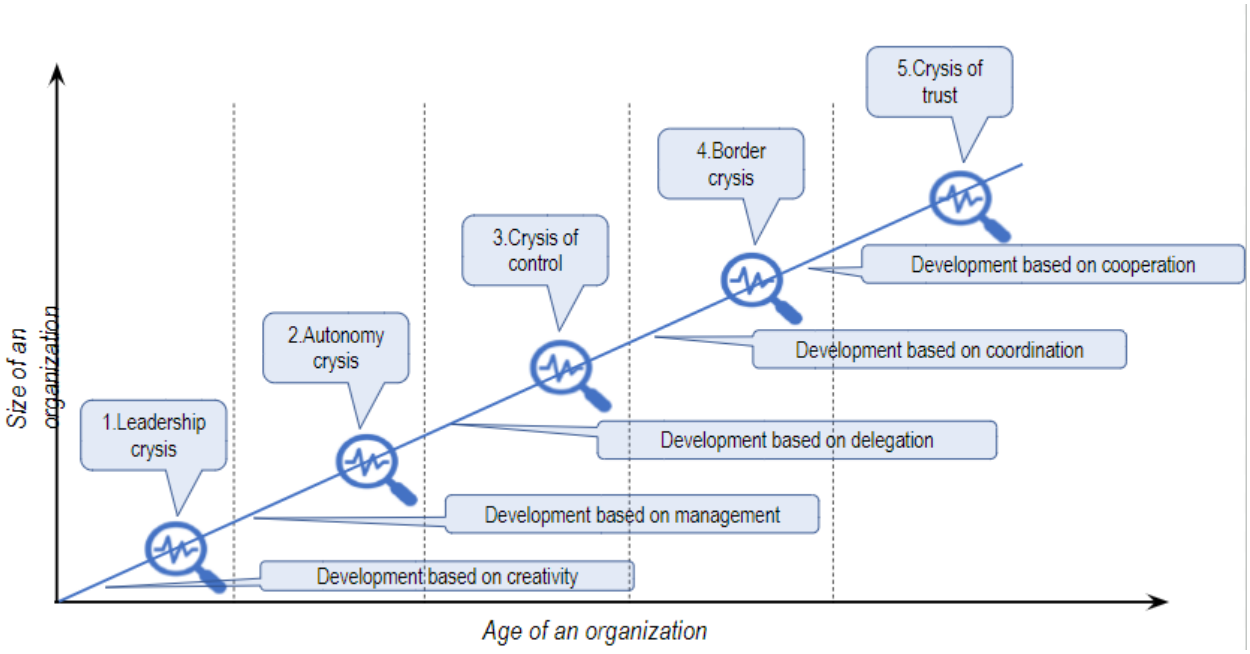

Figure. 2.21. Graphical representation of L. Greiner's model"[221]

For further understanding of organization life processes, let's consider models developed by Russian scientists, who provide their approaches to structuring a company lifecycle. For example, Y.N. Lapygin considers following stages of organizational development:

1) Formation;
2) Intensive growth;
3) Stabilization;
4) Crisis.

Lapygin refers to the development cycles as periods during which an organization fundamentally changes its internal values and orientations.

In turn, B.Z. Milner identifies 5 stages of the organizational life cycle[222]:

1) Entrepreneurship stage;
2) Collectivity stage;
3) Formalization and management stage;
4) Structure development stage;
5) Decline stage.

From the perspective of strategy adjustment, the most important aspect is the change in the dynamics of the system development, so the essential stages of the life cycle are identified as follows:

1) Ascending development - positive dynamics of the system's resources;
2) Flat growth - tendencies of zero growth;
3) Descending development - downturn of the organization as a system.

In any of the examined representations of the life cycle of the organizations, the most significant interest for researchers lies in the change of the development dynamics of the organization (the bifurcation point, representing "...a leap in system parameters after a critical divergence of development course"[223]), as this resolves the fundamental question of the organization's further existence as a system. The transition between life cycle

[221] Ref.: Milner B.Z. Theory of organization: textbook. – M.: Infra-M, 2005.
[222] Lapygin Yu. N. System management of an organization. – M. : MGUESI : VlGU : VIB, 2002.
[223] Ref.: Koroleva E.I., Sukhorukov A.M. Model of the life cycle of an organization // Bulletin of Omsk State University. Series: Economics.– 2008. – № 3. –PP. 27–33.

stages leads to changes in parameters that define the content of the development strategy of socio-economic systems. According to B. Z. Milner, each organization goes through several stages of development. The manager's task is to recognize these stages in a timely manner and take appropriate actions. Otherwise, without relying on a wrong assessment incorrect decisions may be made. Despite the contradictions of various models of the organizational life cycle, analyzing them allows us to identify some common patterns in its development.

Any approach describing the life cycle of an organization has direct similarities with the processes occurring in the life of living organisms and their associations, particularly in biological ecosystems. It is worth noting that any organization, like a biological unit, goes through stages of inception, establishment, stable development, decline, and death. All these processes are accompanied by both endogenous influences within the existence of the biological species and external influences from the micro- and macro-environment. Moreover, biological species in an ecosystem interact with each other. The importance of such constant interaction has been demonstrated by numerous studies, including a particularly interesting experimental confirmation of this thesis conducted in the United States from 1991 to 1996.

The project "Biosphere 2" that was created and financed by the American billionaire Edward Bass to explore the possibility of creating a closed ecosystem on our planet which was doomed to failure. During the experiment, it was proven that an ecosystem cannot survive on Earth without external connections. This same principle can be applied to any entrepreneurial organization.

In this regard, the most consistent theory, in our view, is the theory of A. Bogdanov, outlined in his book "Tektology: Universal Organizational Science," the principles of which have often found practical confirmation. For example, it is widely recognized that based only on logic (solely by "the power of thought"), the author managed to describe Brownian motion, discovered years later. From the perspective of the general organizational science theory – Bogdanov's tektology – any organization should be considered from two positions: as part of a more advanced system and as a network of subsystems. In the life cycle of an organization, national and global economic cycles act as an advanced system, while a network of systems include cycles related to common functions such as personnel management, technology, and so on.

Russian scientist T. Yu. Bazarov also believes that "no organization can remain in the same state for too long, and always goes through several stages of development, each of which is succeeded by the next, often not smoothly, but with the experience of difficulties and contradictions. He identifies several levels of such stages. The periods during which the organization lives within the framework of similar values with fixed managerial tasks over a certain period of its functioning, he calls stages; and the periods during which the organization fundamentally changes its internal values and orientations - cycles of development."

According to Bazarov, "the complete lifecycle of an organization includes stages such as the formation of an organization, its intensive growth or 'multiplication,' stabilization, and crisis (decline). Moreover, the final stage does not necessarily have to end in the 'death' or liquidation of the company. The possibility of its 'revival' or 'transformation' is also considered viable. Figure 2.22 shows the diagram of the organization's life cycle from the perspective of 'time – organization effectiveness.' The stages of one life cycle are labeled by numbers: 1 - organization formation, 2 - intensive growth, 3 - stabilization, 4 - crisis."

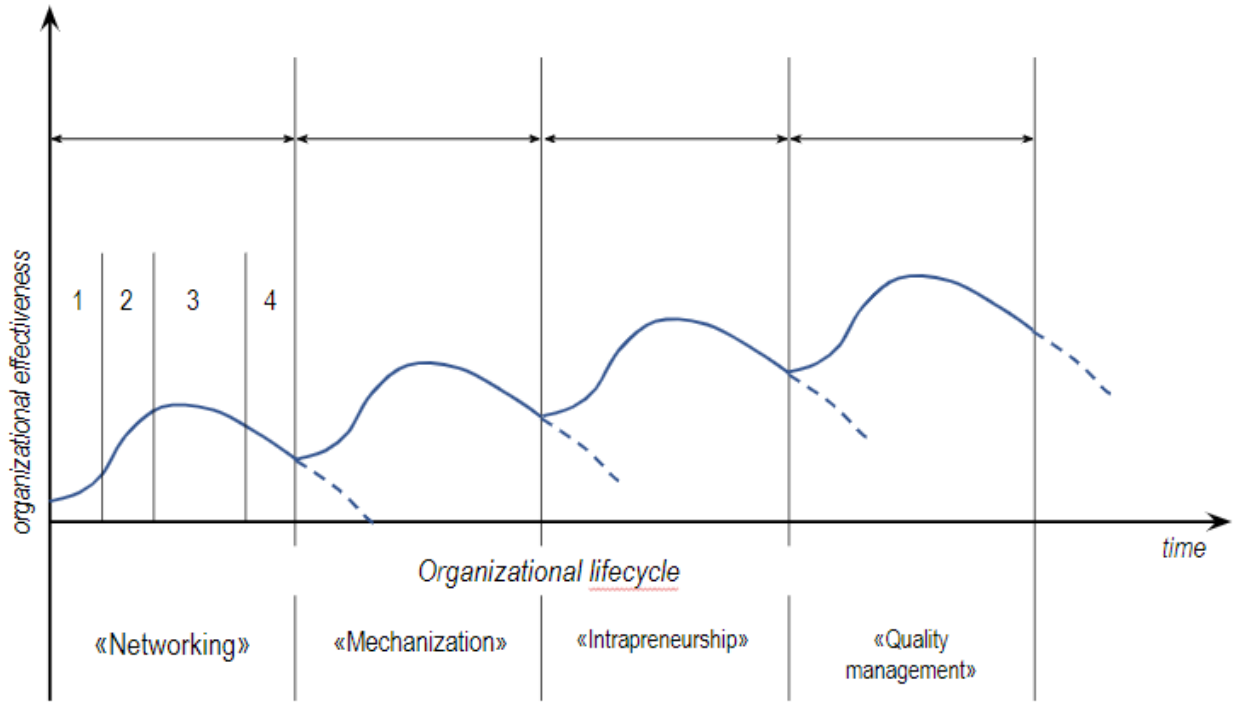

Figure 2.22. Lifecycles and stages of organization according to T. Yu. Bazarov[224]

Analyzing the activities of long-standing Russian enterprises, it can be assumed that organizations go through another cycle during their lifetime, which is longer than the stage-based one, and which can be defined by four different types of periods with their specific values:

1. "Socializing Cycle": characterized by prevailing values of interpersonal communication, the development of values within an organization built on communication and a commitment to strengthening the principles of positive communication, as well as other universal principles of interaction.

2. "Mechanization" prioritizes the values of systematizing and organizing accumulated knowledge and skills. In this stage of development, the organization for the first time faces the need to replace its personnel: employees who fit into the company's communication traditions are replaced by those who can more effectively integrate into production processes.

3. "Internal Entrepreneurship" focuses on the participation of every employee in the entrepreneurial process. This value is based on the idea that each employee in the production process should approach their work with an entrepreneurial mindset. Understanding the needs and preferences of the customer is essential for every stage of the production process, thus adding value to the final product at every stage.

4. Focus of the "Quality Management" stage is on all participants in the product creation process toward continuous control and improvement of quality. Each employee must understand the entire process and perform the highest possible quality in their role. Understanding the quality and its metrics for a specific service or product is crucial at this stage.

The authors E. I. Koroleva and A. M. Sukhorukov presented an original model of the organizational life cycle, based on the concept of the "course of ideal organizational development." In their opinion, the organizational life cycle consists of a series of stages

[224] Ref.: The logical S-curve and crisis forecasts (R. Foster). – URL: http://ibcm. biz/logical-s-shaped-development-curve/ (reference date: 21.01.2023).

that have a certain sequence. Each stage is represented by the evolutionary changes, which gradually accumulate reaching a critical mass that leads to transformation of the organization. The line describing each stage of the organizational life cycle in this model is represented in three-dimensional space, limited by a cylindrical area. At each of these stages, there is an accumulation of effects from the evolutionary changes that have occurred that lead to the next stage of revolutionary changes.

The methods of organizational change have been repeatedly examined and described. Richard Foster, Director and Senior Partner at McKinsey & Company, pointed out the complexity of implementing changes and the skill set required by leaders for their successful implementation as early as 1986. The change process is almost always associated with a decline in productivity. This decline arises from the concentration of new skills and practices, as confirmed by numerous studies aimed at mitigating the consequences of implemented changes in organizational work.

According to R. Foster, innovations follow a recurring pattern, driven by the efforts of geniuses and market competition. He described this phenomenon with a logical S-shaped curve (Figure 2.23).

"The S-shaped curve illustrates the relationship between investments made in product or process improvement and the outcomes obtained from those investments. It is called an S-shaped curve because when plotting the results on a graph, it typically forms a curved line resembling the letter S, but extended to the right at the top and to the left at the bottom. Initially, when funds are invested in developing a new product, it's not obvious whether it succeeds. Then, as the essential knowledge required comes into play, the results may improve dramatically. Finally, as investment in the product continues, technical progress becomes increasingly difficult and costly. Ships don't sail much faster, cash registers don't work much better, and clothes don't become much cleaner—all because of the margins at the top of the S-shaped curve"[225]. At the moment of reorganization, changes occur that lead to a process of declining efficiency, as described by R. Foster, and only after the structural changes are completed and the new organizational structure begins to function does efficiency recover and then increase further. This moment is a serious test for the owners and managers of organizations.``

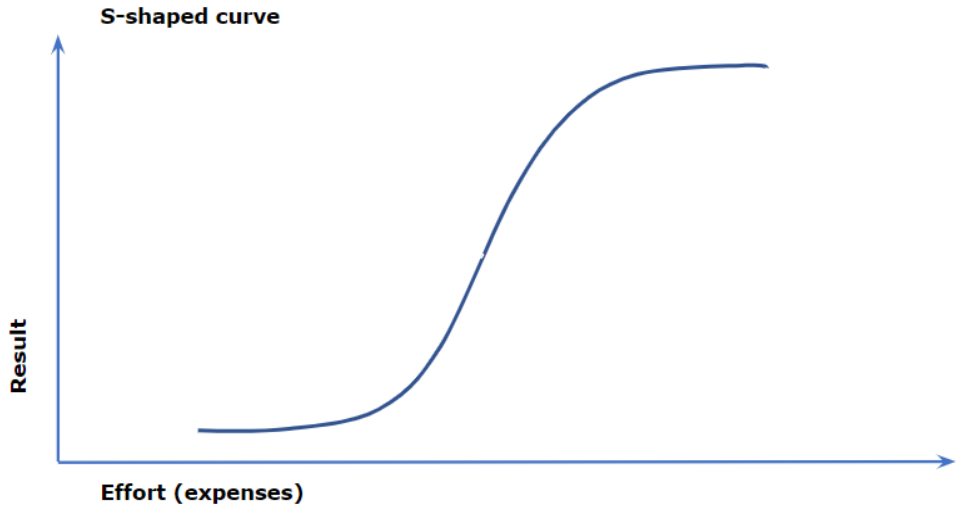

Figure 2.23. Foster's S-curve[226]

[225] Ref.: URL: http://ibcm.biz/logical-s-shaped-development-curve/
[226] Ref.: Arefiev V. A., Lisovenko L. A. English-Russian explanatory dictionary of genetic terms. – M.: Publishing house VNIRO, 1995.

In real life during the time of restructuring, when efficiency declines, management puts on hold the changes, leading to even more discouraging results, decreasing efficiency to zero. This circumstance often serves as a significant practical and psychological barrier to organizational reform. Owners and managers understand that investment is necessary at the time of creating a company. They also recognize that promoting business also requires time, but many of them do not understand that restructuring may also bring positive results. Typically, the owner expects immediate sharp increase in efficiency from the restructuring, rather than a decline and a reduction in profit.

Let's consider the above patterns using the example of the first life cycle setting - "Networking", and analyze its main characteristics. Figure 2.24 illustrates the development of the organization on the axes of "management impact" (horizontally) and "efficiency" (vertically) in the first cycle of "Networking", which will be repeated in subsequent cycles.

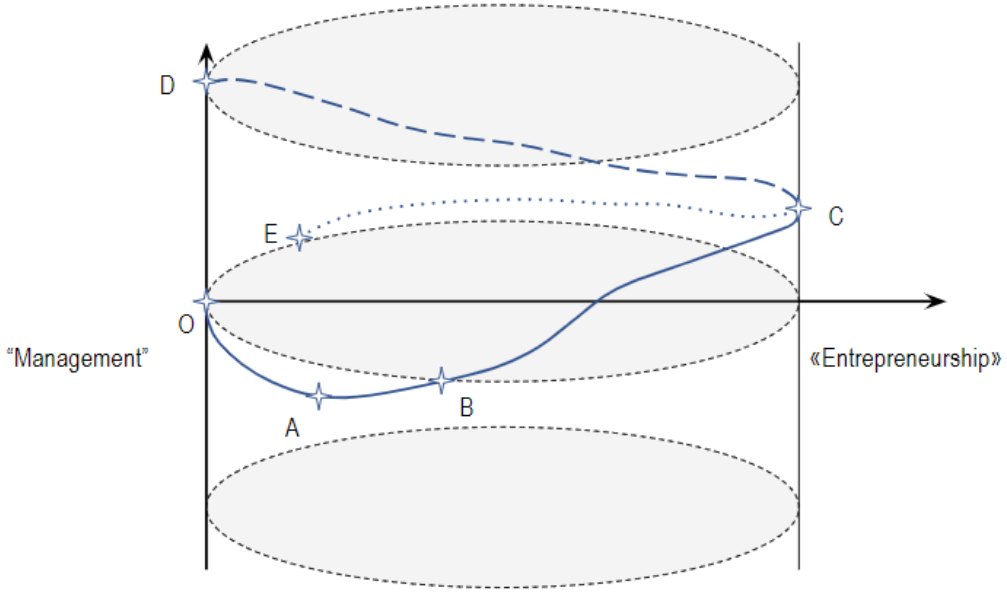

Figure 2.24. Model by E. I. Koroleva and A. M. Sukhorukov

The main difference and unique feature of the model by E. I. Koroleva and A. M. Sukhorukov is the cyclical nature of processes. The authors conducted research within the framework of consulting projects where they found that an organization moves between the two poles of managerial influence along its way - for which they came up with the naming "management" and "entrepreneurship." According to the identified patterns (Fig. 2.24), at the beginning of the organization life it is at point O, the management's initiative strives for a maximum of 100%, while entrepreneurship is at zero level. After completing all of the administrative work, all management efforts should be focused on a proper market entry. The organization captures its market share, and we see that even without unnecessary bureaucracy, operations are going well, and the level of entrepreneurship within the company is growing. The market dictates the need for the company expansion, however its intensive development results in a decrease in efficiency due to weak management. All of the above reveals the need for change, including revising assigned functions and powers, setting priorities for duties and rights for both management and staff.

Let us look more closely at the description of the plot points marked on Figure 2.24. O represents the “moment of birth” of the organization – the registration of the company in accordance with the legislation of the state. As the organization progresses through the O to A, it invests funds in its development, but since no production or sales take place at this stage, the efficiency remains negative while the investment level raises. According to the authors, point A represents a possible turning point in the efficiency curve, which moves into positive territory as production begins and sales commence, while the investment process continues. Point B is the breakeven point, and efficiency increases further up to the point C. Then, for further development and increased efficiency, a necessary transition to the "mechanization" cycle occurs.

If this transition does not happen, the organization's efficiency rapidly declines, and the curve tends towards point E – business liquidation. If the organization's management takes further steps for development, transformations occur within the organization, and its development moves towards point D. At this point, the organization's managers must develop their managerial skills and improve the management system. The level of management should increase (the segment of curve CD), and these transformations contribute to the organization transitioning to the "mechanization" stage. If these transformations are successful, the organization's efficiency will have a positive nature and increase. All processes will be described, verified and put in order. At the same time, guidelines are developed, business processes are described, technological maps are compiled and so on. However, growing bureaucracy starts to delay progress, thereby raising the level of indifference among employees in dealing with emerging issues. All of this results in decreased efficiency, and if timely measures are not taken, the organization development curve once again tends towards the crisis point. To avoid this, it is necessary to develop entrepreneurial competencies throughout the organization, with management focus on "internal entrepreneurship.

Authors of this model describe organization life cycle as the process of developing internal efficiency parameters, which are assigned to each division, and the interaction between them is based on principles of financial autonomy. In other words, each division is assessing the cost of their work and interacts with the others on subcontracting principles, and the management then distributes profits among divisions depending on their contribution to the final product. Additionally, principles and techniques of economic and technological outsourcing are applied. Subsequently, the organization's development reaches a new level, and the algorithm repeats when transitioning to the next cycle.

Therefore above, we have looked at an example of the activity of a successful organization. However, in real life, organizations are often subject to limitations imposed by the external environment (market, natural disasters, industry crises, geopolitical changes, etc.). In this case, the actual course may differ significantly from the ideal one.

Taking into account models discussed, the life cycle curve of an organization should be adapted to modern economic trends (see Figure 2.25). Based on this, we will consider the possibility of transitioning the organization to a new level of development and identify the potential valid transition point to a new quality.

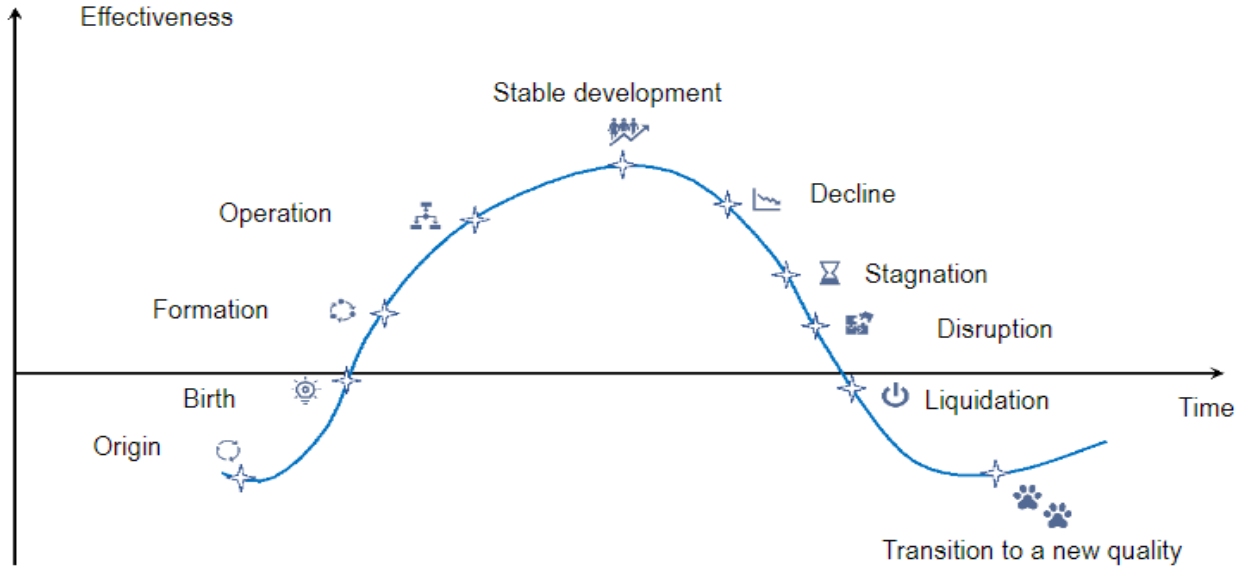

Figure 2.25 Organizational life cycle

In the organizational life cycle, let's highlight the following critical points that comprehensively reflect its development stages and assign the following names to them:

1) Origin;
2) Birth;
3) Formation;
4) Operation;
5) Stable Development;
6) Decline;
7) Stagnation;
8) Disruption;
9) Liquidation;
10)Transition to a New Quality.

Drawing a parallel between the organization life cycle and life processes in the biosphere, the latter curve may be viewed as a planet surface, where all living organisms interact and synthesize substances necessary for life and development using solar energy.

4. Biosimilar organizational life cycles

Let's consider the concept of "photosynthesis," which we'll understand as "a biological process used by many organisms to convert light energy into chemical energy, which is stored in organic compounds that can be metabolized through cellular respiration to fuel the organisms activities…"[227] This process allows us to see the general picture of the organizational life cycle as two slopes of a hill: one under the sunlight and the other in the shade (see Figure 2.26).

[227]Ref.: Presented on the basis of presentation materials of the International Forum of the Federal Tax Service of the Russian Federation "Tax ecosystem: people and technologies." – M., April 27–28 2023

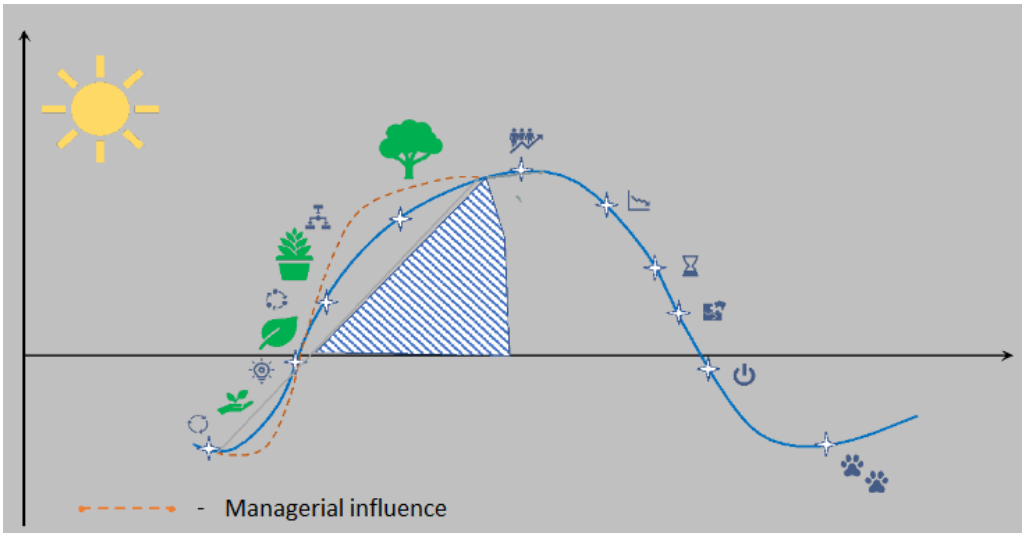

Figure 2.26. Growth and Shadow Areas, Bioanalogy

On the axes let's draw the curve of managerial role, as shown in Figure 2.26 (dotted line). Thus, we get the chart of the most probable and reasonable transition of the organization to a new quality (shaded area). In the future, we suggest defining this area as the "Area of Qualitative Development of the Organization - AQDO".

The structure of section 2.5 is shown in the diagram (Figure 2.27).

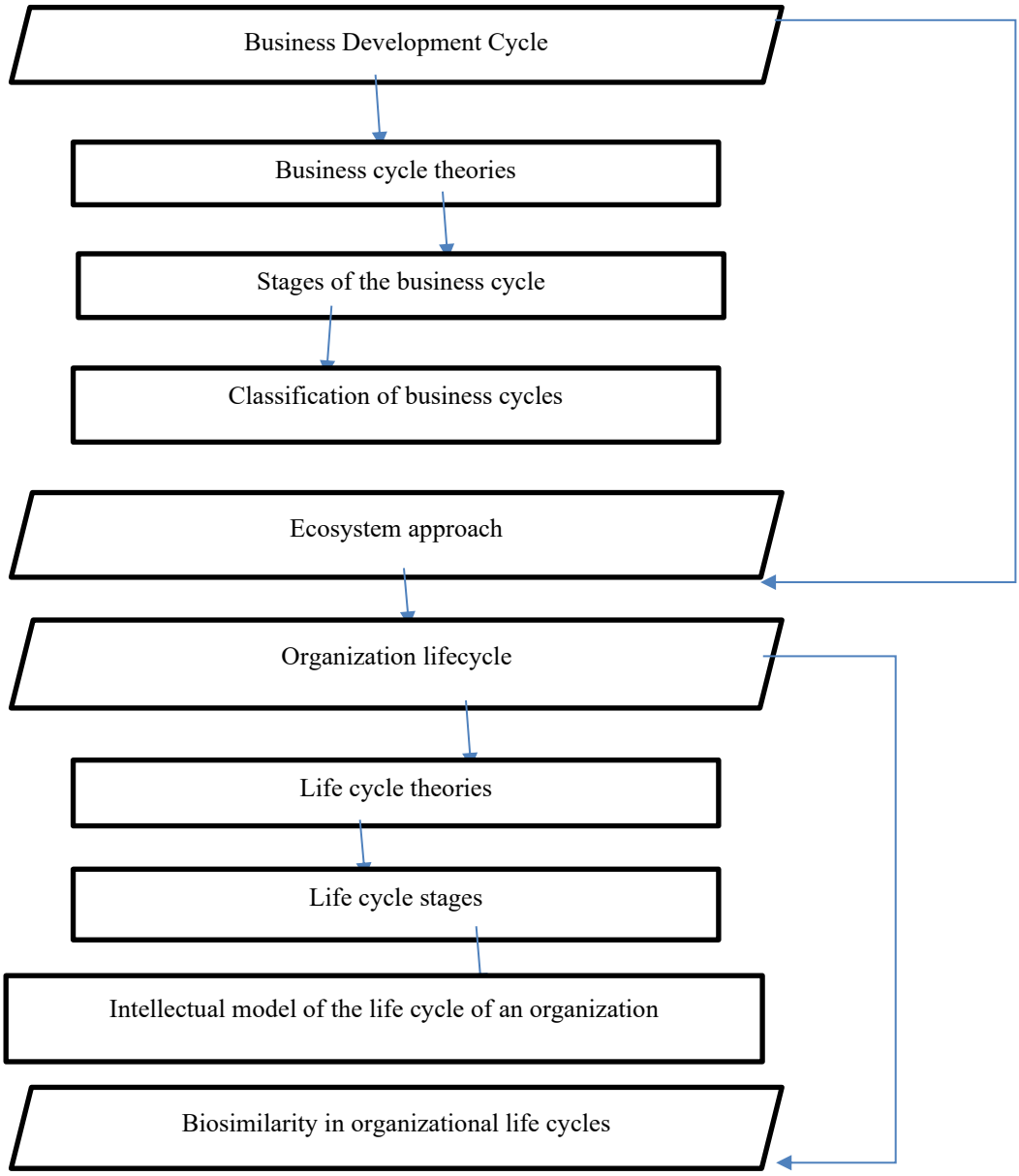

Figure 2.27. Visualization diagram of the " Ecosystem approach to managing the life cycle of an organization "

Control Questions

1. Provide a definition of the economic development cycle. Name the main theories of cycles.
2. Graphically display stages of the economic development cycle.
3. Provide the main classification of economic development cycles.
4. Provide examples of ecosystems in the biological world.
5. Describe the main characteristics of an ecosystem.
6. Give a definition of the organizational life cycle.
7. Graphically display the organizational lifecycle models of I. Adizes and L. Greiner. Name their main characteristics.
8. Describe the main stages of the organizational life cycle.
9. Based on the graphical representation of the organizational life cycle, draw parallels with the life cycle of a biological unit. Identify the most similar stages and their

possible development. 10. Provide examples of business ecosystems. Discuss the basic principles of the ecosystem approach based on the examples provided.

Practical immersion material

Case Study

Select one of the existing business ecosystems in the Russian economic space. Describe its components, identify the main beneficiaries, and their interests in ecosystem development.

Choose and describe the characteristics of ecosystem components based on the material studied. Determine biotopes, coens, and connections between components. Construct the life cycle of any organization within the ecosystem using the most appropriate model.

Based on the data obtained, come up with a development strategy for the chosen organization considering the interests of the main beneficiaries, as well as possible changes in the macro and microenvironment.

2.6. Fiscal system as a mechanism of interaction between the state and business

The process of establishing the interaction mechanisms between the government and business is characterized by its term and evolutionary nature. This is confirmed by a detailed examination of Russia's financial history, which indicates the gradual institutionalization and systematization of fiscal relations that occurred long before the emergence of ecosystems.

During the development of state administrative functions and growth of powers emerged the need of delegating them from higher to lower levels of government. In the mid-XVth century, this resulted in origination of so-called "Prikaz" - separate specialized authorities both at the center and in regions, which were delegated to take over some of state functions.

However, that didn't cover fiscal relations. In this regard, each "prikaz" represented a universal functionality, as it had its own treasury and managed its revenues and expenditures separately from others, as shown on Fig. 2.28. This autonomy characterizes the absence of systematic interaction.

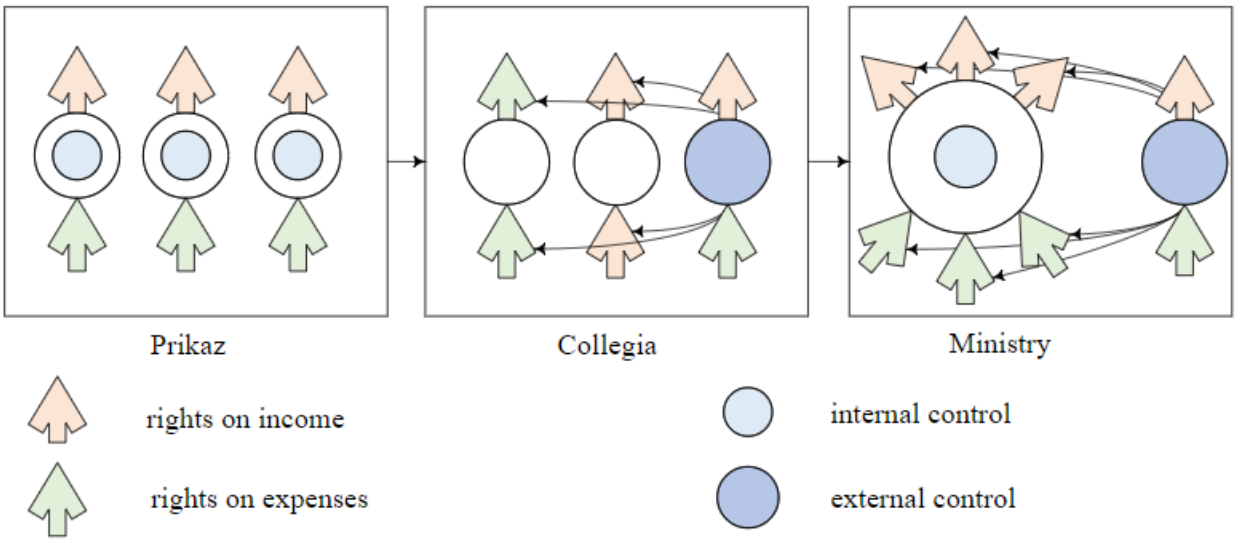

Fig. 2.28. Genesis of fiscal powers of executive authority in Russia

At that historical point, the financial system was very much different from what we know today. Each governing body spent the collected financial resources in line with their authorities in absence of any intergovernmental synchronization, as there was no common idea of developing fiscal relations. The beginning of their gradual structuring process was distinguished by the implementation of budgeting, which involved continuously managing revenues and expenditures, a practice that was not previously in place. Meanwhile revenues were poorly forecasted and far from the real numbers, but expenses were documented in much detail, contributing to origination of the new practice. Overall, it can be noted that this system was characterized by a significant fiscal decentralization, which complicated achieving centralized goals instead it was raising the status of a local authority and enhancing powers of a specific government representative.

Since 1698, a reform of government institutions began, during which "prikaz" system was replaced by a "collagia". As a result, the Senate became the first and one of the

most important bodies, responsible for managing revenue-related matters. Overall, as the result of the reform, 12 collegias were established, with at least 3 of them having certain financial powers. The fiscal potential was concentrated in the Collegium of State Income, which looked after the establishment and receipt of income into the state treasury. This became an innovation of its time, accompanied by cross-departmental and interdepartmental control activities. It increased the transparency of board activities and contributed to eliminating the duplication of functions. Overall, it can be noted that the newly introduced system made a big impact on systematizing and organizing fiscal relations.

In 1802, the new reform replaced collegia system of governance with ministries. This was the beginning of a systemic stage of fiscal relations. Financial (including fiscal) powers were transferred to the Ministry of Finance of Russia. Matters related to the establishment, collection, and control of state budget revenues, as well as the methodology for budgeting, were entrusted to this highest financial authority. Over time, despite changes in Russia's economic and political courses, the Ministry of Finance retained its powers, expanding and adjusting them according to the challenges of the time.

The modern history of the fiscal ecosystem begins in 1991, when following the transformational period, the Russian economy adopted market principles of management. The first regulatory legal act aimed at fiscal relations, the law "Fundamentals of the Tax System in the Russian Federation," did not contribute to the establishment of an integrated system nor has it organized the dynamically evolving fiscal relations.

The Tax Code of the Russian Federation (hereafter referred to as the Tax Code) marked the onset of a structural basis. Its implementation consolidated all payments collected within the country, thereby building the fiscal landscape and enhancing fiscal responsibility. Over a decade, key objectives included reducing the federal budget deficit to achieve surplus and enhancing administrative quality to boost payment collection levels. During this period, the fiscal system was simplified by reducing the total number of payments across all levels of budgetary-tax federalism, as illustrated in Figure 2.29

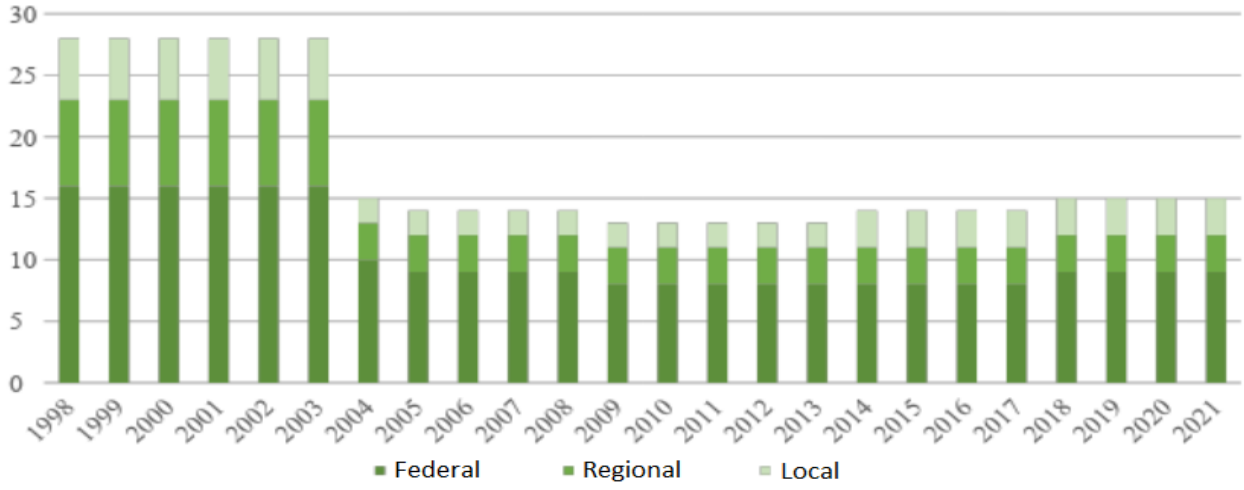

Figure. 2.29. Number of fiscal obligations in the Russian Federation, reflected in the Tax Code of the Russian Federation for the period from 1998 to 2021, in units

This measure contributed to the growth of revenue receipts while simultaneously increasing the powers of fiscal authorities, whose primary goal was to enhance the cash

collection from revenues. The gradual development of fiscal technologies contributed into creating of a risk-oriented model of supervisory control activities by the Federal Tax Service of the Russian Federation (hereinafter referred to as the FTS of Russia), which framework allowed both the fiscal authority and the taxpayer to determine the degree of their risks, evaluate the possibility of inspections, and assess additional liabilities. During this period, the main tool for reducing fiscal risks was funding, meaning consolidating the reserves that could be used to settle additional fiscal obligations.

In 2015, active organizational changes happened within the framework of fiscal relations.The main vector of FTS development was determined to be the implementation and improvement of services and technologies, which fully correspond to the ecosystem approach. It is worth noting that as of today, there is no single understanding of this approach, however, it is possible to form a definition.

The fiscal ecosystem is a combination of organizational, environmental, process, and project components implemented in the field of fiscal relations, allowing for long-term effective interaction among all its participants to form the revenue potential of the state and stimulate the country's GDP growth.

The organizational component involves creating a single cluster, which combines several homogeneous elements into a system: revenue administrators, taxpayers, and intermediary entities that form technical and technological interaction. In this regard, the Federal Tax Service of Russia has implemented several clusters, including:

- Internal cluster: federal and territorial tax inspection departments that directly interact with taxpayers.

- Interdepartmental or external cluster: channels of interaction and synchronization with other government ministries and agencies.

- International cluster: the participation of the Federal Tax Service of Russia in international and transnational financial structures, interaction on a bilateral and multilateral basis with fiscal authorities of other countries.

The environmental component entails the creation and development of various infrastructural solutions based on the digitization of processes within the evolving digital economy at the federal level. The foundation in this case is the concept of "government as a platform," in which fiscal infrastructure is one of the key components. This includes various technological solutions implemented based on cutting-edge financial (FinTech), regulatory (RegTech), supervisory (SupTech), and analytical technologies (Big Data, Smart Data).

In general, the Federal Tax Service of Russia has already developed its own integrated platform, which includes over 70 services, 5 personal accounts, and 5 mobile applications [228]as of 2023, as shown on Figure 2.30.

The process component involves the development of various types of networks, both infrastructure-based and user-based. Infrastructure networks include local departmental networks of the Federal Tax Service of Russia and territorial inspections, as well as external user networks of legal entities and individuals, including information and telecommunication data exchange channels like the Internet. User networks include federal or regional groups of taxpayers-users of software who can exchange information based on this platform to improve the quality of administration.

[228] Ref.: Presented on the basis of presentation materials of the International Forum of the Federal Tax Service of the Russian Federation “Tax ecosystem: people and technologies.” – M., April 27–28 2023.

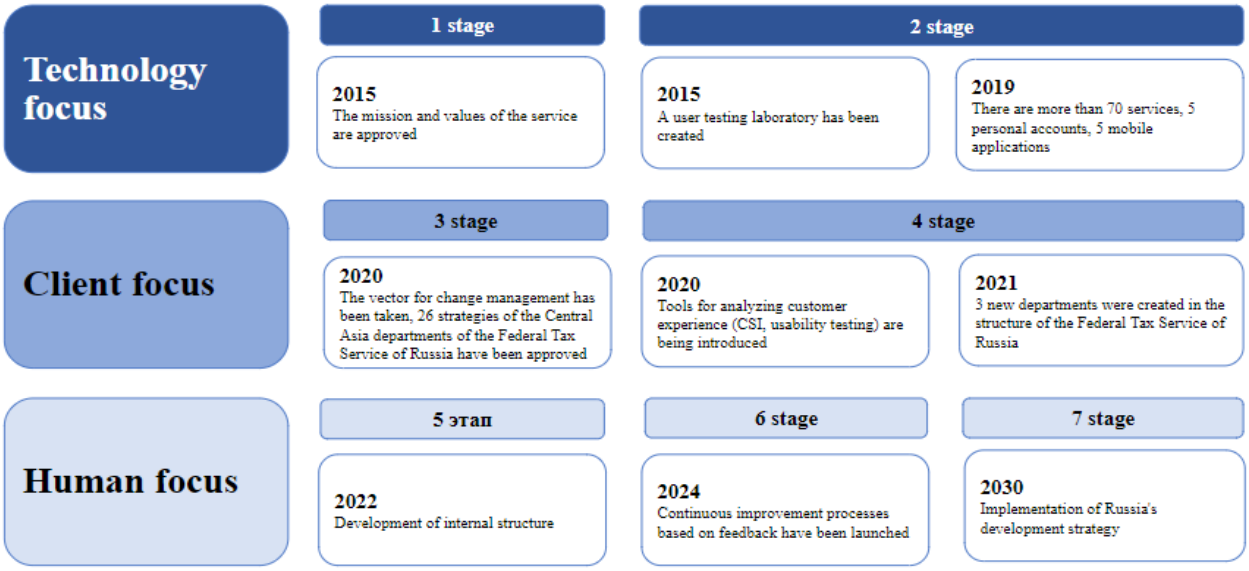

Fig. 2.30. Evolution of the goals and mission of the Federal Tax Service of Russia in 2015-2030.[229]

The project component involves the development of individual projects that complement the entire ecosystem with new functions and capabilities. The main scientific and innovation implementation center (MSIIC), is responsible for developing and maintaining the automated information system of the Federal Tax Service of Russia. In addition, there is a number of various specialized universities, with dedicated units, research institutes, and other scientific organizations all being part of this system.

Ecosystem development is carried out in two directions:

- Organizational: focuses on the development of strategic management aimed at expanding new organizations, complementary and interdependent.

- Technological: focuses on the development of technologies aimed at increasing internal innovative potential, allowing to enhance the quality of internal processes. As can be seen, the Russian ecosystem is developing in both directions.

After 2015, there was active acquisition and accumulation of competencies in service culture with the main focus on digitization of the majority of internal processes.

In 2018 happened a significant methodological shift towards analyzing customer experience. A user testing laboratory was established, primarily focused on optimizing business processes (specifically payee and payer document flow), improving services, and promoting the image of the system.

By 2019, as competencies in user experience analysis accumulated, following services became available on BAU basis:

- an integrated portal allowing for a single point of access to most electronic services;

- the automated information system "Tax-3", which centralized the functionality of tax administration;

- the automated information system "ACS VAT-2", which implemented real-time control activities for VAT transactions;

- electronic statements enabling centralized collection and provision of data from existing registries (e.g., population register).

[229] Ref .: Presented on the basis of presentation materials of the International Forum of the Federal Tax Service of the Russian Federation "Tax ecosystem: people and technologies." – M., April 27–28 2023 .

- cash register equipment that exchanges tax related data, online functioning to transmit information about all cash transactions of business entities;

- the system of interdepartmental electronic interaction (SIEI), facilitating data exchange between various government bodies to minimize the volume of data received from the users;

- product labeling for monitoring their circulation and prevention of counterfeiting;

- the use of electronic digital signatures (EDS) etc.

In addition during the same period a new experiment was successfully completed aimed at creating a new special tax regime for the self-employed. For the first time, feedback analysis was conducted as part of the mentioned experiment, after which all departments of the main fiscal authority of the country were tasked with restructuring their service approaches from control and supervision to strategic consulting. For the first time, the main focus was on the end user.

In 2021 feedback analysis began to be actively used in all areas of activity of the Fiscal authority. During the next year 2022 emphasis was made on the enhanced development of internal corporate culture in an ecosystem that involved a transition from a client oriented approach to a human oriented approach which is presented in Figure 2.31

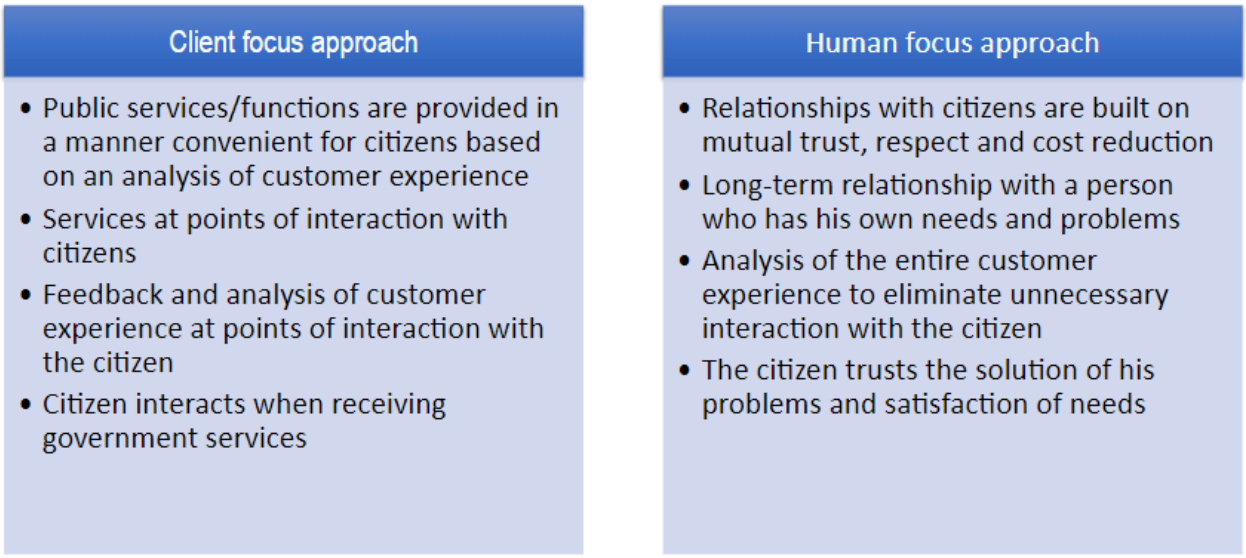

Fig. 2.31. The "From Customer to Human" Concept of the Federal Tax Service of Russia[230]

The development of a human-focused approach in the fiscal ecosystem of the Russian Federation entails the following measures:

- Informal communication with the leadership team;

- Change of the format of the Federal Tax Service of Russia's collegias;

- Regular strategic sessions by the leadership team;

- Consistent receipt of feedback from local authorities;

- Implementation of career projects such as "Leadership School," "Leadership Reserve," and "Make Your Own Career.;

[230] Ref.: Provided on the basis of presentation materials of the International Forum of the Federal Tax Service of the Russian Federation "Tax ecosystem: people and technologies." – M., April 27–28 2023

- Development and adoption of the human focus policy by the Federal Tax Service of Russia;

- Public advocacy of management strategies of the central office of the Federal Tax Service of Russia;

-Embracing feedback culture based on the Net Promoter Score (NPS) – prioritizing customer satisfaction index (CSI) assessment over any other external evaluation.

In general, the fiscal ecosystem of the Federal Tax Service of Russia, based on the human-focus approach, is shown on Figure 2.32.

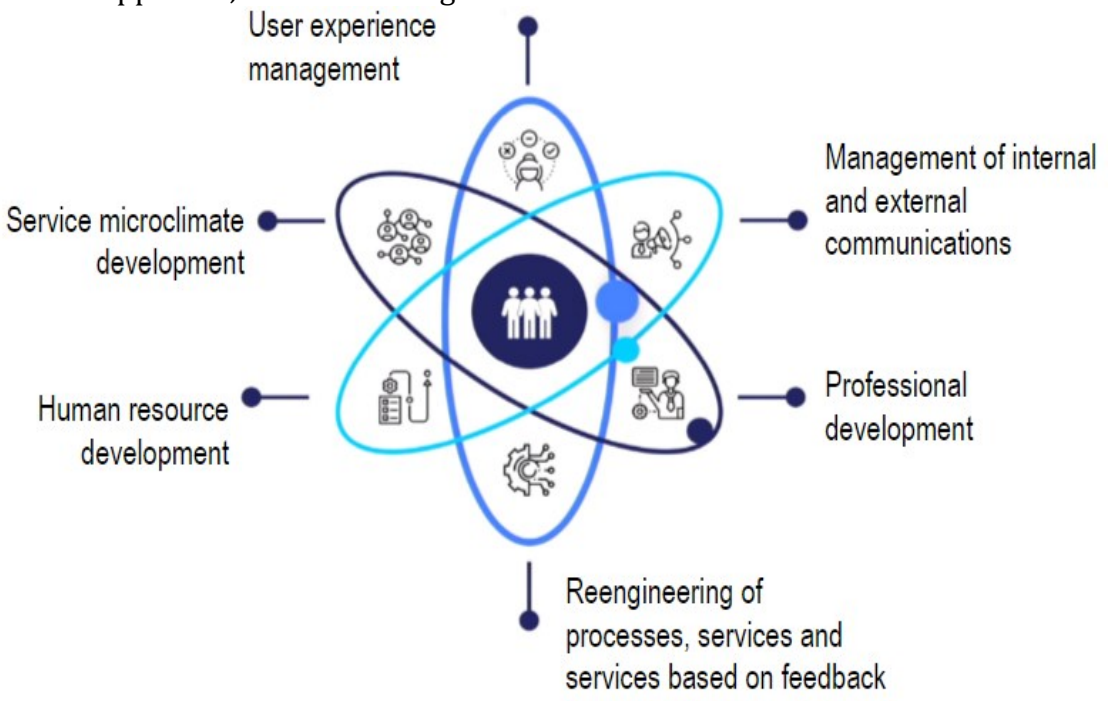

Figure 2.32. The human-focus system in the ecosystem of the Federal Tax Service of Russia

Within the framework of project activities and the implementation of a people-focus approach in the existing fiscal ecosystem of Russia, the following initiatives are already being implemented:

- "Support Measures 2022" service, which includes automatic verification of eligibility for tax support measures by TIN;

- "State Online Business Registration" service, allowing for opening a business in 1 day online; - Developed the "guillotine" directive system;

- Reduced processing time for tax deductions (3-NDFL);

- Developed the "Initiative 2.0" system, allowing for collecting all suggestions from local governments to improve the ecosystem;

- The "Project Exchange" operates – 70 projects are being implemented jointly with local tax authorities;

- The "Operational Account Unlocking" service is actively used, allowing to unlock the account within 24 hours;

- The "Childbirth" super service has been launched, enabling savings of up to 12 hours when canceling up to 60 paper documents;

- An experiment on the Automated Simplified Taxation System (ASTS) has been launched, which cancels 6 reporting forms and implements automatic tax calculation along with the simultaneous cancellation of insurance contributions.

The most promising objective of the fiscal ecosystem of the Russian Federation today is to learn how to manage taxpayers' costs: financial, emotional, and temporal.

Conclusion

In the system of managing physical relations, the ecosystem approach is innovative.it is associated with the technological and organizational development of its initiation and requires significant professional competencies.

In Russian history, fiscal relations have evolved from chaotic to systematic, leading to the launch and successful implementation of the ecosystem approach. Its integration complements the overall process of digitizing the Russian economy, serving as a crucial element of the "state as a platform" concept. Throughout fiscal history, the main fiscal authority of the country has changed its priorities several times. Initially, the focus was on ensuring budget balance by improving the quality and quantity of tax collection. Subsequently, and actively to this day, a risk-oriented approach has been and is being applied, allowing to formally assess fiscal risks of economic entities. And finally, the top of the evolution is the customer-focus approach, which is expected to further transform into a human-focused one. The Federal Tax Service of Russia plans not only to become a high-quality service government agency but also sets goals for accounting and saving financial along with other valuable resources in everyone's life - time, emotions, motivation. All this supports the ecosystemic nature of development, as preserving these resources and their rational use will contribute into the entrepreneurial activity of taxpayers, thereby increasing the fiscal potential in the next financial cycle.

The structure of the section is shown on the diagram (Figure 2.33).

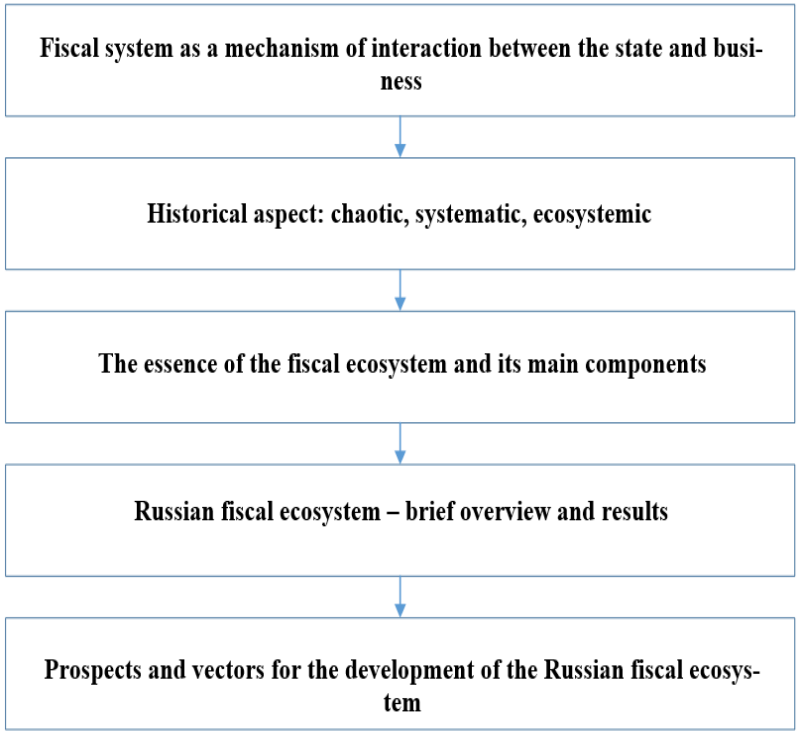

Figure. 2.33. “Fiscal ecosystem” diagram to represent a mechanism of interaction between the state and business

Control questions

1. What is the genesis of the executive authorities in Russia in terms of fiscal powers?
2. What was the goal of the fiscal policy of the Russian Federation in 1991–2001?
3. Which document has allowed to systematize and codify fiscal relations in the Russian Federation?
4. What is a fiscal ecosystem?
5. List the components of the fiscal ecosystem.
6. List the main stages in the development of goal setting and mission of the Federal Tax Service of Russia.
7. What are the main directions of ecosystem development?
8. List the main elements of the fiscal ecosystem of the Federal Tax Service of Russia.
9. Explain the difference between human-focused and client-focused approaches.
10. What are the stages of development of the human-focused approach in the fiscal ecosystem of the Russian Federation.

Practical immersion material

Topics for the essay:
1. The role of the fiscal ecosystem in the economic development of the state.
2. Fundamentals and specifics of the information system AIS "Tax-3".
3. Fundamentals and specifics of the information system ACS VAT-2.
4. Cloud based services as an effective tool in the work of a tax manager.
5. Fundamentals of the system of interdepartmental electronic interaction (SIEI).
6. Product labeling system.
7. The role of electronic digital signatures in the fiscal ecosystem.
8. Fundamentals of the Automated Simplified Taxation System (ASTS).
9. Features of the super service "Childbirth".
10. The concept of human-focus in the current fiscal ecosystem of Russia.

Business Game

Goal of the Game:

The business game is dedicated to exploring the issues of ecosystem elements of the Federal Tax Service of Russia. The idea of the game is for several groups of students to examine the existing ecosystem services and propose their own, which they consider missing at present. It is necessary to summarize goals of the service, tasks it solves, and assess the resource potential in various areas – financial, personnel, technological. It is important to evaluate the target audience of the service, identify the needs that will be addressed by the service within the concept of human-focus.

Participants. For a group of up to 30 people, it is necessary to create working groups of 5-6 people each.

Goals of the game: detailed examination of the services of the fiscal ecosystem of the Federal Tax Service of the Russian Federation; participants presenting the results; gaining experience working in teams in a business communication format; applying the method of brainstorming in conditions of limited time; developing creative and strengthening

leadership qualities; motivating participants to study practical issues in the area of fiscal interaction between the taxpayer and the administrator.

Organization of the game: A multimedia classroom is required for this game with the option to present the results of working groups. It is preferable to have hardware (personal computers) in a quantity of at least 1 per 1 working group.

Course of the game: Students form groups of 5-6 people each. Lecturer sets the rules and goals of the business game, reminding the participants of the fundamentals of the fiscal ecosystem and its current structure. After that working groups start working separately from each other. After 1 academic hour, the results are summarized - each group presents its service, justifying its purpose and functions. The most detailed and high-quality presentation is chosen by all participants.

CHAPTER 3. ORGANIZATIONAL AND LEGAL ASPECTS OF BUSINESS ECOSYSTEM MANAGEMENT

3.1. Institutional Environment of Business Ecosystems Functioning and Development

1. History of Institutional Approach Development

To understand the institutional approach in economics, it is necessary to first consider the concept of "institution" and its origin. It should be noted that this concept does not belong to economic theory but is borrowed from the social sciences. In sociology, the concept of a "social institution" is one of the key concepts and is used to define the tools that create the organization of human society through analysis and evaluation. In turn, it should be noted that this term came into the conceptual framework of sociology from jurisprudence.

The concept of “institution” first mentioned in the XVII century, when T. Hobbes, in his famous work “Leviathan,” explains the emergence of basic institutions as “the result of a social contract between people (for example, the state).” [231]

Particularly interesting is É. Durkheim's definition: a social institution is "specific ways of social action and norms (patterns) of behavior that exist in society independently of individual persons." Later, this approach to defining the essence of social institutions began to evolve in socio-economic sciences. Durkheim's social institutions included religion, morality, law, normative systems that organize and structure systems of group and professional interactions[232].

Adam Smith was among the first to consider the influence of social institutions on economic processes. He argued that changes in economic dynamics couldn't be solely attributed to market forces; ethical motives also played a significant role. It's safe to say that Smith explored the effects on the economy of what we currently recognize as formal and informal institutions, or the institutional environment.

Examination of social institutions has contributed to the emergence of economic institutions as a separate object of research, necessary for conducting a comprehensive analysis of historical, national, and other aspects of economic life. This has prompted researchers to study changes not only in terms of social but also economic interests.

2. Modern concept of the institutional approach and institutional environment

Institutions, according to D. North (1997), represent robust rules of interaction among social entities in the public system, established both at the formal level (laws, instructions, legal norms, etc.) and the informal level (traditions, norms of social behavior, mass social norms, agreements, codes of conduct, etc.). Institutions have a dual nature. On one hand, institutions are created by people who "make their own history," meaning institutions are artifacts, the results of purposeful behavior. On the other hand, institutions represent restrictions imposed on interactions. They represent spontaneously discovered, through repeated actions of agents, efficient social practices that can be interpreted as forms of self-organization of society in the conditions of a specific external environment. This understanding of institutions as forms of adaptation of society to the conditions of the surrounding environment allows for the use of ideas from evolutionary and self-organizational approaches in their analysis.

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[231] Hobbes T. Leviathan: published in 2 books. – T. 2. – M. : Mislj, 1964.

[232] Ref.: Durkheim E. Method of Sociology. Sociology, its subject, method, purpose. – M.: Canon, 1995.

Indeed, it was Karl Marx who wrote that in the social production that serves to support life, people enter into certain necessary relations, independent of their will, which correspond to a certain stage of development of the productive forces. In other words, human actions express an "economic imperative" imposed on them by the economic system according to its material conditions. From this perspective, the economic system can be viewed as a self-organizing structure whose purpose is the reproduction of social life in the natural environment. But since the economy is a system involving humans, its self-organizing mechanism is reflected in the structure of institutions, namely, in the historically formed robust rules of social interactions among economic agents[233].

3. Institutional Matrix

Let's consider the institutional matrix developed by the Russian researcher S. G. Kirdina. The hypothesis of institutional matrices aligns with the sociological institutionalism of the Novosibirsk Economic and Sociological School and a field of interest in modern research on ecosystems as part of the broader economic space. To understand the institutional matrix, it's important to identify the main institutions and the connections between them. Its postulates represent the implementation of the previously mentioned systemic paradigm in social research.

The first fundamental postulate in the theory of institutional matrices, its first axiom, is its objectivist focus on analyzing the society. Often, social and economic sciences are understood as multi-directional, or multi-paradigmatic, reflecting the real challenges in a definitive interpretation of the essence of their subject. Nevertheless, it is possible to distinguish at least two most general approaches (in sociology they are often referred to as paradigms), each represented by specific methodological achievements, or theories - these are the objectivist and subjectivist approaches. They reflect different views on the structure of society and are equally recognized as historically established patterns of analyzing society as a research phenomenon in sociology.

In the objectivist approach, or paradigm, society is considered not so much as a product of human activity (although this aspect is extremely important and present), but as an objectively existing reality independent of them. This approach also includes the well-known idea of man disposing of substances created by him, which stand against him as external, autonomous substances, allowing for a scientific analysis of these substances, primarily society and its basic subsystems.

In this case, society is seen as a self-organizing system, as a natural historical object, its social structures represent a reality arising from the diverse - planned and unplanned - activities of many individuals, and therefore having a natural, rather than artificial, character. The postulate of "objectivity" means that economics is considered by us not as a result and consequence of the behavior of economic agents, but rather as a system of relations "standing above" or "behind" them, characterizing the development of this system. Therefore, for explaining the mechanisms of coordinating the interests of participants in the economic process, the theory of rational choice is irrelevant given it considers a fixed number of participants making choices based on individual preferences. Attention is focused on analyzing the conditions that determine the survival of mechanisms that are appropriate for the economic system, formed under the conditions of "natural selection," which have proven to be the best possible for a given society.

The second hypothesis on which the theory of institutional matrices is based, its second axiom - is the representation of society as a holistic, indivisible entity. Its integrity is ensured by the presence of fundamental internal connections and structures that

[233] Ref.: Kirdina S.G. Institutional changes and the Curie principle – URL: https://cyberleninka.ru/article/n/institutsionalnye-izmeneniya-i-printsip-kyuri (reference date: 24.05.2023).

maintain their significance. And while the social shell of society may constantly change, and it does change, its internal fundamental structures, serving as "supporting constructions", exist in an unchanged form, maintaining connections between the primary meanings.

One of them is the concept of a basic institution, simultaneously forming the third foundational postulate on which further reasoning is based. It is evident that institutions are complex, functionally differentiated systems with various elements and components. In this case, the main interest is focused on identifying the stable component of institutions. It is for this purpose that the concept of a "basic institution" is introduced, characterizing historically stable social relations that are continuously reproduced in practice. Basic institutions form the backbone of the society; they determine the most general characteristics of social situations and guide the collective and individual human actions. Basic institutions develop historically, as a result of the interaction between the organizing society and the conditions of the external environment. They represent firmly established "social technologies" that have a determining character for the subsequent development of society.

The fourth principle of the theory of institutional matrices is a principle of a functional necessity. It is similar to the condition of necessity and sufficiency in exact sciences and implies that the theoretical description of the object under study should contain all essential features that allow both isolating and adequately describing the subject of research. In this case, it means that to build an institutional model, a composition of basic institutions is used, necessary to accurately represent the structure of the phenomenon under study. At the same time, their composition is formed as sufficient to avoid the need to introduce other concepts, schemes, or methodological constructs for description. Thus, the model of an integrated society identifies only three of its projections as most significant, capturing the main features of the institutional structure. In other words, society is represented in the unity of three main projections, in a distinct coordinate system - economic, political, and ideological (Fig. 3.1).

In accordance with this, all social relations forming up the basis of the social structure are fundamentally aligned and indivisible, yet they can be examined from various angles.

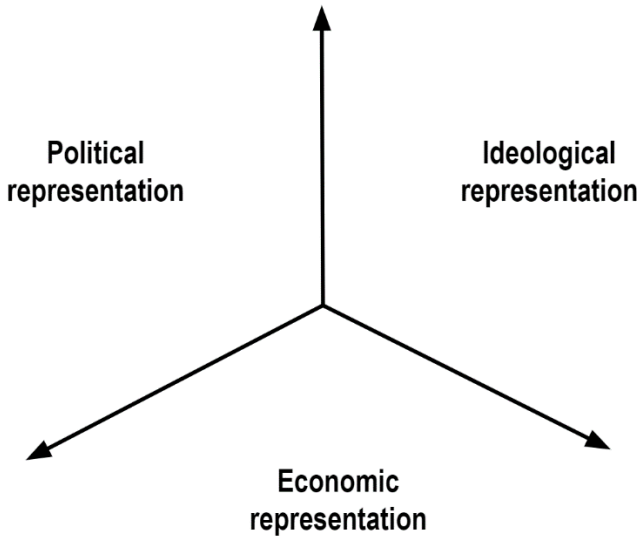

Figure. 3.1 Diagram representing society in the system of economic, political and ideological coordinates

Depending on the subject of study or various research tasks, the following aspects of social relations may be distinguished:

- Economic, related to obtaining resources for the reproduction of social entities;
- Political, meaning organized, structured, and managed in a certain way, aimed at achieving a specific goal;
- Ideological, implementing a certain idea or various values significant for society, which distinguishes human social activity from that of animals.

The fundamental notion from the above allows us, in our view, to characterize the nature of any society as the “institutional matrix.” The term “matrix” translates from Latin as the basis, primary original model, form, generating further reproductions of any given thing. In line with that, the institutional matrix of society means the primary model of basic institutions, namely interconnected economic, political, and ideological institutions, which are mutually consistent (see Figure 3.2).

All subsequent institutional structures reproduce, develop, and supplement this primary model, the essence of which, nevertheless, remains intact. The concept of the institutional matrix is based on the works of K. Polanyi and, primarily, Douglas North, who first introduced this term. It was they who first proposed that the system of institutions within each specific society forms a kind of "institutional matrix," determining a range of possible vectors for further development. In contrast to North's definition, here the institutional matrix encompasses not only economic and political institutions but also ideological ones.

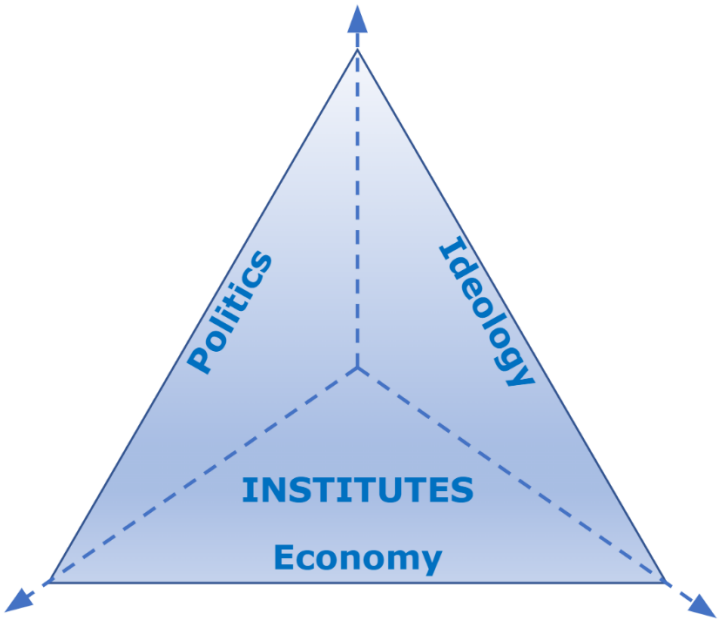

Figure 3.2 Graphical representation of institutional matrix

4. Defining the institutional matrix for ecosystems

Based on the previously discussed theory, let's adapt the institutional matrix presented in Figure 3.2 for the ecosystems and organizations that have emerged in the Russian economy, managed based on an ecosystem approach. When considering institutions in relation to the subject of study (ecosystems) to determine their environment, it is advisable to consider the following:

- Political environment;
- Economic environment;

• Social environment.

To do this, we will consider and define the main institutions for the business ecosystem, belonging to the three above mentioned institutional environments (Table 3.1).

Table 3.1

Definition of the main institutions of the business ecosystem

Political field	Economic field	Social field
Institution of parliamentarism Executive power Head of State Civil service Legal proceedings Judicial Authority Citizenship Electoral rights	Institute of state economic management Major corporations International Economic and Financial corporations Oligarch Elite Economic Entities (Banks, Credit Organizations, etc) Bankruptcy Enterprises Firms Households	Institute of political parties and Movements Public Organizations and Associations Local Self-Government Media Cultural Associations, Unions, Religious Associations Trade Unions Family Educational and Training Organizations

Each institution within any of the three institutional fields receives its benefit from the development of the entire ecosystem as a whole, interacts with others and has a mutual cumulative impact, thereby creating an overall synergistic effect. In this case, we can talk about obtaining a subadditive cost effect, which is one of the signs of a business ecosystem.

Subadditivity of costs is the feature of average costs to decrease throughout the entire output range at any level of production. The concept of subadditivity of costs is critically important for analyzing natural monopolies. However, this property is also applicable to the analysis of business ecosystems because for any producer making decisions to minimize costs, the output vector must correspond to conditions where costs are subadditive.

The concept of subadditivity of costs provides a technological and organizational identification of a natural monopoly as a subject of study and is most fully presented in the works of W. Baumol, J. Panzar, and R. Willig. They define a natural monopoly as follows: "An industry is considered a natural monopoly if, at all levels of output, the firm's cost function is subadditive[234]."

To understand this mechanism, let's examine the practical interaction and the synergistic effect obtained through the interaction of institutions, which results in reducing overall costs. As an example, let's consider the interaction between two institutions from different institutional fields – enterprises and educational and training organizations. Thus, as any ecosystem develops, industrial enterprises develop, interacting with it or becoming part of the business ecosystem framework. The development of production leads to the creation of new jobs with various professional

[234] Ref.: Belousova N. I., Vasilyeva E. M. Issues in the theory of state regulation and identification of natural monopolies: monograph. – M. : URSS, 2006. – C. 46.

and corporate competencies, which in turn affects the training of the appropriate workforce. Educational and training organizations actively participate in this process by creating programs and adjusting the educational process and its outcomes to meet the requirements. One can logically continue this chain and understand that when any institution influences, to a greater or lesser extent, all institutions from all institutional fields will be involved through direct or indirect connections.

In this example, we can make assumptions that the development of production will stimulate the development of both competitors and suppliers of raw materials and materials, which may hold the place within the framework of various economic institutions - both enterprises themselves, firms, and households. Furthermore, when horizontal connections are established, this will push for the development of the influence of institutions of economic entities. In this case, each institution will stimulate the development of the business ecosystem itself and the organizations within its framework. The reduction of costs occurs due to the mutual integration of functions of interacting institutions and their connections.

Thus, we can make a conclusion that all institutions, united by institutional characteristics, interact both within institutional fields and beyond. In Figure 3.3, we will present a diagram of the institutional matrix for the business ecosystem.

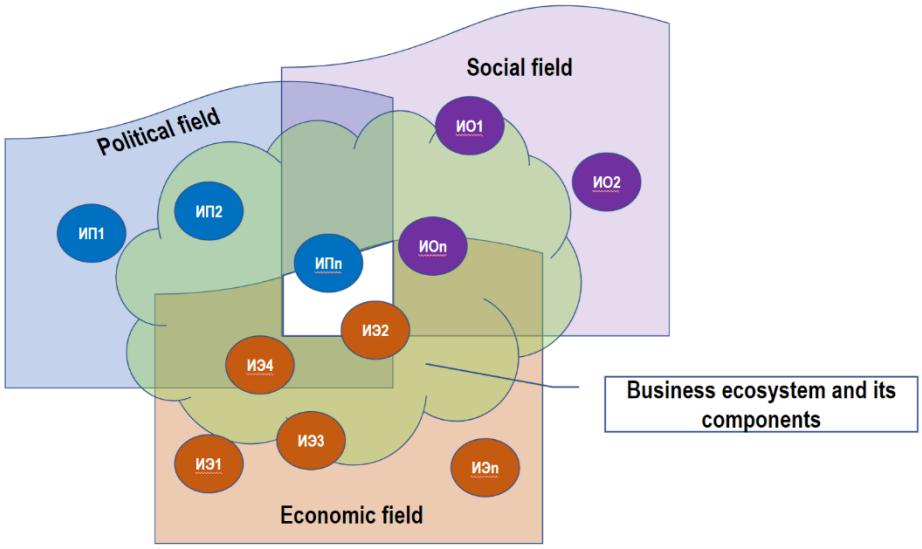

Figure. 3.3. Institutional matrix for the business ecosystem (where ИХn is an institution within the framework of the institutional field)

On Figure 3.3, the shaded area represents the overlapping of institutional fields of the business ecosystem. This area includes institutions that have the greatest influence on the existence and development of the ecosystem.

5. Identification of institutions havving the greatest impact on the creation and existence of the business ecosystem

Let's consider one of the most well-known Russian business ecosystems - "Sber." Its structural diagram is presented in Figure 3.4.

Figure. 3.4. Units of the Sber business ecosystem[235]

As can be seen from the above figure, the core of the business ecosystem is the credit organization PJSC Sberbank, being one of systemically important credit organizations according to the Bank of Russia. The owner of 50% plus 1 share of Sberbank PJSC is the National Welfare Fund of Russia, controlled by the Russian Government[236], while the remaining shares are publicly traded.

There is a vast number of organizations, within the framework of an ecosystem, representing both - online services (such as Sber Cloud, Rabota.ru, etc.) and services operating in the tangible world, such as Citymobil taxi or Samokat food delivery service. During the creation of the "Sber" ecosystem, many services were tailored specifically for the system, while others entered the ecosystem in their existing form, receiving new intra-systemic connections with other components and the external environment. Given a long history and the reputation of PAO "Sberbank" as a credit organization engaged in various financial operations - from providing payroll projects to financing production, as well as its integration with numerous state and non-state enterprises, it is worth noting that the core business of "Sber" is still seeking and attracting of the new clients.

The main areas of activity of the ecosystem are finance, e-commerce, B2B services, entertainment, health and other services (ads, job search, education and self-driving cars) for individuals and legal entities.

Let's consider the institutions that have the greatest impact on the chosen business ecosystem and briefly describe these processes. In the political field, the most influential for Sber are those that provide the legal framework for the work of the core business of the ecosystem and its units - namely, the institute of executive power and the institute of legal proceedings. The institution of executive power, through its federal and regional

[235] Ref.: URL: https://www.kommersant.ru/region/rostov/files/rostov/2021_Reklama/211130 _Supercover_ Сбер_4.jpg
[236] Ref.: URL: https://www.interfax.ru/business/702504 (reference date: 02.06.2023).

bodies, has a direct influence on the core business of the ecosystem, thereby introducing and changing the rules to which the entire business ecosystem adapts, implementing its basic properties.

As for the economic field, the most influential institutions are those of economic entities (banks, credit organizations, etc.), enterprises, firms, and households. This conclusion is drawn from the main activities of the business of a given ecosystem, namely the core - the credit organization "Sberbank," and the organizations within the system providing goods and services to the population, thereby generating orders for various enterprises and firms. They act as both producers and suppliers of goods and services, organizing warehouse and logistics while having a trading function. Additionally, most interactions within the ecosystem are realized through financial operations, the implementation of which is directly affected by the institution of economic entities.

Let's consider the institutions in the social field. Obviously, media has the greatest influence by regulating and implementing the marketing functions of the "Sber" ecosystem, particularly in advertising and getting the feedback from end users through various surveys. It is also worth noting the strong influence of the family institution on the ecosystem, using the mechanism of shaping consumer preferences in accordance with the established lifestyle of social unit.

Within the framework of this textbook, we have identified the most important institutions according to the activities and development of the Sber business ecosystem. Alternatively, depending on the activities and focus areas of development, the array of key influential institutions from institutional spheres will change. We suggest conducting this research as part of a practical assignment for the chapter.

6. The influence of institutional environments on the development of business ecosystems.

When considering the development of business ecosystems, it's essential to understand that the concept of an ecosystem implies its similarity to biological ecosystems, which, in their development, strive for new, more advanced forms of existence adapted to changing conditions. Transitioning to a more advanced structure enables business ecosystems to adapt more flexibly to shifting market conditions, changes in consumer preferences, enhance their economic efficiency, and more carefully adjust to market demands.

The description of such a development mechanism was carefully outlined by the great Soviet scientists A.A. Bogdanov and V.I. Vernadsky in their works. For instance, Bogdanov, in his work "Tektology: Universal Organizational Science," discusses various methods of increasing the efficiency of the overall organizational system, which can be applied to business ecosystems as well. The work provides examples of corresponding examples from the biological world. "Thus, the organized whole turns out to be practically greater than the simple sum of its parts, not because new activities are created out of nothing within it, but because its existing activities are interconnected more successfully than the opposing resistances. Our world is generally a world of differences which can only be reviled during an action, only these differences have practical significance. Where activities and resistances collide, the practical outcome embodied in actual results depends on the manner in which the two are combined; and for the whole this outcome increases on the side on which the connection is more “harmonious” and contains less “contradictions”. This represents a higher-level organization.

An illustration from another realm is the symbiosis of the ciliate and zoochlorella, a unicellular protozoan with a unicellular alga living inside it. The ciliate belongs to the simplest microorganisms, consumes oxygen, and emits carbon dioxide; the alga, a simple

plant, contains green chlorophyll grains, breaks down carbon dioxide using solar energy, using it as material for its tissues, and emits oxygen. Thus, a significant share of activities in the material form of one substance, lost by one participant of the symbiosis due to its unsuitability, is acquired directly by another, and vice versa, thereby preserved in the symbiotic whole. It is clear that this whole practically disposes of a greater sum of activities than if its parts existed separately: an example of an infinitely widespread type of organizational relationships» [237].

Under the influence of its institutional environment and its impact, the business ecosystem seeks to elevate its productivity levels and allocate fewer resources to emerging goals and tasks, mirroring the behavior of living organisms. Events of 2022–2023 show that all business ecosystems started to actively build local connections within the Russian manufacturing sector. Import substitution is actively developing, providing development to both ecosystems and institutions of enterprises, firms and households.

Structure of section 3.1. (Fig. 3.5).

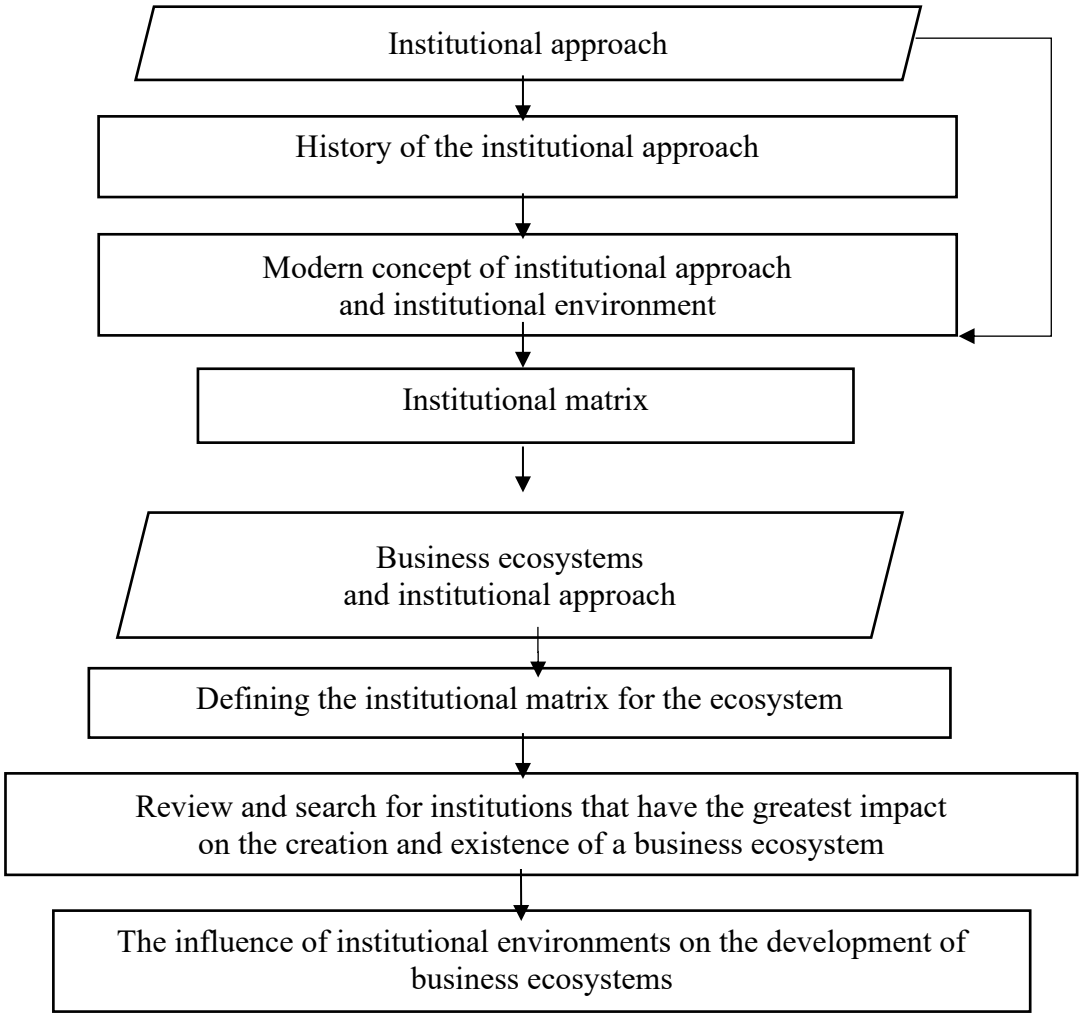

Figure. 3.5. Visualization diagram of the chapter "Institutional environment" functioning and development of business ecosystems"

[237] Ref.: Bogdanov A. A. Tectology. General organizational science. – Berlin: St. Petersburg, 1922 (reprint: in 2 books. – M.: Economics, 1989).

In his work "Biosphere and Noosphere," V. I. Vernadsky also describes the mechanism by which systems transition to a new level due to the influence of human intellect. "The evolutionary process gains special geological significance because it has created a new geological force - the scientific thought of social humanity."

We are currently experiencing its vivid entry into the geological history of the planet. In recent millennium, we have witnessed an intensive effect of one species of living matter - civilized humanity - on the change of the biosphere. Under the influence of scientific thought and human labor, the biosphere is transitioning into a new state - the noosphere[238].

The problem of the development of organizational systems along a nonlinear trajectory was considered long before the emergence of the ecosystem approach to managing organizations. However, even at that time scientists noted a powerful synergistic effect from joint resistance to both external and internal influences by organizational systems, similar to biological forms of existence in natural world.

Control questions

1. Define the institutional environment.
2. Who was the founder of the theory of institutionalism?
3. Based on the definition of the institutional matrix, prepare its graphical representation.
4. Name three institutional fields of the business ecosystem. Give 2-3 examples of institutions for each field.
5. Prepare a graphical model of the influence of institutional environments on business ecosystems. Determine graphically the area of the greatest influence.

Practical Immersion Material

Case Study

Identify an existing system for examination

Prepare its brief description, defining biotopes, cenoses, and communications.

Create an institutional matrix for the selected ecosystem.

To determine and assess the influence, complete the attached form for a specific chosen ecosystem with input from three colleagues. Determine the average influence rating and select the most influential institutions (Table 3.2). Provide examples of the mechanisms of influence of the selected institutions.

[238] Ref.: Vernadsky V. I. Biosphere and noosphere. – M.: AST, 2022.

Table 3.2

Assessment of Institutional Influence on the Development and Functioning of Business Ecosystems

Institutional filed	Institution	Influence rate (from 0 to 3)
Political filed	Institution of parliamentarism	
	Executive power	
	Head of State	
	Civil service	
	Legal proceedings	
	Judicial Authority	
	Citizenship	
	Electoral rights	
Economic field	Institute of state economic management	
	Major corporations	
	International Economic and Financial corporations	
	Oligarch Elite	
	Economic Entities (Banks, Credit Organizations, etc)	
	Bankruptcy	
	Enterprises	
	Firms	
	Households	
Social filed	Institute of political parties and Movements	
	Public Organizations and Associations	
	Local Self-Government	
	Media	
	Cultural Associations, Unions, Religious Associations	
	Trade Unions	
	Family	
	Educational and Training Organizations	

3.2. Organizational Basis and Architectonics of Network Interactions in Business Ecosystems

First of all, should be defined and justified the importance of studying the content of two main concepts: organizational foundation and architecture. It seems useful to explore the content of these concepts, their interrelation, and practical application in the modern business environment, contributing to the improvement of managing business ecosystems.

Organizational foundation is the set of coordinated actions carried out by employees in space and time during the preparation, decision-making, and implementation processes aimed at ensuring the effective functioning and development of the organization. The organizational foundation serves as the foundation that provides the systemic approach for carrying out managerial activities within the business ecosystem. It includes the organizational management structure, functions and processes, centralization/decentralization of management, delegation of authority, and responsibility.

Architecture (from Greek άρχιτεκτονική – architecture, building). This concept is polyphonic and has multiple meanings. In our case, we will understand architecture primarily in the sense of the term "composition," understood as:

- composition of meanings, signs, and symbols. It is an informal compositional completeness that shows how the meanings of all components of the business ecosystem relate to each other, ensuring dynamic balance
- compositional rules aimed at ensuring the integrity of the organization, the interrelation, and consistency of all its parts.

Thus, architecture is considered as a composition, understood in two components:

1. **The first component**. Composition of meanings, signs, and symbols. The keyword here is "meanings." The concept has multiple meanings. For example, the philosophical meaning of a concept is the creation of a relatively coherent picture of the world and maintaining this picture, or the comprehensive content of a statement (scientific, philosophical, etc.). There is also a non-logical definition of meaning. Specifically, the French writer Antoine de Saint-Exupéry wrote that meaning is "connection."

Additionally, the notion of meaning is closely tied to concepts of objectives and principles. Indeed, term "meaning" is understood as the ideal content, the ultimate aim, or the value attributed to something.

Hence, within the concept of "meanings," we recognize the following elements:

- Wholeness;
- Connectivity;
- Objectives;
- Values.

Let's look further into the concept of "value." For any organization, creating value for customers is the primary goal. Therefore, value is a crucial concept in ecosystem activity. However, it's not just any value but rather key value. The effectiveness of ecosystem development depends on management's ability to identify the "coordinates" of key value and to create various innovative solutions based on it. These solutions can involve products, technologies, management organization, among others. By systematically employing these solutions, one can design relationships, enhance, and expand the key value, and so forth.

Hence, management in business ecosystems faces the following tasks:

- How to identify (clarify, find) the key value and reflect it in the mission;

- How to ensure that it is shared by the majority of ecosystem participants;
- How to set the goals based on the key value;
- How to determine an appropriate management style based on values;
- How to manage based on key value: attract new partners, offer consumers new interaction directions, etc.

Let's recall that values are directly and specifically reflected in the mission and organizational culture, and indirectly in all components of the management mechanism.

2. **The second component** consists of compositional rules aimed at ensuring the integrity of the organization, interrelation, and coherence of all its parts. These are provisions expressing certain relationships between the elements of the business ecosystem, as well as their mutual arrangement, ensuring effective joint activity. They should be recorded both formally in various documents (regulations, instructions, regulations) and informally in principles and codes.

Combined, the organizational **foundation** and architecture constitute the legal foundation of the business ecosystem's activities. However, the question arises: "How can all of the above be specifically applied to the characteristics of business ecosystems?" To address this, let's briefly examine the genesis of their creation and their key systemic features.

Business ecosystems have emerged as a result of organizational evolution: from simple and closed to complex and open. What does this combination of "complex and open" imply?

Complexity implies:

1. A large number of diverse elements forming the business ecosystem.
2. Multiple governance entities.
3. A system of interconnected strategic, tactical, and operational objectives.
4. The existence of several strategic alternatives.
5. Creating a single environment for active internal partnership.

Openness entails:

1. Having mechanisms for adapting the organization to the external environment.
2. Carrying out constant monitoring of the environment.
3. Viewing the organization and its environment as a space of resource opportunities and simultaneously resource dependencies.
4. Constant focus on innovation, or more precisely the system of innovation, technological organizational and managerial.
5. Availability of developed recommendations on the specifics of interaction with various elements of the environment.

It can be confidently stated that the complexity and the dynamic nature of the external environment, and therefore its uncertainty, are constantly growing and will continue to do so and it becomes practically impossible to adopt the previous forms of organizations Furthermore, organizations themselves are becoming increasingly complex both in its structure and in the form of activities. They face numerous new problems that were not previously encountered by traditional organizations, and there are no proven scenarios yet as how to effectively resolve them.

The combination of growing complexity, dynamics, and uncertainty in the environment has led to the emergence of network structures. They reflect a new type of relationship among participants in the value creation chain for the customer. The main difference between networks and traditional organizations is decentralization of

management, vigorousness, and flexibility: the core components of a network, by combining resources, key technologies, and competencies, accelerate production and service processes and allow for rapid structural changes through the "addition" or "removal" of individual participants according to changing competitive conditions.

Networks are characterized by high diversity. For example, centralized, decentralized, distributed, etc., which occurs due to the variety of external conditions of their operation (Figure 3.6).

At the beginning of the XXI century, starting with the global crisis of 2008, there was further significant change in the business environment due to the combination of the whole range of diverse factors:- Increased competition and changes in competitive methods;- Large number of new breakthrough innovations, primarily technological- Acceleration of the pace of structural changes in the economy; - Creation of a fundamentally new information environment, a growing process of digital transformation; - Changes in the internal structure of organizations, as well as the ways they interact with the external environment, including hierarchy reduction and "flattening" of organizations. - Qualitative changes in human capital (a new generation with a different set of priorities, values, and interests - work-life balance); - COVID pandemic and so on.

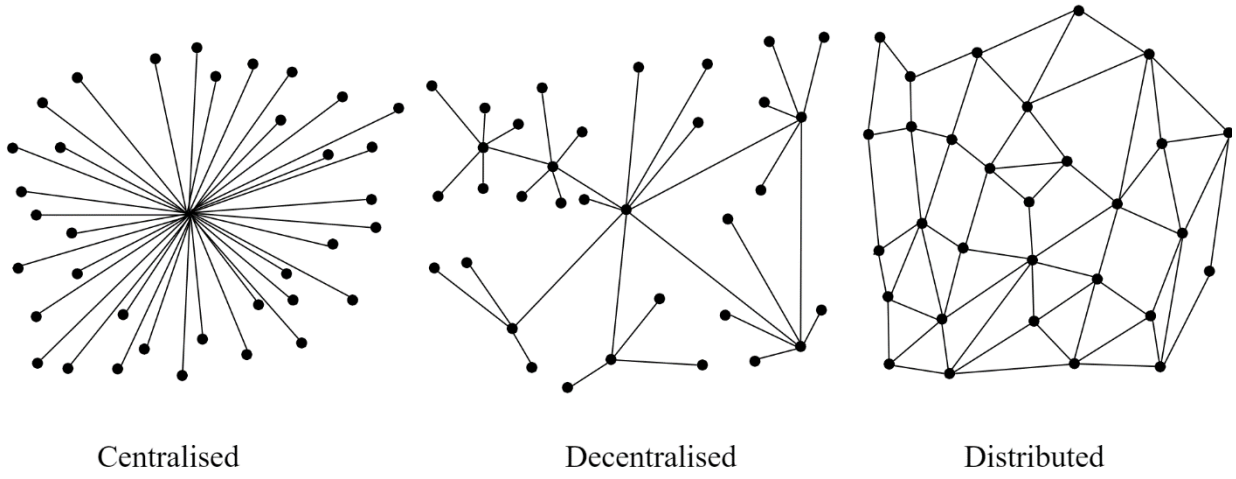

Figure. 3.6. Centralized, decentralized, and distributed networks[239]

All this together determined the need for further development of networks and the creation of new business models, ultimately leading to the emergence of business ecosystems.

When considering the genesis of business ecosystem development as a special type of modern organization, several key points need to be highlighted:

- The emergence of so-called 'big data' including artificial intelligence technologies - Virtualization, which created conditions for the development of network organizations, providing maximum opportunities for conducting business processes in virtual space.

The creation of business ecosystems has largely been an attempt to adapt to a growing amount of change. The business ecosystem has adopted basic properties and characteristic features from network organizations:

1. Strategic advantages:

- Risk sharing among participants;
- Partner selection based on alignment of strategic goals;

[239] Ref.: Baran P. On Distributed Communication. – RAND, 1964. – P. 2626.

- Expanded access to new technologies, information, and markets;

- Development potential: efficient utilization of participants' resources; the extent to which a participant can utilize a partner's resources is determined by the participant itself.

2. Organizational structure:

- A set of interconnected autonomous participants with common goals and interests from various organizational forms;

- "Blurry" boundaries between participants;

- Absence of centralized management; "flattening" of the structure.

3. Organizational culture:

- Shared key values;

- Mutual commitments of participants to act not in their own rather in the interests of the network;

- System of mutual obligations, both formalized and informal, based on network-specific norms, rules, and behavioral stereotypes.

4. Management:

- Adaptation of management methods and styles in line with the mutual interests of the participants;

- Control and coordination of activities only in the area of mutual interest;

- Employees motivation issues are addressed independently by each participant;

- Emphasis on teamwork;

- Activation of self-development processes among network participants.

At the same time, ecosystems have developed unique properties and characteristic features. Specifically:

- The ecosystem is viewed not as an individual player but as an organised community of business players collectively creating new value for customers, primarily through collaboration rather than competition.

- Emphasis on the knowledge component. The effectiveness of the functioning and development of business ecosystems is largely determined by the ability to identify and collect the necessary knowledge and form knowledge assets from them as the core of the key value;

- The ecosystem, being a digital entity, represents a network of self-managed and cross-functional teams;

- The development of management democratization, manifested, among other things, in equal rights of participants in decision-making, shared responsibility for systemic efficiency of activities (instead of traditional individual KPIs), and increasing decentralization of management[240].

The mentioned characteristics and features of business ecosystems, can intensify instability processes and complicate organizational governance without proper management mechanisms. Hence, the question of designing an efficient management system for business ecosystems becomes increasingly important.

However, there is no common terminology yet for defining the concept of "ecosystem"[241]. Even the basics vary: ecosystem, business ecosystem, digital system, etc. Based on the goals of this section, under business ecosystem we will mean "a management model that helps solve business tasks, contributes to the creation of a comprehensive and

[240] Ref.: Reeves M., Levin S., Ueda D. The company as an ecosystem: the biology of survival // HBR-Russia. – 2016. – № 4. – pp. 29–39.

[241] Ref.: Antonov V. G., Petrenko E. S. A critical look at modern business eco-systems: analysis of terminological contradictions. – DOI: 10.36871/ek.up.p.r.2022.12. 05.001

valuable offering, and competes with other methods of product or service development, such as vertical integration, hierarchical supply chains, and open markets."

The most suitable model for a business ecosystem is organizational design. There is no single universally accepted definition of organizational design; there are many definitions. Let's use the following definition: "Organizational design is understood as a method of conducting business and a management philosophy in the Industry 4.0, which promotes understanding the multiple purposes of business (not

only profit), maximizes the organization's capabilities, efficiently combines economic resources, and converges with the digital economic environment." [242]

Why "organizational design"? The term "organizational design" was initially introduced into scientific world in the second half of the XX century after the so-called "quiet management revolution," when organizations began to be viewed as open social systems in constant interaction and dynamic alignment with their external environment. It was argued that any organization could be effective if it matched its environment. Hence the question came up: "How can this be ensured technologically, what should be the management model to ensure the organization's competitiveness?"

It became obvious that an organization must create a self-adjusting management model and constantly evolve it to adapt to current and future environmental disturbances. Organizational design is conceptually viewed as such a flexible, self-adjusting management system capable of ensuring competitiveness and efficiency both in the present and in the future. The emphasis in the design concept is placed on coordinating the interaction of various organizational subsystems (management blocks, components), ensuring the emergence of synergistic effects based on the integration of employees' competencies and knowledge, and achieving adaptation of the existing business model to new conditions and strategic objectives as a result.

A key place in the theory of organizational design belongs to the concept of "*organizational design model*", which refers to a set of subsystems - management blocks and the system of interaction between them, ensuring the effective functioning and development of the organization.

The management blocks include:

- Strategy;
- Organizational structure;
- Organizational culture;
- Leadership;
- Business processes;
- Employees.

This set of management blocks in the organizational design model is commonly referred to as foundational. It primarily characterizes the formal components of organizational design. However, equally important are the informal components, which represent the interpersonal relationships between employees that emerge during work activities, based on mutual interest among workers. Together with the formal blocks, these informal components determine the uniqueness of the management system. For example, the development of interpersonal relationships leads to the emergence of informal organizational management structures, where through unauthorized adjustments to connections (such as the emergence of new connections not outlined in the organizational chart, changes in the intensity of formal connections, etc.), a new

[242] Ref.: Aleksashina T. V. Organizational design: ensuring optimization of the management system of manufacturing companies // Creative Economy. – 2022. – T. 16. – № 5. – P. 2007–2020.

management mechanism is formed. This process can be further enhanced by the influence of the so-called "cultural network." Practically all well-known models of organizational design take this factor into account.

What is meant by compatibility of management blocks with each other? It is unquestionable that all management blocks included in the organizational design model must fit with each other, and this alignment is dynamic: a change in one of the management blocks of the organizational design model inevitably leads to a certain change in others. The term "harmonious" in this context primarily means that initially all blocks are aligned with the strategy as the main, central block. Only after completing this process, their alignment with each other is established. For example, synchronizing the business process map with the organizational management structure, etc.

It should be emphasized that the organizational design model embodies the idea of a systemic approach to aligning structures, processes, employees, leadership, culture, to ensure the organization achieves its strategic goals. Additionally, a methodology for continuous improvement is defined: analyzing problematic situations, making changes or restructuring according to the evolving situation, and developing proposals for implementing new changes. The design process is aimed at improving all components of the organization.

Choosing which organizational design model to adopt can be challenging as there are many models available, and their number is growing. Furthermore, each model follows different perspectives regarding the set of elements included and their significance.

Models are broadly divided into two groups: classic and modern. The essence of classic model can be illustrated by examples such as well-known and broadly described in scientific literature - "Star" and "7S".

The first organizational design model is the "Star" by an American scholar J. Galbraith, introduced in 1960 (see Figure 3.7).

This model is primarily focused on the internal environment and identifies five basic components, managing which the management system can ensure the achievement of necessary results. J. Galbraith classified them as: strategy, organizational structure, processes, rewards, and employees. J. Galbraith specifically emphasized that all components of the model must be aligned and interact harmoniously with each other.

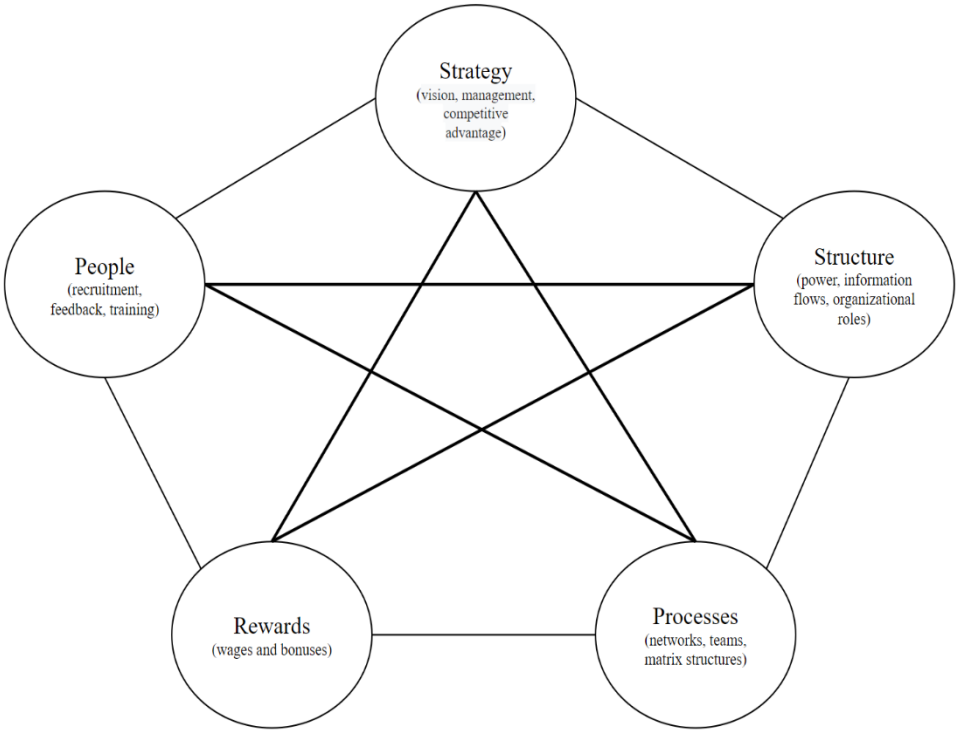

Figure 3.7. J. Galbraith's "Star" Model[243]

Another model focused on the internal world of the organization is the McKinsey 7-S Design Model. The authors are Tom Peters and Robert Waterman, 1980s (see Figure 3.8).

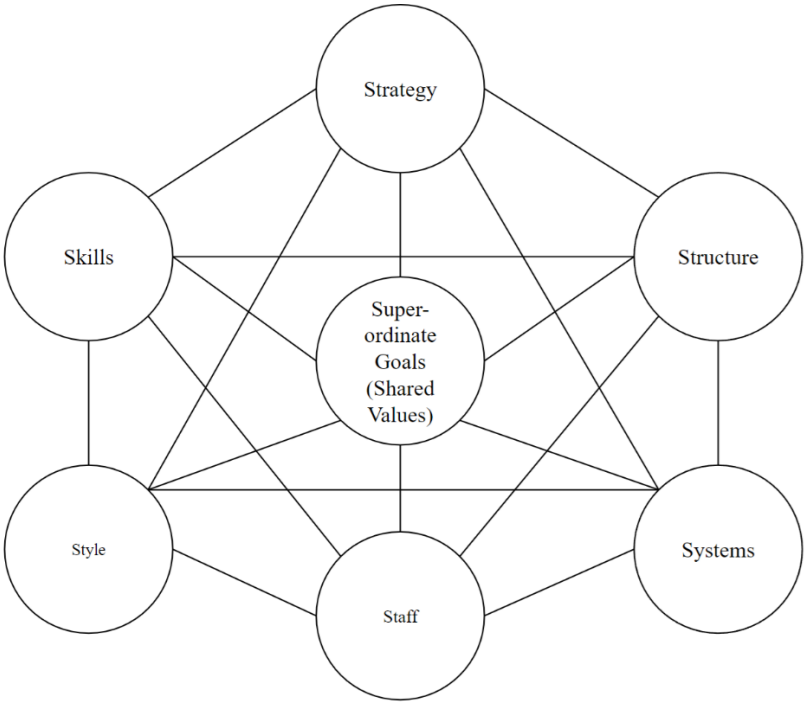

Figure 3.8. McKinsey 7S Design Model[244]

[243] Ref.: Galbraith J. Star Model. – URL: http://www.jaygalbraith.com/ index.php?option= com_content&view=article&id=ll&Itemid=123 (reference date: 18.11.2023).

[244] Ref.: Stevenson H. Organizational design: textbook. – St. Petersburg. : Peter, 2010.

The "7S" model provides a list of seven key elements of the organization's internal environment that require close attention from management in terms of coordination and interaction with each other, thereby ensuring successful development. It should be specifically outlined that according to this model all organizational components must be aligned with the system of shared values of the organization, which is placed at the very center of it. This reveals the significance and effect that the established operation principles and mission have on all other elements of the organization's internal environment.

The "7S" model highlights the importance for management systems of combining "hard" management elements, reflecting its formal side: strategies, organizational structures, systems and regulations, with "soft" management elements, concerning skills, management style, employees composition, and jointly shared values. Successful management implies effective combination of both "hard" and "soft" components. Each classical model of organizational design has its own strengths and weaknesses. They have not lost their significance and are constantly being refined and improved. These models can continue to be used either individually or in a specific combination, depending on the organization's needs and context.

However, there is growing demand for the new organizational design models in the evolving business environment, which is becoming more complex, uncertain, and digital. Therefore, ongoing efforts are made to develop various modifications of classical organizational design models to ensure the sustainable functioning of organizations, as well as new models.

Modern approaches to design aim to build organizations that maximize flexibility and responsiveness, reducing the need for constant restructuring. New organizational design models include:

1) The Holonic Enterprise model, also known as the holonic model.

2) The McMillan Fractal Web design model, also known as the fractal model.

3) The Flexible Organizations model focuses on enhancing the flexibility of the management system. It aims to establish a network of self-managed cross-functional, autonomous teams oriented towards specific outcomes. This model fosters creativity and innovation while shifting the power balance through decentralized decision-making, transferring it from the traditional hierarchy (of command) to the "point of need" where the best decision can be made.

The purpose of this section is not to provide an in-depth analysis of these models. A more detailed information on them can be found in the following sources[245].

All modern organizational design models are complex to implement and require some customization. Their areas of application are quite limited. Therefore, management must be "selective about which model they base their design on, and they must also carefully consider how to personalize the model to better suit their organization's needs."[246]

[245] Ref.: Antonov V. G. Organizational design: educational manual /V. G. Antonov, E. V. Kuptsova, E. S. Kuptsova. – M.: Rusayns, 2022; Stevenson H. Organizational design: textbook. – St. Petersburg. : Peter, 2010; Shanin I. Organizational design: textbook / ed. I. Shanina, Ulfera N. Wilke. – M.: Publishing House "Phoenix", 2007; Galinsky A. A. Models of organizational design: textbook. – M.: Business and Service,2014.

[246] Cameron Nouri Organizational Design 101: What to Know Before Attempting Your Own.nov 2019. – URL: https://pingboard.com/blog/organizational-design-101-what-to-know-before-attempting-your-own/

All this combined requires undertaking of organizational design successful implementation of which should ensure the establishment of an efficient management system.

The relevance of the discussed topics for modern organizations underscores the necessity of a deeper understanding of their significance and the implementation of effective approaches for successful development and management of business ecosystems. The interaction between organizational foundation and architecture becomes the basis for creating modern, flexible, and innovative business ecosystems capable of thriving in a dynamic and competitive environment.

The structure of the section is presented on the diagram below (Figure 3.9)

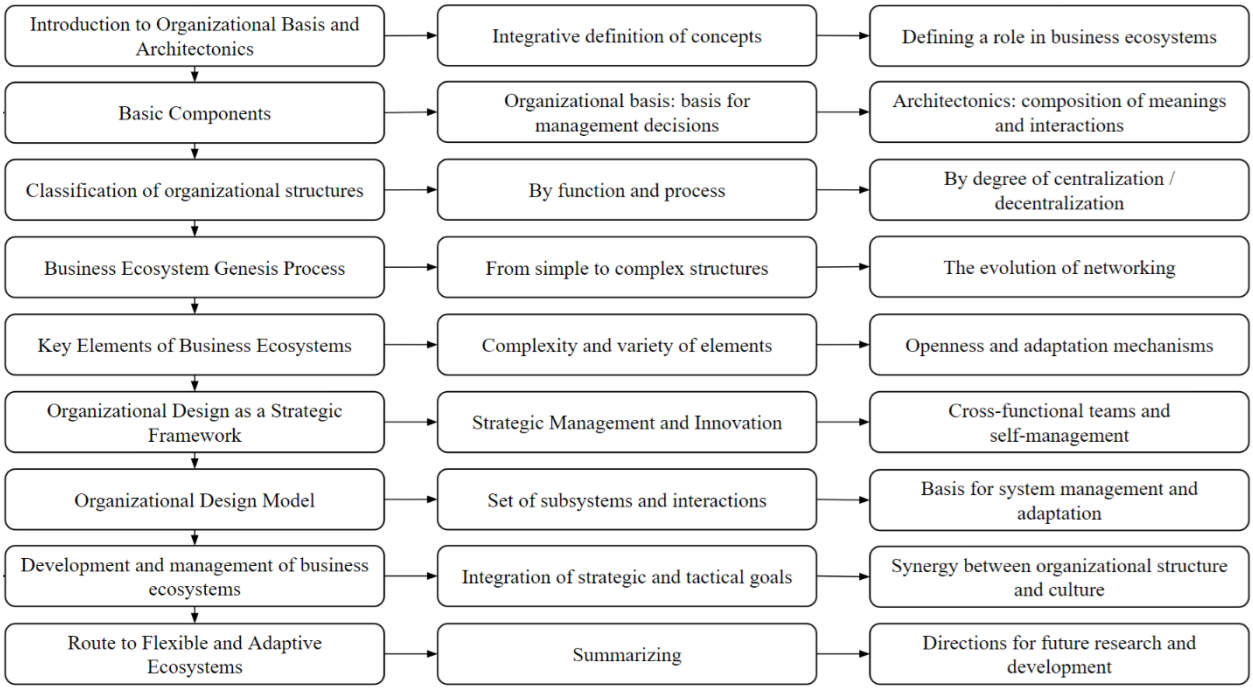

Figure. 3.9. Visualization diagram of a section “Organizational Foundation and Architecture of Network Interactions in Business Ecosystems”

Control questions

1. What is meant by the “organizational foundation”?
2. What significance does “architectonics” hold in business ecosystems?
3. What do “composition rules” entail?
4. What is meant by the term “the genesis of business ecosystems”?
5. What are the characteristics of “flexible organizations”?
6. How is “innovation management” defined?
7. What is the objective of the “organizational design model”?
8. What does “openness” mean in the context of business ecosystems?
9. What challenges does management face in business ecosystems?
10. What is the role of “networking” in business ecosystems?

Practical Immersion Material

Exercise

Development of a business ecosystem model

Purpose of the task

Develop a business ecosystem model for an fictional company in a chosen industry, taking into account key concepts of organizational foundation and architectonics.

Execution steps:

1. Industry selection and company conceptualization:

a) Choose the industry of interest (e.g., technology, healthcare, education) and set up a fictional company.

b) Describe the company's basic mission, vision, and offered products/services.

2. Determining the organizational foundation:

a) Analyze the internal resources and competencies required to fulfill the company's mission and vision.

b) Determine which management decisions and processes will be central to the operational activities of the fictional company.

c) Identify key points of intersection between various functions within the company and external ecosystem participants.

3. Architectonics of interactions:

a) Explore how the company can build relationships with other ecosystem participants: identify potential partners, investors, customers, and competitors.

b) Design possible network interactions that would contribute to the innovative development and growth of the company.

c) Evaluate external factors that may influence the operational activities and strategic development of the company.

4. Development of a business ecosystem prototype:

a) Based on the analysis, create a prototype of the business ecosystem that reflects key participants and their roles.

b) Present how interactions within the ecosystem can stimulate the creation and exchange of value.

5. Development scenarios:

a) Put together several development scenarios for the company within the context of its business ecosystem, including optimistic, pessimistic, and realistic variants.

b) Consider strategies that would help the company adapt to various market conditions.

Results:

a) Present the results in the form of a report or presentation, which includes a description of the company, its organizational foundation, architecture of interactions, and developed scenarios.

b) Introduce possible strategic initiatives that can be applied to achieve sustainable growth in the selected ecosystem.

This assignment will help students understand how organizational structure and network interactions influence a company's success in a dynamic business environment. Practical work on developing their own business model project will allow them to deepen their understanding and apply theoretical knowledge in practice.

Case Study

Ecosystem Strategic Turnaround of EcoTech Solutions

Background:

Description of EcoTech Solutions: a medium-sized company specializing in the production of batteries for electric vehicles.

Current Organizational Foundation:

a) Organizational structure: functional, with clearly defined departments (production, marketing, R&D, finance).

b) Production: centralized production at one plant, high degree of automation.

c) Marketing and sales: primarily B2B sales through car manufacturers.

d) Innovation: internal R&D department, but limited connections with external innovation partners.

Architectonics of Interactions:

a) Partner relationships: limited to a few major automotive companies, with the main focus on supply.

b) Customers: large automakers that integrate batteries into their electric vehicles.

c) Consumers: end consumers, including car enthusiasts and transportation companies.

Tasks:

Analysis of the current situation:

a) Using the provided data, assess the strengths and weaknesses of EcoTech Solutions.

b) Determine how the current architectonics of interactions affects the company's opportunities and limitations.

Assessment of the Business Ecosystem:

a) Describe existing and potential partnerships that could be strengthened to stimulate innovation and growth;.

b) Identify new opportunities in the business ecosystem that can be implemented taking into account trends and market needs.

Development of a strategic plan:

a) Develop a strategic plan to expand the product portfolio and enter new market segments

b) Propose changes in organizational structure and management to support the new strategy.

Implementation Planning:

a) Develop a roadmap for implementing the strategy, including stages, responsible parties, and tentative timelines.

b) Determine mechanisms for tracking progress and evaluating the effectiveness of strategy implementation.

Results:

Prepare a presentation or a report that includes analysis, strategic plan, and implementation plan with specific steps and expected outcomes. This case provides students with an opportunity to apply theoretical knowledge in a practical context, as well as develop their abilities in strategic planning and change management.

Assignment:

Creating a Network of Interactions

Assignment Objective:

To understand the structure and dynamics of the business ecosystem, analyze the relationships between its participants, and suggest improvement plan for effective integration and synergy.

Forming Groups:

Students are divided into groups of 4-5 people. Each group represents different companies in the business ecosystem (e.g., startups, investors, suppliers, customers).

Role Analysis:

a) Each group receives a card with a description of their role and objectives in the ecosystem.

b) Groups analyze their strengths, weaknesses, and interests in the context of the ecosystem.

Network Interaction:

a) Time for the task is limited to one class session.

b) Groups, acting as companies, must establish mutually beneficial connections with other participant groups in the ecosystem.

c) Discussions and negotiations between groups are aimed at creating or improving network connections.

Presentation of the Network:

a) Each group presents their connections and justifies how these connections strengthen their positions in the ecosystem.

b) Groups put the diagram of their interaction network with other "companies" on a large sheet of paper or on a board.

Analysis and Feedback:

After all networks are presented, the instructor and group conduct an analysis, evaluating which connections seem most viable and why. Potential problems and risks of such connections are discussed.

Assignment Results:

Students should gain an understanding of the complexity and importance of forming networks in business ecosystems.

The assignment will help students to see how different types of companies interact and depend on each other, and how they can cooperate to achieve common goals.

3.3. Modeling of Organizational Management Based on Ecosystem Principles

Theoretical background for creating and structuring a business ecosystem point to three groups of participants within a specified field, differentiated by their roles in ensuring its functioning and the nature of their relationships with other participants:

1. Moderator – a participant in the business ecosystem who acts as the coordinator of all major processes and connections among its participants. Typically, a moderator can be:

a) The end participant in the cluster chain, responsible for the production of the final product and closing the process of manufacturing the target product.

b) A large financial organization controlling the activities of one or several industrial enterprises, such as the head company of a holding or vertically integrated company.

c) A center for coordinating production activities, such as the managing center of a transnational corporation.

2. Partners – participants of the ecosystem who consistently engage in its functioning, possessing stable business, organizational, and technological connections with the moderator.

3. Complementors– participants of the business ecosystem who perform individual operations at the request of the moderator on an irregular basis.

The most substantiated directions and levels of ecosystem scaling in the economy as a whole, based on the synthesis of research by Russian and foreign scholars from 1939 to 2020, were identified by M.I. Abuzyarova[247] (Fig. 3.10).

Irrespective of its function within the broader ecosystem of an abstract organization or a specific industrial entity, each individual organization has the features of an independent economic entity in the system of production, technological, organizational, managerial and socio-economic relations. Depending on its founding goals and its orientation towards various business partners, an organization, whether seen as part of a business ecosystem or seeking participant status within it, possesses a developed level of economic independence and freedom regarding the full spectrum of management decisions made in its activities.

The functionality of a specific organization is influenced by both external and internal factors.

External factors include:

1) Engagement with other economic agents:

- Interaction with the government - "Business to Government" (B2G);
- Collaboration with other organizations - "Business to Business" (B2B);
- Engagement with the population (primarily consumers) and other types of individuals in their relations with the organization - "Business to Consumer" (B2C).

2) Level of competition in the field.

3) Level of demand for the products produced by the company, etc.

[247] Ref.: Abuzyarova M.I. Knowledge ecosystems as a dominant approach to the development of new management models // Economics, entrepreneurship and law. – 2021. – № 12. – T. 11. – P. 2659–2670.

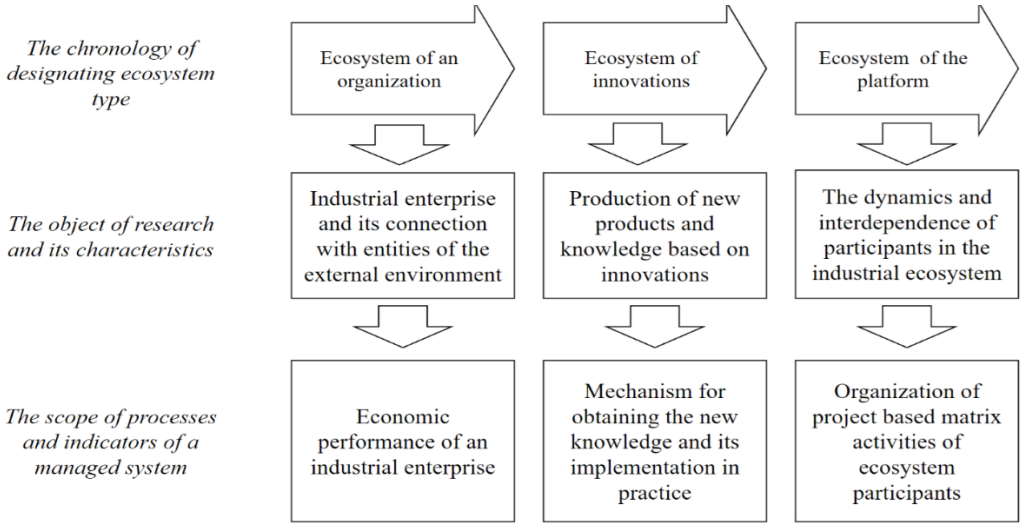

Figure. 3.10. Main Directions in Ecosystem Research

Internal factors of organization shape its functional model, the determination of which falls within the scope of scientific representation. Thus, on one hand, the internal environment is a unique formation inherent only to that organization and a specific stage of its development - any change in the components of the internal environment entails a restructuring of the decision-making system and the implementation of professional activities. On the other hand, the multi-component composition of the organization's internal environment is one of the fundamental directions of management science and can be analyzed element by element depending on the goals of analysis, the level of specificity of factors, industry characteristics of the organization, and other conditions.

The internal environment of an organization is important because the functionality of its components and their uniqueness in the field of creative-economic and regulatory-management activities directly influence the ability to participate in business ecosystems.

Based on the stage of ecosystem development for modern resident enterprises of the domestic economy, it is necessary to determine not only the composition of the functionality of the organization's internal environment but also the various modes of using its components in the activities of a professional participant in business ecosystems. Let's model the development of an abstract organization using the example of an organization providing scientific and technical support (hereinafter referred to as OPSTS), which provides expert support for the activities of industrial enterprises.

After analyzing various scientific approaches to identifying individual components within an organization's internal environment, applied to the organizational model of OPSTS functioning as a mandatory element of an industrial enterprise ecosystem, the position of D. Ryatov appears to be the most suitable for the characteristics of the developing model. He identifies the following elements of the functional model (internal environment) of the organization:

- Values;
- Resources - the material and technical base for expertise and the intellectual capital of OPSTS;
- Technologies - the means of transforming raw materials into objects of human need, including knowledge about expertise methods and new assessment methodologies;
- Employees;
- Structure;

- Management system[248].

At the initial stage of forming ecosystems for industrial enterprises, OPSTSs must demonstrate their significance to their service customers, initially acting as complementer (see Figure 3.11).

By transforming the components of their internal environment into factors that strengthen the growing bond with industrial enterprises, the following positions regarding elements of their functional model will be appropriate for OPSTSs:

1. Values. The values of OPSTS should be formed under the influence of the specifics of its main process, on the one hand, and on the other, taking into account the fact that this process involves highly qualified employees providing expert services. The results of the expertise are aimed at preventing risks: from technological to environmental. This imposes special ethical requirements on the personalities of experts and managers. The relationship of their activities with technological disasters, potential human casualties and other effects leaves a distinctive mark on the organization's behavior, attitude towards expertise, and creates a special kind of responsibility that goes beyond the scope of a single organization. Often, OPSTS employees have to deal not with tasks, but with problems, when they have to develop a personal methodology for the requested type of assessment.

2.

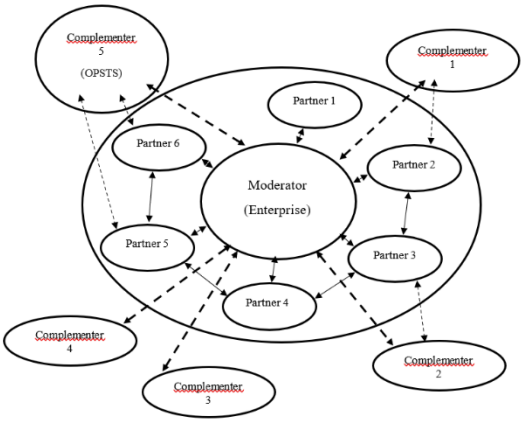

Figure. 3.11. OPSTS as an additional agent in the ecosystem of an industrial enterprise (stage 1) [249]

All this requires the OPSTS management system to form a specific organizational climate that creates an atmosphere of trust, mutual support, exchange of experience, collectivism, collegiality, aimed at finding effective approaches and assessment methods. The main framework values of the organizational culture of OPSTS include:

- Recognition of the priorities of the concept of sustainable development;
- Professionalism based on the concept of continuous learning;
- Inability to profit outside the ethical boundaries of business conduct;
- Focus on results rather than process;
- Respect for the interests of partners and customers;
- Priority of organizational values over personal ones;
- Corporate identity;
- Open motivation, honesty in relationships, trust in leadership;

[248] Ref.: Ryatov K. Functional management. How to create order out of chaos, overcome uncertainty and achieve success: monograph. – M.: Alpina Digital, 2014. – P. 119.

[249] Ref.: Kleiner G. B. Ecosystem economics: a step into the future // Economic revival of Russia.– 2019. – № 1 (59). – P. 40–45.

• Accessibility of management and direct interaction of each team member with it.

3. Resources: The development of technical tools and new methods for data collection and processing enable multi-aspect analysis of the research object. Additionally, advancements in electronic and digital communications reduce the time for information exchange and facilitate data transmission over any distance. This directly relates to the specificity of the non-profit technical production organization's activities and ensures more intensive and rational utilization of this resource group in the operations of specialized organizations compared to the option of independent resource provision by the industrial customer according to the format of the non-profit technical production organization.

4. Technologies: Knowledge management plays a crucial role in the efficiency of operations, directly linked to the growth and multiplication of the human resource as the bearer of technology, upon which the human potential of the OPSTS is formed.

The activities of the OPSTS are aimed at satisfying specific needs, such as assessing various risks, the impact of factors, the consequences of technology application, etc. These needs arise not from individuals (citizens) but during the operations of manufacturing companies in various industrial sectors. The expert service is intended for several interested users within the customer's structure, ensuring the specified parameters of the technological process: management, line managers, and directly the process operators.

The shift in technological paradigms driven by the need for effective innovation leads to the emergence and growth of dynamics in the adoption of new technologies, which require risk assessment and, consequently, comprehensive evaluations to align with the principles of sustainable development. The necessity for these assessments arises not only during the initial implementation phase but also during its enhancement, modernization, and so forth. Managing technological development is closely related to the knowledge management.

5. Employees is the most important element of the model, being the main resource of this business. The OPSTS must be capable of quickly responding to requests from production side, which highlights the need for problem-oriented forms of organization and expertise. This entails changing the requirements for the competencies of the workforce, which must constantly evolve, replenish, and improve. This is ensured by continuous interaction with scientists and users, as joint discussions on the subject of expertise provide the most comprehensive understanding of the problem and a holistic view of the object under study. OPSTS also require the involvement of a larger number of specialists from different fields of knowledge.

At the same time, being a specialized organization, the OPSTS can more effectively utilize the labor and intellectual potential of technological experts compared to the industrial enterprise-moderator.

6. Structure. The classic functional approach to management does not meet the needs of modern organizations. At the current stage of management technology development, the process approach is considered the most effective, which involves the Total Quality Management (TQM) methodology and the basic principles of quality standards, including ISO 26000. Combining functional and process approaches allows optimizing the organizational structure by changing the boundaries of its units. According to management theory, processes are divided into main and secondary. In the OPSTS, main processes include the creation of expert products, while secondary processes include financial management, employees management, interaction with government regulatory bodies and other stakeholders, ensuring the security, development, and

sharing the methodology expertise in the field of OPSTS. The achievement of the main process result is the binding element for all functional structures of the OPSTS.

Clients are end users of the main process results; their requirements must be considered on the criteria for its evaluation. A focus on quality results is the starting point for optimizing functions and processes in the activities of OPSTS, increasing external trust in the expertise products.

7. Management System. The management system type of OPSTS aims for a matrix structure. The technology for producing expert products, given that individual assessment requests come from each client, is implemented in the project management system. This type of management system organization has typical advantages: the ability to swiftly redistribute human resources between concurrently executed projects, organization of brainstorming sessions, strengthening specific areas (procedures, actions, operations) with highly qualified specialists when needed, and several others. These advantages will enable OPSTS to avoid downtime on one hand, and employees shortages on the other.

It is rational to develop external interactions of OPSTS with other organizations developing scientific and technical knowledge based on network interactions. Developing the necessary competencies of the expert team through a network model of knowledge exchange creates the basis for the exchanges of theories and methods in external interactions, which can lead to obtaining new significant results. One advantage of a competency transmission network is its high mobility and the ability for rapid interchange of expert opinions.

Industrial enterprises acting as moderators, capable of addressing a wide range of vital challenges posed by the government and stakeholders, will decide, based on a cost-benefit analysis, whether to integrate OPSTS into their ecosystems or opt for independent activities in R&D (potentially establishing a specialized structural division) or seeking relevant services from OPSTS. This decision will be based on the adequacy of the cost of services provided by professional expert organizations.

To increase the dependency of industrial enterprises on OPSTS, professional organizations should agree or independently initiate the development of an expert support system not only for the moderator but also for the partners of the industrial enterprise, thereby mitigating technological, environmental, and other risks for the moderator.

The organization and provision of expert support for the moderator's partners can be initiated and funded either centrally by the industrial enterprise within the ecosystem or by its partners. Crucially, the focus is on the forecasting and mitigation of risks that could undermine the economic performance of the entire ecosystem.

In Figures 3.12–3.15, we can see various types of functional-partnership connections between participants in the industrial enterprise ecosystem:

- solid lines represent constant connections typical of the relationship between the moderator and partners, as well as among ecosystem partners, aimed at ensuring the normal functioning of the entire functional area;

- a thick dashed line represents connections initiated by the moderator with supplementary organizations (including OPSTS);

- A thin dashed line represents connections between partner organizations and supplementary organizations (including OPSTS). This group of connections, facilitating the solution of tasks that management subsystem of the industrial enterprise ecosystem is facing, is initiated under the control and with the consent of the moderator.

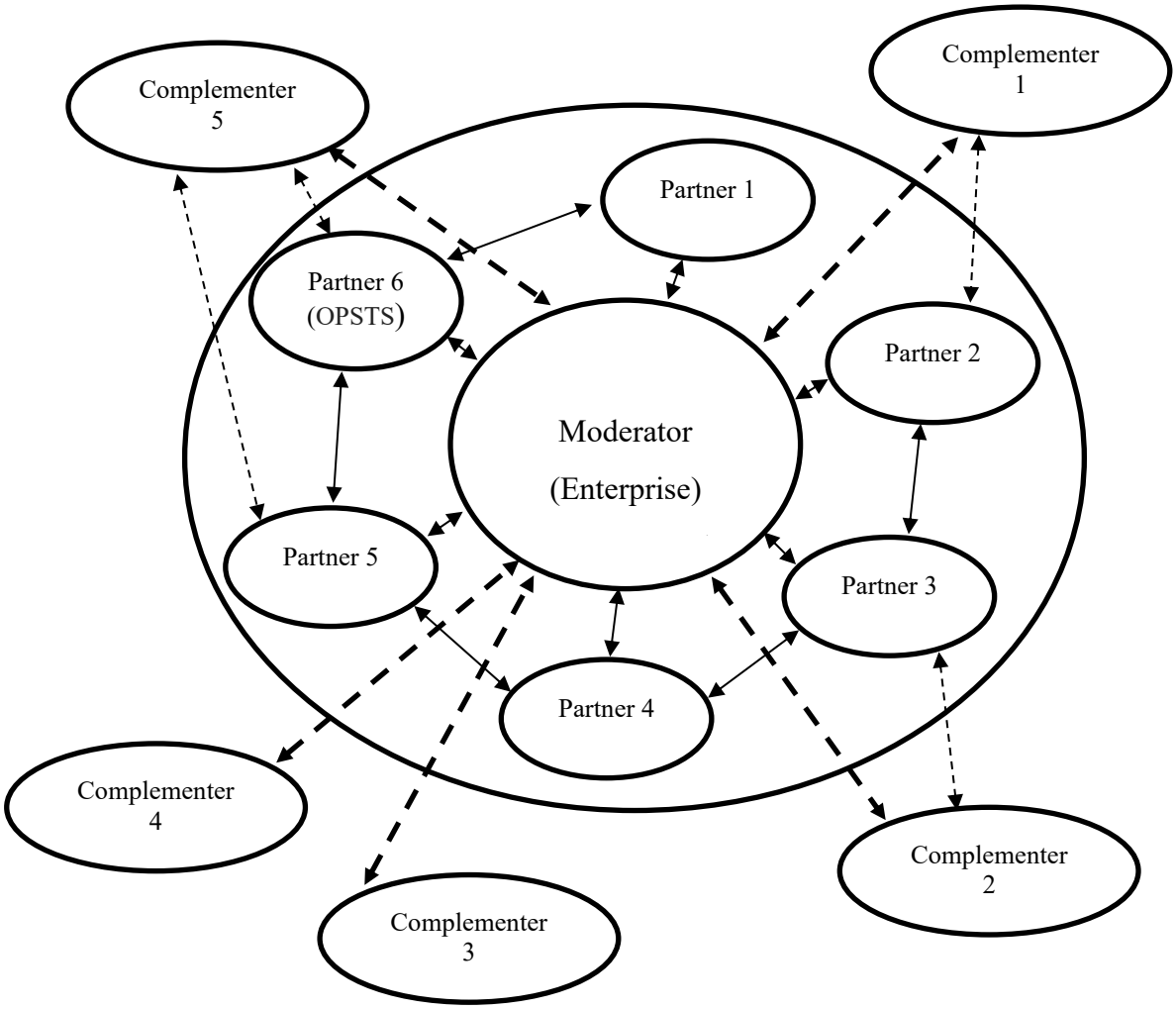

Figure. 3.12. Scheme of the model of OPSTS participation as a partner in the ecosystem industrial enterprise (stage 2) [250]

At the second stage of the transformation of the industrial enterprise ecosystem, as its partnership with OPSTS strengthens in a B2B format, OPSTS changes its status within the ecosystem from a supplementary organization to a partner (see Figure 3.12).

As a result of OPSTS's status change within the industrial enterprise ecosystem, the content of several elements in the organization's internal environment undergoes modifications (refer to Table 3.3).

[250] Ref.: Kleiner G. B. Ecosystem economics: a step into the future // Economic revival of Russia. – 2019. – № 1 (59). – P. 43.

T a b l e 3.3

Changes in the Content of Elements of the Functional Model of OPSTS as a Participant in the Industrial Enterprise Ecosystem as a Result of Changing Its Status from "Supplementary" to "Partner"[251]

Functional model elements	Status of Chnages («No changes» / «Fundamental / Nonfundamental»)	Content of change
Values	No change	–
Resources	Nonfundamental	Resource support for OPSTS activities should be pre planned, taking into account current and anticipated needs of the moderator and partner organizations within the ecosystem
Technologies	Fundamental	Technological support for OPSTS activities should be clearly focused on the needs of the ecosystem taking into account the supervised industry and cluster specific characteristics of the ecosystem (moderator and partner organizations)
Employees	Fundamental	On one hand, the qualifications and experience of employees are improving and growing taking into account the accumulation of operational experience in the industry, growth of status in the ecosystem. On the other hand, strict focus on one moderator (monopsonist) may lead to the stagnation of professional development of OPSTS employees in specific areas of activity.
Structure	Nonfundamental	OPSTS structure undergoes transformation to accommodate the need for continuous interaction with the moderator and partner organizations within the ecosystem
Management system	Fundamental	In the context of an open policy towards a spectrum of supported moderators, OPSTS should establish clear principles for prioritizing the allocation of efforts, resources and specialists among serviced ecosystems

During the first two stages of ecosystem development involving OPSTS, the specialized expert organization plays a supportive role: the main player in the system is the moderator - the industrial enterprise, which may, at its discretion, seek or not seek specialized services from OPSTS, and establish temporary or permanent partnership with the specialized expert organization.

[251] Ref.: Kleiner G. B. Ecosystem economics: a step into the future // Economic revival of Russia. – 2019. – № 1 (59). – P. 43.

In the course of its professional activities, OPSTS progresses to the third stage of ecosystem development involving industrial enterprises and specialized expert organizations (see Figure 3.13).

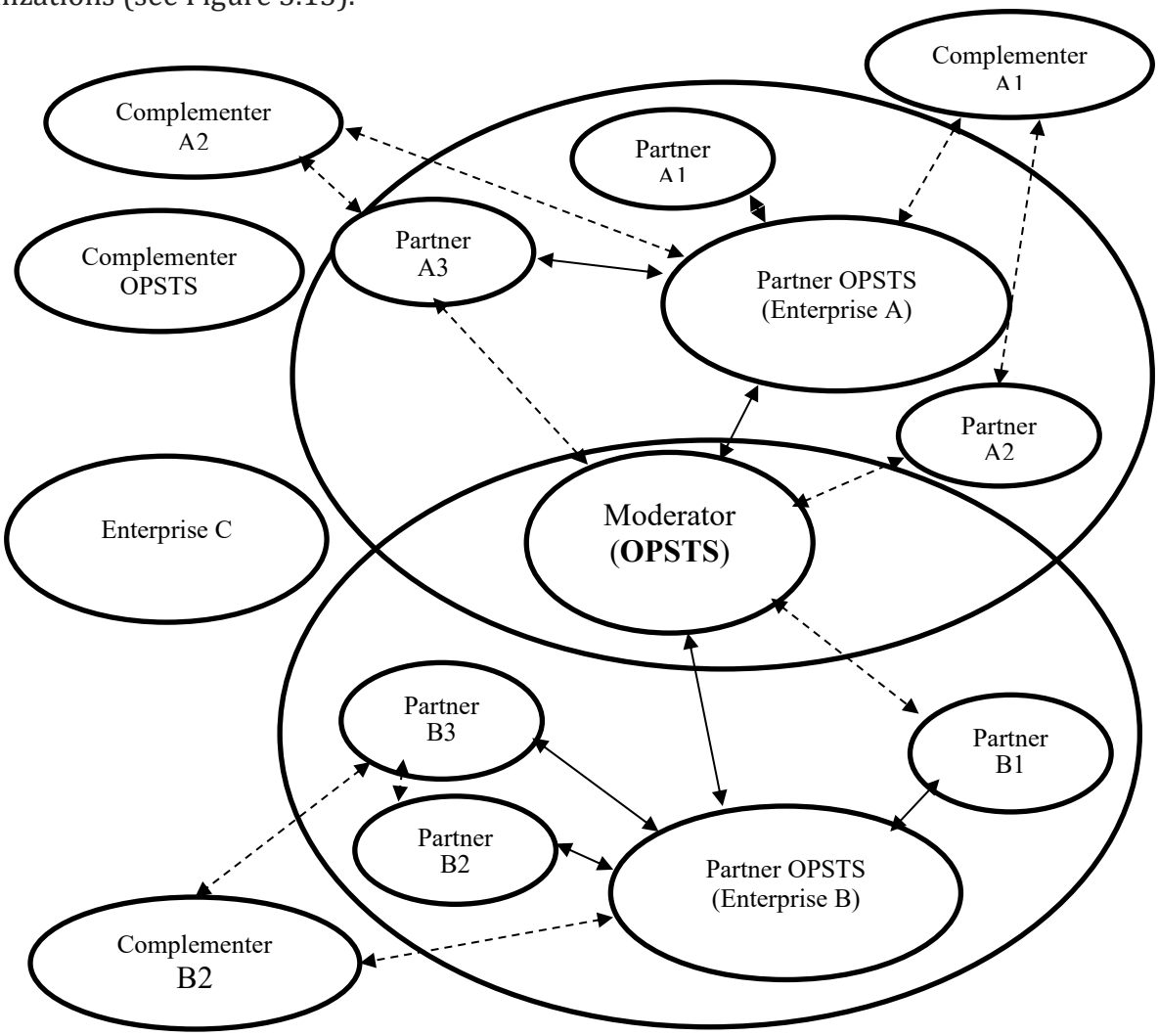

Figure. 3.13. OPSTS participation model as a moderator in ecosystems of industrial enterprises (stage 3) [252]

At the third stage of ecosystem development, the leading role shifts to OPSTS, which becomes the central participant in the ecosystem: in this case, regarding a specific OPSTS, there is a transition from an ecosystem of industrial enterprises with OPSTS as a supplementary or partner entity to an OPSTS ecosystem, consisting of supported industrial enterprises acting as partners to OPSTS (see Table 3.4).

[252] Ref.: Kleiner G. B. Ecosystem economics: a step into the future // Economic revival of Russia. – 2019. – № 1 (59). – P. 43.

T a b l e 3.4

Changes in the Content of Elements of the Functional Model of OPSTS as a Participant in the Industrial Enterprise Ecosystems as a Result of Changing Its Status from "Partner" to "Moderator"[253]

Functional model elements	Status of Changes («No changes» / «Fundamental / Nonfundamental»)	Content of change
Values	No change	–
Resources	Nonfundamental	The resource provision for OPSTS activities is open-ended, with consideration of the potential opportunity to promptly integrate into the industrial enterprise ecosystem with sector-specific relevance that was not previously part of OPSTS 's main area of activity.
Technologies	Fundamental	The technological support for OPSTS activities is continuously expanding, considering the potential to taking over sectors requiring expert support and competition rules in the OPSTS service market.
Employees	Fundamental	In addition to specialists focused on supporting specific industry sectors, OPSTS should maintain a reserve of employees capable of providing expert services in sectors with potential demand for OPSTS services.
Structure	Nonfundamental	The structure of OPSTS should include a department responsible for analyzing potential industry sectors for OPSTS activities.
Management system	Fundamental	The management system should incorporate a culture for accumulating experience in new sectors.

During the process of strengthening and expanding connections between industrial enterprises and specialized expert organizations (stages 2 and 3 of the genesis of industrial enterprise ecosystems), as well as the growth in assets, resources, and expertise of OPSTS, the macroeconomic system transitions to a state reflected in Figure 3.14.

[253] Ref.: Kleiner G. B. Ecosystem economics: a step into the future // Economic revival of Russia. – 2019. – № 1 (59). – P. 43.

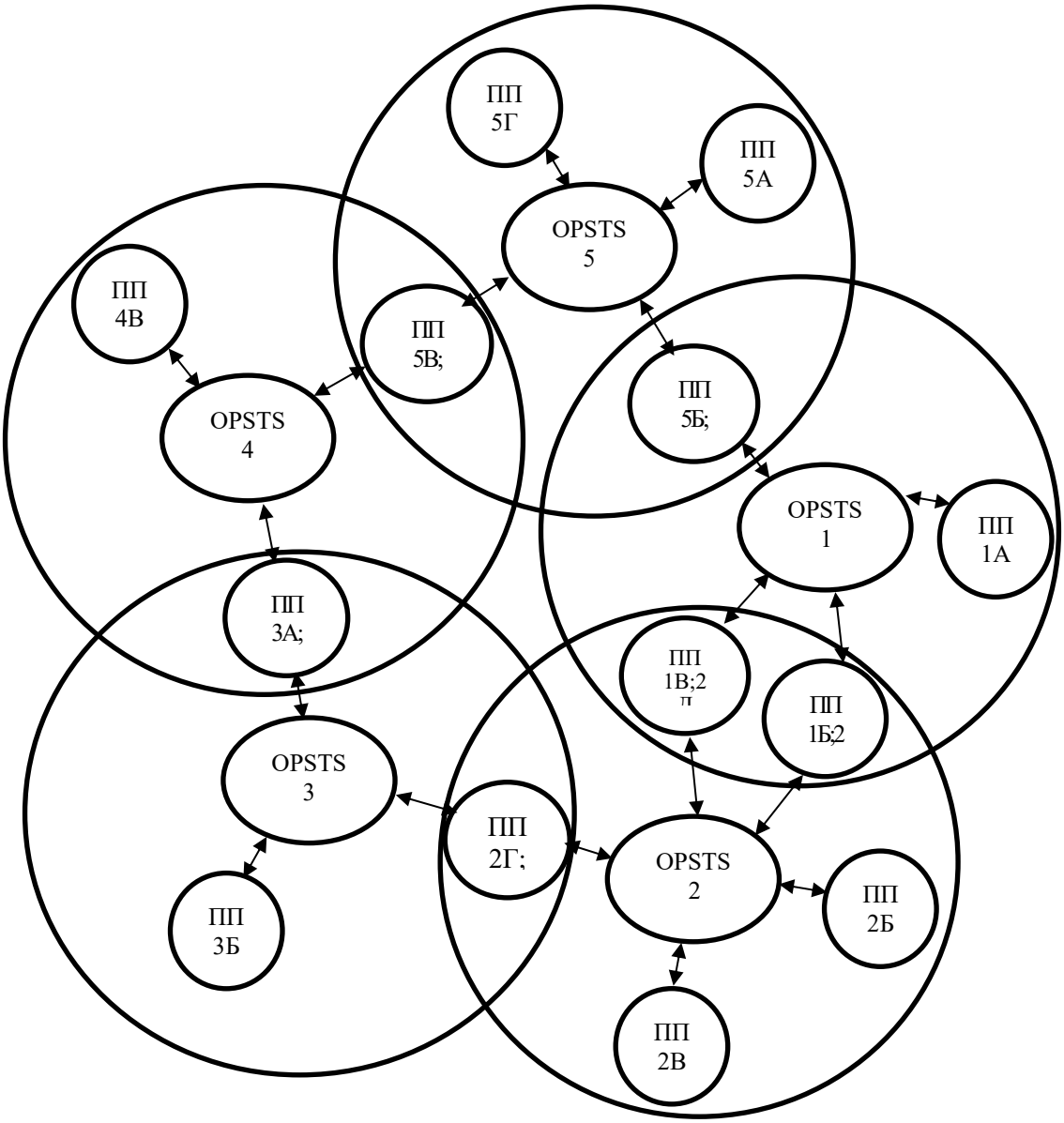

Figure 3.14. Multi-ecosystem model diagram
"Industrial enterprises OPSTS"[254]

In the context of increasing and strengthening of OPSTS's role in industrial enterprise ecosystems, the industrial enterprise always remains the service client. With the emergence of OPSTS moderators in the macroeconomic system, the cost calculation of OPSTS for specific types of work remains subject to bilateral dialogue between the industrial enterprise and the specialized expert organization. However, in conditions of standardization and unification of OPSTS services, taking into account industry-specific factors (under the influence of competitive forces), the mechanism for cost calculation and tariff system for OPSTS services undergoes a process of unifying expert activities (resource intensity, costs, pricing, profitability). Subsequently, the market for expert services transitions to a state of i creased competition for serviced industrial enterprises.

[254] Ref.: Kleiner G. B. Ecosystem economics: a step into the future // Economic revival of Russia. – 2019 – № 1 (59). – P. 43.

As a result of the competitive process, existing OPSTSs aim to form their own ecosystems, incorporating the maximum number of serviced industrial enterprises. However, industrial enterprises keep the right to either not utilize OPSTS services (with a previously defined expectation of decreasing competitiveness) or to seek support from multiple OPSTSs (for example, based on industry or geographical factors).

Upon the completion of the active phase of intensive competition in the expert services market and market share distribution among most successful, strong, and viable OPSTSs, the field of expert services gains balance. At this stage further development of OPSTSs will go in several main directions:

1) Forming of collaborative arrangements among OPSTSs, whether permanent or temporary, within the expert services market: through joint activities (project implementations), OPSTSs engage in sharing expertise in conducting expert activities. This process is expected to enhance the viability and competitiveness of the collaborating OPSTSs; however, it may also result in specialist migration between OPSTSs, increased merger and acquisition activities in the specialized market, and lead to using hidden competitive strategies.

2) Improving the management mechanism of the OPSTS activities, focused on testing new methods and programs of expert activities capable of ensuring competitive advantages in the OPSTS service market.

3) Some OPSTSs are expanding beyond the national macroeconomic system: for Russian OPSTSs, having more favorable conditions for professional development compared to similar expert organizations in most countries worldwide being compatible with profiled organizations- of scientifically and industrially developed countries such as USA, China, France, UK, Japan, Germany, Taiwan, Republic of Korea, and others. It is a good experience to be taking over servicing foreign industrial enterprises and systems - such an experience exists for Russian OPSTSs in the field of building and operating nuclear plants, which can be used for developing and implementing the foreign economic strategy of another industry-specific and universal OPSTSs.

Current example

An actual example is the industrial symbiosis in Kalundborg, Denmark, where material and energy flows are arranged between businesses, residential buildings, and agricultural farms. The initial idea for organizing such a system came from the intention to reduce production costs by utilizing waste and generating more profit.

The enterprise system in Kalundborg brings together five major non-science-oriented partners:

- Asnaes company’s power station with a capacity of 1,500 MW, the largest in Denmark, operating on coal.

- Statoil's oil refinery with a capacity of 4.8 million tons per year, the largest in Denmark.

-Gyro's company's gypsum board plant producing 14 million square meters of gypsum boards annually.

-Novo Nordisk, an international biotechnology pharmaceutical plant with an annual turnover of over $2 billion.

-The city of Kalundborg with a population of 20,000 people, who (like the city's enterprises), need heat and hot water.

In order to establish an industrial ecosystem, the partners initiated the organization of the industrial ecosystem through bilateral agreements. Prior to that, the thermal efficiency of coal utilization at the power station was only 40%. At the same time, another

major energy consumer, Statoil's oil refinery, was emitting large volumes of combustible gases. In the early 1980s, the process of negotiations and agreements has begun.

- The oil refinery agreed to transfer excess gas to the gypsum board plant, which benefited from the low price of fuel.

- The power plant began supplying waste steam to a new district of the city; heating the area with it allowed to remove a major source of air pollution – 3,500 oil-fired furnaces.

- The power station started using seawater for cooling instead of freshwater from Lake Tissø; some of the heated seawater was directed into 57 fish breeding ponds.

- In 1992, part of the coal at the power station was replaced with gas from the Statoil refinery; this became possible after the refinery installed a unit for purifying sulfur-containing exhaust gases, as the gases did not meet the fuel standard otherwise.

Before that they started another process of organizing the material flows:

- Sludge from the pharmaceutical plant and sludge after water purification from the fish breeding ponds began to be used as fertilizer on crop farms.

- The cement plant started using ash from the power station.

- Gypsum, after limestone scrubbing of the power station's exhaust gases, was sent to the gypsum board plant (2/3 of its requirement, the rest being imported).

- Sulfur, after desulfurization at the oil refinery, was sent for sulfuric acid production.

- Excess yeast from insulin production was used as feed for pigs.

The established industrial ecosystem in Denmark has enabled the involved enterprises to reduce production costs and decrease air, water, and soil pollution in the region[255].

Currently, twelve public and private companies from various countries worldwide participate in the symbiosis, closely cooperating with each other, local farms, and the municipality of the city of Kalundborg. In total, there are about 50 symbiotic exchanges in operation.

Currently, there are several dozens of successful industrial symbiosis projects in different countries worldwide. Some of the most well-known include the Keystone Industrial Port Complex and the Intervale Food Hub in the USA, the Guayama Industrial Symbiosis in Puerto Rico, the Norte Fluminense Industrial Symbiosis and Natura Eco-Industrial Park in Brazil, the Altamira-Tampico Industrial Corridor in Mexico, the NISP Industrial Symbiosis in the UK, the Handelo Industrial Symbiosis in Sweden, the Harjavalta Industrial Eco-Center in Finland, the Kaiserbaracke Industrial Park in Belgium, the Rotterdam Harbor INES in the Netherlands, the Knapsack Chemical Industrial Park in Germany, the Deux Synthe Industrial Park in France, the Ulsan Eco-Industrial Park in South Korea, the Kwinana Industrial Zone in Australia, the Lubei National Eco-Industrial Demonstration Park and Suzhou Industrial Park in China, the Nanjangud Industrial Zone and Vatva Industrial Park in India, and the Eco-town Kawasaki in Japan[256].

The structure of section 1.2 is illustrated in the diagram (Figure 3.15).

[255] Ref.: Kalundborg Eco-Industrial Park. – URL: https://ru.zahn-info-portal.de/wiki/ Kalundborg_Eco-industrial_Park

[256] Ref.: Tyryshkin V.V. Industrial symbiosis. New business model of the circular economy // Integration. Evolution. Sustainability: ways of development of socio-economic systems: materials of the I International Scientific and Practical Conference. – Ulan-Ude: BSU,2021. – pp. 147–153.

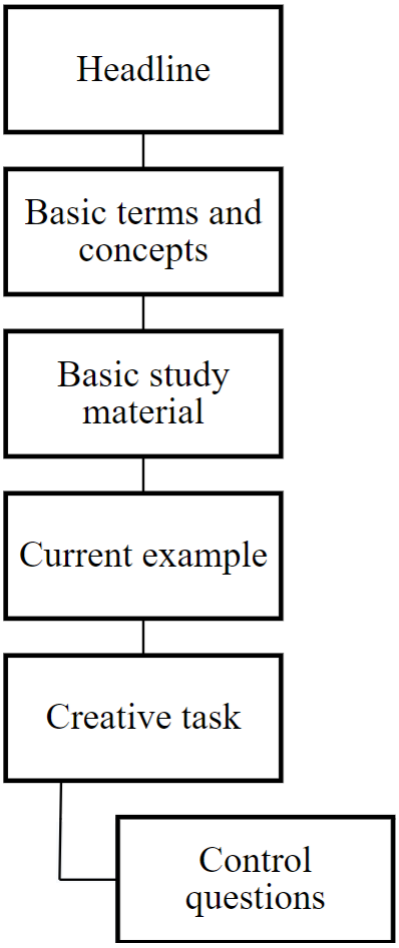

Figure 3.15. Visualization diagram of the section “Modeling of organizations management based on ecosystem principles"

Control Questions

1) Name the main subjective positions of participants in the industrial ecosystem and define the content of their functionality.

2) List the main elements of the functional model of the organization. How do they contribute to the formation of an industrial ecosystem?

3) Indicate possible criteria for classifying relationships between components of the industrial ecosystem and typological differences in classification groups of connections.

4) Specify the main stages of the life cycle of an industrial ecosystem. Is it possible to overcome the decline and liquidation stages in the industrial ecosystem? What methods can be used to achieve this?

5) Is it possible to create national Russian industrial ecosystems at the current stage? What is holding it back?

6) Using the example of the industrial ecosystem in Kalundborg[257], indicate the additional effects (temporal, informational-communicative, financial, material, intellectual-scientific) that could be gained through the participation of a science-oriented partner of industrial initiating enterprises at the stage of its creation.

[257] Ref.: Kalundborg Eco-Industrial Park. – URL: https://ru.zahn-info-portal.de/wiki/ Kalundborg_Eco-industrial_Park

7) For which sectors and fields of the Russian industry and economy is the application of the ecosystem approach most appropriate? Which of the existing Russian scientific, research, consulting, and implementation organizations can become scientific partners of domestic industrial ecosystems?

Practical Immersion Material

Creative Task

Using any specific industrial, service, or research organization resident in the Russian Federation as an example:

1) Based on financial statements data, publicly available information about the organization, and internal information (if obtainable), develop a project of an ecosystem appropriate for the organization's participation as a moderator/orchestrator, partner, or supplement.

2) Create a proposal/offer to other potential participants of the planned industrial ecosystem, aimed at initiating interest in implementing a joint project.

3) Develop a calendar plan of activities for forming the industrial ecosystem. Specify the main types and volume of informational-communicative, financial, material, labor, intellectual-scientific, and other resources planned for each stage of implementation.

4) Compile a forecast for the industrial ecosystem to become self-sufficient, after which it will autonomously generate all necessary resources to sustain its functioning.

5) List the expected beneficial effects of the organization's participation in creating the industrial ecosystem in terms of forecasting horizons (e.g., by years or other equally significant time intervals) and types of effects (financial, scientific, communicative, sustainability, risk management, and others - at the discretion of the performer).

3.4. Business Ecosystems Influence on the State Economic Processes

The modern realities of economic processes in Russia, as part of the global economy, globalization and integration processes, frame the importance of focusing on developing competitive advantages, which should take into account social development, transition to new technological standards and structures, and digital economy reliance on new technologies, platforms, ecosystems. Failure to do so risks diminishing state economic competitiveness and increase the likelihood of falling behind leading economies of the world.

Over the last fifteen years, we have seen the rapid development of information technology: the stability of mobile communications in the world, growing popularity of mobile applications. This trend fosters business growth and stimulates national development. Today it is impossible to live and work without using modern information technologies.

One of the main features of the market is battle over leadership, which is gained by the use of modern technologies and scientific research. It is the countries that invest heavily in scientific research (such as the USA, China, Israel, among others) that come up as leaders in the information technology market, resulting in the increased demand and higher profits for companies and nations. The development and competitiveness of the economy depend on the outcomes of scientific research conducted within the country. If there is no opportunity to invest in science, the state must purchase these technologies. Therefore, a state aiming to secure strong positions in the market, especially in the field of information technology, must allocate the necessary investments in this part of the economy.

If we analyze the sources of investment into the filed of science in leading countries, a significant part comes from private investments by corporations and transnational banks, with less investment from the government. The state itself creates conditions that make investment in scientific research attractive for private businesses, which are subsequently integrated into the economy.

In the Russian Federation, investments in science primarily have a state character, although with the declaration of the Decade of Science and Technology (2022–2031) by the Decree of the President of Russia, Vladimir Putin, on April 25, 2022, this trend may change, and private investors may become more active in funding scientific research[258].

Based on the rules of development in the modern economy and growing importance of competitive advantages, the term "business ecosystem" is increasingly used.

Let's consider the essence and history of each of the presented concepts.

An ecosystem is a system that consolidates certain types of living organisms, considering their interactions with the surrounding environment and with each other. The initial understanding of an ecosystem is associated with ecology and the natural environment. The term was first introduced by Arthur Tansley in 1935. Several years later, Russian ecologist Vasily Dokuchaev continued research. According to his findings, the main features of an ecosystem include the following: each organism has its own place and function within the system; it is crucial that each organism is interconnected with others; disrupting this system is not advisable because it could lead to catastrophic changes or even the destruction of a given system.

[258] Ref.: Decree of the President of the Russian Federation of April 25, 2022 No. 231 “On declaring the Decade of Science and Technology in the Russian Federation”. – URL: https:// www. garant.ru/products/ipo/prime/doc/404436068/ (reference date: 15.04.2022).

Reinterpreting the above into modern-day business ecosystems in terms of state economic development we can note the logical integration of elements, their functioning, interconnection, and outcome that can be described as an ecosystem.

Business (entrepreneurship) has several definitions, but let's form the main one: it is a type of economic activity of an economic entity aimed at generating profit, stable income used for development and further functioning. The term "entrepreneurship" in modern expression means “business”, although the Civil Code of the Russian Federation refers to entrepreneurial activity. The term "entrepreneurship" first appeared officially in a French dictionary in 1723, by Jacques de Bruslon.

In modern Russia, this term appeared on November 19, 1986, in connection with the USSR Law "On Individual Labor Activity"[259].

By combining the two concepts discussed into a unified "business ecosystem," we come up with the following author's definition: it is a collection of subjects, elements of a specific business environment, whose functioning and interaction lead to the achievement of set goals.

The subjects encompass the parties involved in the process of generating profit through the sale of specific goods, provision of services, information, or execution of work. Meanwhile, the elements of the business ecosystem include various technologies and resources that these subjects utilize to achieve their goals[260].

It should be noted that the definition and functioning of business ecosystems emerged thirty years ago in 1993, thanks to the scientist James Moore, who included his research in economics in a series of scientific publications:

- 1993 - "Predators and Prey: A New Ecology of Competition";
- 1996 - "The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems";
- 2006 - "Business Ecosystems and the View of the Firm";
- 2013 - "The Commons: A Thousand Business Ecosystems, Connected Community, and the Future".

J. Moore's analyzed business ecosystems from the perspective of an organization's life cycle phases: the birth of the company (business ecosystem); expansion through investments; leadership (strengthening market position); self-renewal (investing in company innovations); or the death of the business ecosystem due to a lack of investment in development.

Let's consider the types and specific features of business ecosystems. M. A. Bushueva, N. N. Masyuk, Z. V. Bragina, A. A. Bogomolov in their research identified the following business ecosystem types:

- Entrepreneurial ecosystem: interaction among various business entities, agents with diverse specializations, characteristic of a specific territory (region) considering the existing natural, institutional, economic, and other conditions.
- Innovation ecosystem: a combination of various types of research institutions conducting scientific research and making risk investments (venture), utilizing resources of different types necessary for the creation and application of innovations within society.
- Platform ecosystem: a collection of subjects and elements utilizing various digital platforms aimed at creating and satisfying demand through the advantages of digitization.

[259] Ref.: Kulapov M. N., Pereverzeva E. I., Kirillova O. Yu. Business ecosystems: definitions, typologies, development practices // Issues of innovative economics. – 2022. – T. 12. – № 3. – P. 1600.
[260] Ref.: Kulikova O. M., Suvorova S. D. Ecosystem: a new format of modern business // Bulletin of the Academy of Knowledge.– 2021. – № 42 (1). – P. 203.

- Knowledge ecosystem: a collection of entities engaged in the educational process and resources aimed at creating new knowledge and values used for the development of society.

- Service ecosystem: a collection of subjects and elements (resources) whose interaction is aimed at providing quality services in a specific field[261].

Therefore, any sector of the economy can be defined not as a mere field but as an ecosystem because, by its essence, an ecosystem entails interaction between the party offering a specific service for use or a product for sale and another entity, which may serve as both an intermediary in the supply chain and the ultimate consumer of this service or product. The consumer utilizes the objects offered by the ecosystem together with convenience and benefit in holds.

Business ecosystems can be classified based on various criteria:

- Depending on the field of use: material, non-material, financial;
- Depending on the sources of funding: reliant on external investments and injections; developing through self-funding;
- Depending on the level of interaction between parties: regional, national, international;
- Depending on the location: resident and non-resident;
- Depending on the level of openness: closed and open;
- Depending on the field of implementation: manufacturing, financial, scientific.

Let's also consider the structure of business ecosystems. In modern business ecosystems, digital platforms are used to satisfy consumer demand for convenience and benefit. These platforms offer consumers, not necessarily end-users, a wide range of various goods and services. Large-scale business ecosystems provide their customers with a broad range of services and offerings within one company, eliminating the need to seek out other companies or business ecosystems for specific services. For example, one large business ecosystem may offer its customers all necessary transactions related to real estate, healthcare, education, logistics, travel, mobile communication, financial products, and much more[262].

Business ecosystems can also operate based on meeting the needs of clients with one or several services. For example, in the field of real estate, a business ecosystem can offer options not only for renting, buying, and selling properties, including services related to mortgage loans, but also for renovation, interior design, clearing, and etc. Such product range provides comfort and benefits for both parties: the client interacts with one business ecosystem, which considers them as a regular customer due to the usage of multiple services, facilitating future interactions for both the client and the business ecosystem. This achieves the goal of interaction; the client receives quality service in a short time frame through the use of platforms and technologies, while the business ecosystem gains profit and a loyal customer. In such a situation, the business ecosystem may offer certain benefits and discounts to the loyal customer, which is mutually beneficial for both parties. Clients of business ecosystems can be not only individuals but also legal entities.

The two main business priorities are retaining existing customers and increasing the number of new ones. In this situation, this priority is not only achieved but also leads to the business goal of generating profit and expanding.

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[261] Ref.: Bushueva M. A., Masyuk N. N., Bragina Z. V., Bogomolov A. A. The role of business ecosystems in the formation of the ecosystem of the regional economy // Bulletin of the Altai Academy of Economics and Law. – 2022. – № 12. – P. 205.

[262] Ref.: Kurinova Ya. I. Ecosystem approach in the development of small and medium-sized businesses // Financial research. – 2021. – № 3 (72). – P. 95.

Within the business environment, multiple business ecosystems can also unite into a single business model, a platform where potential customers can immediately satisfy most of their needs, which may be of various types.

The international consulting firm "McKinsey & Company," forecasted that by 2025, around 30% of corporate revenues worldwide will be generated by digital business ecosystems, amounting to approximately $60 trillion in dollar equivalent. In 2020, the revenue share of business ecosystems in the global economy was only 1-2%. Such forecasts confirm that the future of state and global economies lies in the hands of business ecosystems[263].

This forecast confirms the development of business ecosystems using modern information technologies. The pivot point for the increased demand for online services from business ecosystems was the pandemic declared by the World Health Organization in March 2020, associated with the spread of a new viral infection and the lockdown.

As we can see from practice, information technologies and the functioning of business ecosystems are closely interrelated. For the active and rapid development of a business ecosystem, various resources are required: labor, financial, informational, and etc. The use of information technologies accelerates the operation of the platform itself, enabling clients to receive information quickly, while their requests are processed in the same manner. Thus, the development of information technologies will contribute to the development of business ecosystems. Information technologies have become even more in demand, especially in conditions of isolation.

The imposed lockdowns and remote work have led people to increasingly use services of digital platforms within business ecosystems. This means that individuals, while staying at home and accessing one platform within a business ecosystem, could satisfy their needs for necessary products, services, and information. Such opportunities and conditions have been created precisely by the digitization of the state's economy as one of the most important contemporary requirements for the advancement of civilization.

The development of models and systems of business ecosystems within a state contributes to the overall development of the country’s economy. Customer demand is often satisfied under convenient conditions through digital platforms, home delivery of goods, and other means. Meanwhile, business ecosystems increase their profits, from which taxes and various payments are made to budgets and off-budget funds in accordance with tax legislation[264].

Earlier, when defining and understanding business ecosystems, the focus was on the resources and technologies used in their activities, as they contribute to social development. On the other hand, the technologies employed, being constantly improved and labeled as innovations, have become an integral part of all modern processes of state, regional, and global economic functioning and development. Thus, the progressiveness of business ecosystems lies in the utilization of digital technologies.

In Russia, business ecosystems are identified based on the fields of their activities:

- Credit organizations: Sberbank, Tinkoff, VTB
- IT companies and telecom: Yandex, VK, MTS, MegaFon.
- Retailers and classifieds: X5 Retail Group, Ozon, Wildberries, Avito.

[263] Ref.: What are business ecosystems and why are they needed?? – URL: https://trends.rbc.ru/trends/innovation/6087e5899a7947ed35fdbbf3 (reference date: 25.04.2023).

[264] Ref.: Business ecosystems: platform business model. – URL: https://www. skolkovo.ru/programmes/ekosistemy-biznesa/ (reference date: 25.04.2023).

Let's look at the core of the functioning of one of the largest business ecosystems in Russia, Sberbank, as an example. In 2022, Sberbank underwent organizational changes driven by the need for further development as a large business model—a new ecosystem. In 2021, Sberbank invested $1 billion in ecosystem development and plans to allocate additional 300-350 billion RUB in further development in the upcoming years. These are internal investments by the bank itself, confirming the development of large business ecosystems, which not only expand their scale but also increase revenue generation.

As of today, Sber has created and acquired over 60 companies in recent years, whose activities are aimed at satisfying everyday customer demands, providing services both in the consumer and business segments, new technologies, and more. Sber has also created a symbol for its business ecosystem - a circle with a checkmark inside, which signifies that the customer receives maximum satisfaction of needs related to various areas when dealing with Sber[265].

The established business ecosystem helps to quickly and efficiently meet the needs of customers with Sber ID. Sber provides services to customers in the following areas:

- Purchases: services for grocery and ready-to-eat food delivery (SberMarket, SberMegaMarket, "Samokat," Delivery Club, "Kuhnya na Rayone," Performance Food, etc.).
- Entertainment: multimedia service Okko, audio streaming SberZvuk and SberZvuk Business, media set-top boxes Okko Smart Box, media services ("Gazeta.ru," "Afisha Daily," and others), SberGames.
- Mobility: location service 2GIS, taxi service "Citymobil," car-sharing "CityDrive."
- Health: digital healthcare service Sber-Zdorovye, SBER EAPTEKA.
- Education and employment: job search service Rabota.ru, educational platforms SberKlass and SberUniversitet, etc.
- Car purchase: SberAuto service for choosing a car.
- Everyday tasks: SberUslugi platform for finding necessary specialists.

Creating a smart environment: devices with virtual assistants Salut – Athena, Joy, "Sber" for home use (SberBox TV set-top box, TV media center with camera SberBox Top, smart display SberPortal, smart light bulbs and sockets), Salut TV platform in partner devices.

However, Sber faces significant competition from Yandex, so it needs to continue developing customer-oriented competitive advantages[266].

Another major business ecosystem in Russia is Yandex. Currently, this platform has about a hundred different projects.

The third business ecosystem in Russia is Mail.ru Group, which was launched in 2019. Until that moment, there were various independent ecosystems, but by 2022, this business ecosystem already included more than 30 services and products.

The shift from traditional business operations to forming ecosystems was initiated by major IT giants who created unified super-applications, combining the functionality of several services at once: WeChat (China) – financial, household, and government services; Alipay (China) – payment system and financial services; "Yandex Go" – taxi, car sharing, food and restaurant delivery, public transport schedule; "VKontakte" – VK Pay payment system, mini-applications for ordering food, watching movies, listening to music, and playing games.

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[265] Ref.: Business ecosystems: platform business model. – URL: https://www. skolkovo.ru/programmes/ekosistemy-biznesa/ (reference date: 25.04.2023).

[266] Ref.: Business ecosystems: platform business model. – URL: https://www. skolkovo.ru/programmes/ekosistemy-biznesa/ (reference date: 25.04.2023).

At the level of international economic relations, large companies such as Alibaba, Google, Amazon, Microsoft, Tencent, Apple, Huawei, Xiaomi, Samsung, Sberbank, Yandex, VKontakte, Mail.ru Group, and MTS are creating their own ecosystems. This direction is relatively new, so this system of relationships is still evolving and doesn't have clear boundaries yet as it gradually develops, and its limits are still unknown. Only in the last thirty years have economies around the world started to engage in the consolidation of companies, resources, and applications, creating platforms for mobile and high-quality customer satisfaction.

It should be noted that the customer of a business ecosystem often believes that they are benefiting from free services, platform information, etc., but that's not the case. At the beginning of this textbook, the definition of entrepreneurship was provided, which is associated with making a profit. Business ecosystems include costs in the price of a service or product in order not to operate at a loss.

Systematic profit is necessary for further development, as competition in the market is growing, and the winner will be the one who has specific advantages formed solely through new investments and innovations. Quantity of clients plays a great role in developing a business ecosystem that generates sufficient profit and gradually diversifies the range of services and products for customers, and each Russian business ecosystem is fighting to grow customer base. The customer chooses the ecosystem that provides a wider range of services and products while ensuring their quality.

Based on this, it should be noted that the economy of the state is raising a number of large business ecosystems, platforms with digital technologies, contributing to its further development and strengthening.

Business ecosystems created on digital platforms also contribute to the development and support of small and medium-sized businesses. Such platforms can provide comprehensive information on services, business opening, registration, management, and more. One such platform is the digital platform for small and medium-sized enterprises. This platform was created within the framework of the national program (project) "Small and Medium Entrepreneurship" through the joint efforts of the Federal Corporation for the Development of Small and Medium-Sized Businesses and the Ministry of Economic Development of the Russian Federation.

This platform is available to everyone: quick registration is possible in the personal account through the "State Services" portal, providing fast access for entrepreneurs or individuals interested in entrepreneurship to necessary materials and statistics in this field.

The digital platform includes:

- Online services: access to purchases by large state-owned companies; preferential financing for innovative companies; production cooperation and sales; obtaining electronic signatures, and many more services necessary for entrepreneurs starting or already operating their business;
- Business education: from anywhere in the world, the opportunity to conduct and participate in various online events, such as live webinars with the option to ask questions to the speaker, recorded video courses, and other educational resources for entrepreneurs.
- Statistics: Information on the state's macroeconomic indicators, the number of employed citizens, the number of registered and operating entrepreneurs in large, medium, small businesses, microenterprises, self-employed individuals, and other relevant data.

- Legislation: Constant updates on legislative acts, current changes in legal documents regarding entrepreneurship, and more.

- News: The latest and most relevant business news in Russia.

The digital platform for small and medium-sized enterprises has been operating since February 2022, with 340,000 users already registered on it, but it is necessary to further develop this platform expanding its scope of operations. Therefore we can see that, digital platforms for social and economic development not only foster companies with private capital and investments but also contribute to the development of the state as a whole.

The existence and development of business ecosystems represents a new phenomenon for our economy and for economies such as the USA and China. In this instance, the question naturally arises about the possibility and the necessity of regulating business ecosystems. There is an opinion that business ecosystems can self-regulate and their development should not be restricted in any way; according to analysts in developed countries, the market system should regulate itself. This approach was changed during the global financial crisis known as the "Great Depression" in the USA (1929–1933) and got even more support during the period of the second global financial crisis known as the "Great Recession" in 2008–2010.

The First World Economic Crisis had a negative impact on the economy of the USA and to a lesser extent on the economies of England and Germany, as globalizing processes were still in their early stages of development. However, it is worth noting that following the crisis, the US government engaged scientists to make a research of the crisis as well as to investigate how future crises can be prevented. These scientists developed various models not only to identify and predict the likelihood of corporate bankruptcies but also a set of prevention measures.

Regulation by government authorities during the crisis became a necessary measure for saving the economy of the USA. The Second World Financial Crisis spread worldwide, and thanks to regulation initiated by the governments, economies began to emerge from recession without widespread bankruptcies of banks and businesses. It was after this crisis that even the governments of developed countries started discussing measures to increase their influence on the market system and its constant monitoring.

The same situation could occur with business ecosystems. At the beginning of their lifecycle, any economic system, with investments and innovations, receives a powerful boost in development. However, during a stage of stabilisation (and if the business ecosystem is not supported at this stage) it could lead to a crisis. In the worst-case scenario, it could result in the collapse of the business ecosystem, followed by its liquidation or complete reorganization. According to the theory of crisis management, crises in the system are inevitable, but they must be anticipated in advance and prevented by developing a set of measures. However, crises also present new opportunities for business ecosystems.

Legislation Authorities of Russian Federation, along with the Russian Union of Industrialists and Entrepreneurs, are paying attention to the need for regulating the functioning of business ecosystems, taking into account existing antimonopoly legislation. They emphasize that both public and private business ecosystems should have equal opportunities in their development and organization of activities. Furthermore, the involvement of the state is essential in the process of regulating and developing business ecosystems, considering the interests of the state, legal entities, and citizens. The Ministry of Economic Development of the Russian Federation has developed a document "Concept of General Regulation of the Activities of Groups, Companies Developing Various Digital

Services Based on One 'Ecosystem,'" aiming to regulate the functioning of digital ecosystems and platforms.

The Concept defines a digital ecosystem as a specific business model that includes a wide range of goods, services, and information provided to consumers to meet their needs.

Business ecosystems have gradually transitioned from offline to digital development, especially amid the pandemic and lockdowns, which has become an essential component of economies not only of individual countries but also of the entire world. This concept distinguishes between national and foreign business ecosystems. Earlier, we discussed the potential for the development of business ecosystems within integration groups and alliances, such as the European Union, BRICS, the Eurasian Economic Union, and interaction between them, which will contribute to increasing customer base and raising profits.

Although business ecosystems are entrepreneurial systems aimed at profitability, it is undeniable that within the context of globalization and integration processes, the emerging trend known as "business ecosystems" will also experience rapid development within integration alliances.

A main distinguishing feature of Russian business ecosystems became that they incorporate not only various technological products and services but also essential elements such as finance and telecom. In Russia, the motivation for developing these business ecosystems is valued and understood, with that being linked not only to the economic development and strengthening international interaction but also to further progress in areas such as the economy, science, and technology, thereby determining the country's competitive advantages on the global stage.

Below we outline the main advantages of business ecosystems based on digital platforms:

- For individual clients: mobile, flexible, and convenient – to satisfy their needs, excluding the limitations in choice, territorial constraints, etc.

- For business ecosystems: increasing the number of subscribers (clients) across the country, and in the future, beyond its borders – engagement in integration alliances, leading to increased revenue and profit.

- For the state's economy: increasing the efficiency and profitability of the economy, boosting contributions to the state treasury through taxes and payments by business ecosystems; creating opportunities for more active development of small and medium-sized businesses, which is one of the strategic goals of the state. This will support increase in employment, income growth, higher tax revenues, and payments to the state treasury; attracting investments into the Russian economy through potential participation of foreign capital in the activities of national business ecosystems; fostering scientific research in these areas.

- For the state: ensuring the necessary level of national security; developing and securing competitive advantages in terms of Russia's technological independence, among other factors.

A subject of national security of the state, particularly economic security as a key component of national security, cannot be overlooked in our research.

In the Decree of the President of the Russian Federation as of July 2, 2021, No. 400 "On the Strategy of National Security of the Russian Federation," in section 3 on the national interests of the Russian Federation and strategic national priorities, there is a mentioning of the sustainable development of the Russian economy on a new technological basis; in terms of safeguarding the national interests of the Russian

Federation, it is necessary to carry out scientific and technological development of the state, ensuring information security[267].

In section "Economic Security" of the Decree there is also a thesis outlining the importance of creating a unified state system for managing scientific, scientific-technical, and innovative activities, as well as conditions and incentives to increase the involvement of Russian businesses in the development of corresponding infrastructures. It also emphasizes the importance of developing prospective high technologies in artificial intelligence, big data processing, and supercomputer systems, which are fundamentally linked to the development of business ecosystems.

According to the Decree of the President of the Russian Federation dated May 13, 2017, No. 208 "On the Strategy of Economic Security of the Russian Federation until 2030," one of the main goals is to maintain the scientific and technological potential of economic development at the global level and increase its competitiveness. These arguments confirm the importance of developing information technologies, an innovative spectrum, and business ecosystems to ensure the competitiveness of the Russian Federation and the development of economic processes that meet modern requirements[268].

In addition to the positive aspects and prospects of business ecosystems, it is important to note the risks and challenges that may arise. To prevent them, it is necessary to implement a series of protective measures both at the state level and within business ecosystems:

- Rapid development of digital technologies requires quality conditions and utilization of technologies to maintain competitive advantages in this market.

- The development of business ecosystems is also associated with risks typical for any business, such as the need for constant internal monitoring and auditing in terms of technological, financial, and personnel aspects.

- Due to the rapid development of a number of national business ecosystems, as previously mentioned, it is important to comply with antimonopoly legislation to prevent monopolization of this market, allowing each newly created business ecosystem to participate in it.

According to research by the Gaidar Institute for Economic Policy, the value of Russian business ecosystems using digital platforms accounts for only 0.76% of the value of the world's largest similar companies, which proves the need to develop this field.

Currently, the largest number of users (clients) of business ecosystems in Russia are registered with "Yandex" - 104 million people and "Sber" - 103 million people, with VTB having more than 14 million clients etc. The more attractive a business ecosystem is for customers, the more convenient and tailored it is for them, the greater the number of profitable clients there will be, thereby boosting the development of this system.

It is worth noting that Russian business ecosystems are at the stage of formation, development, and processes of innovation and investment in further development.

A business ecosystem, like any other economic system, is a subject to analysis of its efficiency and effectiveness, upon which the future potential will depend.

To understand how efficient the business ecosystem is, it is necessary to analyze certain criteria:

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[267] Ref.: Decree of the President of the Russian Federation of July 2, 2021 No. 400 “On the National Security Strategy of the Russian Federation». – URL: https://http:// kremlin.ru/acts/bank/47046 (reference date: 15.04.2022).

[268] Ref.: Decree of the President of the Russian Federation of May 13, 2017 No. 208 “On the Economic Security Strategy of the Russian Federation for the period until 2030 ». – URL: https://http://government.ru/docs/all/111512/ (reference date: 15.04.2022).

- The character of the business ecosystem's activities;
- The level of digital development of the business ecosystem;
- The size of the customer base;
- The stage of the business ecosystem's life cycle;
- Restrictions imposed by specialized regulatory bodies for a particular business ecosystem;
- The level of competition on national and international markets.

The outcome will be the final resultant effectiveness, based on which determinations of the most efficient business ecosystem can be made. However, areas of concern that need to be addressed will also be monitored and controlled.

Let's examine the forecasts for the development of business ecosystems from the International Data Corporation (IDC), an international research and consulting firm that has made observations and research since 1964 and specializes in studying the global market for information technology and telecom[269].

Studying the forecasts for the development of business ecosystems, it is worth noting that by 2024, around 80% of such business ecosystems will implement similar policies in areas such as environmental, social, and managerial aspects. By 2024, approximately 50% of countries with business ecosystems in their economies will actively participate in their further development, scaling, and support. By 2025, there will be a more active exchange of data and information between these business ecosystems, leading to growth in customers and profitability. By 2026, global and international-level applications will become increasingly prevalent.

In summary, it's important to emphasize that:

- The economy of countries, regions, and the world is developing very rapidly, utilizing modern information technologies.
- The active development of market economy and its integral component - entrepreneurship - has led to the emergence of business ecosystems based on digital platforms aimed at quickly and flexibly satisfying consumer demand.
- Large global and national business ecosystems are a modern trend, without which it is impossible to imagine human lifestyles, the functioning of companies, and the economies of states.
- Business ecosystems are still a relatively new phenomenon for the economy and society, although the first ecosystems appeared in developed countries about 20 years ago.
- There is no clear classification for business ecosystems and designation of their organizational and legal form; the process is evolving and expanding.
- The process of forming a country's competitiveness includes the development of modern trends; national security, particularly economic security, aims at scientific, technological, and innovative development of the economy and society, which is directly linked to business ecosystems.
- In Russia, three of the largest business ecosystems are identified: "Yandex," "Sber," and Mail.ru Group.
- Like any phenomenon, a business ecosystem has both positive and negative factors affecting individuals, society as a whole, companies, and the state.
- According to forecasts from various expert organizations in the field of management and planning systems, the future of the countries' economies and the world

[269] Ref.: What are business ecosystems and why are they needed? – URL: https://trends.rbc.ru/trends/innovation/6087e5899a7947ed35fdbbf3 (дата обращения: 25.04.2023).

belongs to business ecosystems, as confirmed by forecasts for the increase in corporate turnover in the global economy.

The structure of the section is shown on the diagram (Fig. 3.16).

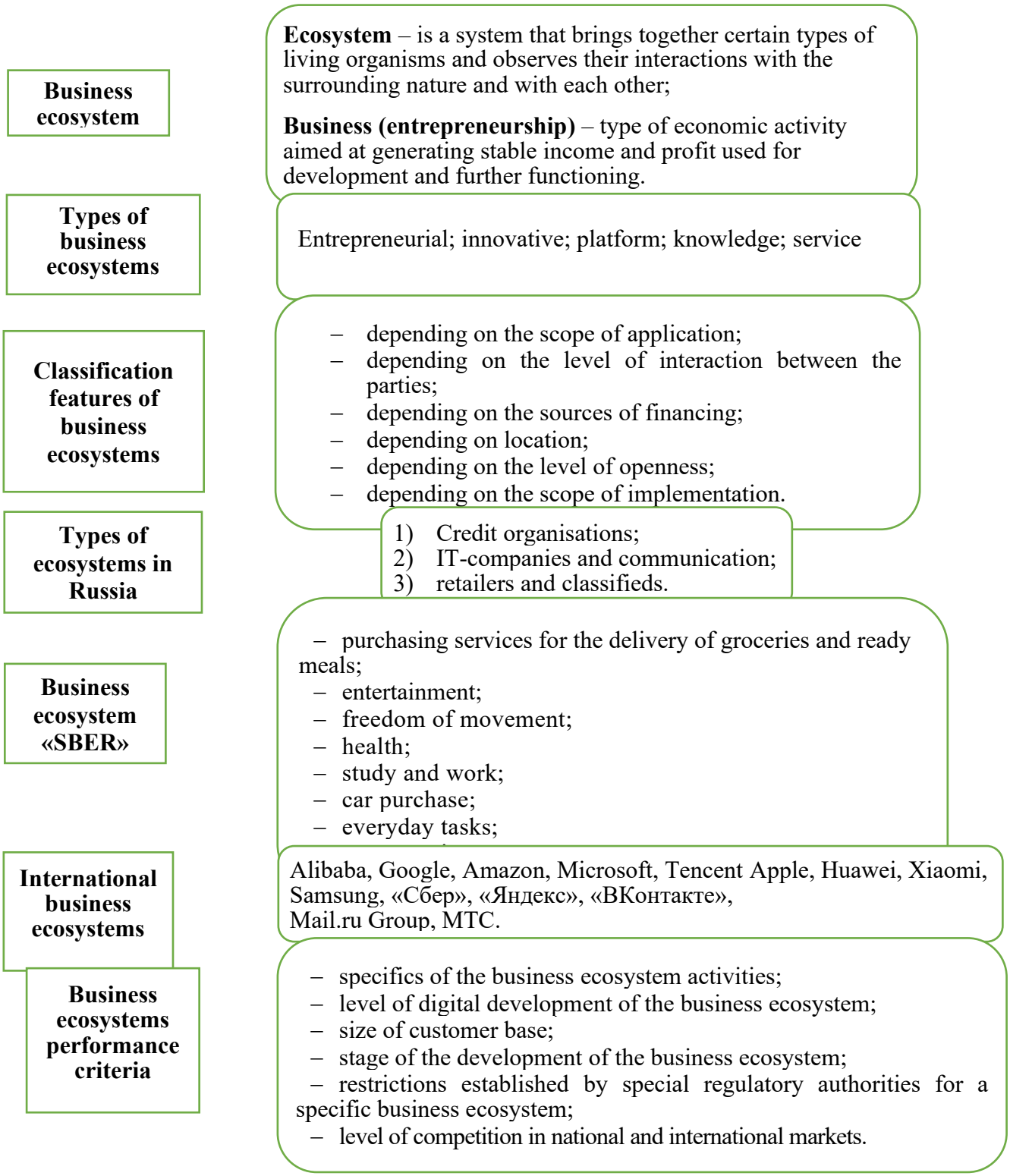

Figure 3.16. Visualization diagram for the section “The Impact of Business Ecosystems”on the economic processes of the state"

Control questions

1. What are the characteristics of modern economic processes in Russia?
2. Why is it necessary to form competitive advantages by the government and companies?
3. How are investment in scientific research and the development of the country's economy related?
4. Who introduced the term "ecosystem"?
5. Who introduced the term "entrepreneurship"?
6. What is meant by a business ecosystem?
7. Which scientist in the 1990s made scientific researches (works) on business ecosystems?
8. List the types of business ecosystems.
9. Characterize business ecosystems in terms of classification features.
10. What is the overall goal of business ecosystems?
11. How do business ecosystems impact the country's economy?
12. Why are modern information technologies and business ecosystems closely related?
13. Why is the pandemic associated with the spread of the new coronavirus infection COVID-19 became an activating factor in the development of business ecosystems?
14. List Russian business ecosystems.
15. Characterize the business ecosystem called "Sber".
16. List international business ecosystems.
17. Characterize the content of the "Digital Platform for Small and Medium-sized Enterprises".
18. Why is regulation of business ecosystems necessary?
19. List the main advantages of business ecosystems based on digital platforms.
20. Characterize the content of national and economic security of the Russian Federation in terms of technological independence and digitization of the economy.
21. List the criteria for the effectiveness of business ecosystems.
22. Characterize the forecasts for the development of business ecosystems.

Practical Immersion Material

Questions:

1. Competitive advantages are characteristic only for...
a) the government;
b) companies;
c) the government, companies, and individuals.

2. The following countries lead in investing in science (scientific research) in the world:
a) Russia, Brazil, India;
b) USA, China, Israel;
c) USA, China, Russia.

3. An ecosystem is...
a) a system aimed at ensuring a high level of ecology and environmental protection;

b) a system that combines certain types of living organisms, considering their interactions with the environment and among themselves;

c) a union of certain living organisms in one environment.

4. A business ecosystem is...

a) the totality of subjects, elements of a certain business environment, the functioning and interaction of which leads to the achievement of set goals;

b) organizations engaged in environmental protection activities;

c) organizations engaged in entrepreneurial activities related to the acquisition of natural resources.

5. Types of business ecosystems include:

a) entrepreneurial, innovative, platform-based, knowledge-based, service-based;

b) environmental protection, defensive, entrepreneurial;

c) entrepreneurship economy, digitization.

6. How are business ecosystems divided depending on the level of interaction between parties?

a) national and urban;

b) international, regional, governmental;

c) international and municipal.

7. Business ecosystems include resources for acquiring...

a) only goods on marketplaces;

b) only real estate services;

c) goods, services, labor, information.

8. A priority goal of a business ecosystem can be...

a) establishing standards for its operation;

b) retaining and increasing the number of customers;

c) maintaining ecological systems.

9. What resources are necessary for the development of business ecosystems?

a) only financial;

b) labor, financial, informational, technological;

c) only labor.

10. Does each business ecosystem have its own symbol?

a) in most cases it does not;

b) business ecosystems do not use symbols;

c) yes, it does.

11. Does the customer use services of business ecosystems for free?

a) yes, of course;

b) it depends on the conditions of the business ecosystem;

c) no, customer service costs are included in the price of goods, services, labor, and information provided.

12. The Digital Platform for Small and Medium-sized Enterprises was created by...
a) the state as part of a national project (program);
b) entrepreneurs;
c) a private company.

13. Is it necessary for the government to regulate the development and operation of business ecosystems?
a) no;
b) entrepreneurs regulate themselves;
c) yes.

14. Who developed the document "Concept of general regulation of the activities of groups, companies developing various digital services based on one 'ecosystem'"?
a) Accounts Chamber of the Russian Federation;
b) Central Bank of the Russian Federation (Bank of Russia);
c) Ministry of Economic Development of the Russian Federation.

15. Is the development of business ecosystems associated with risks?
a) no, there are no risks in their activities;
b) it depends on the state;
c) yes, entrepreneurial activity is always associated with risks.

16. Can the efficiency of a business ecosystem be determined?
a) a business ecosystem is always effective in its essence;
b) no need for that;
c) yes, with the help of specific criteria.

17. What is the forecast for the future of business ecosystems?
a) business ecosystems will disappear due to irrelevance;
b) business ecosystems will continue to develop with the necessary resources available;
c) business ecosystems will not develop.

3.5. Infrastructure and Forms of Interaction Amongst Business Ecosystem Participants

Introduction

At the current stage of economic development, special place of business ecosystems is explained by the fact that they represent sustainable and efficient economic communities. However, for a business ecosystem to function properly, it must have well-developed infrastructure, provide effective forms of interaction not only among its participants but also dynamically develop its services for customers. To this end, the infrastructure of a business ecosystem includes all necessary tangible and intangible resources, such as communication networks, transportation and logistics, legal and financial infrastructure, as well as other resources necessary for the successful functioning and further development of business.

Forms of interaction among participants of business ecosystems, in turn, represent various mechanisms used for interaction between entrepreneurs, investors, governmental and non-governmental organizations, and other participants of the business ecosystem.

The main driver of business ecosystem development is the need for medium and small organizations to survive in conditions of intense competition as well as facing unstable economic conditions[270].

The purpose of this section is to analyze the infrastructure and forms of interaction among participants of business ecosystems, as well as their role in creating efficient and sustainable economic communities.

To create effective infrastructure and forms of interaction among participants of a business ecosystem, it is necessary to consider various factors such as the scale of the ecosystem, its goals and objectives, as well as the industry's specifics. Additionally, effective infrastructure and forms of interaction may vary depending on the location of the business ecosystem and its national characteristics.

One important aspect in creating infrastructure and forms of interaction in business ecosystems is involving both governmental and non-governmental organizations in the process. Governmental organizations can provide necessary resources and infrastructure for the successful functioning of the business ecosystem, as well as create favorable legal conditions to attract investments.

Non-governmental organizations, in turn, can provide expert support, help establish contacts between ecosystem participants, and encourage further interaction among them. Thus, developing effective infrastructure and forms of interaction among participants of a business ecosystem is a necessary condition for the successful functioning of the ecosystem as a whole. However, to create advanced infrastructure and ensure effective forms of interaction, it is necessary to consider the specific features of each particular business ecosystem and employ an individual approach to its further improvement.

A business ecosystem is a network of interconnected and interacting entrepreneurs, companies, organizations, governmental and non-governmental entities, as well as other participants, who create and sustain an economic system based on the exchange of resources, knowledge, technologies, and expertise.

Business ecosystems, as dynamic economic communities, have a unique ability to adapt and evolve. They combine organisations from various industries and sectors of the economy and represent an effective way of creating sustainable economic systems that

[270] Ref.: Busalova A. D. Managing the interaction of participants in the business ecosystem of a telecommunication corporation: dissertation. – M.: Plekhanov Russian Economic University, 2022.

contribute to further business growth, innovation, and development. The main principle of a business ecosystem is mutually beneficial interaction among its participants, enabling them to create products and services more valuable to customers than if they were independent and in isolation from each other. Business ecosystems also support the formation of new progressive business models, as well as innovative products and services, which can become a key source of competitive advantage for ecosystem participants, providing new markets. Overall, business ecosystems represent a modern form of organizing economic activity, allowing ecosystem participants to work in one direction to achieve common goals and objectives.

Infrastructure and forms of interaction play an important role in creating and supporting the activities of such business ecosystems. Infrastructure, including physical, technological, and institutional components, provides the foundation for interaction among ecosystem participants, ensuring efficient resource utilization and enhancing productivity not only of its individual components but also of the system as a whole. Infrastructure, in this case, serves as a supporting subsystem. Physical infrastructure, such as transportation vehicles, power supply, and communication, ensures the accessibility of resources and services for ecosystem participants. For example, a well-developed transportation system enables quick and efficient delivery of goods and services, which can enhance the competitiveness of ecosystem participants.

Technological infrastructure, such as information systems, platforms, and software, provides the foundation for interaction and information exchange among ecosystem participants. For example, e-commerce platforms enable sellers and buyers to interact and conduct transactions online, thereby increasing business efficiency and simplifying business processes. Institutional infrastructure, such as legal and regulatory frameworks, ensures the stability and resilience of the ecosystem, protecting the interests of participants and ensuring compliance with rules and norms. For example, clear and strict consumer protection legislation policy can increase trust in products and services, leading to increased demand and improved business performance for ecosystem participants.

Forms of interaction, such as resource sharing, joint product and service development, as well as knowledge and experience exchange, can help ecosystem participants create products and services that are more valuable to consumers, and also enhance their competitiveness. For example, collaborative product development can enable ecosystem participants to access new technologies and resources that may be too costly or complex to develop independently. Additionally, interaction among ecosystem participants can contribute to increased innovation activity and accelerate business growth.

Overall, by developing infrastructure and improving forms of interaction in business ecosystems ecosystem can enhance the efficiency, productivity, and competitiveness of participants, as well as contribute to the development of new products and services. Therefore, it is important to pay sufficient attention to further improving and supporting all elements of the infrastructure, as well as ensuring effective interaction among participants in the business ecosystem.

Infrastructure of a business ecosystem

Infrastructure of a business ecosystem - a collection of resources, technologies, services, and rules necessary to support the functioning and further development of the ecosystem. It includes not only material elements but also technical equipment, information systems, financial instruments, legal and regulatory mechanisms, etc.

The infrastructure of a business ecosystem should provide conditions for convenient and effective interaction between ecosystem participants, facilitate access to

resources and tools necessary for successful business, and contribute to the development of innovations and new products. It should also be flexible and adaptive to meet the changing needs and requirements of the ecosystem at different stages of its development. The government plays an important role in creating and supporting the infrastructure of the business ecosystem, which contributes to improving conditions for entrepreneurship and business development in the country. The role of the state may include the following aspects.

Creation of necessary legal and regulatory conditions: establishment of the necessary legal and regulatory conditions for businesses, such as intellectual property law, tax benefits, and other incentives for entrepreneurial activities.

Creation and implementation of business ecosystem development strategies: development and implementation of a business ecosystem development strategy, including measures to create necessary infrastructure, such as innovation parks, business incubators, and other tools.

Financial support: financing the development of business ecosystem infrastructure, such as creating new technological platforms, developing education and entrepreneurship support systems, and other projects towards improving the ecosystem.

Ensuring resource accessibility: ensuring the availability of resources necessary for the development of the business ecosystem, such as communication means and information technologies, financial resources, access to international markets, and others.

Promoting international cooperation: promoting international cooperation in the creation of business ecosystems, for example, exchanging experiences, technologies, and other resources.

Overall, the government can perform numerous functions aimed at creating and supporting the infrastructure of business ecosystems. This would contribute to enhancing the competitiveness of the country's economy, increasing innovation potential, and improving the standard of living for population. However, the role of the government in creating the infrastructure of business ecosystems can vary depending on the specific conditions and needs of the country's economy.

It's important to note that sometimes government intervention in the economy can have negative consequences, such as insufficient project efficiency and profitability, and excessive bureaucracy. Therefore, when creating and supporting the infrastructure of business ecosystems, it is essential to also consider the views and interests of the private sector and other ecosystem participants, and conduct work within the framework of partnership and hold the dialogue between the government, businesses, and society.

The private sector plays an important role in creating the infrastructure of business ecosystems. Large corporations can invest in infrastructure that will be beneficial to themselves as well as other ecosystem participants. For example, major technology companies like Google, Microsoft, and Amazon invest in cloud computing infrastructure, which can be used not only by themselves but also by other companies and startups within the business ecosystem.

Additionally, the commercial sector can establish its own infrastructure and service organizations, startups to provide service to various ecosystem participants. For instance, payment systems, logistics companies, data processing companies, etc.

The private sector can also contribute to the development of the business ecosystem through investments in research and development (R&D), as well as the creation of innovative products and services that will be beneficial for all ecosystem participants. Overall, commercial organizations play a crucial role in creating and developing the infrastructure of business ecosystems and can actively participate in its creation and

further support, especially on the early stages of its development. Additionally, the private sector can provide the ecosystem with investments in new technologies and innovative projects, which can boost the development of the entire ecosystem. This may include investments startups, training and development programs that provide necessary skills and enhance the competitiveness of ecosystem participants.

The main part of regulating platform and ecosystem companies is formed by summarizing the existing problematic issues of their operation in the form of special legislative acts and by transferring (adding) previously existing legal norms to new market structures. Additionally, self-regulation traditionally plays a significant role in the IT market (Figure 3.17)[271]

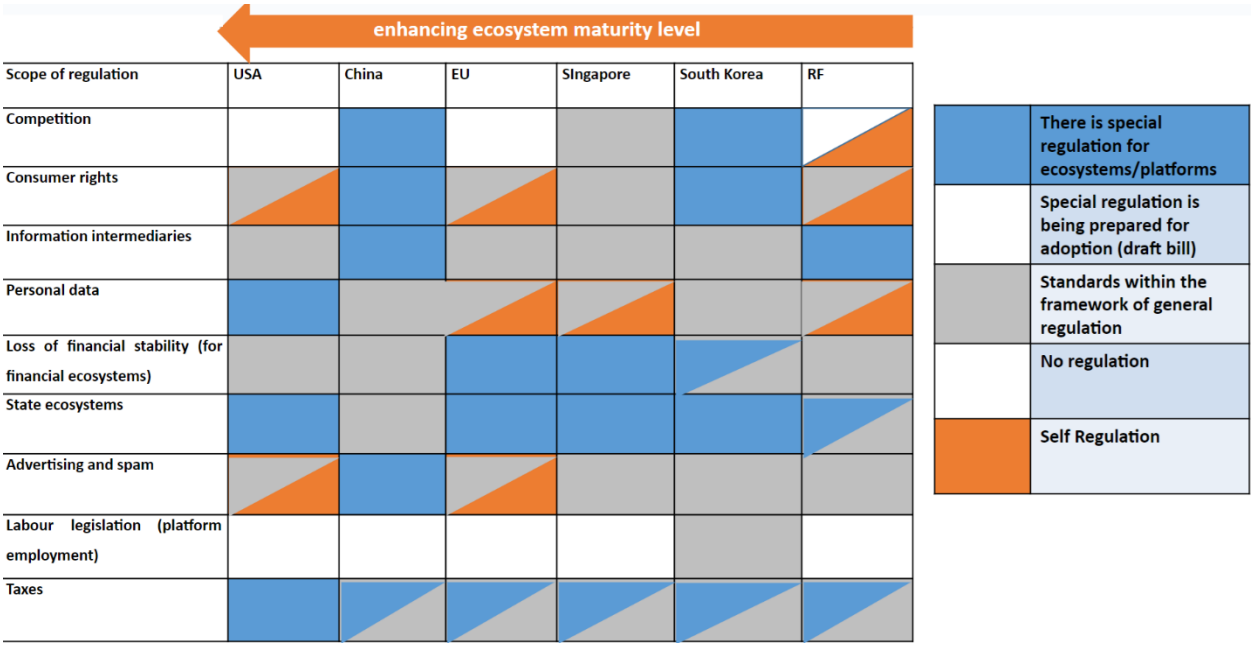

Figure 3.17. Approaches to regulating digital platforms/ecosystems

It's important to note that the role of the private sector in creating the infrastructure of business ecosystems can be particularly crucial in conditions of limited state resources when government agencies cannot provide the necessary level of investment in their development. In this case, businesses can act as the leading investors and initiators of ecosystem development. Overall, creating and supporting the infrastructure of business ecosystems requires not only joint efforts of the government and the commercial sector, which undoubtedly will contribute to achieving common goals and creating conditions for successful ecosystem development, but also a certain level of digitalization of the economy.

There is a forecast that by 2024, 50% of federal governments will play an active role in the development, scaling, and support of business ecosystems through legislation, funding, cybersecurity, as well as digital and physical infrastructure[272].

The development of the digital economy in Russia is in its early stages. Its minor lags behind the average European Union countries and significantly trails behind the most

[271] Ref.: Digital ecosystems in Russia: evolution, typology, approaches to regulation. – URL: https://ict.moscow/research/tsifrovye-ekosistemy-v-rossii-evoliutsiia-tipologiia-podkhody-k-regulirovaniiu/

[272] Ref.: Ecosystems in business. – URL: https://www.tadviser.ru/index.php/Article : Ecosystems in business (reference date: 01.05.2023).

developed countries such as China, South Korea, Sweden, and Ireland. In 2020, gross domestic spending on the development of the digital economy equaled 4.1 trillion RUB or 3.8% of GDP[273](Fig. 3.18).

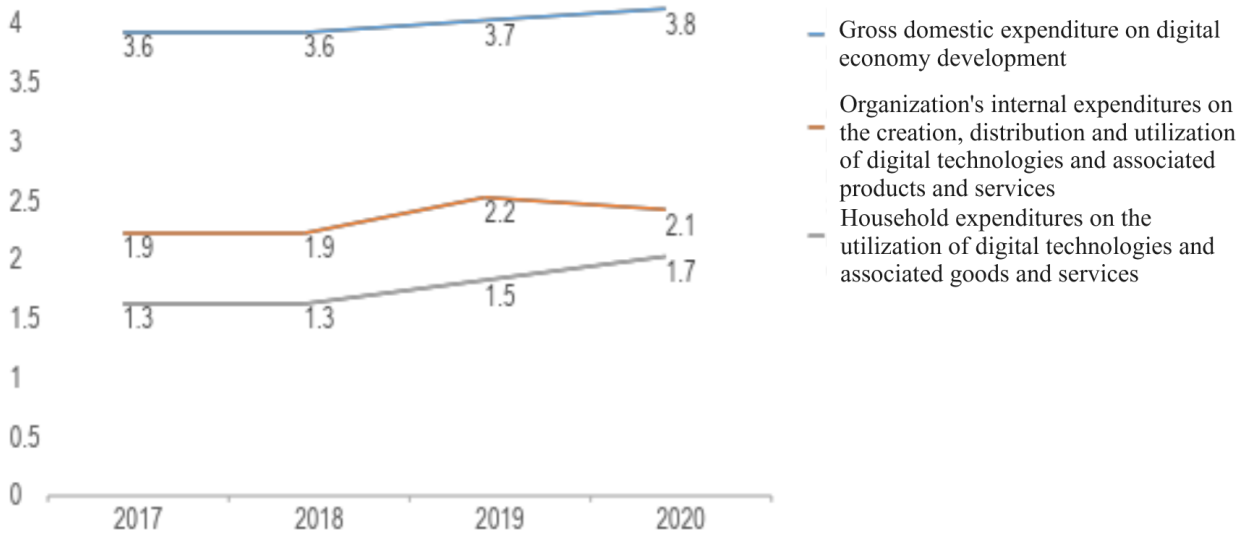

Fig. 3.18. Gross Domestic Spending on the Development of the Digital Economy in the Russian Federation, billion RUB.

Table 3.5 presents the main roles of the private sector and the government in the development of business ecosystems. In reality, these roles may vary depending on specific conditions and strategies adopted in a particular country or region.

[273] Ref.: Digital ecosystems in Russia: evolution, typology, approaches to regulation. – URL: https://ict.moscow/research/tsifrovye-ekosistemy-v-rossii-evoliutsiia-tipologiia-podkhody-k-regulirovaniiu/

T a b l e 3.5

The roles of the private sector and the state in the development of business ecosystems

Role of the private sector in the development of business ecosystems	Role of the government in the development of business ecosystems
Investments in research and development	Regulation of platform and ecosystem companies
Creation of innovative products and services	Transfer and update of legal norms to new market structures
Support of ecosystem infrastructure	Support for the development and scaling of ecosystems through legislation, financing, and infrastructure
Investments in new technologies and innovative projects	Ensuring ecosystem security
Role of leading investor and initiator of ecosystem development	Contribution to digital and physical infrastructure
Joint efforts with the private sector to achieve common goals and create conditions for successful ecosystem development	Scaling and support of ecosystems through financing, legislation, and infrastructure

Below are several examples of effectively organized business ecosystem infrastructures:

Technology parks and business incubators: Technology parks and business incubators are specialized organizations created to support and develop innovative startups. They provide startups with facilities, equipment, consulting and financial support, as well as assistance in finding investors and partners. Examples of well-developed technology parks include "Skolkovo" in Russia, "Silicon Valley" in the USA, and "Technopolis" in Finland.

Logistics centers: Logistics centers are specialized facilities created for the organization and optimization of logistics processes, such as storage, transportation, and distribution of goods. Well-developed logistics centers contribute to speeding up and reducing the cost of logistics operations, thereby increasing the competitiveness of businesses. Examples of well-developed logistics centers include the Port of Rotterdam in the Netherlands, the Port of Shanghai in China, and the Port of Hamburg in Germany.

Financial centers: Financial centers are places where major financial institutions such as banks, investment funds, insurance companies, and others are concentrated. Well-developed financial centers have high liquidity, a wide range of financial services, and a high level of investor protection. Examples of well-developed financial centers include London, New York, Tokyo, and Hong Kong. A prime example of a well-developed business ecosystem infrastructure is Silicon Valley in California, USA. This area has become a hub of high-tech innovation due to its developed infrastructure, which includes high-speed

internet connection, powerful server farms, clusters of research centers and universities, venture capital funds, and startup incubators. This infrastructure significantly facilitates the creation and development of new high-tech business projects.

Another example of effectively organized business ecosystem infrastructure is Tel Aviv, Israel. It serves as a center for high-tech innovation and startups. The business ecosystem infrastructure includes numerous venture capital funds and startup incubators, broadband internet access, clusters of research centers and universities. Additionally, the city is home to the largest technology park in Israel, which brings together many high-tech companies and startups.

These examples demonstrate that developed infrastructure plays a crucial role in creating successful business ecosystems, fostering organizational innovation, economic growth, and the creation of new jobs. Another example of well-developed business ecosystem infrastructure is the city of Shenzhen in China. In the 1980s, this city was a small fishing village, but the Chinese government decided to establish an economic zone where businesses could progress. As a result, the city has become one of the world's largest technology hubs, home to major companies such as Tencent, Huawei, DJI, and BYD.

One of the reasons for the success of Shenzhen is the presence of well-developed infrastructure, including modern technology parks, high-speed internet, transportation networks, and so on. Additionally, the Chinese government provided companies with various tax benefits and other preferences, contributing to the creation of a favorable economic environment for business.

[beginning] -> [Definition of a business ecosystem] -> [The role of infrastructure in a business ecosystem] -> [end]

Forms of Interaction Among Business Ecosystem Participants

Forms of interaction within a business ecosystem determine the ways in which participants can cooperate with each other to achieve common goals. These forms can vary depending on the objectives and characteristics of a specific business ecosystem. Examples of interaction forms in a business ecosystem include:

1. Cooperation: Participants can collaborate to develop a new product or service, create a new market, or ensure more efficient use of resources.

2. Competition: Participants can compete with each other in the market but still interact within the ecosystem to improve the quality of products or services and enhance the efficiency of business processes.

3. Collective actions: Participants can join forces to achieve common goals, such as solving common problems related to resource use, eliminating barriers to ecosystem development, or raising awareness about the ecosystem as a whole.

4. Partnership: Participants can form partnerships for joint product and service development, resource sharing, or new market development. Partnership can help reduce costs and enhance competitiveness in the market.

5. Standardization: Participants can develop and implement standards within the ecosystem, which can increase the efficiency of business processes and ensure compatibility of products and services. In Table 3.6, you can see how the relationship between participants varies in different types of business ecosystems.

T a b l e 3.6

Categories and means of interaction between participants in the business ecosystem

Categories	Interaction
1. Collaboration	– development of new products and services; – creation of new markets; – more efficient resource utilization
2. Competition	– improvement of product or service quality; – enhancement of business process efficiency
3. Collective Action	– addressing common issues; – removing barriers to ecosystem development; – increasing awareness
4. Partnership	– joint development of products and services; – shared resource utilization; – creation of new market opportunities
5. Standardization	– development and implementation of standards within the ecosystem; – enhancement of business process efficiency

In each type of ecosystem, participants can interact differently depending on the nature of their relationships. For example, in a collaborative ecosystem, participants may closely cooperate to develop a new product or service, create a new market, or ensure more efficient resource utilization. In a competitive ecosystem, participants may compete in the market but interact within the ecosystem to improve the quality of products or services and increase the efficiency of business processes. In a collective action ecosystem, participants may join forces to achieve common goals, such as solving common problems related to resource utilization, removing barriers for ecosystem development, or increasing awareness of the ecosystem as a whole. In a partnership ecosystem, participants may create partnerships for joint development of products and services.

Each form of interaction may have its advantages and disadvantages depending on the goals and characteristics of the business ecosystem. Identifying the appropriate form of interaction is an important step in creating a successful business ecosystem. Various forms of interaction among participants in the business ecosystem have their own advantages and disadvantages. Let's look at some of them:

1. Cooperation

Advantages:

- Allows leveraging the resources and competencies of other participants.
- Increases the scale of the business.
- Reduces risks and costs associated with research and development.

Disadvantages:

- May lead to the loss of competitive advantages.
- Problems may arise regarding profit distribution and management.
- Cooperation can lead to dependency on partners.

2. Competition

Advantages:

- Boosts innovation and improves the quality of products or services.
- Enhances production efficiency.

- Lowers prices for consumers.

Disadvantages:

- May result in irrational use of resources.
- Could create unfair conditions for market participants.
- May lead to reduced number of market participants and monopolization of certain sectors of the economy.

3. Collaboration

Advantages:

- Allows participants to combine resources to achieve a common goal.
- Reduces production and promotion costs.
- Enables participants to share experience and knowledge.

Disadvantages:

- Alignment and coordination issues may arise among participants.
- Collaboration may be temporary and inconsistent.
- Some participants may bear greater responsibility or risks.

4. Associations

Advantages:

- Enable participants to consolidate their efforts to achieve a common goal.
- Provide participants with additional resources and expertise.
- Associations can advocate for the interests of participants at the state level.

Disadvantages:

- Coordination between different participants may be challenging.
- Some participants may not actively participate in the activities of the association.

Below are some examples of effective forms of interaction among participants in business ecosystems.

Clusters - groups of companies that have joined together in special economic alliances to ensure joint development and production of goods. Interaction between companies within a cluster promotes the exchange of knowledge, experience, and resources, as well as increases production efficiency.

Cooperation - the collaboration of companies to achieve specific goals, such as developing new products or entering new markets. Interaction within cooperation allows participants to more effectively utilize their resources and skills.

Syndicate - associations of companies for the execution of specific projects. Within a syndicate, companies share responsibility for project implementation and ensure joint use of resources and skills.

Platforms - online services providing tools and services for collaboration between companies. Interaction on a platform allows participants to quickly and efficiently exchange information, cooperate on projects, and access new markets.

Alliances - cooperation between companies on a long-term basis with the aim of joint development and entering new markets. Alliances enable participants to exchange experience and resources, reduce risks, and access new technologies and markets.

Each of these forms of interaction has its advantages and can be effective depending on the goals and circumstances of the business ecosystem participants.

[Beginning] -> [Defining forms of interaction in a business ecosystem] -> [Advantages and disadvantages of different forms of interaction] -> [Examples of effective forms of interaction] -> [End]

The Role of Technology in Developing Infrastructure and Forms of Interaction in Business Ecosystems

Creating an effective business ecosystem infrastructure often requires the use of various technologies and tools. Here are several examples of technologies that can be used to create and maintain the infrastructure of a business ecosystem:

1. Cloud Computing - Cloud services can provide computing power, data storage, and conditions for interaction between participants in the business ecosystem.
2. Big Data - Big data analysis technologies can help participants of business ecosystem to make more informed decisions based on the analysis of large amounts of data.
3. Internet of Things (IoT) - IoT technologies can be used to monitor and manage various systems, such as production equipment, transportation, etc.
4. Blockchain - Blockchain technology can be used to create secure and transparent systems that can help participants of business ecosystem to conduct more efficient and secure activities.
5. Artificial Intelligence (AI) - Artificial intelligence technologies can be used to automate various tasks, as well as to process large volumes of data and provide forecasts and recommendations.
6. Machine Learning - Machine learning technologies can be used to analyze large volumes of data and identify patterns and trends, as well as to predict future events.
7. Software Development - Various software solutions, such as project management platforms, content management systems, etc., can be used to support the business ecosystem.

Furthermore, it is important to consider that technologies are rapidly evolving, with new approaches and tools constantly emerging. Therefore, it is necessary to constantly monitor new trends and innovations and adapt them accordingly. Some technologies used to create business ecosystem infrastructure include blockchain, artificial intelligence, Internet of Things (IoT), cloud computing, and many others. Blockchain can be used to ensure data security, improve transparency, and create decentralized systems. Artificial intelligence can be used to automate processes and enhance the efficiency of business ecosystem operations. IoT can provide data collection on products, processes, and customers, allowing for improved analytics and more effective decision-making. Cloud computing can be used to provide access to data and resources on remote servers, as well as to improve performance and reduce costs associated with IT infrastructure[274].

There are many technologies that can be used to support the interaction forms among participants in a business ecosystem. Social networks enable participants to find and establish connections with others, share information and ideas, communicate, and interact in real-time. Another technology used to support interaction among business ecosystem participants is digital platforms. These can be various online services that allow for different transactions, exchange of information and documents, project management, etc. Examples of such platforms include GitHub for software developers, Upwork for freelancers and clients, Trello for project and task management. Various cooperation and communication technologies are also used, such as video conferencing, chats, and collaborative platforms. These technologies enable business ecosystem

[274] Ref.: Forecast of scientific and technological development (STD) of the Russian Federation for the period until 2030. – URL: https://legalacts.ru/doc/prognoz-nauchno-tekhnologicheskogo-razvitija-rossiiskoi-federatsii-na-period/

participants to work together, communicate, and solve tasks collectively, regardless of their location.

Finally, it's worth mentioning analytics and machine learning technologies. They can be used to analyze data on user behavior and transactions within the business ecosystem, allowing for the identification of potential threats and issues, as well as forecasting trends and changes in participant behavior. This can help take effective measures to address problems and optimize the operation of the business ecosystem. Technologies can also be used to support the interaction forms among participants in the business ecosystem. For example, mobile applications and online platforms can facilitate communication and coordination among different ecosystem participants, urge decision-making, and enhance operational efficiency. Table 3.7 illustrates the technologies used to support the interaction forms among participants in the business ecosystem:

T a b l e 3.7

Technologies Used to Support Interaction Forms Among Participants in the Business Ecosystem

Technology	Description
Mobile Applications	Allow participants in the business ecosystem to communicate, exchange information, and coordinate activities through mobile devices, providing flexibility and mobility
Online Platforms	Provide ecosystem participants with the opportunity for real-time collaboration, information exchange, and document sharing, simplifying interaction and coordination
Chat Applications	Enable instant communication and message exchange between participants in the business ecosystem, facilitating prompt communication and decision-making
Video Conferences	Allow for online meetings and real-time video interaction, providing more visual and productive communication
Collaborative Platforms	Enable collaborative work on projects, tasks, and documents, allowing ecosystem participants to solve tasks together and share ideas
Email	Used for sending messages, exchanging documents, and information between participants in the business ecosystem, providing written communication and archiving
Calendar Applications	Allow for event planning, meetings, and collaborative work, synchronizing schedules and facilitating coordination among ecosystem participants

These technologies contribute to more efficient interaction and cooperation among participants of the business ecosystem, improving coordination and assisting on decision-making.

One example of such technologies is cloud platforms for collaborative work, such as Google Drive, Microsoft OneDrive, and Dropbox. They enable ecosystem participants to work on the same documents and projects, exchange files, and leave comments in real-time.

Also popular are online platforms for sharing experience and knowledge, such as StackOverflow and GitHub. They enable developers and programmers to collaborate on projects, exchange knowledge, and solve technical problems.

Social networks can also play an important role in supporting various forms of interaction within the business ecosystem. For example, LinkedIn is used for finding new partners, clients, and employees, while messengers allow ecosystem participants to quickly exchange news and information.

Another important element of the technological infrastructure of the business ecosystem is analytical and management systems, which can be used for collecting and analyzing data about the ecosystem's operation, identifying problems, and improving productivity. For example, CRM systems (Customer Relationship Management) are used for managing customer base and increasing customer satisfaction.

The specific technologies used to support different forms of interaction in business ecosystems may vary depending on the particular ecosystem. However, there are several common examples of successful technology applications to improve interaction among business ecosystem participants:

1. *Digital platforms*: For example, companies like Uber, Airbnb, and Upwork have created digital platforms that allow people to do business with each other without intermediaries and with minimal costs[275].

2. *Cloud technologies*: Cloud services enable participants of the business ecosystem to quickly and easily exchange information and resources, such as documents, data, and software. Google Drive and Dropbox are examples of cloud services that simplify collaboration and cooperation.

3. *Blockchain*: Blockchain technology can be used to create decentralized systems that allow participants of the business ecosystem to safely and efficiently exchange digital assets and information, such as Ethereum smart contracts.

4. *Artificial intelligence and data analytics*: These technologies enable the analysis of large volumes of data and extraction of valuable information, which can be used to optimize business processes and improve decision-making. For example, Alibaba uses artificial intelligence and data analytics to manage its e-commerce ecosystem.

5. *Internet of Things (IoT)*: IoT technology allows participants of the business ecosystem to receive real-time information about the status of objects and processes, which can help them make quick and accurate decisions. For example, General Electric uses IoT to manage its manufacturing ecosystem.

In general, the application of modern technologies can significantly enhance the efficiency and effectiveness of interaction among participants of the business ecosystem.

[Beginning] -> [Technologies used for creating infrastructure] -> [Technologies used for supporting forms of interaction] -> [Examples of successful technology applications in business ecosystems] -> [End]

Conclusion

Infrastructure and forms of interaction play a crucial role in the development of a business ecosystem. Well-developed infrastructure can contribute to more effective communication and interaction among ecosystem participants, speed up the processes of developing and implementing new products and services, as well as improve working

[275] Ref.: Russian market of public cloud services 2020–2021. – URL: http://tmt-consulting.ru/napravleniya/telekom-munikacii/dostup-v-internet/tmt-rejting-rossijskij-rynok-publichnyx-oblachnyx-uslug-2020-2021/ (date of reference: 30.04.2023).

conditions and attractiveness of the business ecosystem for investors and new participants.

Forms of interaction also play a crucial role in the development of a business ecosystem. They enable ecosystem participants to collaborate, exchange experiences and resources, as well as create new products and services that can be more competitive and efficient than those created by individual companies. Additionally, forms of interaction contribute to increasing network effects, which enhance the value of the ecosystem for all its participants.

Thus, the development of infrastructure and forms of interaction is a key factor in the success of a business ecosystem. It can lead to faster development of new products and services, increased efficiency of business processes, and enhanced overall value of the ecosystem for all its participants. The future prospects of business ecosystems are linked to digital transformation and the development of new technologies that will influence the effectiveness of infrastructure and forms of interaction among participants. One of the most significant directions for development is the creation of digital platforms that enable participants of the business ecosystem to quickly find each other, exchange information, and make transactions. Such platforms can be developed by the private sector alone or in cooperation with government agencies.

In the future, we also expect the expansion of business ecosystem boundaries and the emergence of new forms of interaction, such as international-level ecosystems. This will enable business ecosystem participants to access new markets and expand the geography of their operations.

However, along with the expansion of business ecosystem capabilities, new challenges will also arise, such as cybersecurity threats and the need for regulation of new forms of interaction. Therefore, it is important to improve and develop not only technological infrastructure but also legal and organizational frameworks to ensure the sustainable and successful development of business ecosystems in the future. In modern conditions, when the market is overwhelmed with goods and services, the dynamic development of business ecosystems becomes a key success factor for companies. Creating and supporting infrastructure capable of facilitating effective interaction among all participants of the business ecosystem is an important task that can be achieved with the help of modern digital technologies and tools.

However, it is important not to forget that the choice of interaction forms and technologies should be well-founded and aligned with specific business goals and objectives. Well-developed strategies and understanding the role of each participant in the business ecosystem can significantly enhance the efficiency and effectiveness of interactions between companies. In the future, the development of business ecosystems will continue, and the adoption of new technologies, such as artificial intelligence and blockchain, will enable the creation of more complex and global ecosystems. Therefore, creating efficient infrastructure and selecting best forms of interaction will become even more relevant tasks for organizations.

Business ecosystems are important tools for economic development, enabling participants to operate within a unified system, which accelerates growth and innovation. Infrastructure and forms of interaction among participants are key elements of business ecosystems that influence their effectiveness and further success. Both the government and the private sector play important roles in creating and supporting the infrastructure of business ecosystems, as well as in developing efficient forms of interaction among their participants. The use of modern technologies also contributes to the development of business ecosystems and creates new opportunities for further growth.

In the future, with the development of technologies and globalization, further increase in the number and diversity of business ecosystems is expected, allowing companies to achieve their goals and solve complex tasks faster and more efficiently. However, for the continued successful functioning of business ecosystems, constant support and development of infrastructure, forms of interaction, and the use of the latest technologies are necessary.

The structure of the section is shown on a diagram (Fig. 3.19).

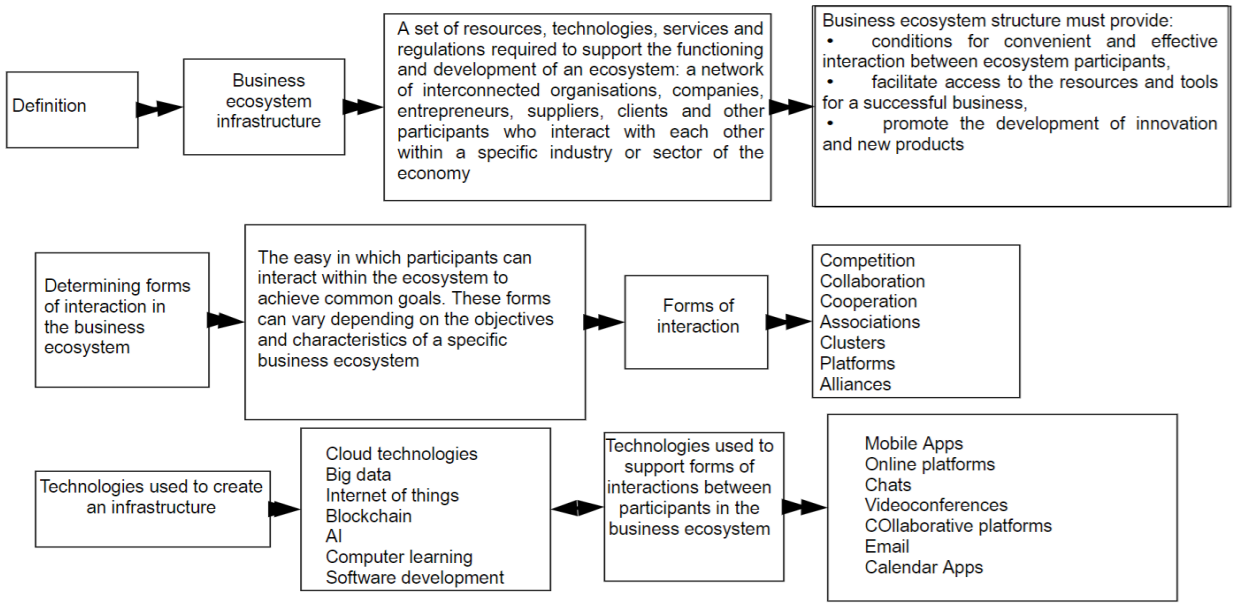

Figure 3.19. Visualization scheme of the section "Infrastructure and forms of interaction among participants of business ecosystems"

Control Questions

1. What role does the government play in creating the infrastructure of a business ecosystem?
2. What measures can the government take to support and develop business ecosystems?
3. What are the main advantages and disadvantages of government regulation of business ecosystem activities?
4. What is the role of the private sector in creating the infrastructure of business ecosystems, and why is it important for the government?
5. What benefits can commercial organizations get from participating in the creation of business ecosystem infrastructure?
6. Give the examples of successful private sector participation in creating business ecosystem infrastructure?
7. What examples of modern business ecosystems with effectively organized infrastructures can you provide?
8. What factors are key to the successful development of business ecosystem infrastructure?
9. What is a business ecosystem, and what forms of interaction can exist within its framework?

10. What are the advantages and disadvantages of different forms of interaction within a business ecosystem?

11. What factors can influence the choice of a specific form of interaction within a business ecosystem, and what strategies can be used to improve this interaction?

12. What are the main disadvantages of competitive interaction within a business ecosystem?

13. What form of interaction may be most effective for fostering innovation within a business ecosystem, and why?

14. What technologies are used for managing data within a business ecosystem?

15. What tools are used to improve communication among participants in a business ecosystem?

16. What technologies can help optimize processes within a business ecosystem and improve its efficiency?

17. What technologies can be used to enhance interaction among participants in a business ecosystem?

18. What specific features of interaction technologies may be important for certain types of business ecosystems?

19. How can interaction technologies help a business ecosystem in more effectively collecting, exchanging, and analyzing data?

Practical Immersion Material

Business Game

Business Ecosystem: Infrastructure Development Game

Objective

To help participants better understand the importance of infrastructure for business, familiarize them with tools and methods for developing business ecosystems, and teach them to make decisions that can influence the effective development of infrastructure.

Participants

Teams of 4-5 people.

Game Process

1. Team: Participants are divided into teams and choose a leader.

2. Training: Brief training is provided on the topic of business ecosystem infrastructure development.

3. Game: Each team is given cards with various tasks to complete. The cards may contain the following tasks:

- examine technological trends and propose new tools for developing the business ecosystem.
- examine existing business platforms and compare their advantages and disadvantages.
- develop a strategy for improving the existing business ecosystem infrastructure.
- assess the risks and benefits of implementing new technologies and tools.
- identify the most important elements of the business ecosystem infrastructure and develop an action plan for their improvement.

4. Presentation: Each team must present their results in the form of a presentation, including analysis and evaluation of the current situation, recommendations for improving the business ecosystem infrastructure, and an assessment of risks and potential benefits.

5. Evaluation of Results: Team leaders must evaluate their team's results based on criteria such as research quality, risk and benefit assessment, and the feasibility and practical significance of recommendations.

6. Discussion: After evaluating the results, participants should discuss how they can apply the knowledge gained in their professional activities and how they can improve the infrastructure of their business ecosystems.

7. Action Plan Development: Participants can develop an action plan to improve the infrastructure of their business ecosystems by identifying problems and weaknesses in existing infrastructure and suggesting appropriate solutions.

8. Feedback: Game organizers can conduct a survey of participants to gather feedback and assess how useful and engaging the game was, as well as identify aspects that can be improved in future game scenarios.

Game Objectives:

– Help participants better understand the importance of infrastructure for business.

– Familiarize participants with tools and methods for developing business ecosystems.

– Teach participants to make decisions that can influence infrastructure development. - Assist participants in developing an action plan to improve the infrastructure of their business ecosystems.

– Gather feedback from participants to improve future game scenarios.

Case

Integration of Small Business into Business Ecosystem

You are the owner of a small café located in a quiet green area of the city. You want to expand your business, attract more customers, and increase profits. You are considering joining a business ecosystem to improve your infrastructure, increase your visibility, and gain access to new customers.

However, you do not know how best to integrate your business into the business ecosystem. What forms of interaction with other participants of the business ecosystem can you use to achieve your goals?

Solution:

1. Use Social Media: You can create a page for your café on social media platforms where you will post photos and videos of your dishes, promotions, and special offers. You can also follow pages of other business ecosystem participants to learn about new products and services, and participate in their promotions and events.

2. Participation in Events and Exhibitions: This will help you network with other business ecosystem participants, get new ideas, and learn best practices. You can also learn about new products and services that may interest your customers.

3. Collaboration with Other Business Ecosystem Participants: The goal is to create joint offers and services. For example, you can create a joint menu with a restaurant or café to attract new customers and provide a wider range of dishes.

4. Development of Online Platforms: Using online platforms such as Delivery Club, "Yandex.Food," and others to deliver your meals to customers will allow you to expand your audience and provide convenience for clients who prefer ordering food through applications.

5. Creation of Loyalty Programs: The goal is to attract customers to your café and increase the base of loyal customers. You can use these programs to collaborate with

other business ecosystem participants, providing bonuses and discounts on their services in exchange for collaboration.

6. Participation in Business Incubators: Business incubators provide startups and small businesses with a place to work, consultations, and access to investors and resources. You can join business incubators to receive support in integrating your business into the business ecosystem. You need to choose the most suitable forms of interaction for your business and create a strategy that will help you integrate your business into the business ecosystem and achieve your goals. Ultimately, your success depends on how well you can collaborate with other business ecosystem participants to create mutually beneficial relationships and improve your business.

Business Game

Integration of Technologies into Business Ecosystem

Game Objective

Players must develop a strategy for integrating technologies into the business ecosystem to enhance the efficiency and competitiveness of their businesses.

Number of Players: 3 to 6 people.

Game

1. Players form teams and choose roles they will follow: café owner, food supplier, courier service, technology company, and other roles related to the business ecosystem.

2. Each team receives a list of technologies that may be useful for the development and integration into the business ecosystem, such as online platforms, loyalty programs, automation systems, etc.

3. Players must choose the most suitable technologies for their businesses and create a strategy for integrating these technologies into the business ecosystem.

4. Each team must justify their choices and the strategy for integrating technologies, describing potential benefits and risks.

5. After all teams present their strategies, they must present them to a jury consisting of investors, experts, and representatives from other businesses who may be interested in collaborating with their businesses.

6. The committee evaluates the presented strategies and selects the winner who presented the most promising and innovative strategy for integrating technologies into the business ecosystem.

7. At the end of the game, players discuss and analyze the presented strategies and exchange experiences and ideas that may be useful for the development and integration of technologies into their real businesses.

This game will help players understand how the integration of technologies can enhance the efficiency and competitiveness of a business in the business ecosystem and how to determine the most suitable technologies and create a strategy for integrating these technologies into their business. It will also help players better understand the role of technologies in the development of infrastructure and forms of interaction in the business ecosystem.

The game can also be useful for investors and representatives of other organizations who can use the strategies presented by players to develop their own businesses. Additionally, the game can help players improve communication and collaboration both within their team and with other teams. At the end of the game, a discussion and analysis of the game can be conducted so that players can share their thoughts and impressions of the game, as well as discuss the lessons they have learned and how they can apply them in their real businesses.

CHAPTER 4. METHODOLOGICAL SUPPORT FOR ECOSYSTEM MANAGEMENT IN MODERN BUSINESS

4.1. Strategic Management of Ecosystems in Business

Strategic management - is the science and practice aimed at the socio-economic development of an organization. Changes of external and intra-organizational circumstances constantly affect management processed. A special characteristic feature of strategic management is that it is aimed at a long term - not less than three years. At the same time, three main conditions need to be taken into account:

1. The current position of the organization.
2. The position in the external market and socio-economic environment that owners and shareholders would like to take in three or more years.
3. The list of technical, financial, and organizational management measures required to achieve this.

In this regard, it is necessary to provide a statement from the famous management theorist and practitioner, Peter Drucker, who outlined that 'in modern conditions, the most important task of management is not so much to make profit as it is to ensure new opportunities for its development[276].

In standard industrial conditions of organizational development, managers prioritize technological progress, which is undoubtedly wise. However, when considering ecosystems, we must add another fundamental aspect to this. Another basic condition is knowledge management in terms of its constant growth. In essence, management entails accommodating uncertainty and ambiguity in the sequence of each stage of the organization's movement in today's conditions and in the future. It involves limiting and simultaneously identifying options for further development. Since the business ecosystem implies connecting the ideal representation of the surrounding economy with the practical reality, the strategy of managing business ecosystems should find methods to combine our ideas with the conditions of competitive struggle both now and over the estimated period of time (3-5-10-15 years).

In this context, we must understand that management should create not only material things – goods, objects, energy, services, but also ideal things – knowledge, categories, business technologies, activity procedures. Moreover, it is necessary to consider that management is simultaneously a rational and irrational process. In the course of their actions, a manager is confident that they are acting rationally but may unexpectedly achieve a negative result, that is, an irrational one.

Strategy is the process of the development of plans for the organization's future. 'Strategy as a plan implies that management is free to choose directions and ways to achieve set goals[277].' However, strategic management is a broader concept. It includes budgeting, extrapolation, strategic planning, real-time monitoring and evaluation of the external and internal environment, which should ensure the integrity and common direction of organizational development in business.

This happens because even for a short period of time - a month, two, three - a person may not know if they are making mistakes or may not be confident in the appropriateness of their management actions. They may act impulsively or irrationally, driven by

[276] Drucker P. Management challenges in the 21st century. – M.: Williams, 2004. – P. 77.
[277] Gurkov I. B. Strategic management of the organization. 2nd ed., rev. and additional – M.: TEIS, 2004. – P. 33.

emotions. National characteristics play a crucial role here. The history of humanity shows that national-cultural characteristics largely determine the methodology of formation and specific methods of this process.

The Chinese approach to strategic management is illustrative. In the book "Thirty-Six Stratagems," it is stated: "Strategy is an art based on knowledge of the deepest laws of reality, or more precisely, on the understanding of the deeply ambiguous status of the visible world, which is both real and not real. Because the situation always maintains a sense of authenticity. But, in a certain sense, this is an illusion, which is the most reliable evidence of truth." [278]

Speaking about the significance of these stratagems, Harro von Senger, a German researcher of Anglo-Saxon and Western European management systems, provides their limitations in terms of strategic content: "Because whoever relies solely on Western notions of strategy and 'rationality' will, when facing volatility, whether in China or in our cultural environment, become just as helpless and understand nothing. Those who understand globalization only as a huge flow of money and goods, and not as a worldwide exchange of knowledge between Western and Eastern countries and vice versa, those who do not understand that globalization also means expanding one's own horizons of thinking, for example, in terms of knowledge of stratagems, will not succeed in business." [279]

Furthermore, Chinese books such as "The Lessons of Zen: The Art of Management"[280] by Lee Gou, "The Art of War"[281] by Sun Tzu, extensively and deeply explore the essence of the approach of strategic planning[282], based on forecasting and anticipation of future changes.

In ancient Egypt, during the construction of pyramids, a method of strategic planning called "project management" was developed, which ensured successful phased construction for over 50 years, even by today's standards. In Mesopotamia, strategic management technologies for managing state economic structures as a whole and its regions were developed over two thousand years ago, reaching their peak during the reigns of Hammurabi and Nebuchadnezzar II.

In ancient India, almost three thousand years ago, the state treatise "Arthashastra" was adopted, with its main part called "the Science of Politics," where historical changes and methods of responding to them were foreseen with amazing insight. Even today, some of its provisions are used in political, state, and economic management in modern India.

Ancient Greek management idea of the strategic direction was expressed through philosophers and managers such as Aristotle, who said that the development of nature and society occurs according to common laws. He stated that a diversity of knowledge is combined into unified laws of existence, and the task of a governor is to accurately determine their development options and to utilize them in the interests of their people. Isn't this approach similar to modern ecosystem approach? Plato, Pythagoras, Socrates, and Plotinus also, to various degrees, t ouched upon, studied, and developed topics of

[278] Thirty-six stratagems. Chinese successes of success / trans. from China M. M. Malyavina. – M.: White Alva,, 2000. – P. 8.
[279] Zenger Harro von. 36 strategems for managers / trans. with him. I. Kanevskaya. – M.: Olympus = Business, 2011. – P. 10.
[280] The Lessons of Zen: The Art of Management / trans. from Chinese R.V. Kotenko. – St. Petersburg. : Eurasia, 2000.
[281] Sun Tzu "The Art of War"/ trans. from Chinese. G.V. Zinoviev and Z.G. Lapina. Series "Canons". – M.: White Alva, 2001.
[282] Sun Tzu. Art of War. Fundamentals of Chinese military strategy / trans. from English – St. Petersburg.: Dilya, 2006.

long-term (strategic) state management, local and economic self-governance as a unified comprehensive system.

Ancient Roman civilization added in new active diversification component into the science and practice of strategic management. State, regional, economic, military, religious, local government, and the management of individual sectors of the economy of the Roman Empire were based on self-regulation. Essentially, this was the same ecosystem with elements of business technology as today, which was managed based on strategic forecast.

The development of strategic management as industrial management was formed in the late 19th to early 20th century in England, Western Europe, and the United States. Prominent management pioneers such as F. Taylor, H. Ford, G. Emerson, A. Fayol, G. Gantt, and others developed the science and practice of strategic production management[283].

Today, these foundational concepts are evolving in numerous directions, such as modeling (design) schools, strategic planning, market positioning, entrepreneurship, the "7-S Framework," competitive advantage, marketing mix, mind mapping, strategic human resource management, intellectual management systems, framework of effective management, and organizational change models.

These and many other concepts have a strategic orientation in management. But they all share another feature that makes them similar. All of them, to some extent, incorporate elements of a business ecosystem. This aspect allows us to examine in more detail this defining course in the development of modern global and domestic management. Finding rational and commercially viable, profitable business models to achieve competitiveness and competitive advantage has been ongoing throughout the development of management. Over this time, a wide variety of business technologies, corporate integration schemes, forms of cooperation, and production and business ecosystems have been utilized.

All industrial and commercial associations are divided into two integration classes: vertically centralized and horizontally decentralized. In the first case, one company absorbs others with full or partial, but more than 50 %, ownership. In the second case, merger and cooperation takes place while maintaining financial and commercial independence. Over the past two decades in Russia, as in all economically developed countries, the model of horizontal-integrative network association has become widespread.

The integration of companies is called "ecosystem integration." It acquires an increasingly complex structure and a multi-variant type of functioning, driven by the growing processes of implementing innovative, technological, informational, and digital technologies in both manufacturing and the field of commerce and services.

Ecosystem networks are flexible, horizontally-integrated management structures that operate through systematically combined intellectual, human, knowledge-based, material, financial, and organizational-management resources.

Participants of integration networks operate based on agreements and a common information and resource base, allowing companies to make rational and highly effective decisions. Such a commercial business ecosystem enables not only operational but also strategic management decisions to be made. This includes: reducing production costs and the cost of goods and services, creating a single information base of professional standards and competencies, providing access to a knowledge base, implementing a faster turnover of consolidated capital, balancing risks, and strengthening various connections

[283] Ref.: Mazur I. I., Shapiro V. D., Olderogge N. G. General history of management. – M.: Publishing house. ELIMA center, 2006.

between partners, maximizing overall revenues, coordinating entrepreneurial actions, and strengthening the common business ecosystem organizational and corporate culture[284].

With this approach, the question of adopting and implementing a high-quality corporate business strategy becomes extremely relevant. Industries of mathematical modeling such as Management Science (MS) and Operations Research (OR) are aimed at solving these issues in real business processes. These two sectors of ecosystem strategy in business will be collectively referred to as "Management Science" (MS). In the USA, there is a national association under the brand ORMS, which utilizes these methods to form and implement corporate ecosystem strategies in business. Companies that use them gain a significant competitive advantage. Unfortunately, in Russia, this comprehensive method is not well known.

By using Management Science (MS), the following strategic objectives are set and achieved: improving managerial and production efficiency, increasing the profitability and competitiveness of any activity and business over the long term, identifying ways for the enterprise to exit loss-making situations, developing investment projects, determining promising market niches, and solving other critically important market business tasks. Management Science utilizes various information technology and mathematical techniques such as multi-criteria decision analysis, antagonistic games, target project and programmed management, linear and nonlinear as well as integer programming, alliance games, discrete-event and stochastic modeling of business processes, creation and operation of neural networks, simulation modeling, Data Mining, and other methods of digital platform technologies. This entire complex essentially addresses all the challenges faced by the business ecosystem. These methods are indispensable in transportation, telecom, aviation, military affairs, manufacturing, trade, services, agriculture, construction, and other industries. Essentially, all sectors of the national economy can successfully utilize the MS complex.

In addition, functional areas of operational and strategic business such as finance, marketing, controlling, human resource management, legal services, engineering, informatization, data analysis, contractual processes, labor regulation, production technologies, R&D, logistics, and many other functions of real business require both operational and strategic management. Such knowledge helps business owners and stakeholders understand the essence of business problems and find ways to solve them [285].

Let's draw a conclusion and provide a definition of what strategic ecosystem management in business entails.

Firstly, ecosystem strategy management is a synergistic and comprehensive approach to conducting business operations and specific technologies aimed at shaping and effectively utilizing the social and professional potential of the entire ecosystem in which the company operates.

Secondly, this strategy is based on the idea that all its companies and corporations can and should be profitable and successful in the long-term strategic perspective.

However, this will only be possible under one very important condition. The condition is that all organizations must have the established strategically oriented and mutually beneficial contractual relationships with all partners within the business

[284] Ref.: Methodology of domestic management: textbook: in 2 books. - Book 1 / under general ed. K.V. Ekimova. – M.: REU named by Plekhanov, 2022. – P. 304.
[285] Ref.: Methodology of domestic management: textbook: in 2 books. - Book 1 / under general ed. K.V. Ekimova. – M.: REU named by Plekhanov, 2022. – P. 398–401.

ecosystem. These partners include owners, shareholders, managers at all levels, staff, clients, suppliers, distributors, local government authorities, consumers, competitors, and other internal and external stakeholders.

It is necessary to create a system mechanism that will mutually support companies in creating goods and services by all participants within the ecosystem. Such a strategy builds relationships that motivate mutual development of enterprises and corporations based on communication and the development of innovative values. For successful implementation of the ecosystem strategy, firms must invest in its development and adapt their business model as per the requirements of the evolving ecosystem. Practical activities always involve adjustments. The process of reorganization is associated with objective phenomena such as scientific and technological progress and its digitalization.

Strategic management of ecosystems in entrepreneurial activities entails a systemic approach to creating a long-term model of their functioning. It is necessary to develop long-term development plans for all structures and departments to achieve profitability and efficiency for both individual firms and corporations, as well as for business ecosystems as a whole.

An example of such a business ecosystem can be the widely known global horizontally integrated ecosystem with elements of vertical integration, Alibaba Group, presented in Figure 4.1 in a simplified version [286].

This is a classic example of a global business ecosystem of a global level. As seen from the diagram, this ecosystem consists of eleven sectors engaged in various activities but interconnected and complementing each other.

Alibaba Group as a business ecosystem was created in 1999 to serve the needs of medium and small businesses as a trading platform. Over the course of 24 years, it has brought together over 730 different businesses. This confirms that the chosen business strategy was indeed the right one.

The group includes B2B platforms, logistic and advertising companies, cloud data and payment services, financial structures, companies involved in the leisure and entertainment industry, as well as media.

However, the original area of business remains dominant. E-commerce generates nearly 90 % of the revenue. Interestingly, other segments of the group actively support and develop various directions of e-commerce.

[286] Ref.: Digital ecosystem of Alibaba Group: what services are there, what are they for and how many of them do you know. – URL: https://vc.ru/services/234561-cifrovaya-ecosistema-alibaba-group-kakie-tam-servisy-dlya-chego-oni-nuzhny-i-skolko-iz-nih-vy-znaete (reference date: 15.11.2023).

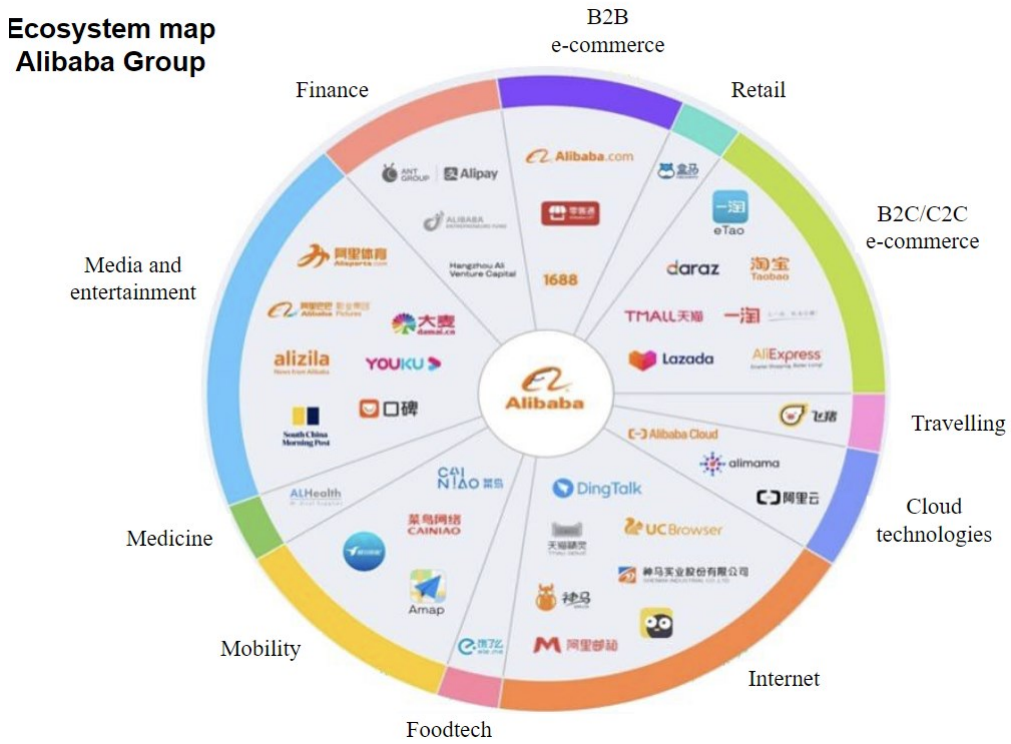

Figure 4.1. Map of the Alibaba Group ecosystem [287]

Alibaba Group forms a comprehensive infrastructure trading platform. Customers-buyers and intermediaries can be from any business and/or any country. This business ecosystem promotes and sells goods and services on national and global markets, seeks buyers, processes payments and related financial transactions, and handles the delivery of goods and services.

Essentially, this ecosystem fulfills all five classic tasks of a commercial commodity project: where to source and sell value, how to promote the trading platform, process and execute financial payment transactions, and how to deliver orders.

As an example, let's consider the activity of the B2B trading-value platform. It is the largest trading platform in the world. Wholesalers from all over the world are using it. Manufacturers and intermediary resellers use this platform as an aggregating agent.

This platform handles the entire order process lifecycle from receipt to delivery in the internet store's trading system ("fulfillment").

At the core of the turnover process is the client's mobile application, through which more than two-thirds of orders are placed, nearly 2 million individual users every 24 hours. As of September 2023, Alibaba Group's total revenue (Q2 '23) was $31.02 billion, with a gross profit of $11.41 billion [288].

On figure 4.2, is presented the revenue distribution mechanism from the commercial activities of the Alibaba Group business ecosystem. Another example of a business and digital ecosystem is the Chinese giant Tencent. They serve as guiding benchmark of ecosystem values.

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[287] Digital ecosystem of Alibaba Group: what services are there, what are they for and how many of them do you know. – URL: https://vc.ru/services/234561-cifrovaya-ekosistema-alibaba-group-kakie-tam-servisy-dlya-chego-oni-nuzhny-i-skolko-iz-nih-vy-znaete (reference date: 15.11.2023).

[288] Ref.: AlibabaGroupHoldingsLtd. – URL: https://ru.tradingview.com/symbols/NYSE-BABA/financialsincome/statement/?selected=total_revenue%2Coper_income%2Cpretax_income%2Cnet_income%2Cgross_profit Отчет о доходах (дата обращения: 20.12.2023).

These global ecosystems operating in business organize and manage the evolution of their sectoral participants. Within these groups, scientific, knowledge-based, business, and financial technologies synergistically combine with monetary and information flows, management and organizational structures, innovations, various logistical infrastructures, barter networks, motivational and incentive mechanisms for personnel, and much more, constantly reproducing the effect of a self-developing business ecosystem.

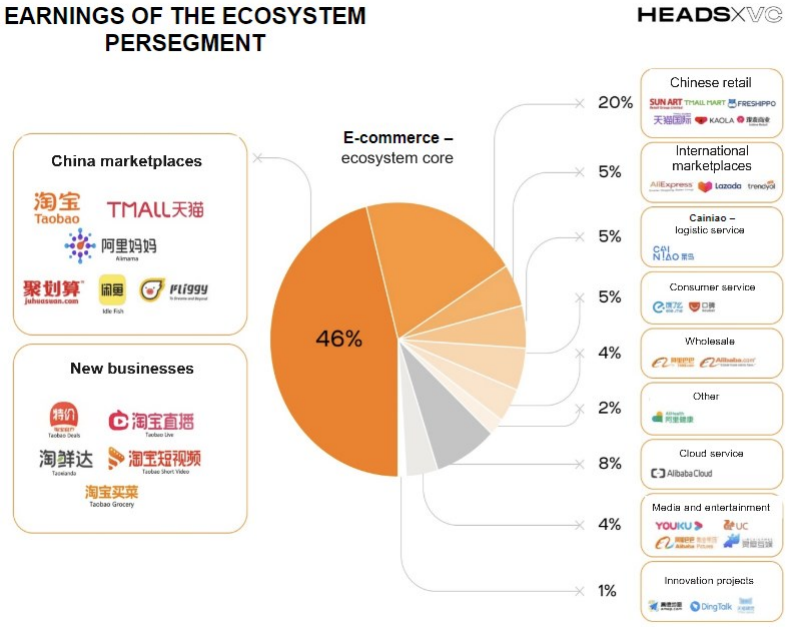

Figure 4.2. Revenue of the Alibaba Group ecosystem by segments[289]

To build a successful strategy for a business ecosystem, it is necessary to form five blocks.

1st block. First of all, define the philosophy and main goals of the business to be launched. An effective business ecosystem strategy begins with defining the core and related enterprises. Additionally, it is crucial to determine the advertising campaign where the business needs to showcase what it will be known for. Find that unique feature that will make it stand out. This will determine the main direction of the strategy, aimed at specific consumer demands, at those values that the consumer has and wishes to acquire through the offered goods and services in the ecosystem. In the process of implementation, the sectors of the ecosystem that are most or least valuable to it will be identified. Joining any business ecosystem is, first and foremost, a strategic choice and a managerial decision for long-term practical work.

2nd block. It is necessary to correctly identify sectoral partners for business activities. They should correspond to the motivational task and role that you have set for yourself in the strategic value creation chain. Partners should be adequate to the ecosystem you are building. Ideally, these sectoral partners have business contractual relationships with firms, investors, clients, suppliers, and other external stakeholders who will contribute to the development of the organized enterprise and the sectoral business ecosystem as a whole.

[289] Digital ecosystem of Alibaba Group: what services are there, what are they for and how many of them do you know. – URL: https://vc.ru/services/234561-cifrovaya-ekosistema-alibaba-group-kakie-tam-servisy-dlya-chego-oni-nuzhny-i-skolko-iz-nih-vy-znaete (reference date: 15.11.2023).

3rd block. It is necessary to develop a detailed strategy of relations with sectoral partners. To do this, specific practical operational, structural, and managerial interaction technologies with them need to be established. Identify and coordinate what they will do, what you will offer them, define the boundaries of cooperation, and the stimulating financial relationships in the overall business ecosystem.

4th block. Form a mutually beneficial entrepreneurial atmosphere. It should be one where all members of the business ecosystem benefit. Its foundation should be economic and social efficiency, profitability of activities, and mutual responsibility.

5th block., It is necessary to constantly monitor and track the profitability of entrepreneurial activities for all participants in the ecosystem, evaluate and develop it. Special attention should be paid to issues that arise both across the ecosystem as a whole and for each sectoral partner.

As a result, there will be a real opportunity to development strategy for the business ecosystem that is effective in long-term. When implementing the business ecosystem strategy, it is crucial to ensure that sectoral partners are willing to conduct all necessary activities jointly with you and share risks, problems, and achievements.

From a financial and legal perspective, it is necessary to highlight that the use of financial operations should be prompt and accurate. Their goal is to meet the needs of all partners, clients, and the market, as well as to add differentiated value to gain a competitive advantage. Distributing value-added products through financial operations is a crucial condition for the effective and profitable operation of any business ecosystem [290]. This process is indeed the development of a real business ecosystem strategy, the implementation of which will inevitably lead to a positive outcome.

Therefore, strategic ecosystem management in business addresses the following complex questions: what is the current state of the ecosystem in real time, what will happen to the ecosystem in 3-5-10 years, and what transitional measures (technical, commercial, informational, social, political, etc., using a complex of digital methods of NMU and IO) need to be applied to transition with minimal losses to a more advanced state that meets market requirements.

It is always difficult to estimate ways and methods of transitioning to a new state, as the everything changes over time, along with the values of consumers, partners, owners, and business stakeholders. Nothing can guarantee that the ecosystem is moving along the desired direction. To get a somewhat understanding a specialized targeted monitoring is necessary, based on a combination of parameters that will provide an answer. There are many schools that specialize in strategic management, similar to the ones described in Henry Mintzberg's work "The Strategy Process." [291] Some widely recognized ones include: the design school (A. Chandler, F. Selznick, K. Andrews), the planning school (I. Ansoff, P. Lorange, J. Steiner, etc.), the positioning school (M. Porter, D. Schendel, K. Hatten, etc.), the entrepreneurial school (L. Jauch, D. Welch, etc.), the cognitive school (M. Lyles, G. Simon), the learning school (C. Lindblom, G. Rapp, S. Winter), the power school (G. Allison, G. Estli), the organizational culture school (E. Denison, R. Norman), the environmental school (M. Hann, J. Freeman, etc.), and the configuration school (P. Handa, D. Miller, P. Friesen, etc.).

The idea at the core of making strategic decisions lies in providing the basis for understanding the direction of ecosystem development in business. Strategic management is based on decisions associated with significant uncertainty. It is necessary

[290] Ref.: Zhiteng He Analysis of Enterprise Business Strategy Based on Business Ecosystem. – URL: https://doi.org/10.1051/shsconf/202215101041 EMSD 2022

[291] Ref.: Mintzberg G., Ahlstrand B., Lampel J. Strategic safari: an excursion through the wilds of strategic management. – M.: Alpina Publisher, 2013.

to consider various unknown and uncontrollable factors in the external environment, which entails retargeting and accumulating of significant resources in strategic planning. Typical strategic management decisions include occupying new market niches, organizational changes, ecosystem development processes, launching competitive products, and developing and implementing innovative technologies.

In modern conditions, strategic ecosystem management in business should aim to create new ecosystems and apply best business practices. It is essential to create a comfortable environment for both consumers and producers by integrating innovative technologies and creating new markets that will generate societal wealth. In the new economic cycle, the primary focus should be on forming ecosystems with innovative power, whose goal is to attract more customers, partners, and new ideas into their world of entrepreneurial activity. In other words, it is necessary to establish new economic relationships, with business ecosystems forming the foundation, which will be the advanced form of new economic development.

One of the founders of the ecosystem approach in business, J.F. Moore, justified the need for strategic ecosystem management in business with four objective conditions:

1. In the conditions of deep transformation in traditional industrial sectors and the field of commerce (trade and services), the only rational way to remain competitive is to excel beyond competitors in creating new business ecosystems, rather than simply producing superior products and services. Once you establish an efficient ecosystem, you no longer want to find yourself within the boundaries of a standard industry. The goal is not to win someone else's game but to change the game so that you can win. Or the goal is not to become an industry leader but to disrupt old industries and create new ones [292].

2. These new business communities are needed to offer bold innovations to sectoral partners, clients, and consumers. By innovations, we don't just mean improving the technology of a product or service. It must go beyond that. Distinctive results are necessary. Otherwise, justifying the expenditure on creating a business ecosystem would be impossible. The costs for these resources include expenses for developing innovative technologies and new business processes, allocating additional financial and material assets, and creating a network of sectoral partners (collaborators).

3. The content and scale of what comprises the ecosystem are central to strategic management and decision-making. For example, on one hand, you can create an extensional, thorough ecosystem that includes tens or, as in the case of the personal computer business, hundreds of thousands of individuals and organizations.

On the other hand, one can narrow down the business ecosystem's scope but still meet the main criterion: addressing significant issues and rewarding its organizers when they solve current, albeit local, problems and offer solutions that provide real value. The scale and boundaries of the business ecosystem are not dictated by traditional management practices. They must be managed swiftly and decisively. Otherwise, the results of innovations will not be translated into practice. A manager must view entrepreneurial activity as part of the business ecosystem. They should forecast and count on the fact that the financial benefits from this will significantly outweigh the costs throughout the ecosystem's existence.

[292] Ref.: Moore J. F. The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems. – URL: https://www.researchgate.net/publication/31744644

4. Competitive advantage will be based on knowing when and how to create business ecosystems, strategically defining diversification processes, and directing their operations toward long-term growth and continuous improvement [293].

Certainly, in theory, these principles may seem simple, but their execution requires immense effort and significant investment. It's necessary to constantly consider changes in rules of cooperation and the level of competition. New ecosystems require managers capable of working within both traditional and, to a greater extent, non-traditional organizational, managerial, and cultural frameworks and external conditions.

Let's focus on some aspects of entrepreneurial experience in strategic ecosystem management in business.

Asian countries. Strategic ecosystem management in Asian countries like China, Japan, and South Korea is built on a value-based foundation, defining the most important goals, mechanisms, and resources for their achievement, as well as identifying key issues that either hinder or, on the contrary, facilitate their operations.

Strategic management of business ecosystems in China

It is based on the thesis of the "great revival of the nation," the construction of a "moderately prosperous society," "socialism with Chinese characteristics in the new era," and the implementation of the "Made in China 2025" strategy. All these theses and documents aim to transform China into a global innovation leader. There is a focus on improving the quality of Chinese-specific new-type brain centers and establishing a consulting system for strategic decision-making. The strategic plan "Made in China 2025" covers ten areas: robotics, next-generation information technology, aviation and aerospace, shipbuilding, rail transportation, energy-saving and new energy vehicles, power equipment, agricultural machinery, new materials, biopharmaceuticals, and high-tech medical equipment. The implementation of this strategic plan consists of three steps: achieving the stated goals by 2025, positioning China among the world's top producers by 2035, and achieving unconditional leadership in all areas by 2050 [294]. China's strategic management system is also aimed at creating a strong potential for further development of business ecosystems in these industries and in the field of commerce, as mentioned earlier.

Strategic management of business ecosystems in Japan

Researchers note the uniqueness of Japan's strategic management system as a key feature of its development and application in creating ecosystems [295] . Japan's strategic management has always focused on the main strategic objectives for the country's economic development. Currently, the strategic focus is on the development of biotechnology, robotics, artificial intelligence, modern medical equipment, essentially everything that facilitates the transition to the sixth technological paradigm. The characteristics of the strategic management system typical for Japanese companies include the shift from predominantly quantitative indicators to qualitative ones and the creation of various types of strategic ecosystem business alliances. Functional strategies that support corporate, financial, marketing, and innovation strategies are widely used in these alliances. While employees are viewed as the company's main strategic resource [296].

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[293] Ref.: Zhiteng He Analysis of Enterprise Business Strategy Based on Business Ecosystem. – URL: https://doi.org/10.1051/shsconf/202215101041

[294] Ref.: Mikheev V.V., Ignatiev S.V. The practice of strategic planning in North-East Asia // Federalism. – 2019. – № 2 (94). – P. 89, 158.

[295] Ref.: Milner B.Z., Oleinik I.S., Roginko S.A. The Japanese paradox. Realities and contradictions of capitalist management. – M.: Mislj, 1985. – P. 89, 264.

[296] Ref.: Mintzberg G., Ahlstrand B., Lampel J. Strategic safari: an excursion through the wilds of strategic management. – M.: Alpina Publisher, 2013. – P. 159.

Strategic management of business ecosystems in South Korea

South Korea, like Japan, has very limited natural resources. Therefore, South Korea extensively adopts innovative technologies based on foreign acquisitions. Over the past 20 years, the number of such acquisitions has increased more than tenfold, with financing increased by 35 times. This has allowed the Korean economy to enter a new stage of industrialization – high-tech manufacturing. A logical result of this approach has been the formation of high-tech clusters, technoparks, research centers, venture industry, and the conduct of technological foresight. While in the past, the government prioritized support for large state-owned corporations, today it actively stimulates business ecosystems of private entrepreneurship. Much is done to encourage cooperation between companies of different size and business directions, both in manufacturing and in trade and services [297].

Strategic management of business ecosystems in USA

Business ecosystems in the United States primarily develop at the corporate level, as the country is home to very powerful corporations in all sectors of the economy. The United States is a pioneer in the field of strategic management. American companies began organizing and developing ecosystem networks as early as the mid-1960s. The current stage of ecosystem strategic management development of US companies is characterized by specific segment-oriented focus. The system of strategic management of business ecosystems in the United States is mainly focused on assessing and identifying its attractive sides. For this purpose, strategic business centers are created to manage the most profitable business zones within ecosystems [298] . It is worth noting that at all levels of strategic management in corporations, "Management Science" (MS) and "Operations Research" (OR) are widely used. Strategic development models are initially developed for each division in particular and then consolidated into a unified corporate model.

Strategic management of business ecosystems in EU

Typical characteristic of the European Union is a supranational level of strategic management and planning. Its implementation provides benefits to member countries. The foundation of the system of strategic management and planning is the creation of conditions for sustainable development of the EU and inclusive growth. Inclusive growth implies the involvement of participants in the business ecosystem in its development "regardless of economic status, age, gender, physical condition, or religious beliefs." All countries of the European Union are involved in implementing a pan-European strategy. However, each EU member state has its own national characteristics, which are reflected in the strategic management of business ecosystems.

Strategic management of business ecosystems in Russian Federation

Today, business ecosystems in Russia are in the early stages of the development. A well-formed and implemented management strategy should aim to achieve the set goals and tasks by coordinating the goals and interests of individual employees, structural units, key participants, and the organization as a whole. In other words, integration of strategic and operational activities should be carried out, minimizing conflicts of interest between sectoral ecosystem participants.

In recent years, major companies in Russia have been actively organizing business ecosystems and showing interest in non-core businesses. Currently, banks set the trend in Russia being most developed business ecosystems, such as Sberbank, Tinkoff Bank, and VTB. Sberbank sells goods, and in the Tinkoff Bank app, users can buy food, plane tickets, and book appointments.

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[297] Ref.: Boykova M. V., Salazkin M. G. Korea: advanced strategies // Foresight. – 2007. – T. 1. – № 4. – P. 52–63.

[298] Ref.: Current experience of foreign countries in the development of state strategic planning systems. – Part 2 / A. V. Klimenko, V. A. Korolev, D. Yu. Dvinskikh, etc. – M.: HSE, 2016. – P. 40.

Major players also include such corporations as MTS and Mail.ru Group—they acquire other companies, invest in joint ventures, and try to integrate new services into their business. Additionally, large Russian aggregators and marketplaces like Ozon and Wildberries are part of the ecosystems. The search engine "Yandex" started booking taxis and created the ecosystem "Yandex.Navigator", "Yandex.Transport", and sells everyday goods. In the Magnit stores app, users can pay for utilities and get a bank card.

Despite the significant risks for consumers, large companies are improving their platforms and applications, constantly adding new services. There is no alternative to the ecosystem. One market after another is developing and rapidly digitizing.

Only those corporations that, in addition to their core business, aggregate additional services and products from third-party providers and service providers, will be able to maintain and grow their business, even if this aggregation is at the beginning stage and not as extensive and profitable as their core business[299].

The structure of section 4.1 is shown on the diagram (Figure 4.3).

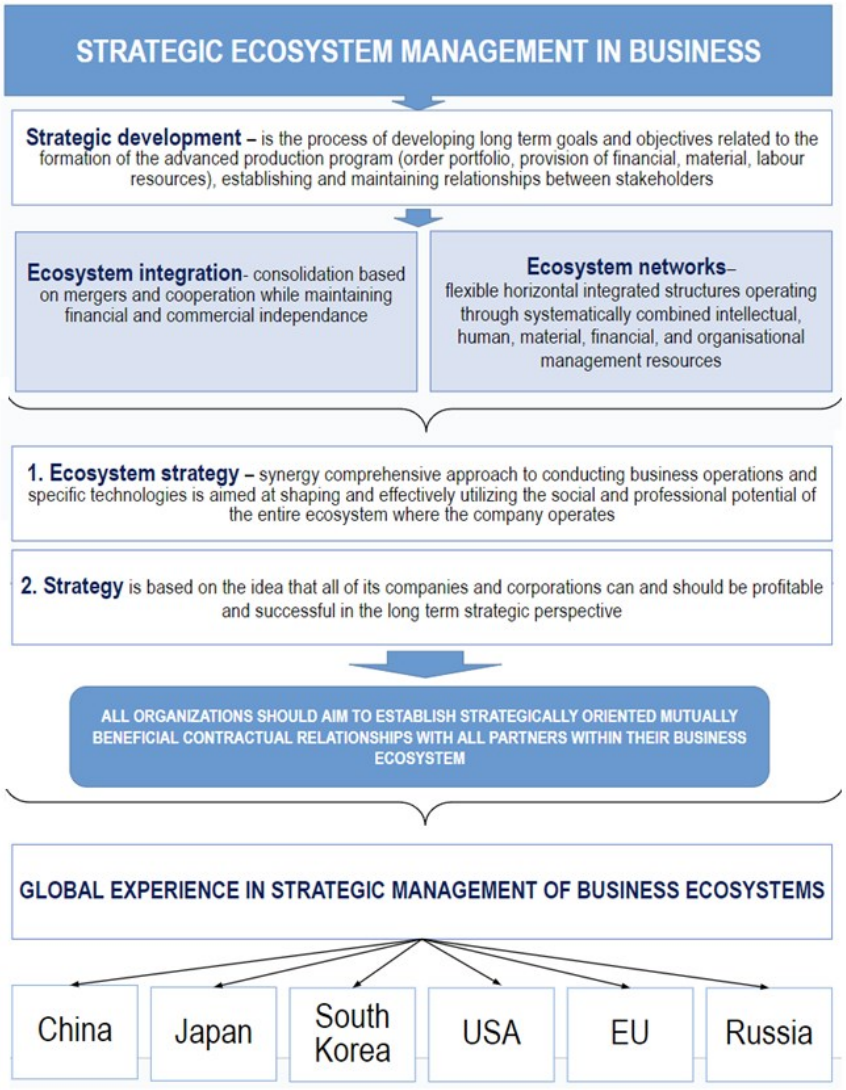


Figure 4.3. Section visualization diagram "Strategic management of ecosystems in business"

[299] Ref.: URL: https://dzen.ru/a/YTCK3lkP3lzQzKKB

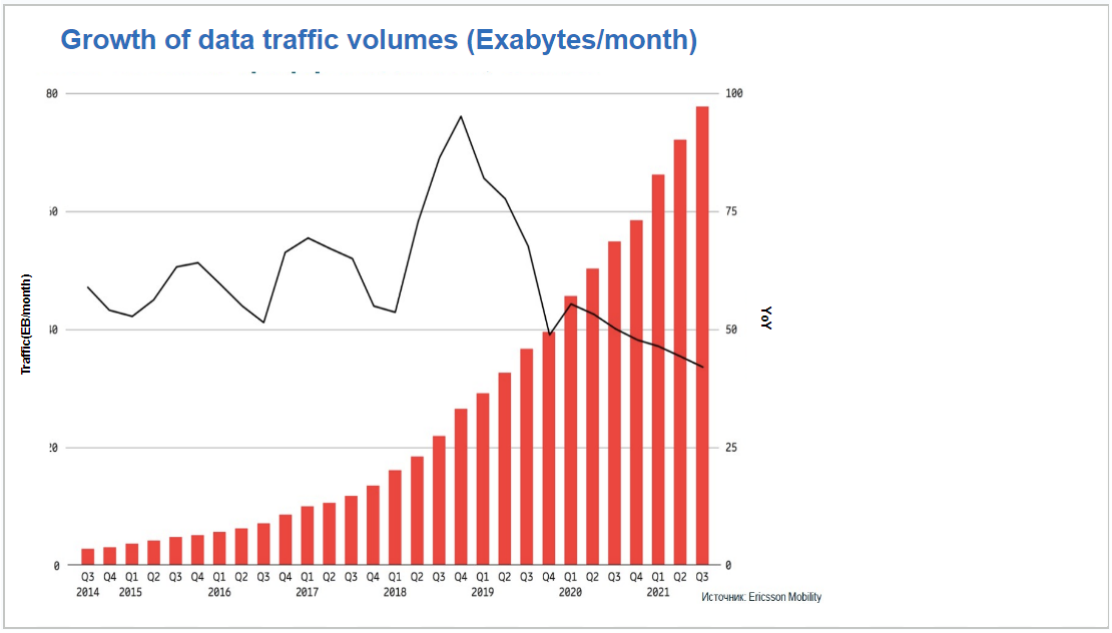
Control questions

1. Types of strategies that you know?
2. How does the strategy differ from planning?
3. How does strategic management differ from operational?
4. The main stages of the business process.
5. Signs of horizontal integration in a business ecosystem.
6. Signs of vertical integration in a business ecosystem.
7. Differences between horizontal integration and vertical integration in a business ecosystem.
8. Scientific management methods in the Management Science system.
9. Describe Operations Research system.
10. What digital methods and technologies are used in strategic ecosystem management in business?
11. Give examples of B2B platforms.
12. Give examples of corporate business ecosystems in Russia.

Practical Immersion Material

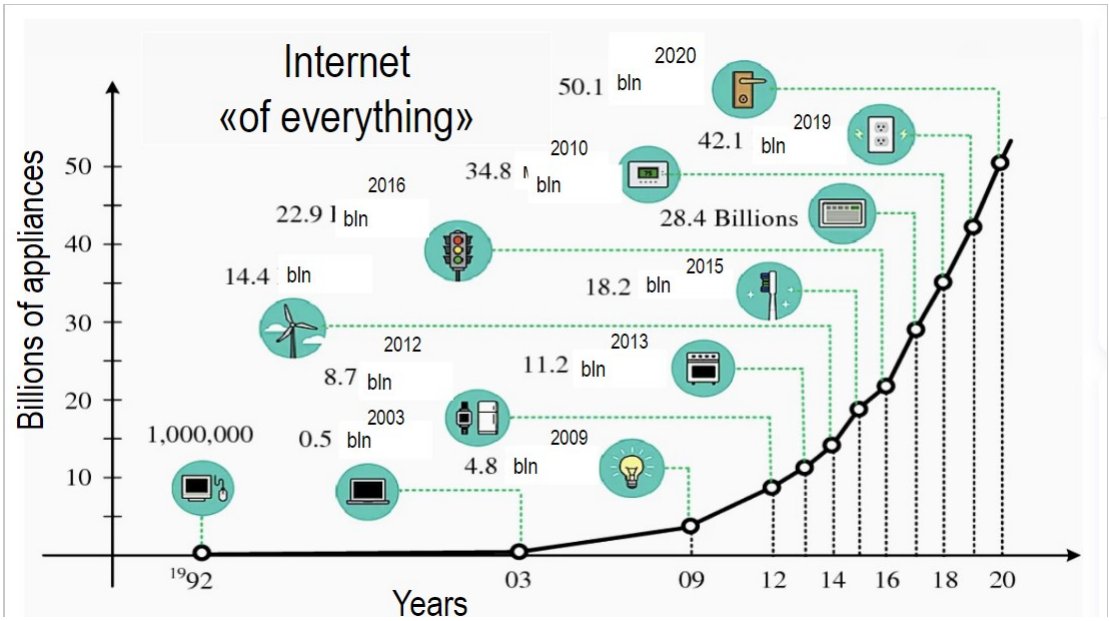
Task 1

Explain the reasons for the increase in data traffic and provide examples from the practice of functioning business ecosystems in Russia and abroad.



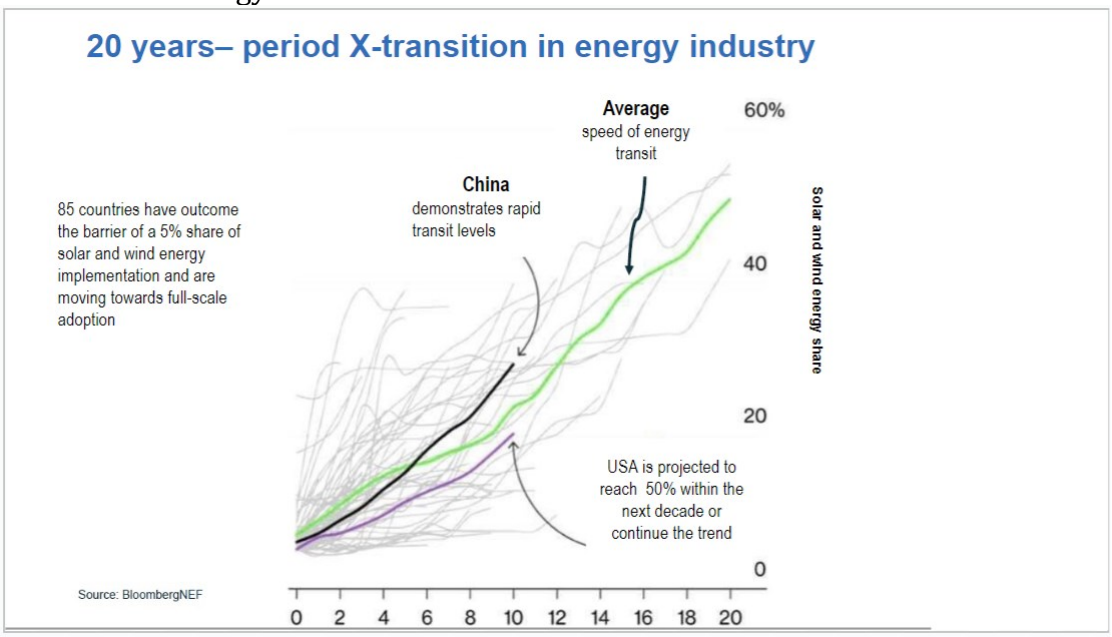
Task 2

Explain the essence of the concept of the "Internet of Things" and explain the reasons for the growth from the perspective of the raising number of business ecosystems.



Task 3

Based on the graph, make an assumption about the prospects for the growth of ecosystems in the energy sector.



4.2. Organization of Digital Communication in Business Ecosystems

At present communication in the digital environment plays a special role. Since the digital environment is formed based on the application of digital technologies and devices, and represents a complex self-organizing system with a set of characteristics that can be added and modified depending on the situation, when establishing contacts between partners, it is necessary to consider how and to what extent communications will be carried out. In such conditions, specific requirements are imposed on individuals, groups of people, and organizations involved in digital interaction, and therefore communications are based on principles that are significantly different from traditional forms of communication.

Thus, communication in the digital environment can be understood as a process of active interaction between participants (project stakeholders) using various means and practical actions aimed at combining their joint arrangements to resolve tasks and achieve set goals.

Among the main objectives in the communication process, the following can be highlighted:

1) Creating an integrated space;

2) Exchanging existing information and knowledge;

3) Organizing effective interaction among process participants;

4) Increasing the efficiency of the production and economic activities of each participant in the communication process;

5) Forming a new level of culture and mentality among people;

6) Creating a new image and model for the future development of the economy, as well as the behavior of participants in the digital society.

The main aspects affecting communication process include: the availability of high-speed information technologies, trust and open relationships among participants, their competence in solving tasks, the possibility of feedback, and a focus on results.

Primary functions of digital communication are: informational, expressive, and pragmatic.

The implementation of the informational function is based on the ability to transmit data and messages among communication process participants.

The expressive function involves the evaluation and analysis of the information and knowledge obtained during communication.

The result of implementing the pragmatic function will be the level of impact on communication process participants and the development of solutions that are beneficial to each of them.

In the era of digital transformations, there is a sharp change in forms and methods of communication. New means of communication provide new opportunities for interaction, open new perspectives for cooperation, and, most importantly, create conditions for the making of information and media culture. The emergence of new types and tools of information technology contributes to the development of modern communication in society.

Digital ecosystems imply the implementation of an integrated scheme of interaction of segmental parties, information resources, services, and business processes based on the "win-win" principle – the principle of joint effective and mutually beneficial

activities[300]. Digital ecosystems combine in their structure both independent subsystems and processes related to the activities at the level of individual companies, partner networks, related companies at various stages of the production cycle, industry, and the economic system as a whole.

The development of digital ecosystems provides a number of advantages for both their participants and users[301].

For participants (ecosystem parties), integration into a unified digital environment ensures:

- Increased competitiveness through the synergistic effect of interaction;
- Expansion of the user base and their coverage while simultaneously reducing customer acquisition costs;
- Generation of revenue streams from additional activities.

For users of digital ecosystem services, the qualitative parameters of service support are improved, resulting in a "seamless user experience":

- Shared access to services is provided through a single account;
- Due to the integration of segmental parties under a common brand, recognition is simplified, information perception is enhanced, and the customer journey is minimal;
- Waiting time for service provision is significantly reduced, and the speed of information exchange in the "user-ecosystem" chain is increased;
- Convenience of conducting operations and accessibility of services without being tied to a specific location;
- The ability to swiftly switch between individual ecosystem services is achieved[302].

The formation of digital ecosystems is driven by the natural processes of economic development change from analog to digital, accompanied by the corresponding transformation of business models as the basis for entrepreneurial activities transitioning from analog (traditional) to transitional and digital, including ecosystem.

Today, digital business ecosystems are highly diverse and cover a variety of sectors, both at the business and governmental levels.

Digital business ecosystems combine a collection of digital companies, enterprises, clients, suppliers, competitors, and other participants who interact with the aim of facilitating digital transactions, communication, and collaboration at various stages of the customer journey.

Business ecosystems can be represented by the following scenarios:

1) Digital platforms - bring together sellers and buyers to facilitate effective collaboration. Some platforms include Amazon, Alibaba, and Uber;

2) Cloud service ecosystems - provide storage, processing, and data transmission services. Some cloud service ecosystems include Amazon Web Services, Microsoft Azure, and Google Cloud;

3) Social media ecosystems - link users for information exchange and interaction;

4) Internet of Things (IoT) ecosystems - involve building a network of devices interacting within and beyond the ecosystem through the Internet. Some IoT ecosystems include "smart home" and "smart city";

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[300] Ref.: Dorzhieva V.V. Russia in the process of digital transformation of the world economy // Russia and the modern world. – 2022. – № 3. – P. 27–39. – URL: https://doi.org/ 10.31249/rsm/2022.03.02

[301] Ref.: Milovanov P. D. Customer-oriented Management of Business Processes in a Digital Economy // Russian Engineering Research. – 2022. – Vol. 42. – P. 72–74. – URL: https:// doi.org/10.3103/S1068798X22010142; Verhoef P. C., Broekhuizen T., Bart Y. et al. Digital Transformation: A Multidisciplinary Reflection and Research Agenda // Journal of Business Research. – 2021. – Vol. 122. – P. 889–901. – URL: https://doi.org/10.1016/j. jbusres.2019.09.022

[302] Digital ecosystems - 2021 // Website of the Center for the Development of Competencies in Business Information Sciences, Logistics and Management.– URL: https://hsbi.hse.ru/-articles/ tsifrovye-ekosistemy/

5) Artificial Intelligence (AI) ecosystems - involve companies using artificial intelligence to improve business processes and create new products and services. Some AI ecosystems include Google, IBM, and Microsoft;

6) E-commerce ecosystems - use the Internet for selling goods and services. Some e-commerce ecosystems include Amazon, eBay, and Alibaba;

7) Blockchain ecosystems - involve using distributed databases to store and transmit information in a secure and transparent manner. Some blockchain ecosystems include Bitcoin and Ethereum.

It should be noted that sometimes the stage of development of the digital economy may not fit the stage of business digitization, resulting in asynchronicity.

Identification and description of mechanisms for forming various types of digital business ecosystems are important for understanding the interaction of companies in the digital economy, as well as for the forecasting of their development prospects.

Currently, we more often hear about digital business transformation, which is understood not only as the implementation of a set of specific projects, but as a necessary path that organizations must take to ensure their resilience in modern realities. This also applies to business ecosystems, where communication plays a key role in their effective functioning and competitiveness. It is worth noting that the creation of a single information space for partner participants of business ecosystems and ensuring the interaction of information systems is increasingly becoming one of the priorities for the development of such interaction.

In any business ecosystem, two main types of communication can be distinguished: with partner organizations (suppliers, services, etc.) and with customers. Both types of communication should be automated and in digital format.

From the perspective of internal digital communications, i.e., relationships between the organizer and partners, a business ecosystem includes three main blocks interconnected by a single corporate bus for transmitting information throughout the system[303] (Fig. 4.4):

- Back-office with proprietary services;
- Back-office consisting of third-party services;
- Front-office, including interfaces for interaction with consumers.

[303] Ref.: Inside the digital ecosystem: how everything works. – URL: https://vc.ru/services/ 168665-vnutri-cifrovoy-ekosistemy-kak-vse-ustroeno

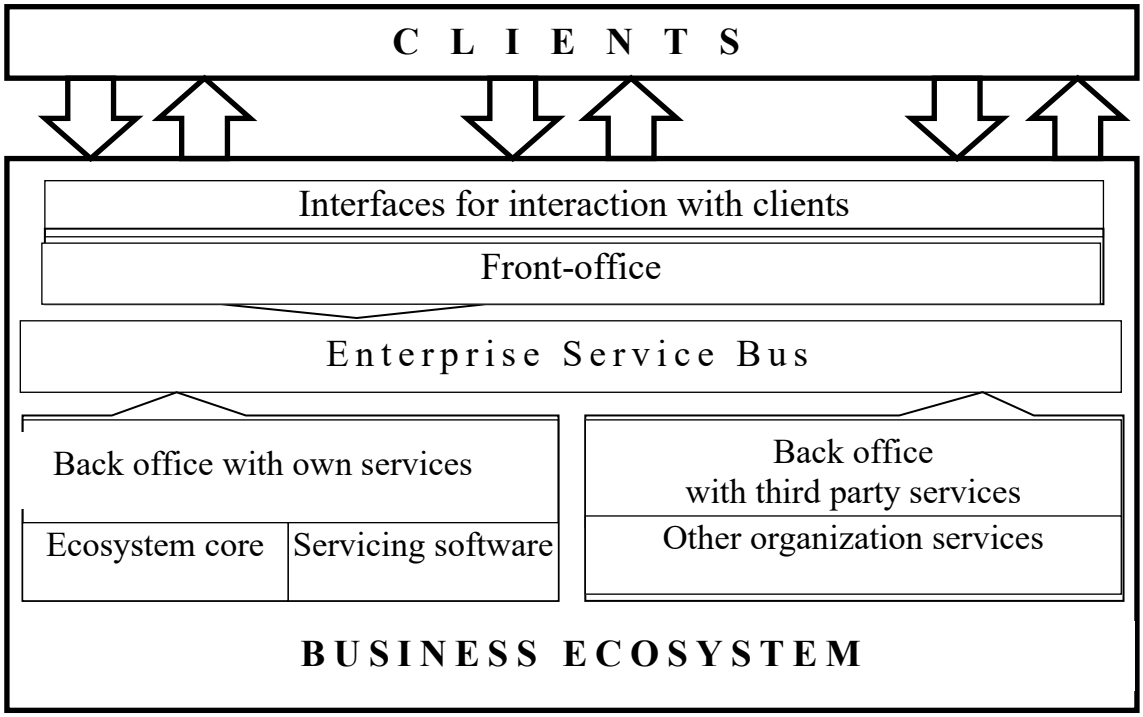


Figure 4.4. Interconnection of the main functional blocks of the business ecosystem

Let's take a closer look at each of these blocks:

1. ***Back-office with own services***, which serves as the foundation of the business ecosystem upon which the entire project is built (Fig. 4.5). It consists of two parts: the ecosystem core and service software (SW).

The core of the business ecosystem is the necessary minimum set of services that define the basic principles of operation and ensure its full functioning. It is here that the functionality of the platform is laid out, and the list of data required for it is determined. Its structure typically includes:

1) *Unified data repository*. This is where the core data of the business ecosystem is located – directories, product information, etc. It has a cross-cutting nature. All business processes are initiated from here, distributing data to other subsystems.

2) *CRM (Customer Relationship Management) and CDP (Customer Data Platform)* systems. It is crucial for the business ecosystem to track all interactions with the customers. These systems collect and systematize data on all customer-ecosystem interactions in both online and offline formats for the analysis. The integration of segmented data allows for the creation of a unified customer ID.

3) *Cloud-based file storage*. Corporate file storage in a cloud format offers the following advantages for the business ecosystem:

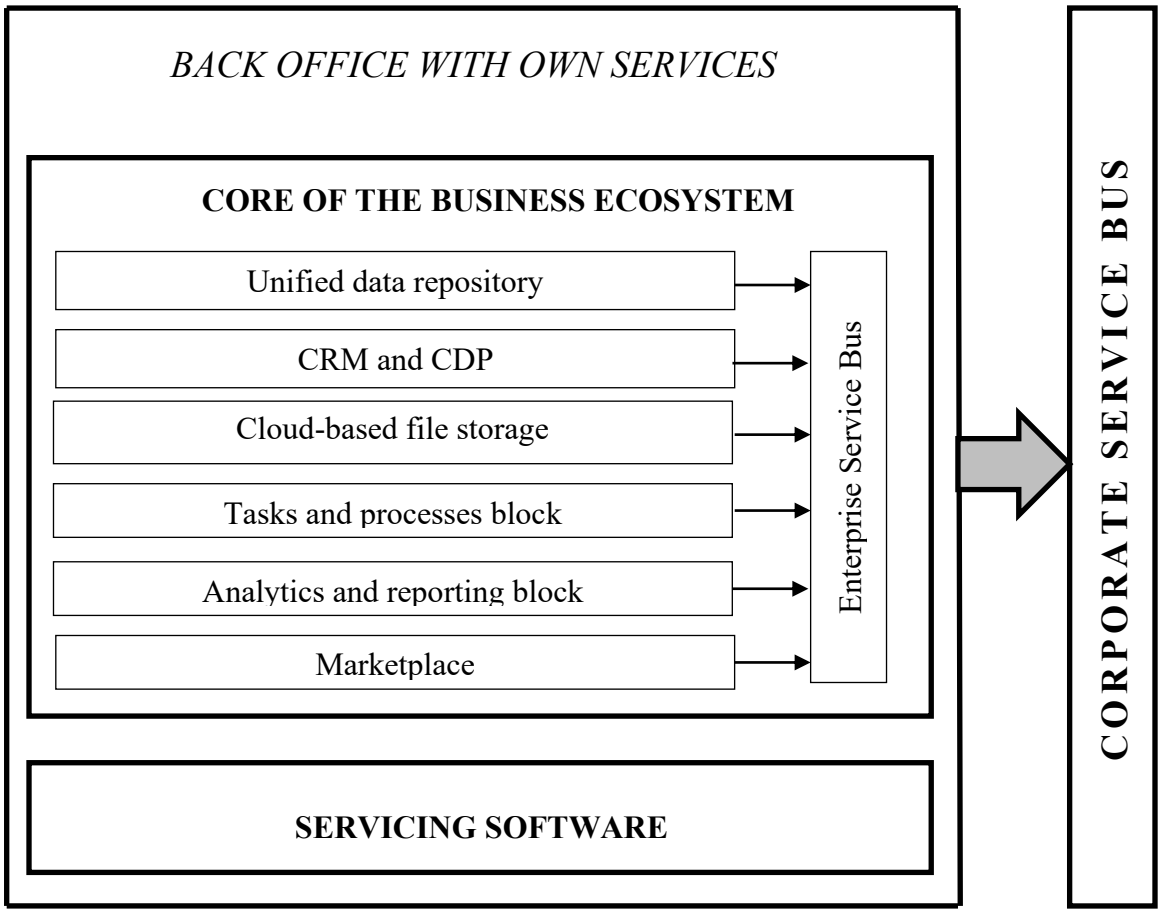


Figure 4.5. Back-office with own services

- Characterized by greater reliability, as in the event of a "crash" of local disks, all accumulated valuable data may be lost.

- Allows, on the one hand, to provide information access to all numerous systems, and on the other hand, allows only specific users (internal and external) to access the required information.

- Facilitates the search for necessary information.

4) *Task and business process block*. It characterizes the functionality of the ecosystem, where business processes are configured. Automation and regulation of processes minimize risks associated with data loss and errors caused by human factors.

5) *Analytics and reporting block*. Thanks to data accounting and analysis, forecasts and plans for the future can be made. Moreover, based on the customer data collected in the repository, the business ecosystem can build a consumer behavior model and use it in the process of creating new offerings.

6) *Marketplace*, which is a key block of the business ecosystem for working with partners. It should take into account the specifics of particular market segments and the characteristics of processes taking place in it, data collection procedures, entry and exit for partners, API connection technologies, and be easy and understandable for users.

The above core blocks of the business ecosystem lack direct interaction but are interconnected through an internal data bus, enabling information exchange throughout the core. Using an internal data bus has several advantages. Firstly, it allows for connecting necessary new blocks and disconnecting outdated ones without harming the

core of the business ecosystem. Secondly, it protects against failures in individual components.

The interaction of the remaining blocks of the business ecosystem with its core is carried out only through the internal data bus, which is externally connected only to the outside common corporate data bus. This allows for the transmission of data from the core and receiving data from the external environment. However, data for the internal and external environments must be separated from each other while adhering to all information security rules.

The second part of the back-office with own services is the supporting software. It includes systems for implementing supporting functions. These can be technological solutions for accounting, document management, analytics, building predictive models, and other special software products. Including this set of software into a separate category is justified for several reasons. Firstly, it is for the use of a limited number of counterparties. Secondly, it is important for security reasons. Finally, its integration into the core of the business ecosystem is complex and therefore unjustifiably costly.

2. ***Back-office with third-party services***. This includes services from other companies (Fig. 4.6):

1) *Advertising services*, which manage advertising by building predictive models. Leveraging data from other systems and analyzing them, advertising services can segment the audience and present personalized ads to the client.

2) *Mail and messaging services*, *telephony*. Automating this system allows optimizing communication with the client and enables them to choose convenient channels for interacting with the ecosystem independently.

3) *Acquiring*, i.e., the ability to make non-cash payments between the client and the business ecosystem (payments by bank cards, QR code, etc.).

4) *Single Sign-On (SSO)* system - technologies for single sign-on. These are digital tools that allow the client to move between various services of the business ecosystem without re-authenticating.

5) *Specialized services* that take into account the specific activities in a particular market (for example, for the banking sector - credit history verification, for the automotive market - vehicle verification by VIN number, etc.)

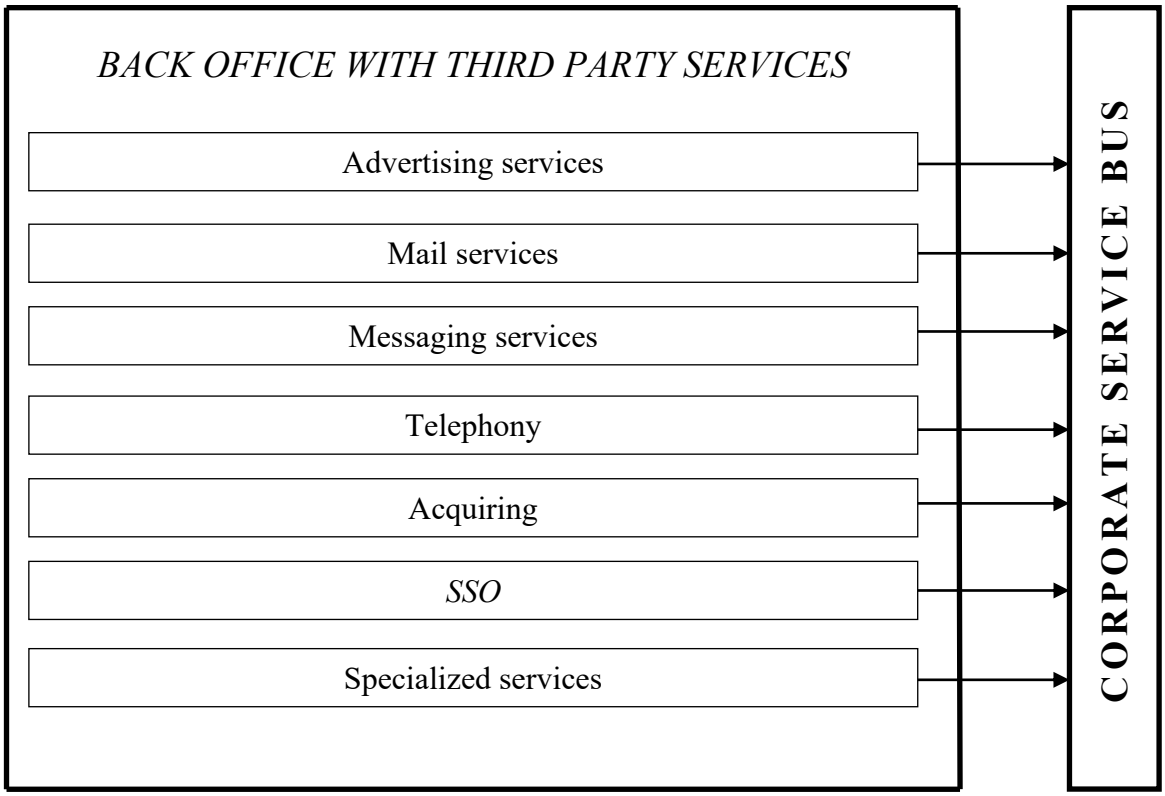


Figure 4.6. Back office with third party services

3. **Front-office** - the "visible" part accessible to all clients and partners of the business ecosystem (Fig. 4.7). It includes interfaces for interaction with external users. The following elements may be included:

1) *Main website*. It also interacts with the data bus on key data issues and contains essential information of direct interest to clients, such as, for an e-commerce platform - a list of main product categories and services, for a real estate database - listings for sale, purchase, and rental of apartments, etc.

2) *Wizard for creating websites for special projects*. This service acts as a kind of constructor, allowing suppliers in the business ecosystem to create landing pages, business card websites, and more for specific products or projects themselves.

3) *Unified customer personal account (UCPA)* - a special service in web and mobile versions that allows the customer to perform various operations within all user applications and services within the business ecosystem perimeter.

4) *Unified supplier personal account*. This service is similar to the previous one but is intended for organizations selling their products within the ecosystem. Here, they can manage customer requests, financial transactions, analyze statistics, generate reports, etc.

5) *Unified partner personal account*. This is for partners participating in the core business processes of the business ecosystem, performing some supporting functions. Therefore, the functionality of their account may be either similar to or broader than that of product suppliers. Special technological tools may also be present here.

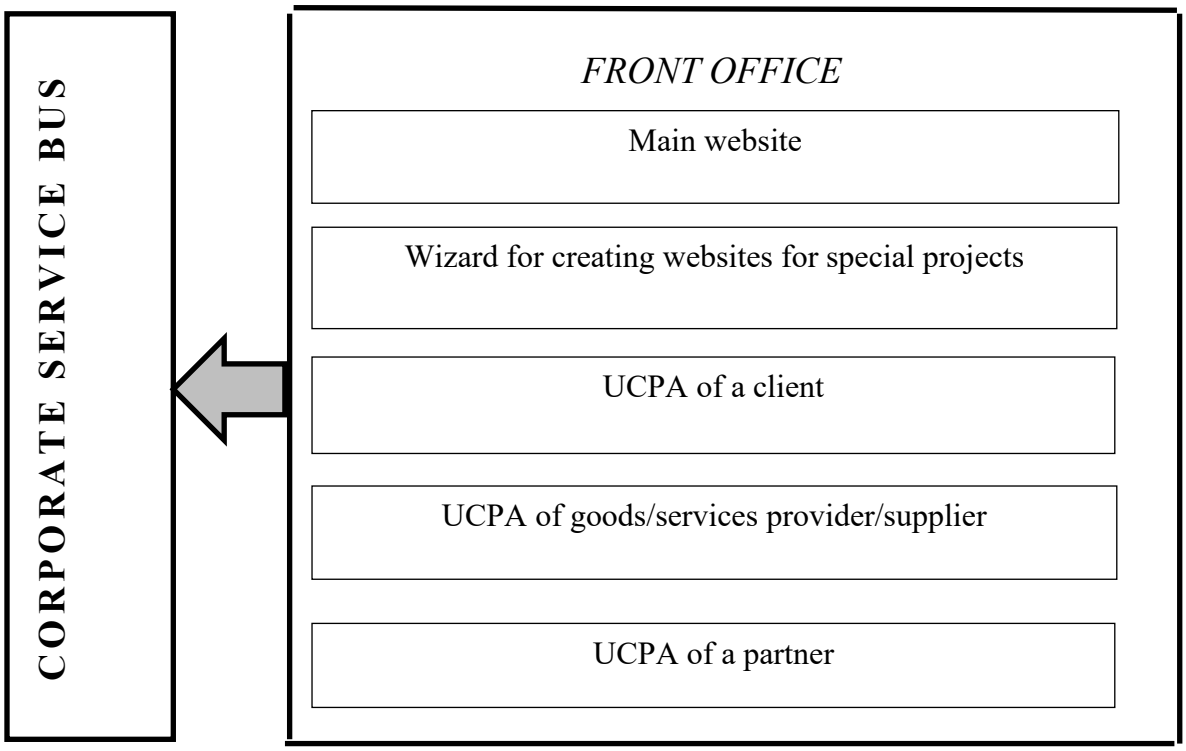


Figure 4.7. Front office

4. **The corporate data bus** plays a key role in the business ecosystem, uniting its functional blocks and ensuring efficient communication. Its autonomy, reliability, and protection against cyberattacks are crucial.

In case of force majeure situations or failures in any functional block, it should ensure the continuous operation of other key nodes, accumulate information from the external environment, and, upon restoration of functionality, transfer it to the necessary systems.

Since the business ecosystem involves a large number of elements and a complex integration structure, configuring internal communications is a crucial task for its organizer. The implementation of this task allows attracting and retaining a large number of participants within its perimeter and ultimately determines its effectiveness and development prospects.

Special attention should be paid to the organization of communication and the direct interaction of the business ecosystem with the customers.

The coronavirus pandemic and global digitization have led to significant changes in customer preferences. According to PwC research, in addition to traditional needs such as - price, wide product assortment, delivery time, brand loyalty, the list of customer requirements now also added with - convenience, and security of purchases. The latter two characteristics are directly related to communication processes. Organizations operating within the ecosystem business model must pay particularly close attention to this.

To succeed in competition for customers, business ecosystems must emphasize flexibility, speed of service, and customer orientation. In this regard, the organization of digital communications with consumers now takes over. For modern customers, a new level of quality of interaction with sellers and personalized offerings is very important.

Dissatisfaction with service can lead to future disengagement from the business ecosystem and consequent customer loss. This is supported by statistical data from PwC's conducted research (Figure 4.8) [304].

The most important tool for ensuring competitive advantages in organizing digital communications for the business ecosystem is omnichannel.

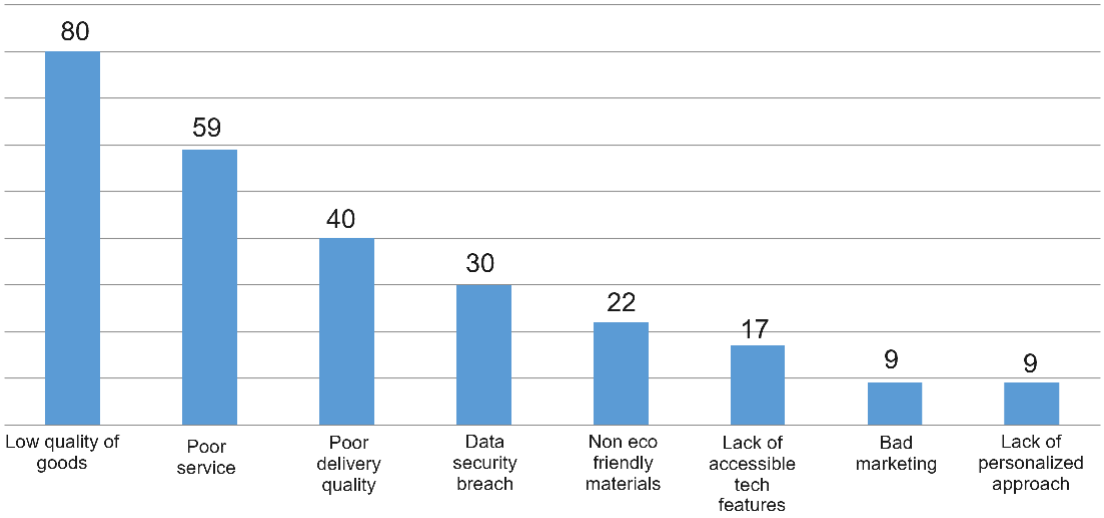


Fig. 4.8. Reasons for ending relationships with the brand, %

Omnicannelity refers to the integration of all communication channels of an organization or business ecosystem into a single system.

Let's examine how the process is organized. Simple presence of various interaction channels with consumers, such as a website, mobile application, messengers, and phones, does not necessarily mean omnichannelity. If they exist independently and each is managed separately, it's simply a multi-channel approach. Omnichannelity means that all customer interactions with various services of the business ecosystem through any channel are recorded in the history and allow the customer to choose ways of communication that fits them best. For example, a customer can learn about a product on the website, pay through the mobile app, and pick it up using a self-pickup service. Thus, any consumer inquiries are integrated into the system and become part of the customer data.

Omnicannelity is effective not only in retail and e-commerce but also in the financial sector, healthcare, tourism, education, and others. Using an omnichannel approach allows a business ecosystem to comprehensively address tasks across multiple key areas at once:

1. Optimization of marketing activities: Omnichannelity helps gather all customer interactions into a single history, enabling detailed analysis of their behavior and making personalized offers.

2. Increasing customer loyalty: Implementing an omnichannel approach into communication field organization helps improve response speed to inquiries and reduce customer waiting time. When a customer interacts with a business ecosystem through communication channels that were combined in a single network, they receive responses to their questions much faster, ultimately leading to increased loyalty.

[304] Ref.: Omnichannel: why this is a global trend in 2022 and how to use it in business.– URL: https://mango--office-ru.turbopages.org/mango-office.ru/s/newsletter/omnikanalnost-globalnyy-trend-2022/

3. Increasing profit through increased conversion rates: Based on expert estimates, using an omnichannel approach can increase website conversion rates by 60% and allow for a more than 40% increase in profit through personalized communications.

It's worth nothing that, given the active digitization of all social processes, the application of an omnichannel approach is not just a passing trend but a necessary condition for building effective communication between the business ecosystem and consumers. This enhances its competitiveness, ensures sustainability, and leads to growth in financial and economic results. The structure of the section is illustrated in diagram (Fig. 4.9).

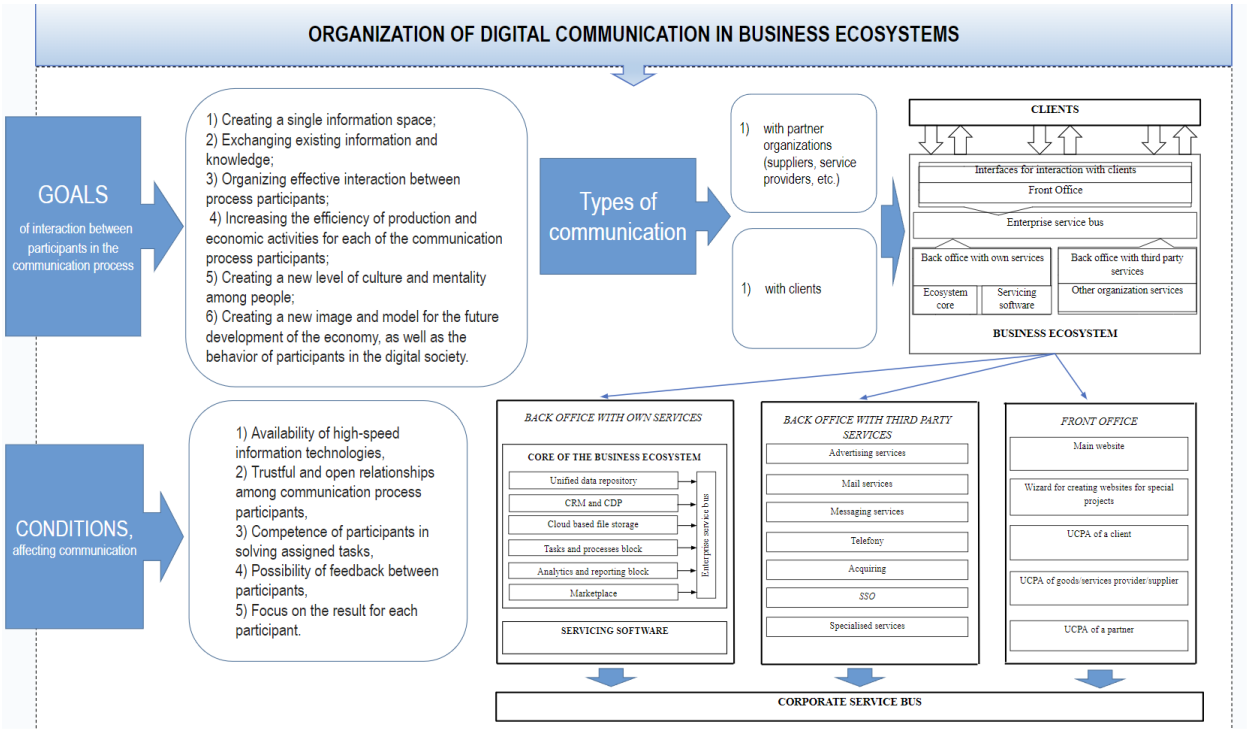


Fig. 4.9. Visualization Diagram of the Chapter "Organization of Digital Communications in Business Ecosystems"

Control questions

1. Types of communication in the digital environment.
2. Communication process in the digital environment.
3. Goals and objectives of implementation of digital communication.
4. Functions of digital communication.
5. Optimization of marketing activities.
6. What are the main structural blocks of a business ecosystem?
7. What does the back office with own services include, and what are its functions?
8. What are the components of the back office with third-party services, and what is their purpose?
9. Characterize the structure of the front office of a business ecosystem.
10. What is a corporate bus, and its role in organizing communication in the ecosystem?
11. What is omnichannelity? Characterize the mechanism of its operation.
12. Efficiency of omnichannelity.
13. What are the advantages of using omnichannelity for business ecosystems?

Practical immersion material

Test:

1. A global computer network is:

a) an information system with hyperlinks;

b) a set of computers interconnected by information transmission channels within the same room or building;

c) a system for exchanging information on a specific topic;

d) a combination of local networks and computers located at great distances and connected into a single system.

2. The incorporation of all communication channels of an organization or business ecosystem into a unified system is called:

a) omnichannelity;

b) IP address;

c) digital communications;

d) multichannelity.

3. A computer connected to the Internet must have:

a) an IP address;

b) a web page;

c) a home web page;

d) a domain name;

e) a URL address.

4. It serves as a tool for connecting new suppliers, services, and partners to the ecosystem:

a) the core of the business ecosystem;

b) corporate data bus;

c) unified data storage;

d) marketplace.

5. A special service in web and mobile versions that allows the customer to perform various operations within all user applications and services within the framework of the business ecosystem is:

a) a website builder for special projects;

b) a unified personal account (UPA) of the customer;

c) a unified personal account of a goods and services supplier;

d) a partner's unified personal account.

Task

Based on your own observations and experience, characterize the business ecosystems of Sberbank, Yandex, MTS, Tinkoff, and VK, highlighting their strengths and weaknesses.

Evaluate the level of organization of communication with customers. Is an omnichannel approach implemented in these business ecosystems? Provide examples. Fill in the table:

Characteristics of Communication Organization in Business Ecosystems

Characteristics	«Sber»	«Tinkoff»	«Yandex»	MTS	VK
Services underlying the business ecosystem					
Primary customer needs satisfied by the ecosystem					
Strengths					
Weaknesses					
Implementation of omnichannelity					
Overall assessment of communication organization in the ecosystem					

4.3. Methods of Studying the Patterns of Business Ecosystem Development

Quantitative Research Methods in Business Ecosystems

First of all, it is important to note that quantitative research in business ecosystems primarily involves working with big data. Therefore, this section will address the methods used for conducting quantitative research in business ecosystems and how the results can be practically used. Generally, conducting quantitative research involves the following actions:

1. Data search necessary for conducting the research.
2. Data preparation.
3. Selection of method(s) for conducting the research according to the set objectives.
4. Conducting the research.
5. Analysis and interpretation of the obtained results.

Let's examine each of the stages presented above in more detail. When it comes to data search necessary for conducting research, it involves finding data sources. Such data sources may include financial and economic activity results of the organizations published on their official websites or from other open sources; data from official statistical agencies, such as the Federal State Statistics Service (Rosstat); professional databases containing information necessary for conducting research, survey results, and other sources.

To ensure that the obtained data can be used for the analysis, it has to be structured in advance. Data preparation typically involves extracting from relevant sources, transforming the data into a format suitable for analysis, and loading it in that format into the appropriate software product (such as Microsoft Excel, Microsoft Access, IBM SPSS Statistics, or others).

Depending on the type of data extracted from sources, it is divided into *quantitative (numerical)* and *qualitative (categorical)*. In turn, quantitative (numerical) data is split into *discrete* and *continuous*, while qualitative (categorical) into *nominal* and *ordinal*[305]. Quantitative (numerical) data represent indicators that take numerical values (for example, the number of organization's clients during the reporting period, average purchase amount per client, revenue of the organization during the reporting period, etc.). If quantitative (numerical) data can take any value within a selected interval, it is called *continuous*. If quantitative (numerical) data can take a finite number of values within a selected interval, it is called *discrete*. Qualitative (categorical) data characterize the class or category to which the corresponding object belongs. For example, the type of economic activity of the organization, the name of the region where the organization is registered, and other. Nominal data feature is that cannot be meaningfully ordered (for example, the name of the region where the organization is registered). As such, ordinal data can be arranged to a certain extent (for example, the reliability rating of the organization assigned to it by a rating agency).

One of the most important stages in data preparation is data cleaning, which involves excluding unreliable information and/or filling in missing information. Excluding unreliable information involves removing data with odd values, i.e., numerical values that significantly differ from the average values of the corresponding indicator in the database. Filling in missing information typically involves replacing the missing numerical value of

[305] Ref.: Data Analysis: Textbook for Academic Bachelor's Degree / ed. V. S. Mkhitaryan. – M.: Yurayt, 2017.

the indicator with the mean or median value for that indicator from the database. It is worth noting that many modern software products already have algorithms allowing exclusion of odd values during data analysis (for example, when building decision trees in IBM SPSS Statistics, the algorithms used "discard" odd values in the analyzed database). Cleaning is performed for all selected data for subsequent analysis regardless of its type - quantitative (numerical) or qualitative (categorical).

The choice of method or methods for conducting research is determined by the purpose of the research being conducted. Currently, there is a large number of different data analysis methods; however, this section will only consider those methods that are most commonly used in quantitative analysis of business ecosystems. As noted above, a large number of different statistical and econometric methods are used for quantitative analysis of business ecosystems, it is necessary to first classify these methods and examine what they are used for. In the literature dedicated to data analysis[306], the following main groups of methods are distinguished:

1. Preliminary data analysis.
2. Correlation analysis.
3. Classification methods.
4. Regression analysis.
5. Time series analysis.

Preliminary data analysis (descriptive statistics) is most commonly used for quantitative (numerical) indicators to divide them into specific intervals and quantitatively assess them (basic numerical characteristics). In the simple case, dividing into intervals involves identifying quartiles (dividing the values of the analyzed indicator into four parts) or deciles (dividing the values of the analyzed indicator into ten parts), as well as calculating intervals of the analyzed indicator for subsequent construction of histograms and cumulative distributions. For each of the identified intervals, basic numerical characteristics are subsequently calculated, such as mean, median, range, variance, and various others.

Correlation analysis is used to identify the relationship between analyzed indicators. In other words, correlation analysis allows to identify the functional dependence between two analyzed indicators. Within the framework of conducting quantitative research on business ecosystems, correlation analysis helps determine the presence or absence of mutual influence of the investigated economic or other indicators that are not related to each other by formalized mathematical dependencies. To conduct correlation analysis of quantitative indicators, the calculation of the Pearson correlation coefficient is most often used. The Pearson correlation coefficient characterizes the degree of linear dependence between two indicators against the background of the influence of other indicators[307]. In simpler terms, if N indicators were selected for conducting quantitative research on business ecosystems, then using the pairwise Pearson correlation coefficient, a pairwise comparison of all indicators (from 1 to N) is performed, determining the degree of their mutual influence. The values of the pairwise Pearson correlation coefficient can range from -1 to +1, with values closer to 1 indicating a stronger relationship between the analyzed indicators (Fig. 4.10). Positive values of the pairwise Pearson correlation

[306] Ref.: Data Analysis: Textbook for Academic Bachelor's Degree / ed.
V. S. Mkhitaryan. – M.: Yurayt, 2017; Eremenko K. Working with data in any given field. How to reach a new level using analytics: trans. from English – M.: Alpina Publisher, 2019.

[307] Ref.: Data Analysis: Textbook for Academic Bachelor's Degree / ed.
V. S. Mkhitaryan. – M.: Yurayt, 2017.

coefficient characterize a direct relationship between the analyzed indicators, while negative values indicate an inverse relationship between the analyzed indicators.

Figure 4.10 An example of a correlation between indicators X and Y

Classification methods are used to divide research objects into specific classes or groups. Most often, classification methods are used to partition multidimensional data (when the research object is described by a set of several indicators) into a certain number of homogeneous groups. Among the classification methods most commonly used in the analysis of economic phenomena, the following have gained the greatest popularity:

- Hierarchical cluster analysis;
- Decision trees.

Hierarchical cluster analysis is used when segmentation or grouping of data is needed, but the number of segments or groups is not known in advance. There are two types of hierarchical cluster analysis[308] - agglomerative and divisive, which differ in the way clusters (segments) are formed. When using the agglomerative clustering method, clusters are formed "bottom-up" - any object from the database is selected, and then other objects with similar set of indicators are grouped with it. In the case of divisive clustering method, cluster is formed "top-down" - all objects in the database are considered as one large cluster, which subsequently starts to split into components depending on the distance between the indicator values. Mathematically, the distance between indicator values in cluster analysis can be calculated in various ways, but more often, it is determined as the Euclidean distance between indicator values. To observe the process of cluster formation, a dendrogram is plotted (Fig. 4.11), which shows the number of targeted objects (on the X-axis), and their grouping into clusters with the indication of the Euclidean distance between them (on the Y-axis). When conducting economic research, the agglomerative clustering method is most commonly used.

[308] Ref.: Eremenko K. Working with data in any field. How to reach a new level using analytics: trans. from English – M.: Alpina Publisher, 2019.

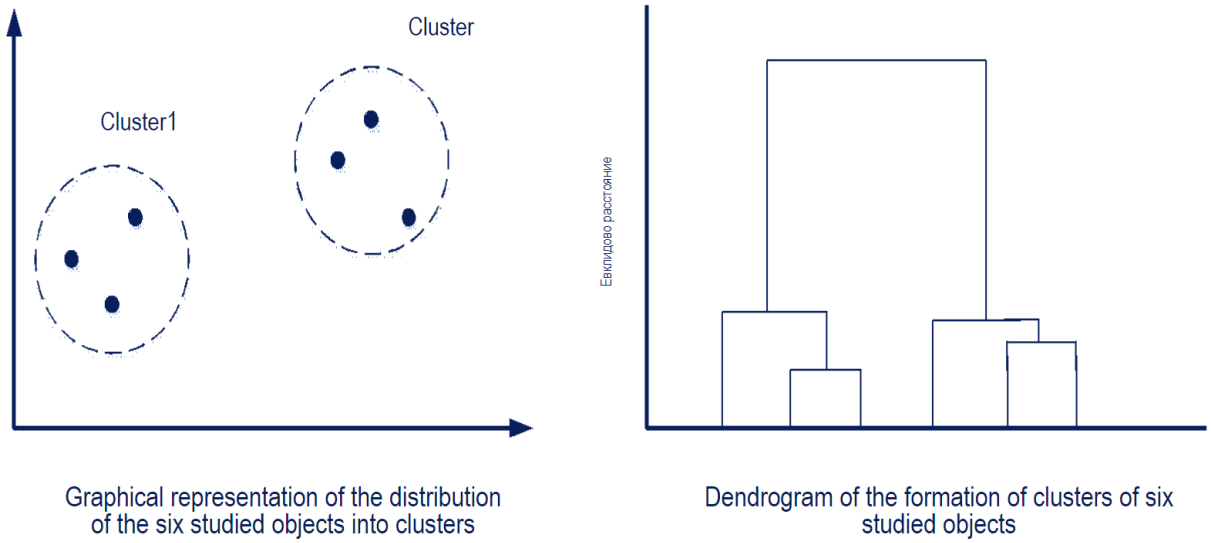


Figure 4.11 Dendrogram

Decision trees are plotted in cases where information about the classification of objects into specific segments (groups) is already known, and it is necessary to identify which factors affect the formation of the corresponding segment (group). To plot decision trees, a target variable is pre-defined, which is the indicator for which values of other indicators (predictors) determining its value are sought. The target variable typically takes discrete values. Structurally, a decision tree consists of nodes and leaves. Nodes represent specific classes within the classification being conducted. The first node used in classification is called the root node. The last node (also called a terminal node), after which no further partitioning is done, becomes a leaf (Fig. 4.12).

Decision trees can also be used to predict the numerical value of the independent variable (predictor variable) for the selected target variable in regression problems.

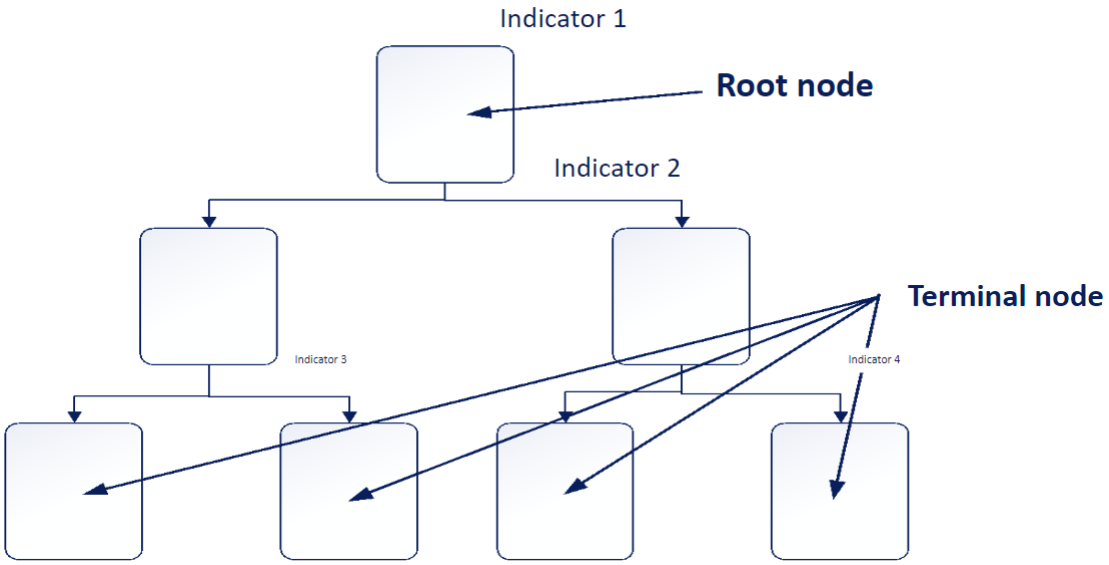


Fig. 4.12. Example of a decision tree structure

Regression analysis is a statistical method of research that allows identifying the influence of one or more independent variables $(x_1, x_2, x_3 \dots x_n)$ on the dependent variable (y). The result of conducting regression analysis is the plotting of a regression

equation, which with a certain degree of error describes the mathematical relationship between the analyzed variable and the independent variables:

$$y = f\ (x_1, x_2, x_3 \dots x_n)$$

In regression analysis, independent variables are called regressors. The degree of error of the plotted regression equation is characterized by the coefficient of determination (R^2). The value of the coefficient of determination can range from 0 to 1. A coefficient of determination value of 1 indicates no error in the plotted equation, while a value of 0 indicates no functional relationship between the analyzed dependent variable (y) and the selected independent variables ($x_1, x_2, x_3 \dots x_n$).

In practice, regression analysis is conducted after correlation analysis, when statistically significant relationships between the dependent variable (y) and independent variables ($x_1, x_2, x_3 \dots x_n$) have already been identified.

Time series analysis is a set of mathematical and statistical methods aimed at studying changes in a variable over time and forecasting its values. In economic research, time series analysis is used to forecast the values of analyzed indicators in future periods. For this purpose, the value of the analyzed indicators at each moment in time is often divided into the following structural components:

- Long-term component, also known as trend;
- Cyclical (seasonal) component;
- Random (irregular) component.

By identifying these structural components, it becomes possible to forecast the values of the analyzed indicator in future periods: based on the values of the analyzed indicator in previous periods, using various mathematical methods, the long-term trend component and the cyclical (seasonal) component are isolated. Then, for future time periods, the forecasted value of the analyzed indicator is calculated as the sum of the long-term component in the corresponding period and the cyclical (seasonal) component. The random component determines the error in calculating the forecasted value of the analyzed indicator in the corresponding period[309].

When conducting time series analysis, extrapolation of the values of the analyzed indicator in future periods can also be employed. This approach is based on regression analysis, where initially a regression equation is plotted, and then based on this equation, the values of the analyzed indicator for future periods are calculated.

Methodological approaches to conducting quantitative research on business ecosystems for forming strategies for their development.

The methods discussed above are just the tools necessary for conducting quantitative research and evaluating the effectiveness of business ecosystems. Therefore, before moving on to the practical application of these methods, it's important to familiarize oneself with the most common metrics used to assess the effectiveness of business ecosystems. While a set of metrics for evaluating different business ecosystems may vary, there are common approaches to forming these metrics. Currently, the North Star Metric (NSM) is widely used for assessing the effectiveness of business ecosystems. This metric serves as a key reference point around which the priorities of ecosystem development are organized[310]. The North Star Metric represents a crucial indicator that guides the business ecosystem at the current moment and significantly influences its financial performance. The advantage of using the North Star Metric is its ability to define

[309] Ref.: Data Analysis: Textbook for Academic Bachelor's Degree / ed.
V. S. Mkhitaryan. – M.: Yurayt, 2017.
[310] Ref.: Rachitsky Lenny. Choosing Your North Star Metric. – URL: https://future.com/ north-star-metrics/

the primary direction of ecosystem development, enabling long-term stability and growth beyond short-term gains[311]. One notable aspect of the North Star Metric is that it doesn't consist of a strictly defined and singular indicator characterizing the value of a product/service. Each organization, when forming its business ecosystem, independently determines the corresponding key indicator based on the specifics of its activities. There are six categories of the North Star Metric, from which the key indicator is subsequently determined:

1. Revenue generation.
2. Customer base.
3. Consumption of goods/services.
4. Level of customer engagement.
5. Operational efficiency.
6. Customer

Cash inflow is typically determined by indicators such as sales revenue for a specific period or the total turnover of all goods and services (this indicator is more commonly used by marketplaces). Relative indicators may also be used, such as revenue per customer.

The *customer base* is usually characterized by market share or the number of loyal customers.

Consumption of goods/services is generally determined by the number of orders, inquiries, or bookings made by customers.

The level of customer engagement is evaluated using commonly accepted metrics such as Monthly Active Users (MAU), Weekly Active Users (WAU), and Daily Active Users (DAU).

Operational efficiency is assessed using indicators such as the marginal revenue from one customer or the ratio of profit from one customer to the cost of attracting them.

Customer experience is evaluated by the level of customer satisfaction, for example, through the Net Promoter Score (NPS) index.

The decision to focus on a particular category among those described above is largely determined by the chosen strategy for ecosystem development. Examples of forming business ecosystem development strategies based on the North Star Metric are provided in Table 4.1.

[311] Ref.: Bolshakova Dayana. The North Star Metric is the path to long-term product value – URL: https://admitad.pro/ru/blog/metrika-polyarnoj-zvezdy-produkta-ili-North-Star-Metric-put'%20k-dolgosrochnoj-cennosti-produkta?ysclid=lgde4qtjsl 478692804

T a b l e 4.1

Formation of the development strategy for well-known business ecosystems based on the North Star Metric

Company	Cash Inflow	Customer Base	Consumption of Goods/Services	Level of Customer Engagement	Operational Efficiency	Customer Experience	Applied Strategy
1	2	3	4	5	6	7	8
Airbnb			Number of bookings per day				Rise in the number of transactions
Dropbox		Teams using Dropbox Business					Rise in the number of revenue-generating teams
Duolingo	Revenue			Number of active users per day		Users by language proficiency levels	Rise in number of active users and enhanced customer experience
Netflix			Hours of viewing per month				Increased depth of engagement
Spotify		Subscribers	Listening hours (for podcasts)	Number of active users per month			Increased user engagement and conversion in paying
Tinder		Share of paying users					Rise in the number of paying users
Twitter				Number of active users per day			Increased user engagement
Uber	Gross write-offs	Market share	Number of trips				Rise in transaction volume and speed of the trip

Business ecosystems implementing similar business models often use identical or closely related metrics (see Table 4.1). For instance, marketplaces and platforms employing a transaction-based revenue model primarily focus on transaction volume (number of booked nights, number of trips, or number of placed orders). Among the most

well-known of such business ecosystems are **Airbnb**, **Uber**, and "**Yandex**". Business ecosystems strategically oriented towards expanding their customer base typically use the number of paying users or paying teams as a key metric. Examples of such ecosystems include **Tinder**, which uses the number of paying users as a key metric, and **Dropbox**, which uses the number of teams using Dropbox Business as a key metric. Business ecosystems focused on monetizing web traffic through advertising often use user engagement metrics (such as Daily Active Users - DAU, Weekly Active Users - WAU, or Monthly Active Users - MAU) as key indicators. One of such companies is **Twitter**.

At the same time, many business ecosystems use metrics that is specific to their business models as key indicators. For example, in **Duolingo**, they focus on revenue because a significant share of their users utilize free plans. Additionally, they track the number of active users per day since the number of users with paid plans is proportional to the number of active users. In **Spotify**, there's a greater focus on the metric of podcast listening time since not all active users do so regularly. Similarly, **Netflix** is also focused on viewing time as the intensity of service usage directly impacts customer retention rates.

As mentioned earlier, the North Star Metric is a key indicator that business ecosystems focus on during the process of their development. In other words, the North Star Metric is a beneficial metric that demonstrates the results of the ecosystem's activities and defines long-term goals within the chosen business model. Since such a key metric depends on a variety of factors, when using the North Star Metric, a hierarchical tree is plotted to show which indicators influence the chosen key metric, as well as a list of initiatives to achieve target indicator values. The set of indicators affecting the chosen key metric is recommended to be grouped into four categories[312]:

- Breadth
- Depth
- Frequency
- Efficiency

Therefore, the list of initiatives to achieve target indicator values is also grouped into the four categories mentioned above.

The hierarchical tree illustrates what needs to be done to achieve the target value of the North Star Metric. Figure 4.13 shows an example of plotting a hierarchical tree of the North Star Metric for a marketplace.

The key indicator of the North Star Metric is the number of orders delivered on time per month. In the example provided, the "breadth" category compares indicators of new and returning customers. Within this category, activities are intended to attract new customers and encourage the return the previous ones. The "depth" category relates to the number of items purchased in one order. Activities within this category are aimed at expanding the range of items in an order (product recommendations, offers within various promotions, providing promo codes or coupons, etc.). The "frequency" category relates to the number of monthly orders. Activities within this category are aimed at increasing the number of orders (reminders of discounts on items of interest, notifications of sales, etc.). The "efficiency" category relates to the indicator of the proportion of orders delivered on time. Within this category, activities are intended to enhance the efficiency of the delivery system (improving the delivery system, providing

[312] Ref.: Bolshakova Dayana. Product “North Star” Metric, or North Star Metric – the path to long-term product value. – URL: https://admitad.pro/ru/blog/metrika-polyarnoj-zvezdy-produkta-ili-North-Star-Metric-put'%20k-dolgosrochnoj-cennosti-produkta?ysclid=lgde4qtjsl 478692804

quick feedback to customers, offering customers similar items when the selected item is not available in stock, etc.) [313].

In the provided example of plotting a hierarchical tree for the North Star Metric of a marketplace, the key indicator (number of orders delivered on time per month) is related to influencing indicators by mathematical dependencies:

$$NSM = (NC + RC) \times P \times O \times DR,$$

where: - NSM is the key indicator of the North Star Metric (in the example provided, the number of orders delivered per month); - NC is the number of new customers; - RC is the number of returning customers; - P is the number of items purchased per order; - O is the number of monthly orders; - DR is the proportion of orders delivered on time.

However, in practice, the key indicator of the North Star Metric does not always have a simple mathematical dependency on the influencing factors, as shown in the example provided. Additionally, the influencing indicators mentioned in the example may also depend on a variety of factors. For instance, the number of new customers may depend on their gender, age group, income level, region of residence, and several other factors. Therefore, for each of the influencing indicators, it is also possible to continue building a hierarchical tree characterizing their dependency on the factors influencing them.

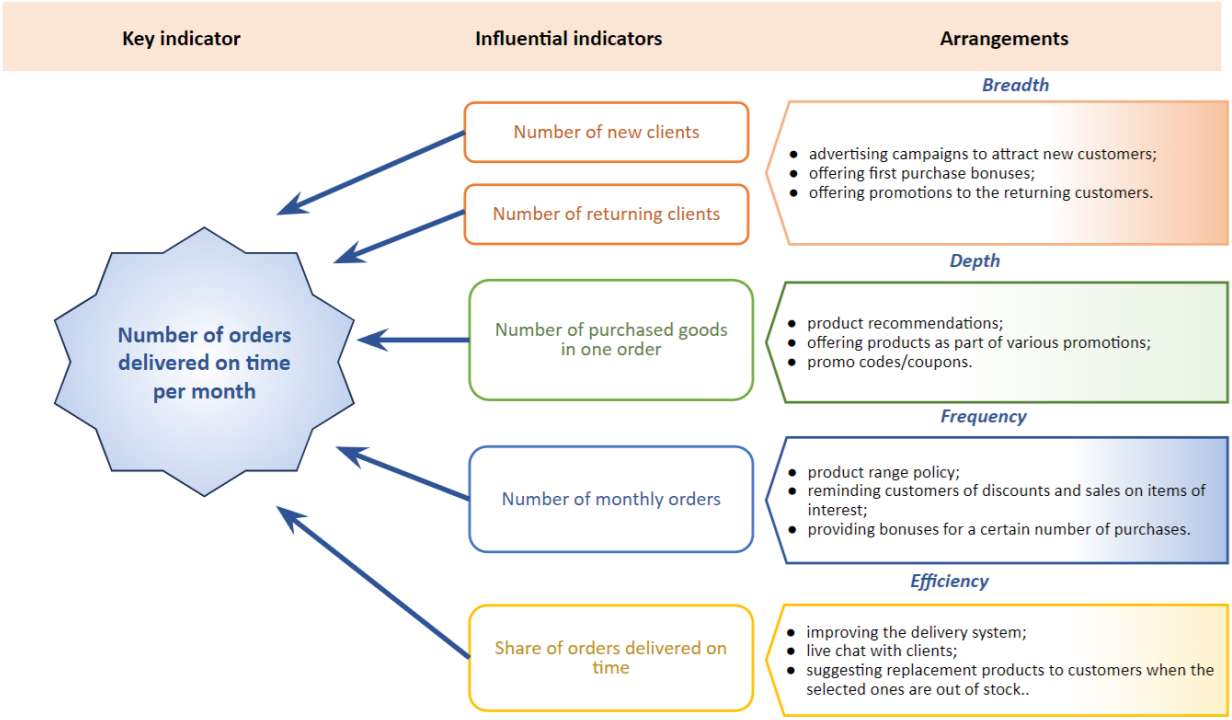


Figure 4.13. Example of a hierarchical tree for the North Star Metric for a marketplace.

The dependency, however, often does not have a strict mathematical relationship and may only be identified through statistical methods. In turn, managerial decisions, implemented as corresponding initiatives, must take into account all factors directly or indirectly influencing the key indicator. For example, if advertising campaigns are conducted to attract new customers, the implementation of such campaigns should

[313] Ref.: Bolshakova Dayana. Product "North Star" Metric, or North Star Metric – the path to long-term product value. – URL: https://admitad.pro/ru/blog/metrika-polyarnoj-zvezdy-produkta-ili-North-Star-Metric-put'%20k-dolgosrochnoj-cennosti-produkta?ysclid=lgde4qtjsl 478692804

consider the characteristics of the targeted audience they are aimed at (gender, age group, income level, etc.).

Thus, conducting quantitative studies of business ecosystems using data analysis methods allows for identifying the main factors influencing their efficiency and ensuring support for managerial decisions.

The first part of this section described the main methods used for data analysis. Let's consider how they can be used for quantitative research of the development patterns of business ecosystems. The first step in quantitative research is preliminary data analysis, during which the available information about the subject of interest is evaluated. In this case, information about marketplace consumers will be considered[314]. For simplification, a relatively small sample of 200 consumers was examined. The indicator of how often a buyer purchases clothing represents a categorical variable using the following rating scale:

1. Once a year or less.
2. Once every six months to a year.
3. Once every 1-3 months.
4. Several times a month.
5. Several times a week or more.

The indicator of how important fashion is to the buyer in clothing, footwear, and accessories represents a categorical variable using the following rating scale:

1. Not important at all.
2. Somewhat unimportant.
3. Somewhat important.
4. Very important.

Indicators: customer level of income and average check per order are calculated in local currency.

Indicator: customer age - full years. All calculations are performed using the IBM SPSS Statistics software.

Table 4.2 provides descriptive statistics for the targeted sample. As seen from the table, the income level of the examined group of customers ranges from 38,000 to 295,000 RUB. The mean value of this indicator is 96,043 RUB. The standard deviation is 47,745 RUB. This means that on average, there is a significant income spread among customers. However, the median value is shifted lower compared to the mean value (76,000 RUB). This indicates that most customers have income slightly below the average. Similarly, other indicators can be analyzed. The average check per order is 15,128 RUB. However, most customers spend 9,000 RUB per purchase. The age of customers ranges from 16 to 35 years old. But the majority of customers are young people aged 17 to 27 years old.

Table 4.2

Plotting Descriptive Statistics for the Marketplace Using IBM SPSS Statistics

Statistical Indicators	Customer Income Level, RUB	Average Check per Order, RUB	Customer Age
Mean	96 043	15 128	22,62
Median	76 000	9 000	22,00
Standard Deviation	47 745	11 822	4,83
Minimum	38 000	3 000	16
Maximum	295 000	42 000	35

[314] Ref.: URL: https://nafi.ru/academy/prepodavatelyam-spss/?ysclid=lh5ttx39js388008999

As seen from the provided example, using descriptive statistics helps to form an understanding of the customers on this marketplace. However, for a more detailed analysis, other statistical methods are necessary.

It's particularly interesting to analyze the presence of statistically significant relationships between individual indicators. For instance, is customer age related to the average check? Or is purchase frequency linked to income level? To answer these questions, correlation analysis is conducted, which helps to identify functional dependencies between two analyzed indicators[315]. When performing correlation analysis, matrices of paired Pearson correlation coefficients are plotted (see Table 4.3). As can be seen from the results the most significant correlation is between customer income level and the average check per order, which is logically sound. Additionally, it's observed that gender significantly influences purchase frequency. Negative correlation between customer age and purchase frequency is notable, indicating that, on average, customers make fewer purchases on this marketplace as they age. As further analysis will reveal, the highest number of purchases is made by customers at the age of 18.

T a b l e 4.3

Plotting a matrix of paired Pearson correlation coefficients using IBM SPSS Statistics

	How often the customer purchases clothing	Customer level of income	Average purchase amount	Customer age	Customer gender
How often the customer purchases clothing	1	0,242	0,177	–0,342	0,320
Customer level of income	0,242	1	0,753	0,200	0,183
Average purchase amount	0,177	0,753	1	0,081	0,234
Customer age	–0,342	0,200	0,081	1	–0,315
Customer gender	0,320	0,183	0,234	–0,315	1

There is also an evident correlation between the income level of customers and the frequency of purchases. It is important to note that the produced results of the correlation analysis help to identify statistical patterns within the entire sample. However, the composition of this sample may be heterogeneous, meaning that within the analyzed group of customers, separate subgroups may form, each of them may significantly differ from others in their consumer preferences. As mentioned above, cluster analysis is most often used for this purpose, being one of the most commonly used methods of data classification. In this case, a two-stage cluster analysis was used to identify and subsequently analyze consumer groups, allowing for a detailed analysis of each of the identified consumer subgroups. As a result of the cluster analysis, two clusters were identified, their characteristics are presented in Table 4.4. For categorical variables, the %age of the most frequently encountered category is indicated in brackets.

[315] Ref.: Bobkov A. L. Research into patterns of organizational development: theory and practical application: monograph. – M. : Rusayns, 2022.

The results of a cluster analysis of customers revealed two subgroups among the marketplace customers. The first subgroup (cluster 1) includes two-thirds of all surveyed customers. For these customers, it is important to follow fashion trends, so they purchase clothing quite frequently (once every 1–3 months or more[316]). The majority of customers assigned to this cluster are young women (with an average age just under 21 years old), willing to spend significant amounts on fashion (average purchase amount - 18,928 RUB, which is above the average purchase amount for all analyzed customers). The second subgroup (cluster 2) includes one-third of all surveyed customers. The overwhelming majority of them are men (over 80%), with an average age just under 26 years old. For them, fashion is not as important, so they purchase clothing relatively randomly (once every six months to a year or less) and are not willing to spend much money on it (average purchase amount - 7,750 RUB, noticeably below the average purchase amount for all analyzed customers).

T a b l e 4.4

Results of cluster analysis of customers using IBM SPSS Statistics

Indicators	Cluster 1	Cluster 2
Number of analyzed customers	132 (66%)	68 (34%)
How important fashion is for the customer in clothing, footwear, accessories	Important (55,3%)	Somewhat important (86,8%)
How often the customer buys clothes for themselves	once every 1–3 months (38,6%)	once every six months to a year (39,7%)
Customer age	20,93	25,90
Customer gender	female (68,9%)	male (80,9%)
Average size of the order	18 928	7 750
Customer income level	108 561	71 743

Therefore, based on the results of the cluster analysis, it can be seen that the key customers of the marketplace are young women around the age of 21, willing to spend significant amounts on fashion.

It is important to note that to raise the revenue, to achieve planned targets of attracting new customers and increase the number of orders per month may not be sufficient. It is also necessary to increase the average order value. To address this, the main factors affecting the average order value need to be identified. Typically, regression analysis methods are used for such tasks[317]. In this case, a decision tree will be used, which will allow both to identify the main factors influencing the average order value and to predict their numerical values.

The decision tree was plotted using the CHAID method. The dependent variable chosen was the "average check per order." The results of the decision tree are presented in Figure 4.14. The decision tree consists of two levels and contains 3 terminal nodes. The root node includes 200 observations.

316 Ref.: When using two-stage cluster analysis in IBM SPSS Statistics, you can display detailed information about the distribution of variable values within each cluster. This information was not included in table 4.4.

317 Ref.: Bobkov A. L. Research into patterns of organizational development: theory and practical application: monograph. – M. : Rusayns, 2022.

As seen in Figure 4.14, the "average check per order" is directly influenced by the customers' income level. This is quite evident considering the high value of the Pearson correlation coefficient for these two variables (Table 4.3).

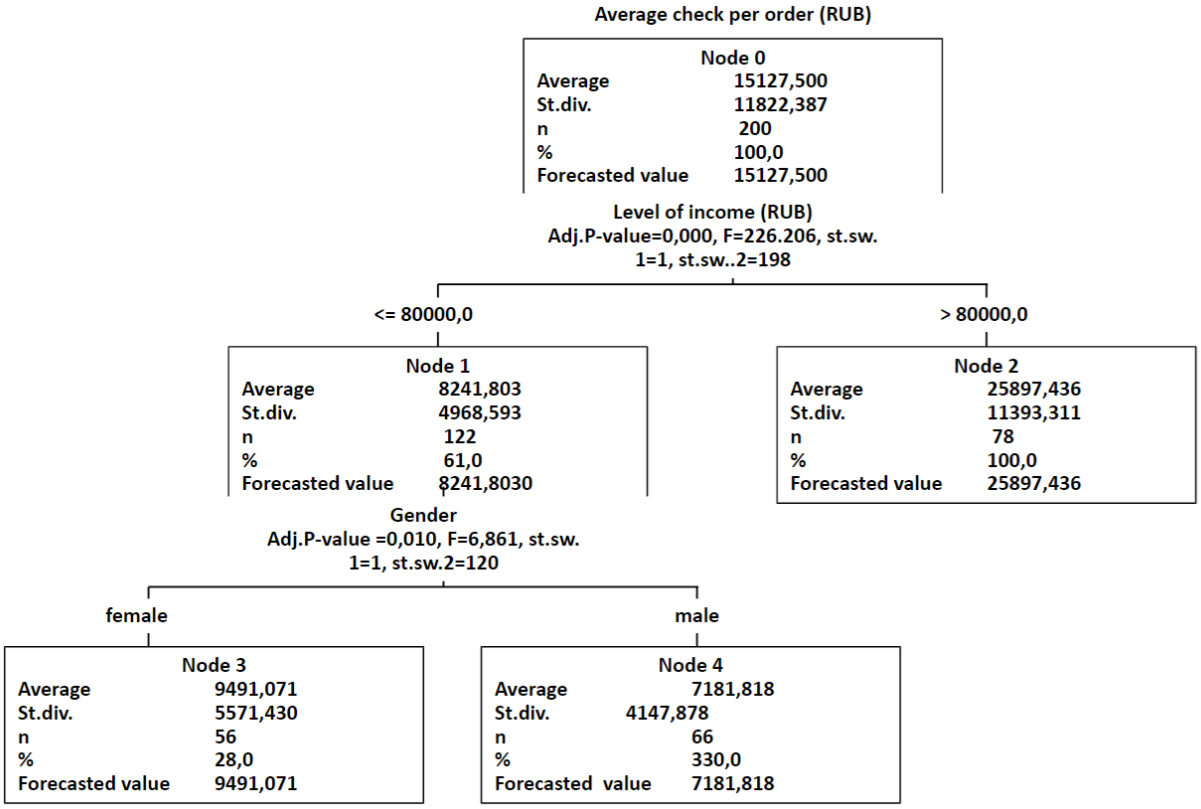


Figure 4.14. Results of decision tree applying IBM SPSS Statistics

It becomes clear that customers with an income exceeding 80,000 RUB on average purchase goods worth 25,897 RUB per order. This group makes up for 39% of all marketplace customers. Among customers with income of 80,000 RUB or less, two slightly different-sized groups stand out: women (28% of all customers), who on average spend 9,491 RUB per order, and men (33% of all customers), who on average spend 7,182 RUB per order. The decision tree once again confirms the result obtained from the cluster analysis: women spend more on purchases than men even with comparable income levels.

Therefore, summarizing the results of the conducted research on buyers, we can make a conclusion that the key clients are young women around the age of 21 with a relatively high-income level (exceeding 80,000 RUB), willing to spend significant amounts on purchasing fashion items.

The outcome results will enable the marketplace management to more effectively organize promotions and develop product range policies to achieve planned targets for key performance indicators such as the number of new customers, the number of returning customers, the number of items purchased per order, and the number of monthly orders, as selected within the developed North Star metric (Figure 4.13). For instance, more frequent updates of the product range for women based on the latest fashion trends, expanding the product range with brands, organize advertising campaigns targeting the identified target audience, and more.

The structure of the section is shown on the flowchart (Figure 4.15).

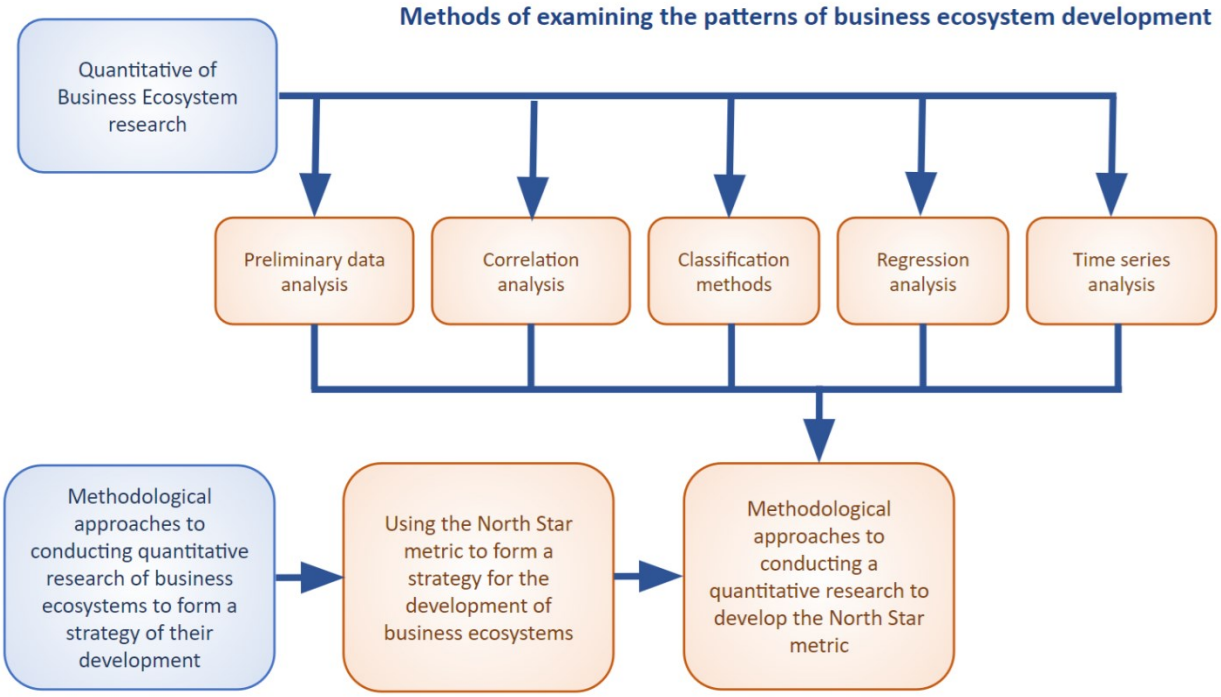


Figure 4.15 Flowchart

Control Questions

1. What is the essence of correlation analysis? Provide examples of using correlation analysis to solve economic problems.
2. What is the essence of cluster analysis? Provide examples of using cluster analysis to solve economic problems.
3. What is the essence of regression analysis? How is the accuracy of the regression equation quantitatively evaluated?
4. What is the purpose of time series analysis? Provide examples of using time series analysis to solve economic problems.
5. What does the North Star metric represent? Provide examples of using the North Star metric for business ecosystems.
6. How does the use of data analysis methods help to form a strategy for developing business ecosystems?

Practical Immersion Material

Case Study:

Analysis of the "Yandex" Ecosystem[318]

Today "Yandex" ecosystem is the largest Russian technology company, being used by almost every resident of Russia and the CIS countries. Having evolved from a search engine created in 1997 to a platform ecosystem combining over 90 services by 2023, the current market capitalization of "Yandex" reached 979 billion RUB. The active audience of the company's products exceeds 61.5 million people per month. Comparing "Yandex"

[318] Ref.: The case is based on official data from Yandex, given in the company's report as of October 27, 2023.– URL: https://yastatic.net/s3/ir-docs/events/2023/IR_3Q2023_RUS.pdf

with global ecosystems such as Google, Alibaba.com, and Amazon demonstrates excellent potential for further development in the international market. Therefore, studying the history of "Yandex" ecosystem and analyzing its current services will provide deeper insights into various ecosystem strategies and their functioning specifics in the Russian market.

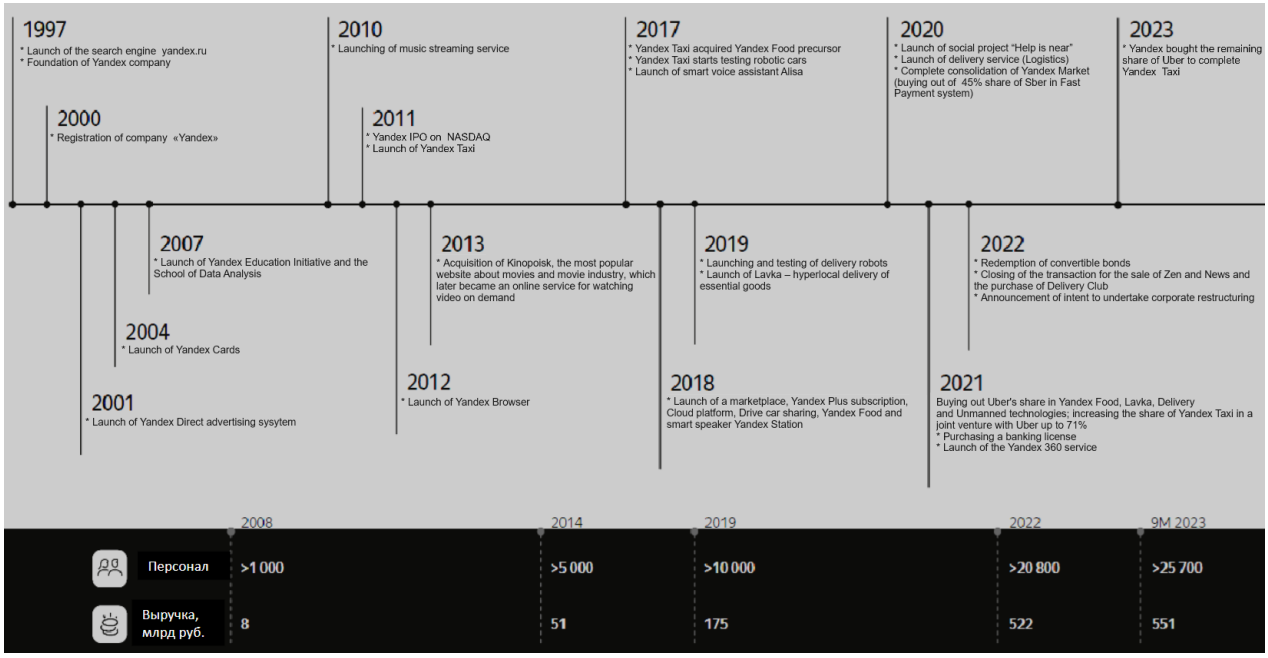


Figure 4.16. Key Events and Dates of the "Yandex" Ecosystem[319]

Figure 4.17. "Yandex" - a platform of over 90 services used by millions of people every day[320]

[319] Ref.: The case is based on official data from Yandex, given in the company's report as of October 27, 2023.– URL: https://yastatic.net/s3/ir-docs/ events/2023/IR_3Q2023_RUS.pdf

[320] Ref.: The case is based on official data from Yandex, given in the company's report as of October 27, 2023.– URL: https://yastatic.net/s3/ir-docs/events/2023/IR_3Q2023_RUS.pdf

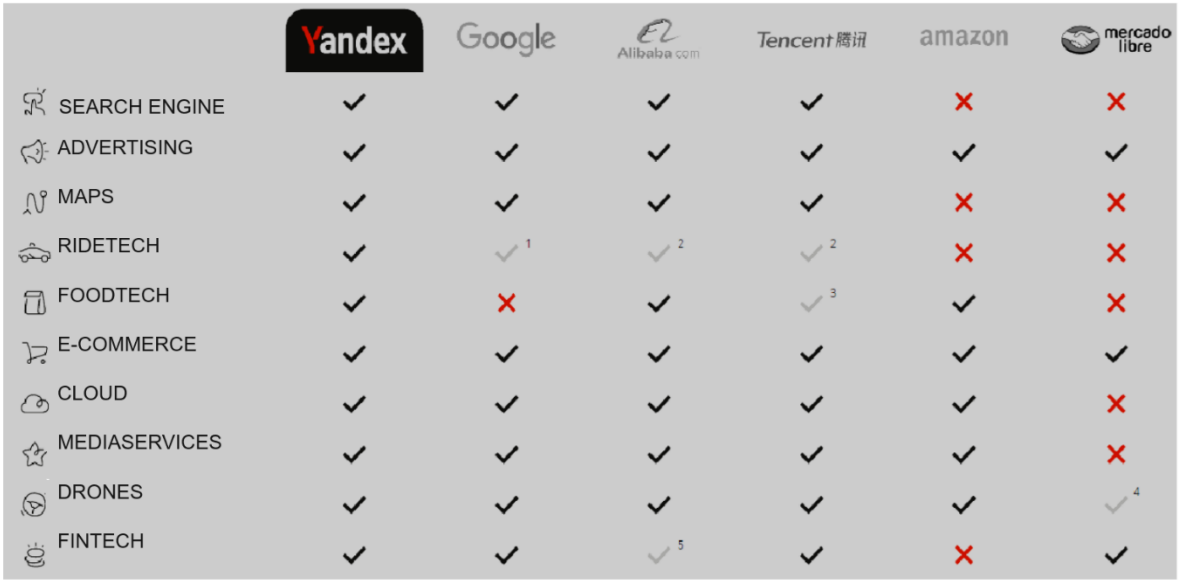


Figure 4.18. Position of "Yandex" in the global market[321]

Task 1

Based on your user experience, open sources, and data from the company's official website URL: https://ir.yandex.ru/, offer metrics and plot a hierarchical tree of the North Star metric for any three product services of the "Yandex" ecosystem. Highlight patterns, similarities, and differences in the audience of the selected services and their promotion and development strategies.

Task 2

Using the online service of each product from the previous task, data from the company's website URL: https://ir.yandex.ru/, and the similar web service (URL: https://www.similarweb.com/ru/website), generate values for the proposed metrics (or similar ones available in open access) and build descriptive statistics for each product. Develop a descriptive representation of the customers/users/audience of each service. Using Pearson's correlation coefficient, determine the presence or absence of statistically significant relationships between individual indicators of the examined services. If there is a sufficient amount of data, classify users/audience of the service using cluster analysis and describe the obtained results. Statistical analysis is recommended to be done using software such as Excel, IBM SPSS Statistics, Statistica, MatLab, etc.

Task 3

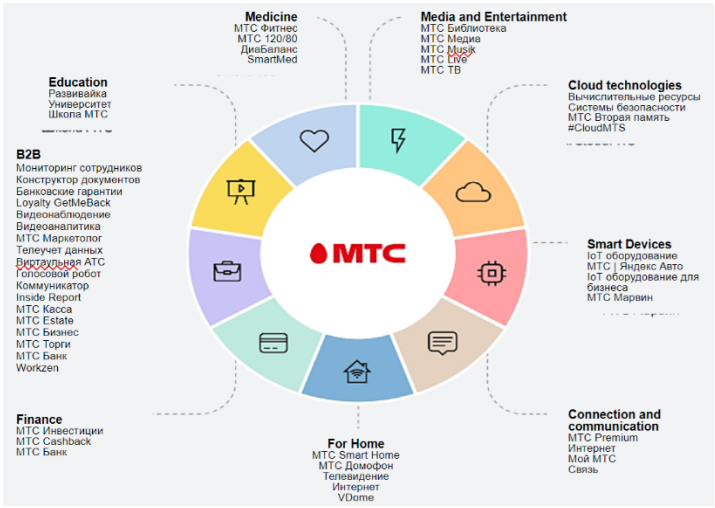
In addition to the IT company "Yandex," many banks, marketplaces, telecom, and industrial companies are developing their ecosystems in Russia. Based on open data about existing Russian ecosystems and using the data from Figure 4.19, analyze the North Star metrics and propose development strategies for any eight Russian business ecosystems, including "Yandex."

You can use Table 4.1 as a template for completing the task. To make an ecosystem analysis and develop North Star metrics, it is recommended to use the following analytical services:

URL: https://www.similarweb.com/ru/website/yandex.ru/#traffic

[321] Ref.: The case is based on official data from Yandex, given in the company's report as of October 27, 2023.– URL: https://yastatic.net/s3/ir-docs/events/2023/IR_3Q2023_RUS.pdf

URL: https://wordstat.yandex.ru/
URL: https://trends.google.ru/trends/
URL: https://radar.yandex.ru/search
URL: https://www.similarweb.com/website/yandex.ru/#overview



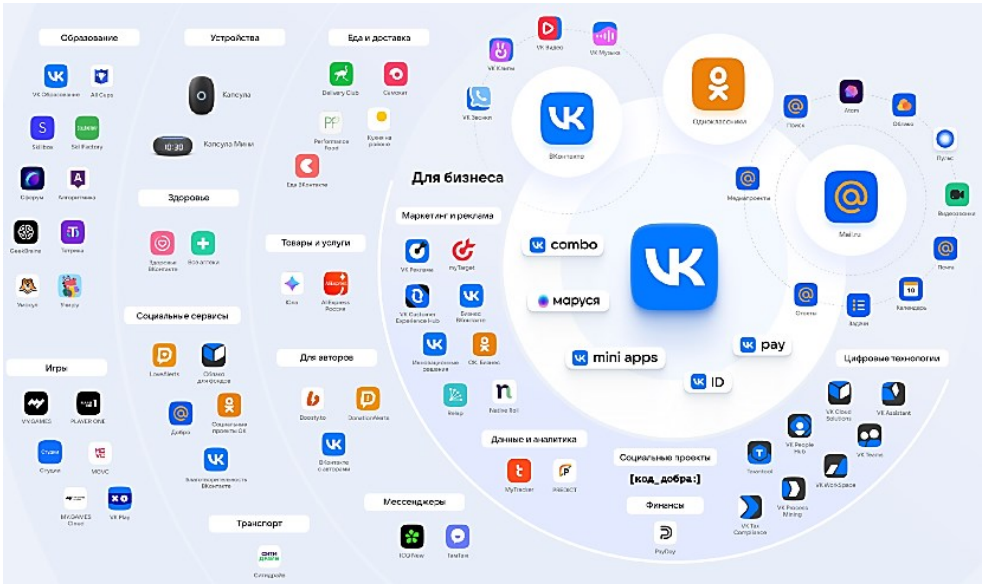


Fig. 4.19. Examples of Russian business ecosystems

4.4. Artificial Intelligence in Business Ecosystem Management

As earlier stated, the term "ecosystem" was first introduced in 1935 by the British botanist Arthur Tansley. Meanwhile many scientists have studied the interaction of individuals in the environment.

It is obvious that the biotic community, which initially represented the ecosystem, is a holistic system that includes a set of interacting organisms (system elements) united by a common goal:

1) The primary goal is to support viability at a sufficient level to meet the requirements for survival in a changing environment (this goal is conditioned by the basic need for self-preservation, physical safety, resistance to threats, and various destructive factors);

2) The secondary goal is the subsequent development of internal potential, increasing the degree of stability, security, and independence (this goal is conditioned by the need for development and improvement).

Thus, it can be said that individual organisms integrate into a community to possess a new qualitative property - greater resilience and viability, where each element (organism) is benefiting as a result.

In the early 1990s, business strategist James Moore suggested utilizing the idea of the functioning, development, and interaction of an ecosystem in relation to business entities (organizations, companies, enterprises, firms). Based on this, a company is considered not as an individual player, rather as a participant in a comprehensive business ecosystem, encompassing many participants from different industries.

Moore suggested considering the life cycle of the ecosystem from the perspective of 4 stages:

1) Emergence;

2) Expansion;

3) Leadership;

4) Self-renewal (restructuring of the business portfolio, rebranding, reprofiling of activities, etc.).

When transitioning to the final (fourth) stage, another outcome is possible - the so-called "disappearance" (collapse, dissolution, winding down of activities, exit from the market). Table 4.5 shows the stages of the business ecosystem life cycle, reflecting J. Moore's vision.

Table 4.5

Generalized Model of the Business Ecosystem Life Cycle[322]

Stage	Collaboration Challenges	Competition Challenges
Emergence	Collaboration with suppliers and consumers to create a new value proposition around innovation	Designing own ideas based on ideas introduced by other participants related to corresponding issues
Expansion	Moving from a new proposal to capturing a larger share of the targeted segment through collaboration with suppliers and partners to expand and maximize segment coverage	Lack of alternative implementation of similar ideas. Important aspect: the chosen approach should be a market standard in the selected segment.
Leadership	Designing of an "irresistible" vision of the future aspect for suppliers and clients for joint work and further improvement of the value proposition	Maintaining negotiation power with other players in the ecosystem, including key customers and valuable suppliers
Self-renewal	Working with innovations to introduce new ideas into the existing ecosystem	Maintaining high entry barriers to prevent the creation of alternative ecosystems by others. Maintaining trusting relationships with customers to obtain valuable information and use it for creating new value

In reality, there are no clear boundaries between the stages. The process of co-evolution—complex interaction between competitive and cooperative business strategies—remains constant.

Within a systemic approach, each individual organization (business unit) is not just an independent unit and system combining multiple elements but itself is an element in a broader system (community) described in contemporary management as a "business ecosystem." Therefore, as noted by J. Moore, "innovative business structures cannot function in a vacuum space. They must attract resources of any kind, including capital, business partners, customers, and create integrated communities based on this foundation",[323] transitioning from a random set of elements to an coherent community in the format of an ecosystem.

If we continue looking into the analogy between the functioning of biotic communities and business ecosystems, it's worth noting that the idea of rigid, destructive competition has become a history, and the new reality - is mutually beneficial cooperation that benefits all participants of the community (ecosystem). Common goals and interests make cooperation the basis of ecosystem business. In this context, when creating new value, focus shifts towards responding to quickly changing consumer demands. In a more

[322] Ref.: Moore James F. Predators and Prey: A New Ecology of Competition // Harvard Business Review. – 1993. – No. 5. – URL: https://hbr.org/1993/05/predators-and-prey-a-new-ecology-of-competition

[323] Ref.: Moore James F. Predators and Prey: A New Ecology of Competition // Harvard Business Review. – 1993. – No. 5. – URL: https://hbr.org/1993/05/predators-and-prey-a-new-ecology-of-competition

advanced form of interaction within the business ecosystem, anticipation of changes in these demands becomes essential, justifying the existence of another competency—strategic vision or change management, which is achievable for a business community that is having the status of innovator, creator, or "trendsetter."

Behavior models of the business ecosystem in creating value, largely determined by its financial capabilities and internal potential, reflected in its "status," are presented in Figure 4.20.

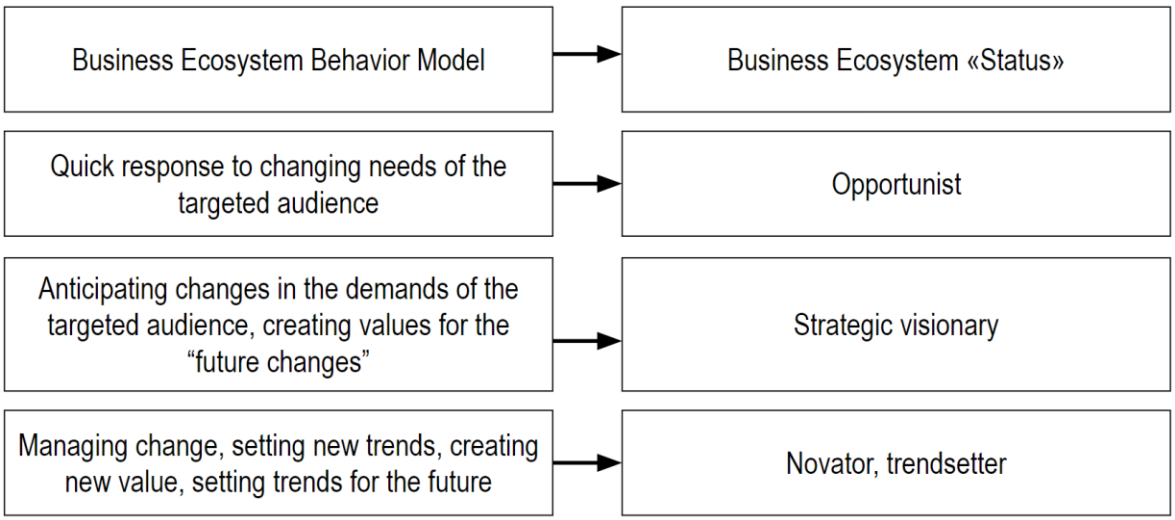


Figure 4.20. Behavior Models and Statuses of Business Ecosystems

The above represents that the status of an ecosystem reflects its customer orientation, its relationship with the target audience, which, in turn, is part of this system (community).

Business ecosystem focuses on solving specific business problems (in cooperation with legal entities) or everyday problems (in cooperation with individuals) and utilizes corporate resources (intellectual capital, physical labor, intangible assets, fixed capital, material resources, finances, relationships with counterparties, information) to implement a specific value proposition. The business ecosystem represents a distinctive management model—distinct from other ways of creating value (classical bureaucratic organizations, organizations with rigid hierarchical management, vertically integrated structures, project firms, niche enterprises) and competes successfully with these approaches.

Experts from the Boston Consulting Group, Ulrich Pidun, Martin Reeves, and Maximilian Schüssler, define a business ecosystem as "a dynamic group of relatively independent economic agents creating products or services that together constitute a coherent solution." [324] Based on this, each ecosystem is characterized by a specific value proposition and a clearly defined (though periodically changing) group of participants (economic agents) with different roles and functions (producer, supplier, coordinator, distributor, dealer, etc.). In a broader sense, the concept of a "business ecosystem" implies communities in various areas and in different formats of interaction, such as[325]:

– Trading platforms (marketplaces) (Amazon, eBay, Taobao);

[324] Ref.: Ulrich Pidun, Martin Reeves, Maximilian Schüssler. Do You Need a Business Ecosystem? Corporate Strategy. – URL: https://www.bcg.com/publications/2019/do-you-need-business-ecosystem
[325] Ref.: Same source.

– Hospitality businesses (Airbnb, TripAdvisor, Open Table);
– Companies specializing in outsourcing services (providing freelance workforce) (Upwork, Croogster, Fiverr);
– IT systems (Microsoft Windows, Apple iOS, Android, SAP NetWeaver);
– Offerings integrating components from different players (video games, e-books, smart home systems, solutions for solar energy in residential spaces, Internet of Things services);
- Offerings combining services from different providers (credit card systems, platforms for disease management, solutions for precision agriculture).

The experts from the Boston Consulting Group highlight the following distinctive features of business ecosystems (see Table 4.6).

T a b l e 4.6

Distinctive Features of Business Ecosystems[326]

Feature	Characteristic	Example
Modular approach	Unlike vertically integrated structures and other hierarchical systems, in business ecosystems, components of the value proposition are developed separately, but at the "integration" stage, the value proposition functions as a whole. The consumer can choose either the entire proposition or its individual components.	When purchasing a product, the consumer may opt out connecting to additional applications.
Customization	Unlike open market models, the contribution of ecosystem participants adapts to it. Participation in the community (ecosystem) requires a specific contribution inherent to that particular business ecosystem. Therefore, "entering" a specific business ecosystem, a participant (company, enterprise, firm, freelancer) must accept its "rules of the game."	For example, a manufacturer of a specific product, when entering into a contract with a multi-brand store, must consider the latter's requirements for promoting goods to maximize value for the consumer.
Systematic and multi-facticity	Unlike open market models, ecosystems imply a set of interrelationships that cannot be reduced to the level of bilateral interaction. Based on this, the entire complex of possible relationships is taken into account, arising from transactions with various participants (agents): suppliers, financial and credit institutions, application developers, marketplaces, etc.	For example, a successful contract between agents A and B (phone manufacturer and application developer) can be undermined by the non-performance of the contract between A and C (phone manufacturer and telecom service provider).
Coordination	Unlike vertically integrated structures and hierarchical systems, business ecosystems are controlled to a greater extent at the institutional level (through standards, rules, processes, and procedures) rather than at the hierarchical level.	On digital platforms, access and interaction are usually regulated by a set of application programming interfaces (APIs).

In addition to the characteristics listed in Table 4.6, it is advisable to note of another one - the active process of applying information technology, in particular, artificial intelligence (AI). In a sense, informatization reflects the process of integrating information technologies into various aspects of modern human life - socio-cultural, socio-economic, educational, scientific-technological, political, bureaucratic.

[326] Ref: Ulrich Pidun, Martin Reeves, and Maximilian Schüssler. Do You Need a Business Ecosystem? Corporate Strategy. – URL: https://www.bcg.com/publications/2019/ do-you-need-business-ecosystem

Pioneers in the field of implementing information technologies into current activities are companies that simultaneously create these technologies as a final product with corresponding value for consumers. As a result, information technologies are used as an economic resource (factor of production) involved in operational processes on one hand, and are the result of a company's work, reflected in the form of an economic good with value and promoted in the target segment, on the other hand. These include electronic manufacturers (particularly Apple, Xiaomi, Honor), digital search systems (particularly "Yandex"), software products inventors (particularly Skillbox), financial institutions (particularly Sberbank, Tinkoff), and others.

However, the application of informatization and digitalization technologies is not limited to the framework of business entities creating value in intangible forms; whether it's searching for information in a search engine, distance learning, or applying for a loan online. Companies producing tangible goods are equally actively involved in the information space, using information technologies as one of the factors of production to solve operational tasks at the level of secondary business processes - logistics processes, online order processing, maintaining feedback with customers, and so on. This difference becomes evident when forming business ecosystems of two types:

1) Those involved in the IT industry and companies directly operating in the information space create business ecosystems “revolve” around everyday needs satisfied through the provision of online services (ordering goods, purchasing tickets, organizing trips and travels, leisure and entertainment, arranging banking products).

2) Companies from the real sector of the economy, producing tangible goods and utilizing information technologies as one of the aspects of production, create business ecosystems aimed at maximizing value by combining complementary options in addition to the core product (to increase the competitiveness of producers of tangible goods, mending the production function is not sufficient, so the process of maximizing value is now enriched with additional benefits - payment systems, marketplaces, developers of applications and software products, SMM platforms (Social Media Marketing - marketing in social networks).

The described differences between the two types of business ecosystems can be represented in the form of a model (Fig. 4.21).

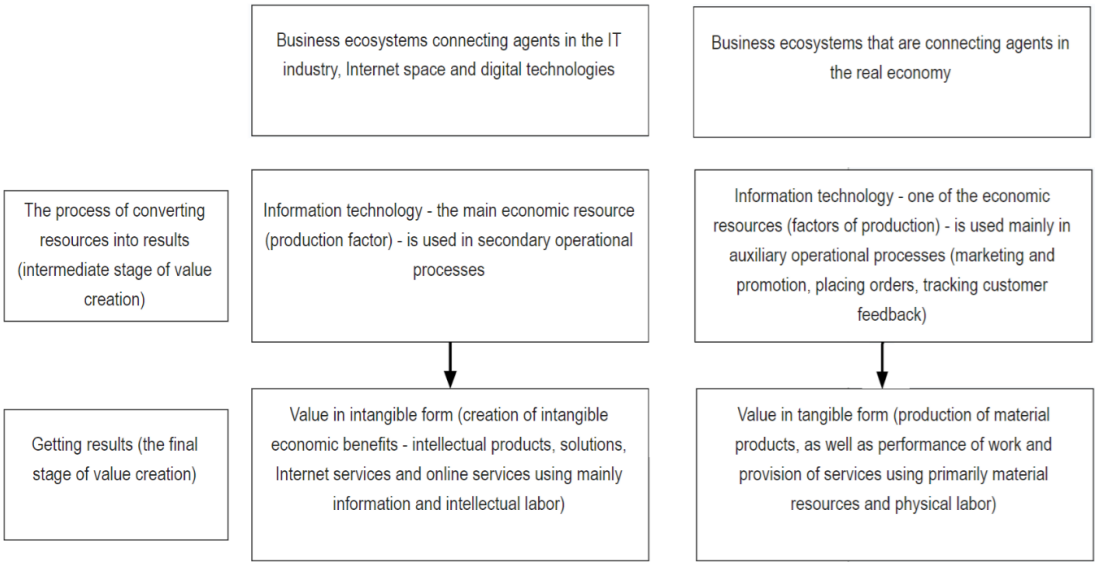


Figure 4.21. Distinguishing Features of Business Ecosystems in the Information Environment and the Real Sector of the Economy

Artificial intelligence as a technology, allowing a system (machine, computer, program, application) to perform tasks on a rational basis and at a certain level simulate human logic in making simple (typical, homogeneous, standardized) managerial decisions, contributes to a more coherent coordination of actions of individual chains within the community (business ecosystem).

Artificial intelligence emerged as a theory and method of creating computer programs capable of performing cognitive work carried out by the human brain. Even in Ancient Greece, attempts were made to understand human reasoning: Aristotle invented logical thinking. However, the theoretical grounds for creating the science in artificial intelligence emerged much later, in the 17th century. The next step was the work of Wilhelm Schickard, who in 1623 built the first mechanical digital computing machine, followed by the machines of Blaise Pascal (1643) [327] and Leibniz (1671) [328]. Leibniz was also the first to describe the modern binary numbering system, although before him this system was occasionally explored by many great scientists.

In 1832, the collegiate assessor S.N. Korsakov put forward the principle of developing scientific methods and devices to enhance the capabilities of the mind and introduced a series of smart machines, where perforated cards were first used in the history of computer science[329].

The first computer models, inspired by the principle of the operation of neural connections in the human brain, were developed before the emergence of expert systems in the 1940s. They affected the development of information systems that assist humans in decision-making. In the 1950s, appeared expert systems that describing the algorithm of actions for selecting a solution depending on specific conditions. Based on research data, engineers and scientists began to make attempts to develop artificial intelligence.

In 1950, mathematician Alan Turing proposed a set of criteria by which a machine could be considered thinking. The term "artificial intelligence" was introduced two years after Alan Turing's death, but the work of the revolutionary British mathematician laid the foundation for major discoveries in this field. Turing, best known for breaking the Enigma code during World War II, which German military used for message exchange, laid the groundwork for computer science and formalized the concept of an algorithm.

The beginning of the scientific discipline called "artificial intelligence" took place in 1956. That summer, a group of 10 scientists gathered at Dartmouth College in the United States for a seminar to discuss the possibility of creating programs capable of exhibiting intelligent behavior. Among the participants of the seminar were John McCarthy, Marvin Minsky, Herbert Simon, and Allen Newell. The idea of "artificial intelligence" was born at the Dartmouth seminar, dividing science into natural sciences and sciences of the artificial and raising the question of how they differ from each other. The answer to this question was provided in Herbert Simon's work "The Sciences of the Artificial," which was published in 1969 (translated into Russian in 1972) [330].

John Brockman suggested that the term "artificial intelligence" is meaningless; he preferred "created intelligence." Perhaps his term indeed has several advantages, but nevertheless, the phrase "artificial intelligence" (as well as its acronym AI) has become so

[327] Ref.: Anglin W. S., Lambek J. The Heritage of Thales. – USA : Springer, 1998.
[328] Ref.: Bacon F. The Advancement of Learning. – Book 6.
[329] Ref.: Casamayor A., Amandi A., Campo M. Intelligent Assistance for Teachers in Collaborative E-learning Environments // Computers & Education. – 2009. – Vol. 53. – No. 4. – P. 1147–1154.
[330] Ref.: Anthes G. Artificial Intelligence Poised to Ride a New Wave // Communications of the ACM. – 2017. – No. 60 (7). – P. 19.

popular both in specialized literature and in colloquial language that changing it now would be pointless.

The term "artificial intelligence" first became known in the early 1960s. However, a clear understanding of its essence and purpose came only in 1969 when a landmark conference "International Joint Conference on Artificial Intelligence" took place in Washington.

The definition of the term "artificial intelligence" varies significantly among different researchers. Nevertheless, all these definitions come down to one key idea: "artificial intelligence is a human-created system capable of emulating the solution of complex tasks typically performed by humans in their activities." This concept was extensively described by academician V. M. Glushkov in the "Dictionary of Cybernetics" (1979). The keyword in this definition is "emulating": artificial intelligence systems can solve complex problems similar to humans, but they may do so in ways different from how humans do it.

Today, the understanding of the essence of artificial intelligence covers a wide range of algorithms and software systems, distinguished from others by their ability to solve problems using various solution methods.

The essence of artificial intelligence lies in the creation of computer systems capable of analyzing and interpreting information, extracting knowledge from vast amounts of data, drawing conclusions, and making decisions based on the acquired information. However, artificial intelligence is not an ideal replacement for human intelligence – this task cannot yet be completely solved. Computer systems still have their limitations and are not always able to adequately analyze and process complex tasks that require a high level of non-standard thinking. Nevertheless, artificial intelligence is constantly evolving and improving, finding increasingly more applications in various areas of our lives, including its application in business ecosystems.

According to the most commonly used definition, "artificial intelligence (AI) is the property of intelligent systems to perform creative functions traditionally considered the prerogative of humans."

The goals of artificial intelligence include perception, reasoning, and learning. Simple algorithms are used in basic rule-based applications, while more complex algorithms support strong artificial intelligence based on machine and deep learning (see Fig. 4.22).

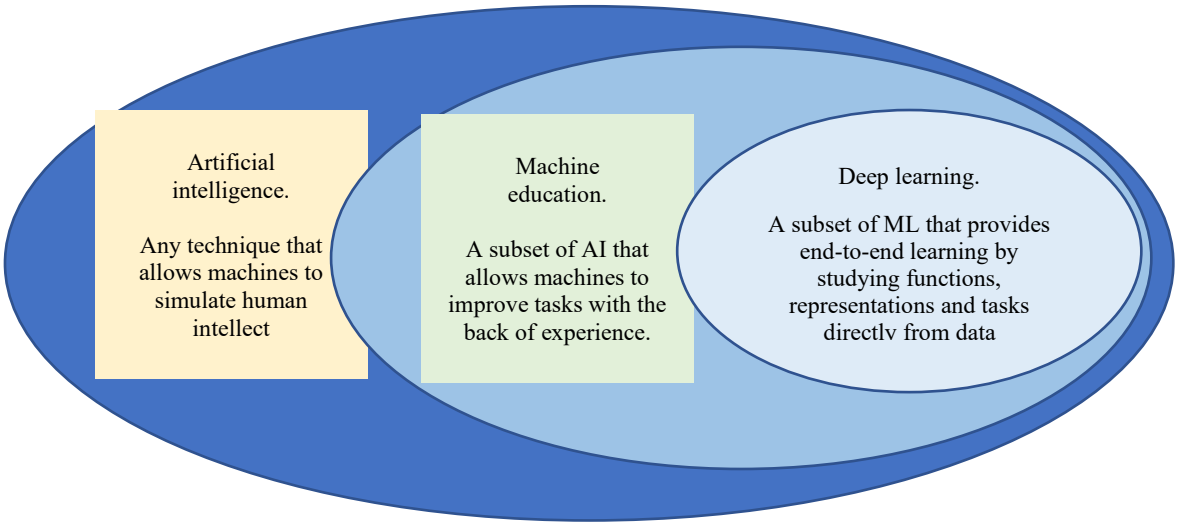


Figure 4.22. Essential characteristics of artificial intelligence

In the most general terms, AI reflects the ability of the machine systems to perform functions that were traditionally considered the prerogative of human cognitive activity.

For example, the development of a detailed business plan, including descriptive and financial parts, is considered a complex task requiring significant intellectual and time investment. However, with the implementation of professional software products (such as Project Expert, COMFAR, Alt-Invest), the development of a high-quality project business plan or similar tasks require less effort. While human involvement remains central in defining the concept of the business model, describing the product, plotting the product matrix, and inputting correct data, routine actions (such as revenue, cost, profit, break-even point calculations) are successfully performed by the program. Another example of machine system task execution is the implementation of specialized AutoCAD software in engineering design. The AutoCAD software, designed for creating diagrams, charts, and engineering projects in Mac OS and Windows, allows users to design various objects in 2D and 3D formats. Users can create signature production drawings, simulate real objects in the form of models and structures, and animate these objects, such as simulating machine operation or modeling a virtual tour of a house.

The goals of AI application reflect three components: perception, reasoning, and learning[331]. Achieving these goals is done using a systemic approach, reflected in two types:

1) General-purpose approach;

2) Special-purpose approach[332].

The first is applied to solving a wide range of problems and issues, while the second is used for solving a specific task. It should be noted that the simulation of human intellectual activity by artificial intelligence can be exercised through various approaches. Three main research directions in the field of artificial intelligence can be distinguished: heuristic (or informational), bionic, and evolutionary.

The *heuristic* (or informational) approach is based on searching for problem-solving methods and alternative solutions developed from experience or intuitive knowledge. Within this approach, algorithms and methods are developed that allow processing information, making logical deductions, and making decisions similar to those made by humans.

The second approach - *bionic*, is based on studying and simulating biological systems, such as the brain or nervous system. This approach aims to create computer models that can simulate the functioning and behavior of real systems. It includes the application of machine learning methods, neural networks, and genetic algorithms.

The *evolutionary* direction is based on the principles of natural selection and evolution. Within this approach, computer programs and algorithms are created that can autonomously change and evolve during operation, adapting to new conditions or requirements. The evolutionary approach is often used to create greatest solutions.

Each of these directions has its own advantages and disadvantages, and depending on the task, the most suitable approach can be chosen. Artificial intelligence is a multifaceted research field, and new ideas and methods are constantly emerging to move closer to the creation of truly intelligent systems.

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[331] Ref.: Badma-Goryaev A. M., Khodykova N. V. Artificial intelligence and ecosystems: essence, connectivity, development trends // Bulletin of the Institute. – 2021. – № 2 (43). – URL: https://cyberleninka.ru/article/n/iskusstvennyy-intellekt-i-ekosistemy-suschnost-svyazannost-tendentsii-razvitiya/viewer

[332] Ref.: Same source

In practice, the application of AI technology covers various areas of human activity: marketing and brand management; services in the banking and financial sector; education and professional development; healthcare; bureaucratic procedures; organization of leisure and entertainment. However, the most extensive object of AI application is modern business ecosystems.

Earlier, it was noted that a biotic community, consisting of a certain number of interrelated organisms, is driven by two goals:

1) Basic goal - survival, self-preservation, and maintaining viability at a level necessary for elementary functioning;

2) Secondary goal - development of internal potential. Drawing an analogy between biotic and social systems (business systems), a similar priority in goal achievement is observed:

- The basic goal - self-preservation of the business ecosystem;
- Its development, increasing competitiveness, and moving towards new "heights."

On this basis, the dual role of AI in the development of business ecosystems can be identified. On the one hand, AI is a vital necessity - a technology that must be applied, lacking one would make normal coordinated functioning of the business ecosystem impossible. On the other hand, AI is a competitiveness factor, as ignoring information technologies and AI can lead a company to lag behind and weaken its market positions.

Among the main directions of artificial intelligence development, the following can be highlighted:

1. Speech generation and recognition: This is crucial for efficient human-computer interaction. These systems significantly increase the speed of information input and provide the ability to control the computer using voice commands.

2. Visual information processing: This deals with various tasks related to the analysis, synthesis, and transformation of images. One of the primary tasks of image processing is modifying graphic images to create new ones.

3. Learning and self-learning: This includes models, methods and algorithms designed for automatic accumulation and generation of knowledge using procedures for analyzing and summarizing data. Systems for data mining and knowledge discovery are developed in this area.

4. Pattern recognition: This is an important direction that allows for the classification of objects and determining their appliance to specific classes. Classes in this context are defined by certain values of object features.

5. Machine creativity: This involves the combination of computer technologies and creative imagination, resulting in the creation of original and innovative art. Machine creativity finds its application in areas like computer music composition, poetry generation, and the creation of intellectual computer games. However, machine creativity not only entertains but also educates. Computer games provide unique tools for learning and developing various skills. They can be used to train cognitive abilities, improve reflexes, and develop communication and cooperative skills.

6. Artificial intelligence system software: specialized programming languages are widely used, designed for processing symbolic information, such as LISP, SMALLTALK, and REFAL, as well as for formalizing knowledge and logical relationships in systems (PROLOG). Programming languages such as OPS 5, KRL, and FRL are used for knowledge representation. They allow for describing knowledge and inference rules, which is a key element in creating intelligent systems. Integrated programming environments, such as KE, ARTS, GURU, and G2, provide the conditions for developing, testing, and debugging intelligent systems in a unified environment, while expert system shells such as BUILD,

EMYCIN, EXSYS Professional, and EXPERT greatly simplify the creation of application systems, without requiring developers to have deep programming knowledge.

7. Intelligent robots: Currently, programmable manipulators with rigid control schemes are used. Creating autonomous robots faces a number of unresolved issues, such as knowledge interpretation, machine vision, and storage and processing of three-dimensional visual information. These issues represent bottlenecks in the development of intelligent robots. Ultimately, artificial intelligence system software and intelligent robots represent an exciting direction for research and development. The development of tools and solutions to unresolved problems will enable the creation of more advanced and efficient systems and robots, leading to new potential opportunities in various fields of human activity.

All the research and development have significant practical importance in various fields such as medicine, security technologies, advanced human-computer interaction technologies, and many others. They enable the automation and optimization of information processing, reducing time and resource costs.

Types of artificial intelligence:

1. Strong AI: This artificial intelligence has maximum capability to simulate human intelligence and copying human behavior. Another name for this intelligence is "artificial general intelligence." Alan Turing described a method for determining such intelligence in his article "Computing Machinery and Intelligence" in the 1950s. When a person cannot understand whether he is interacting with an artificial intelligence, it can be said that strong AI has been created.

2. Narrow AI: This intelligence exceeds human intelligence in a narrow field, such as mathematical calculations, reaction speed, etc.

3. Superintelligence: This is the next stage of AI development, where it surpasses human intelligence both insignificantly and significantly. Elon Musk, Bill Gates, and Stephen Hawking have referred to such AI as the greatest threat to human existence. Humanity may not survive the emergence of this intelligence.

4. Weak AI: The basis for creating AI is artificial neural networks, which are mathematical algorithms created analogously to biological neural networks. They can evolve through self-learning. Early neural networks were trained on structured databases that were relatively easy to understand and process. Modern neural networks (with the help of humans at the initial stages) can process and extract data from unstructured data sets, videos, images, etc.

Deep learning is used to describe the algorithms used in neural networks that leverage unstructured and unlabeled data to extract useful information. For example, it can be used to automatically search for videos with specific undesirable content without human involvement.

Unsupervised learning allows neural networks to automatically identify the key characteristics of input data (videos, text, images) and get the desired results from their processing. Without deep learning, the process of finding important information often falls on the shoulders of the programmer developing the software system.

Neural network algorithms are initially trained on pre-arranged labeled and structured data, and after the network has been trained, it starts to perform a specific task on its own.

Given that a business ecosystem is a multidimensional structure, there is often a problem of imbalance with numerous partnerships and participants interaction. The use of artificial intelligence tools makes it possible to solve issues of coordination and

synchronization of individual players, increasing the degree of control of the system as a whole and the quality of feedback from the clients.

The AI tools for managing business ecosystems can be divided into the following categories:

1) Project management tools, including software products for tracking project task progress, identifying and solving project work problems: Bitrix24, Asana, ActiveCollab, Slack, Wrike, MSProject, Trello;

2) Platforms and research applications for storing and visualizing data: Airflow, Druid, Hadoop, Kafka;

3) Marketing engagement information tools - context and targeted advertising, search engine optimization, influencer marketing (influence marketing or tools for promoting products through "influential" people), CRM marketing (tools for managing consumer behavior using information technology), CMM marketing (tools for promoting products through social networks);

4) Digital collaboration tools, including email, file sharing, instant messaging, and video conferencing - MS Outlook, MS Teams, Notion, Dropbox Paper, Google Drive;

5) Public platforms and mobile applications.

The AI tools for managing business ecosystems allows for a highly qualitative approach to enhancing business value, effectively managing customer relationships, and promptly responding to target audience requests. As part of an interconnected community (ecosystem), its participants (companies, firms, enterprises, institutions, individual affiliated entities) utilize opportunities for creating new value through cooperative interaction. These participants collaborate, based on the spirit of constructive competition, transitioning towards cooperation.

According to K. Prahalad, the digital transformation and AI completely transforms the nature of every firm; the core of each firm strategy is a long-term success and there should be a clear understanding that the modern consumer demands an individualized approach and is no longer willing to accept a passive role as a buyer. The focal point of any company's activity becomes each individual person, who contributes to creating consumer value[333]. However, there is also a downside to this: despite apparent customer orientation and maximum consideration of the target audience's needs, for the business ecosystem the customer is only a set of digital symbols. Based on this, one can draw a reasonable conclusion: customer orientation and depersonalization reflect a certain contradiction in the relationships between the business system and its consumers.

To be successful and competitive, an ecosystem requires five basic conditions:

1) Regular monitoring of the AI tools market, tracking new digital tools, products, and applications.

2) Wide coverage of the target audience.

3) Reliable customer base.

4) Flexibility and systematic thinking among management entities.

5) A well-thought-out strategy and value proposition.

Overall, customers and their key needs are at the center of the business ecosystem. Depending on the nature of business anyone from individuals to legal entities, and governments can act as a customer. The most extensive business ecosystems focus on satisfying everyday needs - organizing comfortable purchases, trips, payment services, entertainment, and arranging financial products.

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[333] Ref.: Prahalad K. Space of business innovations. Creating value together with the consumer / trans. from English K. K. Prahalad, M. S. Krishna. – M.: Moscow School of Management "Skolkovo", 2012. – P. 27–54.

One of the most important ways AI is changing the business ecosystem is through automation. AI-based systems and algorithms can simplify repetitive tasks, optimize workflows, and eliminate human errors. From manufacturing and logistics to customer service and data entry, companies can use AI to increase efficiency, reduce costs, and boost productivity. Automated processes free up valuable time and resources, allowing organizations to focus on more critical tasks that require a creative approach and problem-solving skills.

AI heavily relies on data to understand the needs and requirements of customers and efficiently provide responses and solutions. Data is presented with various degree of complexity and structure. Some data may be highly structured, stable, and require a small volume, such as bank reference data or clinic registration requests. Some data is unstructured, unstable, and requires a large volume for AI to function properly, such as account management. Machines and AI algorithms require a sufficient amount of data for training and solving various problems. Devices like Apple phones and watches diligently collect individual health data through their applications. Thanks to the network effects, Google and Amazon have also been able to collect big data, which they use to continuously improve their products and services. This, in turn, brings them even more users and provides even more data. Data management is as important as algorithms in real AI applications. In these cases, technological managers who develop, manage, and use AI also need to work on data management plans.

It is important to emphasize once again that the main difference between artificial intelligence and previously existing software lies in the use of learning algorithms, called "machine learning," to analyze large datasets. "Machine learning is the study about computer algorithms that improve automatically through own experience." [334] The key element of machine learning is the "trainable agent," which is a specific function that, using a certain number of features, performs the classification of analyzed data. The operational diagram of the trainable agent is presented in Figure 4.19.

As seen in Figure 4.23, during its training session the agent performs a classification task based on a certain set of characteristics. Training data refers to a statistical sample containing knowledge that needs to be extracted and studied. In the business area, solving such task is most relevant when analyzing information about a large number of customers, which is characteristic of most ecosystems operating in the consumer market. For example, a classic task for trading platforms (such as Amazon, Ozon, etc.) is establishing the relationship between actions taken by visitors of the website towards products they are interested in.

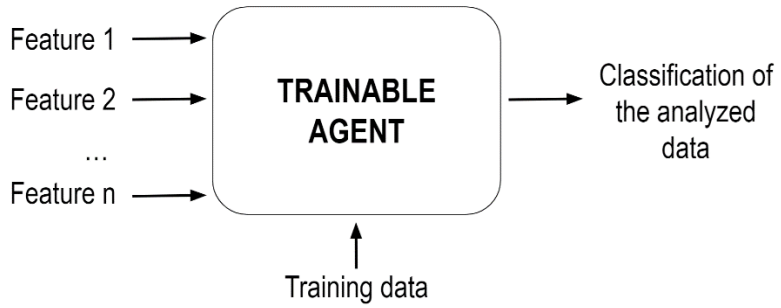


Figure 4.23. Trainable agent using artificial intelligence technologies

[334] Ref.: Ertel Wolfgang. Introduction to artificial intelligence / trans. from English A. V. Gorman. – M.: Eksmo, 2019. – P. 231.

From a statistical standpoint, solving such a problem of data analysis is done as follows:

1. A set of variables characterizing consumers (gender, age, region of residence, etc.) and information about the products they purchase (product class, name, purchase frequency, etc.) is determined.

2. A correlation matrix is plotted, which numerically represents the relationship between the analyzed variables.

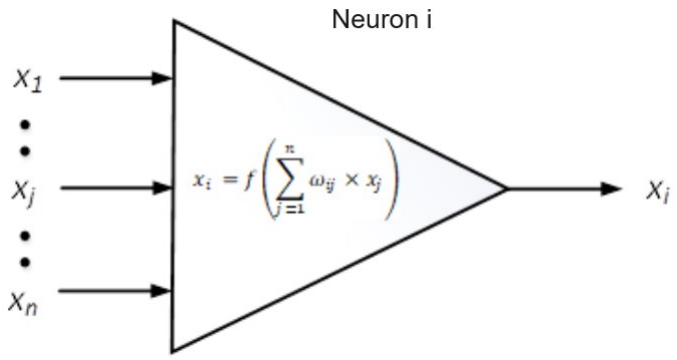
3. An analysis of the matrix is done, allowing the extraction of analyzed data based on certain classification criteria. The results obtained from this analysis are used to tailor product offerings to specific consumer groups.

Another relatively simple yet effective statistical data analysis tool is the decision tree. An example of which was provided in detail in the previous chapter. The advantages of using this statistical tool as one of the algorithms of artificial intelligence include the ability to control decisions made by visualizing the constructed decision tree. However, despite these advantages, this tool does not work very efficiently with a large number of classification features, as this leads to a significant raise in the number of terminal nodes in the decision tree and, as a result, increases the required time.

As mentioned earlier, one of the main tasks when using artificial intelligence in data analysis is identifying specific classification features. Another statistical tool used in the development of artificial intelligence algorithms is cluster analysis. Using cluster analysis allows for dividing the analyzed data into a certain number of classes (clusters). The statistical methods used in cluster analysis are well-known and can be presented quite simply as corresponding algorithms.

The greatest challenge in algorithmizing these methods lies in determining the number of clusters for the data to be allocate. This applies mostly to divisional clustering methods, as the results depend on the choice of the initial cluster formation point. To avoid incorrect results the algorithms apply the method of sequential cluster extraction from different initial points. Based on the results of cluster formation for each initial point, the density distribution of variables in each constructed cluster is calculated, and the best solution is determined based on these calculations.

Recently, one of the most rapidly developing trends in the field of artificial intelligence is the use of neural networks for information processing. A neural network is a mathematical model of information processing based on the principles of the nerve cells functioning in the human and animal brain. The use of neural networks for information processing is functional as simultaneous processing of information and the establishment of complex connections between neurons ensure effective solutions to complex tasks (such as pattern recognition, identifying non-obvious correlations between things, etc.). If we compare the operation of the human brain with that of a modern computer, the speed of the brain is more than 1,000,000 times slower than the speed of the computer. However, in solving tasks such as pattern recognition, humans are more efficient than computers. That is why artificial neural networks, based on the principles of operation of human brain nerve cells, are created to solve complex problems. The mathematical model describing the operation of a single neuron can be represented as follows:



Where: x_1 … x_j … x_n is the set of input variables; ω_{ij} are the synaptic weight coefficients characterizing the significance of the corresponding input variable; $x_i = f\left(\sum_{j=1}^{n} \omega_{ij} \times x_j\right)$ is the activation function, which transforms the input variables into an output value.

The mathematical model above demonstrates the principle of operation of a single neuron. Accordingly, when creating a network consisting of multiple neurons, each of them will perform the transformation according to the described model and transmit the values of the output variable to the subsequent neuron.

In addition to solving complex tasks, one of the advantages of neural networks compared to the previously discussed algorithms (correlation matrix construction, decision tree construction) is the ability to use incremental learning. The essence of incremental learning is that if changes occur in the training data, it would be sufficient just to incorporate these changes into the data. In the previously discussed algorithms, in case of changes in the training data, it is necessary to completely update them and redo the training process with the updated data. This training approach is called batch learning.

In business ecosystems, algorithms based on neural networks are most commonly used for analyzing and predicting consumer actions with the purpose to make forecasts regarding further interactions with these consumers.

Overall, when considering the use of artificial intelligence technologies and algorithms in business ecosystems, the main areas of application include:

1. Customer Relationship Management:

- Automation of marketing campaigns;

-Analysis of consumer behavior and provision of personalized recommendations based on data analysis;

- Automated responses to customer inquiries and chat support.

2. Organization and Production Management:

- Optimization of production processes and increasing efficiency;

- Predicting possible equipment failures.

3. Logistics:

- Distribution and optimization of delivery routes;

- Automated warehouse operations management.

4. Financial Management:

- Analysis of financial data and forecasting trends in financial markets;

- Automated management of investment portfolios, including securities portfolios.

Those are currently most actively developing areas of application of artificial intelligence technologies and algorithms. According to McKinsey's assessment[335] (Fig 4.24), the potential benefit of implementing artificial intelligence in organizational

[335] Ref.: McKinsey Global Institute.

business processes reaches $15 trillion annually. Sectors showing the highest efficiency from AI implementation include marketing and sales (potential benefit up to $6 trillion annually), manufacturing (potential benefit over $5.5 trillion annually), finance, IT, and risk management (potential benefit over $1 trillion annually).

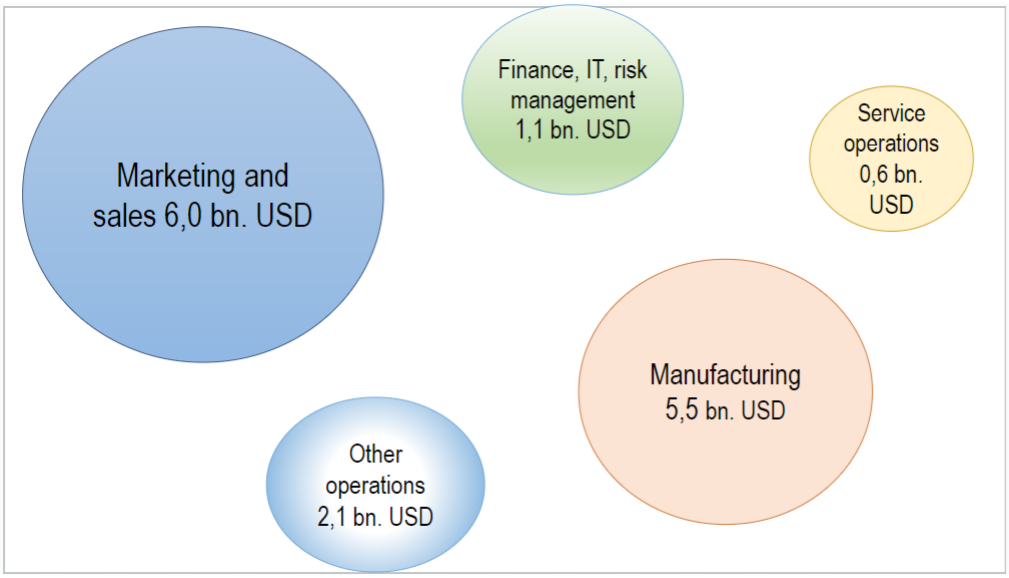


Figure 4.24. Potential Benefit of Implementing Artificial Intelligence Technologies in Individual Business Processes (in bn of USD) [336]

As estimated by top managers of large companies in various sectors of the economy, included into the research made by McKinsey and Survey[337] companies (see Figures 4.25 and 4.26), the implementation of artificial intelligence in organizational business processes is expected to result in a reduction of expenses by at least 10% and an increase in revenue by at least 5% on average in such areas as:

- Supply chain management;
- Product or service development;
- Manufacturing;
- Marketing and sales;
- Corporate finance management;
- Risk management

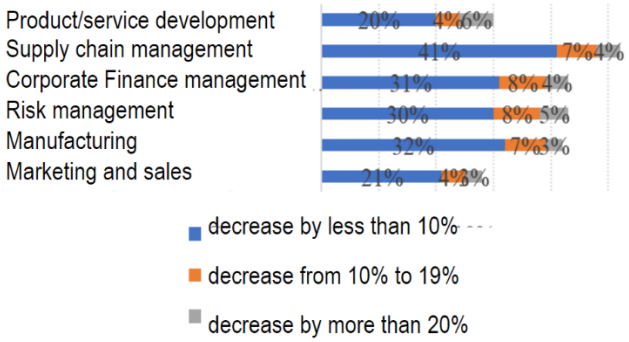


Figure 4.25. Estimate of Cost Reductions through the Implementation of

[336] Ref.: McKinsey Global Institute data
[337] Ref.: McKinsey & Company Survey 2022.

Summarizing this chapter, it is important to note that artificial intelligence has become an integral part of modern business ecosystems. The use of artificial intelligence technologies and algorithms enables the automation and optimization of business processes, enhances the quality of customer service, and supports the making of informed strategic decisions. Implementing artificial intelligence technologies and algorithms in business ecosystems requires careful analysis and preparation, but organizations that can use its potential effectively will gain a competitive advantage in the market.

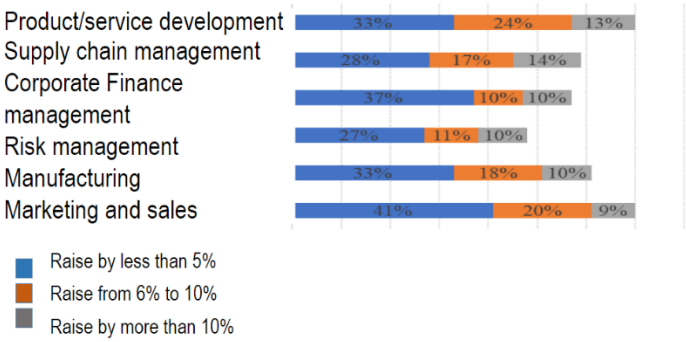
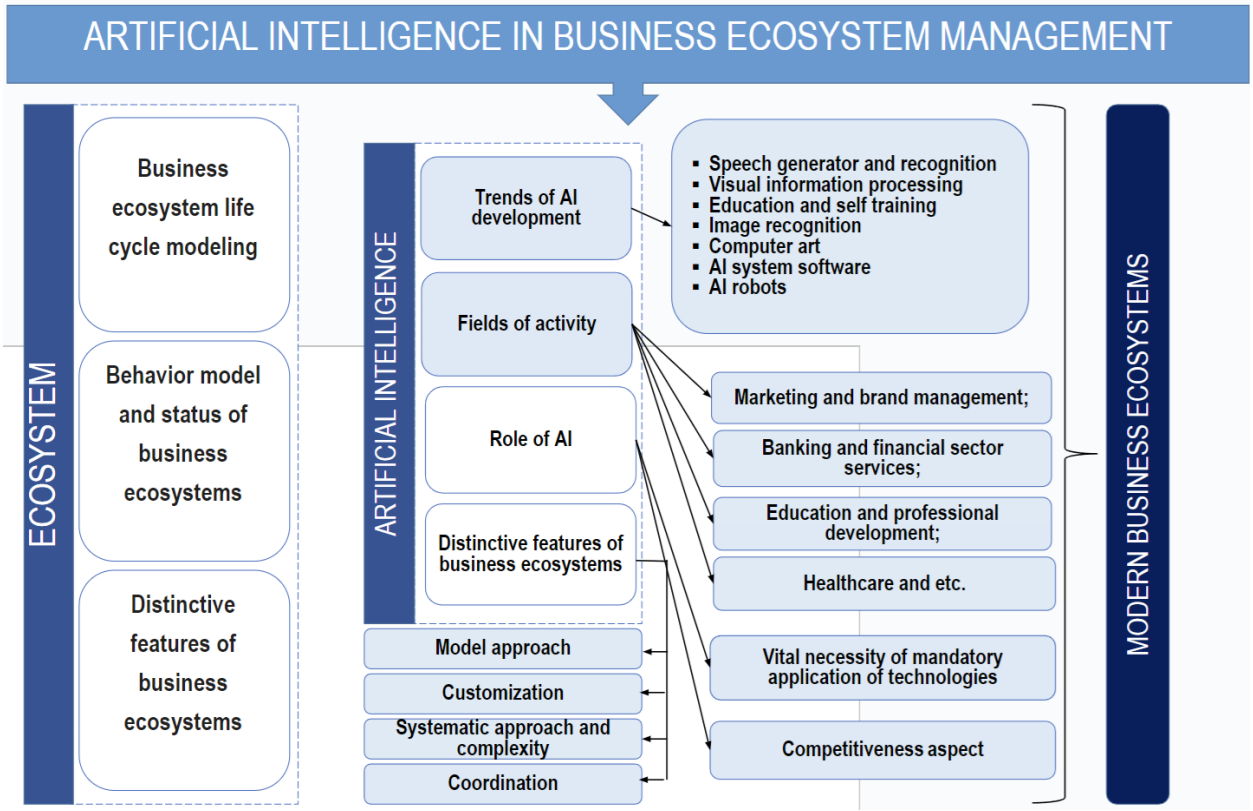


Figure 4.26. Estimate of Revenue Growth through the Implementation of Artificial Intelligence Technologies in Individual Business Processes[339]

The structure of the section is shown on the diagram (Figure 4.27).



[338] Ref.: McKinsey & Company Survey data
[339] Ref.: McKinsey & Company Survey data

Control Questions

1. List the main distinguishing features of business ecosystems.
2. Provide a definition of artificial intelligence.
3. Name the artificial intelligence used in managing business ecosystems.
4. What distinguishes artificial intelligence from software?
5. Name the main application areas of artificial intelligence.

Practical Immersion Material

Task 1

Study the essence, structure, specifics, and main risks of applying artificial intelligence in the business ecosystem using the example of "Yandex."

Task 2

List at least three successful and market-presented applications that use AI algorithms. Explain the reason for the effective functioning of such business models.

Task 3

Provide your own classification of artificial intelligence systems. Provide several examples for the classification you gave.

Task 4

Provide examples of unethical use of artificial intelligence concerning humans and wildlife, as well as at least three hypothetical cases of unethical human interaction with artificial intelligence.

Task 5

Based on the "Roadmap for Research of Current and Future Trends" developed by Richard Watson, forecast the characteristics of applying artificial intelligence in the development of business ecosystems.

4.5. Mechanisms for Building Business Ecosystems

Understanding the significance, potentially high efficiency and competitiveness, as well as the diversity of business ecosystems in the modern economy, emphasizes the importance of reviewing the effective mechanisms for building such business ecosystems. This is determined by the fact that, on the one hand by 2030 (according to the research), the integrated network (in this context - ecosystem - being interconnected in terms of subjects, processes, and services) economy may account for about 25% of the total economy (compared to 1-2%, typical for 2021), many companies of all sizes and industries have started developing cross-sectoral ecosystem offerings[340]. On the other hand, transitioning to an ecosystem model is not easy, as shown by McKinsey's research made in 2020[341]. Around 50% of companies report minor success in the early stages of their ecosystem activities; only about 10% see a significant revenue[342]. Creating interconnected services that meet users' needs in various sectors is a complex task that requires a coordinated strategy and approach. McKinsey experts argue for the appropriateness of applying a design -led approach to building business ecosystems[343].

In general, the mechanism of building a business ecosystem includes a set of principles, methods, subjects, models, forms, algorithms, technologies, structures, and resources through which business ecosystems are built. In other words, the mechanism of building business ecosystems answers questions about who, how, and with what means creates these ecosystems.

In modern literature on economics and management, the process of building business ecosystems is considered both from theoretical[344] and practical sides[345], and the total number of publications on this topic has been consistently increasing in recent years, as can be seen on wizdom.ai[346](Fig 4.28).

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[340] Ref.: Joshi Niharika Hariharan, Khan Hamza, Rab Istvan. A Design-led Approach to Embracing an Ecosystem Strategy, 2021. – URL: https://www.mckinsey.com/capabilities/ mckinsey-design/our-insights/a-design-led-approach-to-embracing-an-ecosystem-strategy#/

[341] Ref.: Chung Violet, Dietz Miklós, Rab Istvan, Townsend Zac. – URL: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/ecosystem-2-point-0-climbing-to-the-next-level

[342] Ref.: Same source

[343] Ref.: Same source

[344] Ref.: De Vasconcelos Gomes Leonardo Augusto, Farago Fabio Emanuel, Figueiredo Facin Ana Lucia, Flechas Ximena Alejandra, Nascimento Silva Lucas Emmanuel. From Open Business Model to Ecosystem Business Model: A Processes View, Technological Forecasting and Social Change. – URL: https://doi.org/10.1016/j.techfore.2023.122668; Cha Hongryol. A Paradigm Shift in the Global Strategy of MNEs Towards Business Ecosystems: A Research Agenda for New Theory Development. – URL: https://doi.org/ 10.1016/j.intman.2020.100755; Mann Geoffrey, Karanasios Stan, Breidbach Christoph F. Orchestrating the Digital Transformation of a Business Ecosystem. – URL: https://doi.org/ 10.1016/j.jsis.2022.101733; Dalenogare Lucas Santos, Le Dain Marie-Anne, Ayala Néstor F., Pezzotta Giuditta, Frank Alejandro G. Building Digital Servitization Ecosystems: An Analysis of Inter-firm Collaboration Types and Social Exchange Mechanisms Among Actors. – URL: https://doi.org/10.1016/j.technovation.2023.102756

[345] Ref.: Pidun Ulrich, Reeves Martin, Schüssler Maximilian. How Do You "Design" a Business Ecosystem? – URL: https://www.bcg.com/publications/2020/how-do-you-design-a-business-ecosystem; Grenacher Manuel. Building a Business Ecosystem: 4 Key Elements. – URL: https://www.the-future-of-commerce.com/2019/11/08/building-a-business-ecosystem/; Auge-Dickhut Stefanie. 9 Steps to Unlocking Business Ecosystems Posted. – URL: https://ccecosystems.news/en/9-steps-to-unlocking-business-ecosystems/; Draper Alan. 4 Ways to Build Your Business Ecosystem (and Why It Matters). – URL: https://www.business2community.com/strategy/4-ways-to-build-your-business-ecosystem-and-why-it-matters-02094865; Joshi Niharika Hariharan, Khan Hamza, Rab Istvan. A Design-led Approach to Embracing an Ecosystem Strategy. – URL: https://www.mckinsey.com/capabilities/mckinsey-design/our-insights/a-design-led-approach-to-embracing-an-ecosystem-strategy#/; By Pidun Ulrich, Reeves Martin, Zoletnik Balázs. What Is Your Business Ecosystem Strategy? – URL: https://www.bcg.com/publications/ 2022/what-is-your-business-ecosystem-strategy; 8 Steps To Build Successful Business Ecosystems. – URL: https://www.tycoonstory.com/8-steps-to-build-successful-business-ecosystems/; Ultimate Playbook: Building a Winning Business Ecosystem Strategy! – URL: https://rossrepublic.com/business-ecosystem-strategy-playbook/

[346] Ref.: Wizdom.ai. – URL: https://www.wizdom.ai/topic/business_ecosystem/1115098

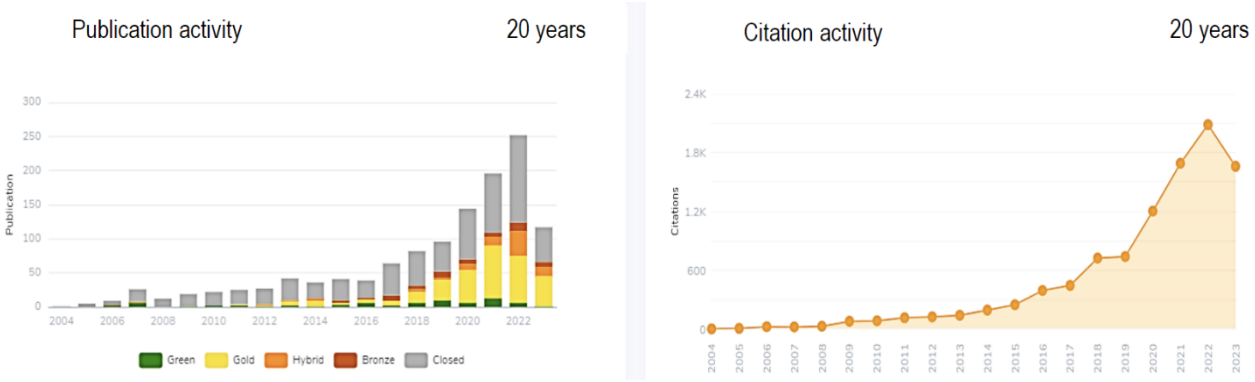

Figure 4.28. Dynamics of the number of publications and citations by business ecosystems[347]

In theoretical publications, significant attention is given to various methodological approaches of the research and, therefore, the process of developing the ecosystems, as well as the analysis of specific industry and regional cases from various perspectives. However, in practice, the focus is primarily on actions that are relevant to build an effective business ecosystem.

As noted in James Moore's work, "for companies to collaboratively develop their products and services, they must find ways to align their visions in such a way that research and development investments are mutually supportive, and capital investments and operational processes are synergistic. Companies must create interfaces and protocols to combine their efforts. Most importantly, they must closely interact with customers to create exactly what the customer wants and is willing to pay for[348]". Hence, the principles of building business ecosystems are closely linked to the very ecosystem nature of interaction between economic entities and generally include:

- Structured and diversified approaches
- Taking into the account the external factors (including regional and sectoral) - Digital support and information security
- Flexibility and adaptiveness of interaction mechanisms
- Motivational mechanisms and alignment of interests of the counterparties
- Interaction between entities
- Transparency, and etc.

It's also important to note that the principles of building business ecosystems are strongly linked to the content of this category. Without getting deep into details of the types of ecosystems, it's worth mentioning that the principles will differ, particularly for ecosystems as affiliations and ecosystems as structures. As Rod Eddner suggests, an ecosystem as affiliation views ecosystems as communities of interconnected entities, defined by their networks and affiliation with platforms; an ecosystem as structure views ecosystems as configurations of activities, defined by value proposition[349]. With this in mind, the focus and principles of building ecosystems will depend on the chosen approach to their dimension.

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[347] Ref.: Same source

[348] Moore James. Business Ecosystems and the View of the Firm // The Antitrust Bulletin. – 2006. – P. 4–5. – DOI: 51. 10.1177/0003603X0605100103

[349] Ref.: Adner R. Ecosystem as Structure: An Actionable Construct for Strategy // Journal of Management. – 2017. – No. 43 (1). – P. 39–58.

Rod Eddner highlights three guiding principles for creating successful ecosystems[350]: minimal viable ecosystem, staged expansion, and ecosystem transfer (to new ecosystems).

These principles already indicate a certain type of stage approach to building business ecosystems. In other words, since building a business ecosystem is a process, it's possible to identify certain stages, that allow to structurize the transition process to an ecosystem organizational model.

Niharika Hariharan Joshi, Hamza Khan, and Istvan Rab[351] identify three steps of ecosystem implementation: define the stages, design the ecosystem, build an ecosystem, and advise to apply the design approach throughout the process.

During the first stage, the focus should be on three main areas[352]:

- Defining key trends (the combination of social, economic, and technological trends affecting consumer behavior and what they need and want from products and services).

- Planning the desired ecosystem and identifying sources of value (the ecosystem strategy should focus on rapidly growing areas that align with the organization's business ambitions and capabilities).

- Defining the core value proposition (the most distinctive offerings are based on a comparison of customer data, market trends, customer experience, business ambitions, and vision).

The second stage - designing a new ecosystem, should start with understanding the customer's perspective and be based on an agreed upon value proposition and experience. To achieve this goal, organizations may consider three areas: consumers, sectors and partners, as well as products and services.

The third stage, building a business ecosystem, aims to create a flexible and adaptive operating model capable of not only constantly introducing new solutions, but also managing the entire portfolio of value propositions, which requires a number of cultural shifts in organizations[353].

The core of this approach is built around the idea of value proposition with main principles that include:

- Comprehensive coverage of physical and digital worlds during the design stage, focusing on omni-channel interaction and development of both customer interfaces (front-end) and internal business processes and employees (back-end).

- Expanding the scope of application of design (specifically as a design approach[354]), using its tools for generating initial ideas and developing solutions.

- Defining success based not only on speed but also on other criteria, combining speed and quality and forming its own value proposition.

- Emphasizing the importance of design and desired outcomes, as well as the means of achieving them.

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[350] Ref.: Наименьшая конфигурация видов деятельности (и партнеров), которая может создать достаточное количество свидетельств создания ценности для привлечения новых партнеров. – URL: https://ronadner.com/winning-the-right-game-glossary-of-terms/

[351] Ref.: Joshi Niharika Hariharan, Khan Hamza, Rab Istvan. A design-led Approach to Embracing an Ecosystem Strategy. – URL: https://www.mckinsey.com/capabilities/ mckinsey-design/our-insights/a-design-led-approach-to-embracing-an-ecosystem-strategy#/

[352] Ref.: Same source

[353] Ref.: Same source

[354] Ref.: Laskova T. S., Nikitaeva A. Yu. Economics and innovation management: micro-level. – Rostov-on-Don; Taganrog: Southern Federal University, 2021.

Ulrich Pidun, Martin Reeves, and Maximilian Schüssler[355] highlight the importance of a systemic approach as a distinguishing feature of ecosystem design and the design of business ecosystems. It's not only necessary to develop a model for creating and delivering value but also take into account the distribution of value among ecosystem members in conditions of limited hierarchical control within the ecosystem[356].

It's also important to consider the high complexity of business ecosystems in terms of management compared to individual organizations. This complexity is determined by the multi-subject nature, distributed creativity and decision-making among participants with a large number of horizontal connections, changing interaction models with external stakeholders, higher innovation, the need to reconcile diverse interests of ecosystem participants, the complexity of socio-economic systems data, and so on[357].

Ecosystems face strategic challenges that are not presented in other management models, such as solving the "chicken or egg" problem associated with creating a critical mass of partners and customers during the launch stage, and how to build a scalable and defensible model. Moreover, business ecosystems cannot be fully planned and designed – they can emerge on their own[358], and here the ecological and biological meaning of the term "ecosystem" is fully revealed.

Nevertheless, after completing the analysis of over a hundred of successful and unsuccessful ecosystems in various sectors and geographical markets, BCG consultants came to a conclusion that the problem of designing an ecosystem can be addressed by answering six sequential questions[359]:

- What problem do you want to solve?

How significant is it and can it really be solved with the help of an ecosystem? What type of business ecosystem should be designed?

- Who should be part of your ecosystem?

The types of activities required to implement the value proposition, the connections between them and the responsibilities of the various participants, the distribution of roles between ecosystem actors, who will be the orchestrator of the ecosystem, who will be accepted by other participants, who will coordinate, how can the orchestrator motivate other players, etc.

- What should be the initial management model for your ecosystem?

It's an important constructive decision because it sets standards, rules, and processes that define the formal or informal structure of the ecosystem, the level of its openness, and the control model. Management should strike a balance between two requirements for ecosystem success: creating value (rules of cooperation for jointly creating value as an ecosystem) and sharing value (rules and processes for distributing value among ecosystem participants).

- How can you reflect the value of your ecosystem?

Finding a way to transform the benefits that the ecosystem creates for its customers into value for its participants, identifying sources and methods of monetizing the ecosystem. Monetization should be designed in a way that does not hold ecosystem growth but instead encourages and stimulates participation, thereby promoting the network effect.

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[355] Ref.: Pidun Ulrich, Reeves Martin, Schüssler Maximilian. How Do You "Design" a Business Ecosystem? – URL: https://www.bcg.com/publications/2020/how-do-you-design-a-business-ecosystem

[356] Ref.: Same source

[357] Ref.: Mikhalkina E. V., Nikitaeva A. Yu. The youth labor market is a systemic impulse for innovative economic development // Terra Economicus. – 2016. – T. 14. – № 3. – P. 131–144.

[358] Ref.: Pidun Ulrich, Reeves Martin, Schüssler Maximilian. How Do You "Design" a Business Ecosystem? – URL: https://www.bcg.com/publications/2020/how-do-you-design-a-business-ecosystem

[359] Ref.: Same source

- How can you solve the "chicken or egg" problem during the launch?

Firstly, despite the primary importance of network effects in many business ecosystems, the benefits of being a first mover are often overestimated. It's not about being the first to the market but about being first with a comprehensive solution. Secondly, the size of the network should be measured not only by the number of participants but also by the number of interactions or transactions; this is how business ecosystems create value. Thirdly, it's not just about the quantity of participants but about having the right participants.

- How can you ensure the evolvability and long-term viability of your ecosystem?

When designing an ecosystem, three expansion paths should be considered. Firstly, expansion can occur by adding new products or services to the existing ecosystem. Secondly, the existing ecosystem can be used to expand into adjacent markets. And finally, ecosystem transfer is a strategy that uses the success of one ecosystem to create advantages when building a new one.

Further developing the issue of building a business ecosystem from a strategic perspective, BCG experts Ulrich Pidun, Martin Reeves, and Balázs Zoletnik[360] proposed a step-by-step structure for developing a company's ecosystem strategy, covering eight questions (largely related to the previous ones), the answers to which reflect the stages of ecosystem design[361]:

1. Should we participate in the business ecosystem?
2. How can we identify viable ecosystem opportunities?
3. What role should we play in the ecosystem?
4. How can we build our own ecosystem?
5. How can we overcome competing ecosystems?
6. How can we benefit from our ecosystem?
7. What benefits can we get as ecosystem participants?
8. How can our ecosystem strategy evolve over time?

Stefanie Auge-Dickhut suggests using a structured approach to build a business ecosystem based on theoretical and empirical research conducted at the Center of Competence "Ecosystems" at the Institute of Business Engineering in St. Gallen. This approach includes nine steps[362]:

1. Analysis of the future development of customer needs and the company's business.
2. Specification of the idea – defining the core value proposition and target group.
3. Identification of key services and needs of business ecosystem participants.
4. Identification of additional services and needs of business ecosystem participants.
5. Identification of companies participating in the business ecosystem and their activities (target situation).
6. Summarizing the results (for example, in the structure of an ecosystem business canvas – similar to the business model canvas by Osterwalder and Pigneur).
7. Guideline revenue generation mechanism. \
8. Understanding existing business ecosystems.
9. Decision-making on the portfolio strategy of the business ecosystem.

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[360] Ref.: By Pidun Ulrich, Reeves Martin, Zoletnik Balázs. What Is Your Business Ecosystem Strategy? – URL: https://www.bcg.com/publications/2022/what-is-your-business-ecosystem-strategy; 8 Steps To Build Successful Business Ecosystems. – URL: https:// www.tycoonstory.com/8-steps-to-build-successful-business-ecosystems/

[361] Ref.: Same source

[362] Ref.: Auge-Dickhut Stefanie. 9 Steps to Unlocking Business Ecosystems Posted. – URL: https://ccecosystems.news/en/9-steps-to-unlocking-business-ecosystems/

When considering the mechanisms of building business ecosystems, it is important to understand that they will differ for existing economic entities and for newly created economic participants.

In the first case, it is essentially about transitioning from an existing form of organizational activity and an existing business model to an ecosystem. In the second case, it is about creating a new form of organization from scratch. Each option has its own advantages and disadvantages; however, universal components of the mechanism for building business ecosystems and specific elements determined by the specifics of the particular situation can be identified.

For an existing organization, the first step is to analyze its current situation and positioning, assessing the possibility of entering existing ecosystems or creating its own ecosystem structure as an orchestrator. If it's about creating a new organization directly in an ecosystem format, it's advisable to develop it iteratively and involve relevant participants in cooperation, interaction, and ecosystem-building processes as early as possible, defining functions and roles distribution. Business ecosystems are formed around a comprehensive core value proposition, around which individual players are organized[363].

In any case, the mechanism for building a business ecosystem involves the existence of a certain target model of the business ecosystem that the management entity (potential orchestrator/coordinator in the case of an ecosystem) plans to create. When choosing the specific type and design of such a target model, it is important to consider the goals and objectives of specific economic entities, as well as the prospective trends in the development of business ecosystems that are identified at a certain point in time.

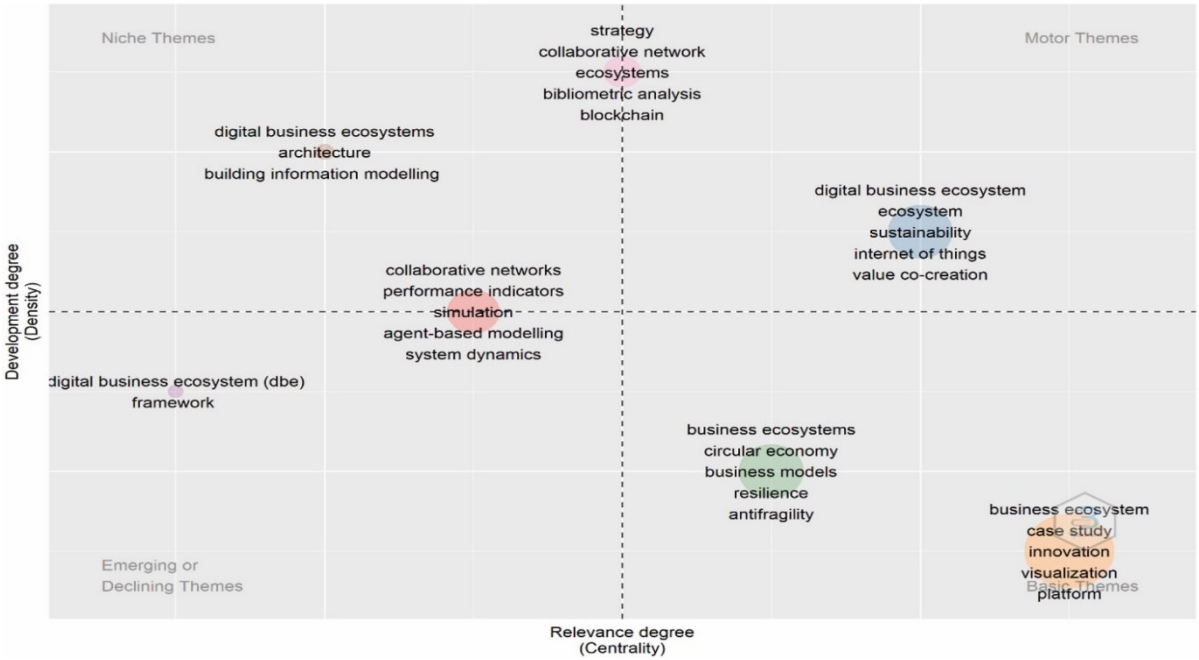

Figure 4.29. Subject Map of Research Streams on Ecosystems[364]

In this case, we are talking not only about technological trends, the forecast dynamics of customer needs, and organizational perspectives, but also about the trends

[363] Ref.: Same source

[364] Ref.: Espina-Romero Lorena C., Guerrero-Alcedo Jesús M., Ossio Carlos. 7 Topics that Business Ecosystems Navigate: Assessment of Scientific Activity and Future Research Agenda. – URL: https://doi.org/10.1016/j.heliyon.2023.e16667

in the development of ecosystem models for organizing activities. For example, Lorena C. Espina-Romero, Jesús M. Guerrero-Alcedo, Carlos Ossio highlight current key and potential research areas in the field of business ecosystems, showing both emerging and declining themes (see Figure 4.29).

In many ways, the importance of taking into account trends is due to the fact that the analysis of such trends allows us to identify tools that can become a driver of ecosystem transformations within the corresponding mechanism for building business ecosystems. Currently, cross-cutting technologies of Industry 4.0 serve as such a driver. Digital solutions (artificial intelligence, big data, industrial Internet of Things, etc.) enable the creation of ecosystems based on fundamentally new platform business models and allow the implementation of complex ecosystem organizational mechanisms through information-analytical and communication support for the integration of elements of distributed multi-subject value creation chains[365].

Next, potential partners are identified, a strategy of relationships is developed, and a management model for the ecosystem is formed. When designing the ecosystem, both structural and process aspects of its functioning are considered. Additionally, the type of integration underlying the relationships within the ecosystem is taken into account – whether it's vertical or horizontal integration. The first involves networking across all logical levels of the organization, from intelligent manufacturing systems and field-level equipment to production management, sales and marketing, customer service, and research and development departments. The latter implies the integration of multiple entities into a multidimensional system. This extends to integrating various organizations in value creation networks, including suppliers, production networks, delivery channels, and consumers[366].

At each stage of designing and building a business ecosystem, a wide range of tools and resources of various types is required. The mechanism for constructing a business ecosystem may include organizational management, financial-economic, socio-psychological, institutional, and information-communication tools[367]. These types of tools are applied at different stages depending on the content of the implemented steps in building the ecosystem.

Organizational and managerial tools include creating new structures, reorganizing business processes and project methods, developing strategies and plans for joint activities, expertise and foresight, platforms for regular meetings of participants, and so on.

Financial and economic tools cover methods for monetizing the ecosystem, financing and participation models within the ecosystem, ways to assess and model risk and revenue distribution, tools for scaling beyond pilot projects, budgets for innovation projects, and so on.

Institutional measures enclose both contractual support for ecosystem creation processes and the creation of a favorable environment for interaction through informal

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[365] Ref.: Nikitaeva A. Yu. Reconfiguration of business models of industrial enterprises: vectors for increasing sustainability in new realities / A. Yu. Nikitaeva, N. N. Kiseleva // Bulletin of Volgograd State University. Economy. – 2021. – T. 23. – № 1. – P. 110–120.

[366] Ref.: Dalenogare L. S., Benitez G. B., Ayala N. F., Frank A. G. The Expected Contribution of Industry 4.0 Technologies for Industrial Performance. – DOI: 10.1016/j. ijpe.2018.08.019; Wang S., Wan J., Li D., Zhang C. Implementing Smart Factory
of Industrie 4.0: an Outlook. – DOI: 10.1155/2016/3159805; Veile J. W., Schmidt M. C.,
Müller J. M., Voigt K. I. Relationship Follows Technology! How Industry 4.0 Reshapes Future Buyer-supplier Relationships. – DOI: 10.1108/JMTM-09-2019-0318

[367] Ref.: Partnership technologies for enhancing the innovative development of industry in the South of Russia: monograph / edited by. ed. prof. A. Yu. Nikitaeva. – Rostov-on-Don: Southern Federal University Publishing House, 2016.

institutions and the development of a common ecosystem organizational culture. These are complemented by socio-psychological tools, including motivational and adaptation activities, enhancing the status of ecosystem participants, and so forth.

Information and communication tools for the ecosystem building mechanism are primarily related to creating digital platforms as the technological core of modern business ecosystems and providing comprehensive information, communication, and analytical support for their activities, taking into account the specifics of distributed value creation chains.

When considering the mechanism of building an ecosystem, it is important to note that the transition to the corresponding form of organizational activity affects not only various levels and multiple entities but also different stages (not only in the integration perspective mentioned earlier). Therefore, tools and influencing factors may also be associated with all the components mentioned.

Thus, based on the analysis of specific cases, some specialists identify stages of ecosystem development such as:

1) Expanding view (at this stage, firms realize they are part of an ecosystem and need to transform their business model);

2) Integration (firms distinguish between the existing and target ecosystem business models and then integrate between them);

3) Organization - orchestration (coordinator firms (orchestrators) deliberately manage the joint evolution of ecosystem and their own business models and the interaction between them) [368].

Each stage is characterized by its own tools[369].

The first stage of transformation involves recognizing the fact that firms participate in certain ecosystems, and in some cases, in many ecosystems. In this context, the main action is to rethink the ecosystem, where managers realize that various firms provide part of the ecosystem's value proposition based on a digital platform. Rethinking the ecosystem also includes the important task of revising partners as parts of the interdependency structure (including the value proposition) in ecosystems.

During the second stage, a common ecosystem business model is created, and the business models of ecosystem participants are integrated by building coordinated relationships between them.

To achieve this, a number of actions is taken such as – divisioning (boundaries, participant roles, distinguishing characteristics, flows, connections, etc.), repositioning (changing how partners recognize the coordinating firm's business model in this ecosystem in terms of its role and activities in creating value, its delivery, and value appropriation in the ecosystem; changing the roles and activities of ecosystem participants regarding the ecosystem business model; creating collective understanding of differences and similarities between the ecosystem business model compared to other competing ecosystems), alignment or coordination (aligning the ecosystem business model and the business models of participants and building a whole set of interdependencies, shaping actions that influence the direction, breadth, and depth of

[368] Ref.: De Vasconcelos Gomes Leonardo Augusto, Farago Fabio Emanuel, Figueiredo Facin Ana Lucia, Flechas Ximena Alejandra, Nascimento Silva Lucas Emmanuel. From Open Business Model to Ecosystem Business Model: A Processes View, Technological Forecasting and Social Change. – URL: https://doi.org/10.1016/j.techfore.2023.122668

[369] Ref.: Same source

partner business model development within the ecosystem), and protection (in the context of maintenance and development) [370].

At the third stage, firms encounter the challenge of managing the joint evolution of the ecosystem business model and their own business models, as well as the interacting in between them.

The arrangements at this stage are focused on establishing a system for managing the ecosystem business model and developing ecosystem business processes.

Specific structures and types of business ecosystems that emerge as a result of developing and using the appropriate mechanism are characterized by a wide variety and have been discussed earlier in this textbook.

The aggregated form of a mechanism for forming business ecosystems is presented in Figure 4.30.

It should be noted that the detailing process and formalization of various components of the business ecosystem construction mechanism will depend on the specific situation and characteristics of potential ecosystem participants (including such informal components as corporate culture).

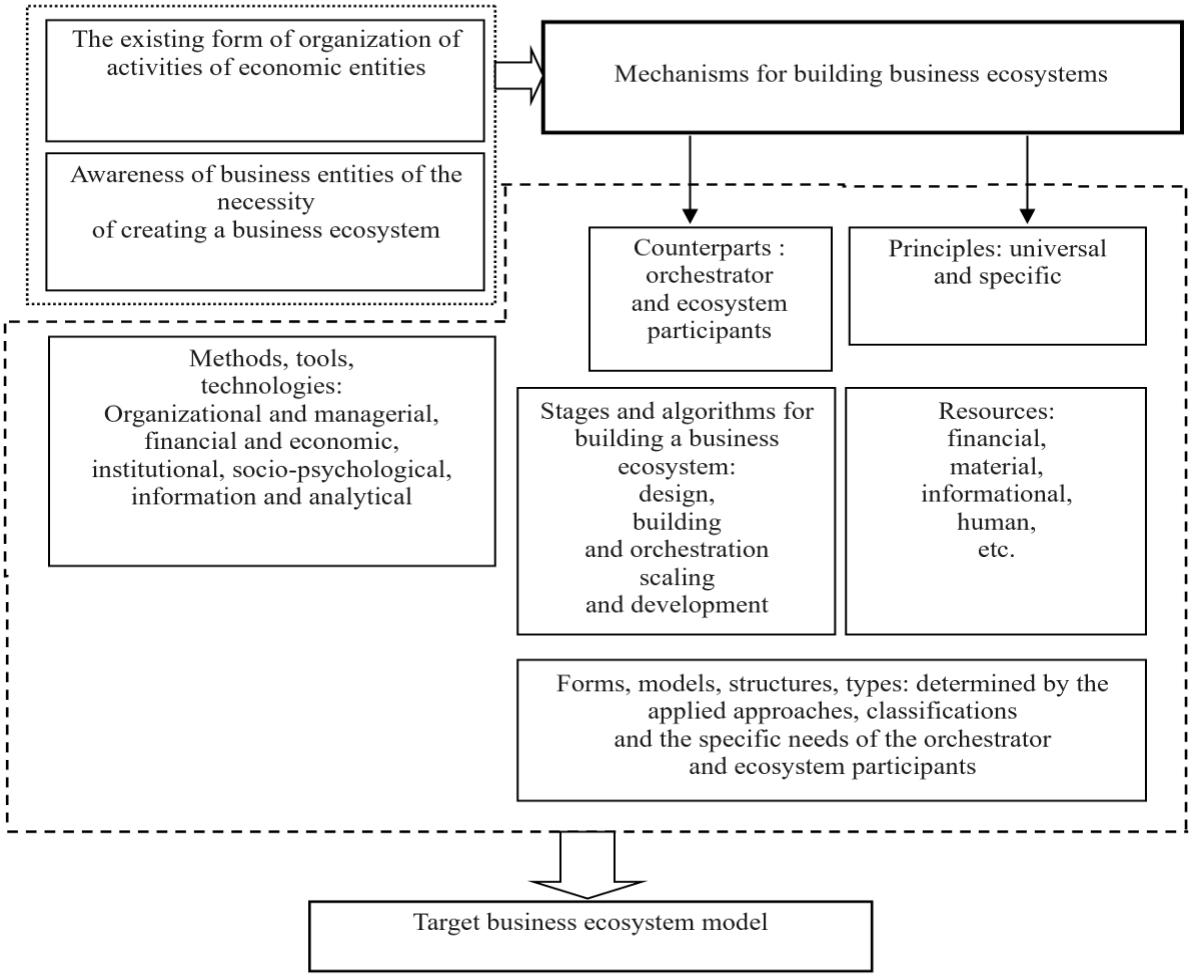

Figure 4.30. Visualization scheme of the section “Mechanisms for Building Business Ecosystems”.

[370] Ref.: De Vasconcelos Gomes Leonardo Augusto, Farago Fabio Emanuel, Figueiredo Facin Ana Lucia, Flechas Ximena Alejandra, Nascimento Silva Lucas Emmanuel. From Open Business Model to Ecosystem Business Model: A Processes View, Technological Forecasting and Social Change. – URL: https://doi.org/10.1016/j.techfore.2023.122668

Thus, the mechanism for building the business ecosystems is multicomponent and reflects a whole range of structural and dynamic aspects of creating effective business ecosystems in today's realities.

Control Questions:

1. What is meant by the mechanism of building a business ecosystem?
2. Why is it necessary to create and use a specific mechanism for building business ecosystems?
3. What are the main elements of the mechanism for building business ecosystems?
4. Identify the key principles of building business ecosystems.
5. Define the main stages of transitioning to an ecosystem business model for an existing economic entity.
6. What stages can be involved in forming a business ecosystem "from scratch"?
7. What tools allow for the transition to a business ecosystem as a model for organizing the activities of an economic entity?
8. What is the purpose of conducting an analysis of business ecosystem development trends?
9. Do the tools for building business ecosystems differ for various stages of its formation and development?
10. What are the information and analytical tools of the mechanism for building business ecosystems used for?
11. What resources are used for building business ecosystems?

Practical Immersion Material

Practical Assignment

A company that has been successfully operating in the Russian pharmaceutical market for 10 years has decided to expand its field of activity and develop a service package for disease prevention and maintaining a healthy lifestyle. The company's management understands that the enterprise lacks competencies in this area and that the creation of a business ecosystem is necessary. With this in mind, determine:

a) Who should be considered as potential participants in the business ecosystem?
b) Which stages of creating a business ecosystem should be chosen in this case?
c) What tools should be included in the mechanism for building the business ecosystem?

4.6. Methodological Approaches to Managing a Mobile Operator Business Ecosystem

Mechanism for Building a Business Ecosystem of a Mobile Operator

Practical interest in building business ecosystems among mobile operators (hereinafter referred to as "operators") emerged on the back of current trends in the telecom industry. Among the main objective reasons that made operators to reconsider their development strategy based on an ecosystem approach, we can list the following[371]:

1. The requirement for the digitization of society at the state level within the framework of approved strategies for the development of the communications industry[372], the development of the information society[373], and national development programs[374].

2. Changes in user consumption models, developed in the following directions:

- Transformation of content consumption formats: from voice services and short messages (SMS) to personalized audio and video services, video content, etc.
- Popularity of smartphones as means of obtaining content services, and transition from computer-based content consumption to mobile with a demand for accelerated content consumption speeds from its producers.
- Changes in producers' interaction channels with consumers with the development of new platform-based business models.

3. Changes in manufacturing business models due to new technologies 5G and 6G, with the introduction of operators' tariff plans of new types of services (virtual and augmented reality VR/AR, audio and video streaming services, cloud gaming services, Internet of Things services, etc.). The development of 5G technology and subsequently 6G will drive the creation of new digital services such as human-centric services and services for controlling smartphones and tablets by thought (brain-computer interface BCI), as well as changing the ways of content consumption[375].

4. Development of the concept of convergence and joint activities of diversified businesses in the value chain creation.

In addition to objective reasons, building of business ecosystems has become a major growth driver for communication operators as a forced measure because the telecom services market is oversupplied and in the future may be subject to regionalization processes due to the disruption of global markets, where revenue does not significantly increase, and investments in new technologies are necessary.

A research of the accumulated experience in building business ecosystems by the leading communication operators in the 11 largest cities in the world has identified nine key directions that communication operators develop within their business ecosystems (Figure 4.31)[376].

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371 Ref.: Umansky R. Yu. Approaches to the formation of an innovative development strategy for mobile operators // Innovations in management. – 2022. – № 4. – P. 281–286.

372 Ref.: Draft strategy for the development of the communications industry of the Russian Federation for the period until 2035.

373 Ref.: Decree of the President of the Russian Federation of May 9, 2017 No. 203 “On the strategy for the development of the information society in the Russian Federation for 2017–2030».

374 Ref.: The “Digital Economy of the Russian Federation” program, approved by Decree of the Russian Federation dated July 28, 2017 No. 1632-r.

375 Ref.: Tikhvinsky V. O., Terentyev S. V., Koval V. A., Devyatkin E. E. Development of mobile communication networks from 5G Advanced to 6G: Projects, technologies, architecture. – M.: Technosphere, 2023.

376 Ref.: Saprykina A. Ecosystem as a way of survival for operators. – URL: https://www.comnews.ru/content/214597/2021-05-21/2021-w20/ekosistema-kak-sposob-vyzhivaniya-dlya-operatorov (reference date: 27.10.2023).

According to the research findings, in the majority of cases, communication operators act as a digital platform for offering comprehensive partner services and solutions in IT, finance, telemedicine, entertainment, and other areas, less often than creating their own services from scratch.

The mechanism for building a business ecosystem within a company (e.g., a communication operator) can be used for all three main types: closed, open, and mixed (Figure 4.31)[377]. The methods and tools used for building business ecosystems by company management will be determined by both - the chosen option of building the business ecosystem and the ecosystem development strategy (Figure 4.32).

In the first scenario of building a business ecosystem, a communication operator may develop a closed business ecosystem of its digital services, in which the company itself performs all the main roles and creates a value proposition for consumers.

In the second scenario, the communication operator attracts partners or participants to the business ecosystem on the condition that they significantly enhance the existing value proposition for the consumer and ensure the growth of sales of new services. In this case, the company must determine the role it is aiming to play in such an open business ecosystem and begin searching for partners.

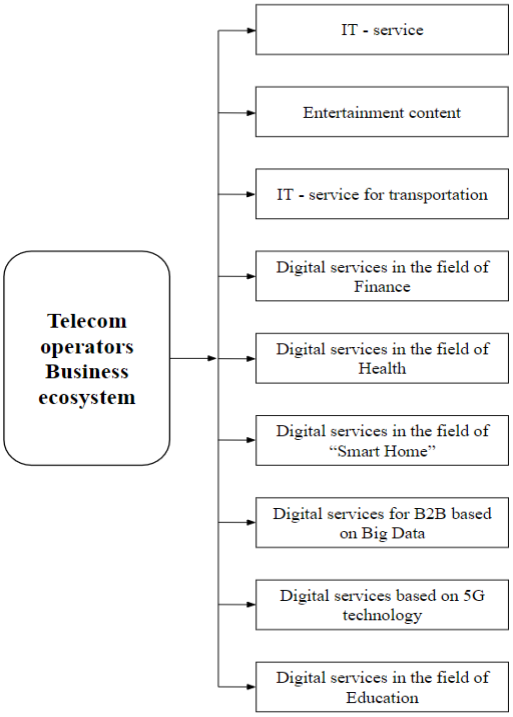


Figure 4.31. Main Directions of Development of Business Ecosystems for Communication Operators

[377] Ref.: Umansky R. Yu. Mechanism for forming a strategy for the development of the ecosystem of a mobile operator // Innovative activities. – 2023. – № 1 (64). – P. 124–136.

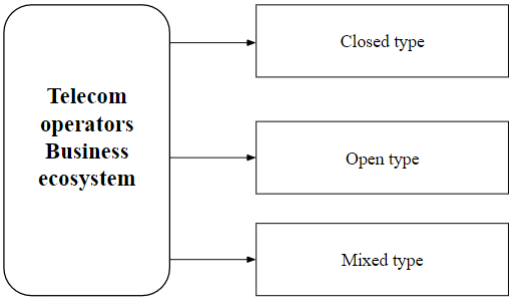


Figure 4.32. Main Types of Business Ecosystems for Communication Operators

There is also a third - mixed type of business ecosystem development, where the operator may independently develop its own closed multi-product business ecosystem for certain digital services, while simultaneously creating an open business ecosystem for other digital services.

The established practice of creating business ecosystems by communication operators indicates the predominance of two main directions:

1. The communication operator predominantly acquires assets and integrates them into its business ecosystem (for example, this is the scenario chosen by MTS).

2. The communication operator implements an ecosystem approach without acquiring companies but rather building ecosystemic communication within partnership interactions with other companies (for example, T2 Mobile LLC "Tele2").

Additionally, three main positioning strategies of communication operators can be identified today, directly reflecting their approach to forming and developing business ecosystems[378]:

1. ***Development strategy for the underlying asset***, where the operator is primarily focused on maintaining and developing the existing technological infrastructure and customer base and has no aim to develop a business ecosystem.

2. ***Development strategy for the underlying asset plus***, where the operator begins to build a business ecosystem based on the existing technological infrastructure and customer base, developing services in areas closely related to its main business (fintech, banking, insurance, media, etc.).

3. ***Development strategy for the underlying asset plus new business***, where the operator builds a business ecosystem through the development of base assets and areas closely related to the main business (the second strategy), adding services from entirely new business areas to the business ecosystem.

The decision-making issue on building a business ecosystem are quite important for operators because they are tied to the strategic choices regarding their business development, which will impact future results. It's essential for top management to develop an effective decision-making mechanism for forming the strategy of their business ecosystem development. The goal of creating such a mechanism is to minimize possible errors in decision-making. The entire strategy of building a business ecosystem can be represented as the following methodological framework of actions (see Figure 4.33)[379].

This framework will include the following steps:

[378] Ref.: Umansky R. Y. Approaches to the formation of an innovative strategy for the development of mobile operators // Innovations in management.– 2022. – № 4. – P. 281–286.

[379] Ref.: Umansky R. Y. Approaches to the formation of an innovative strategy for the development of mobile operators // Innovations in management. – 2023. – № 1 (64). – P. 124–136.

Step 1. *Analysis of the external and internal environment and evaluation of the potential prospects for business ecosystem development*.

At the first stage, the communication operator begins by analyzing the external and internal environment to form its vision and evaluate the potential for business ecosystem development. During the analysis of the external environment, the main focus should be on studying the key trends and directions that define the competitive landscape. After conducting this research, it's necessary to forecast the dynamics of their development and potential impact on the strategy of business ecosystem development.

Researching trends and forecasting their development should include analyzing and assessing the preferences of target consumer groups and the level of technological advancement to determine how well digital services are ready to fully meet such demands. Additionally, should be evaluated the level of market competition for services, as well as current and strategic opportunities of competitors to supply similar value propositions.

Furthermore, when analyzing the external environment, the entire range of factors (geopolitical, demographic, etc.) that could influence the future of business ecosystem development must be assessed. However, to ensure that the subsequent choice of a value proposition for the selected consumer group in the business ecosystem leads to a positive result and can be implemented in practice, it is necessary to analyze the internal environment of the communication operator to identify the resources that can help in forming an effective business ecosystem.

First and foremost, the communication operator should assess its internal capabilities for forming a business ecosystem. Key research questions should include analyzing the existing management system and organizational structure, the capabilities of financial and technological resources, corporate values and standards, and so on. All these factors will play an important role in deciding the role of the communication operator in a given business ecosystem, its type, and in finding the best value proposition for consumers.

Based on the analysis of the external and internal environment, the management can identify its problematic areas that may hold back the achievement of strategic plans for creating a business ecosystem and, at the same time, classify strategic risks according to their nature (technical, managerial, organizational, competition risks, etc.). To do this, management can use many practical tools for analyzing the external environment, but two key tools are:

- PEST analysis, which will identify issues that could jeopardize the achievement of long-term goals set for the created business ecosystem.

- SWOT analysis, which will determine how and through what means the created business ecosystem can avoid the negative impact of the external environment to enhance competitiveness in the long term.

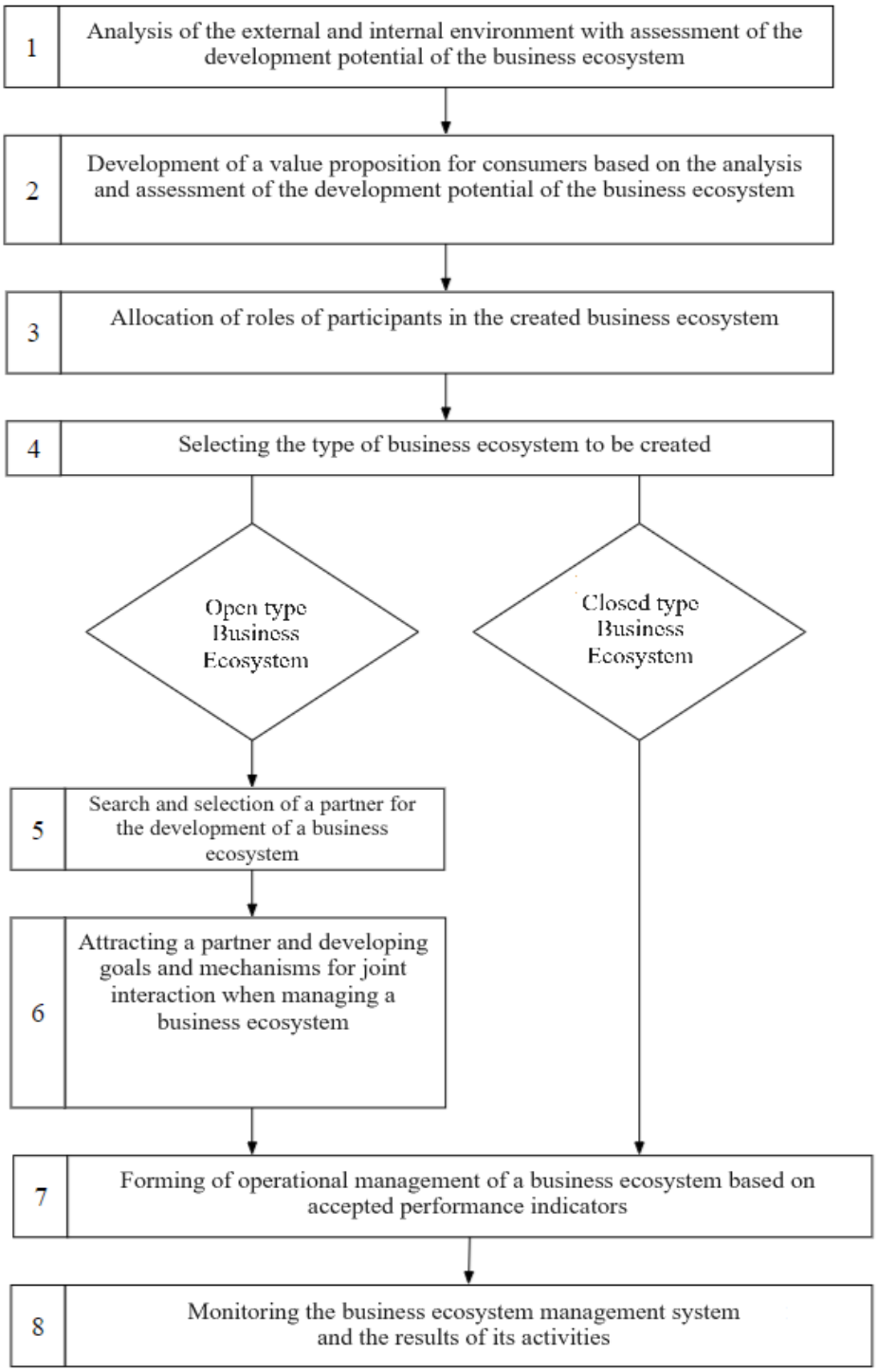


Fig. 4.33. Methodological support for building the business ecosystem of a telecom operator.

Based on the analysis, it is possible to form a risk map, identifying which of the identified threats could pose the greatest danger to the business ecosystem and how they can be managed to minimize the risks of implementing the strategy.

Step 2. *Development of a value proposition for consumers based on the analysis of the external and internal environment and the assessment of the development potential of the business ecosystem*.

The aim of the second step is for the management of the telecom operator to create a value proposition for consumers based on the formed business ecosystem and determine what value the operator itself can bring to the business ecosystem.

As noted above, the ultimate success in selecting and developing a value proposition for the business ecosystem depends on the telecom operator's ability to recognize specific consumer segments and tailor customized offers for the targeted group after detailed analysis. These ideas for consumer groups can, within the business ecosystem, form an innovative value proposition that was not previously offered on the market. Thus, the ability to form a value proposition by the telecom operator at this stage directly determines the success of creating the business ecosystem, as it defines the correct positioning relative to other business ecosystems considering the formed innovative value proposition for the consumer group.

The next steps will involve the implementation of following measures and activities required to create the business ecosystem.

Step 3. *Distribution of roles among participants in the developing business ecosystem*

At this stage, after selecting the value proposition, developing business ecosystem should form an understanding of the telecom operator's role as well as identify the areas where, if necessary, other participants from adjacent markets should be involved in creating business ecosystem. Accordingly, the key task of the third stage is for the management to provide a realistic answer to the question of its role in the business ecosystem. Should the telecom operator be:

1) a leader - organizer of the business ecosystem;

2) a key partner;

3) a regular participant.

If we look into the role of a leader-organizer, it involves fully organizing, managing, and controlling the value proposition chain and interacting with consumers, ensuring the business ecosystem's financial and technological resources, as well as forming the key operating principles of the business ecosystem, selecting key partners, and participants.

The role of a key partner entails participating in the business ecosystem, managing the value proposition chain, and interacting with consumers through their core business while working on their own brands and products/brands of the business ecosystem.

The role of a participant involves using their specialized business in organizing and managing certain elements of the value proposition chain of the business ecosystem, as well as interacting with consumers in areas where the participant has achieved strong competitive positions.

The telecom management should evaluate the pros and cons of each role, considering the analysis of external market factors and their internal resources, including the established value proposition for consumers. Often, the role of a key partner or a simple participant in the business ecosystem can significantly reduce risks for the telecom operator compared to being a leader-organizer and provide the opportunity to better utilize its strategic advantages for developing the business ecosystem and gaining significant economic benefits.

Step 4. *Choosing the type of business ecosystem to be created*

Analysis of operational practices shows that until recently, many companies only considered opportunities to create and manage their own business ecosystem without involving any partners, meaning they created and managed a closed-type business ecosystem. At the same time, modern management trends and the digital transformation of society force telecom operators to reconsider the development strategy of business ecosystems from closed to open formats of cooperation with various partners.

Therefore, if the telecom operator sees itself as a leader-organizer and has decided to work independently, it originates a closed-type business ecosystem without involving key partners and participants. If the telecom operator believes that its role as a leader-organizer is insufficient for the full development of the business ecosystem, then it should start considering options for finding and selecting partners and participants for collaboration. However, in this case, the operator must realize the necessity - in the case of attracting partners - of subsequent adjustment of its management system and technological platforms in the conditions of an open-type business ecosystem for effective collaboration within the partner network.

The choice of the type of business ecosystem directly impacts the further development strategy. If the telecom operator choses a closed-type business ecosystem, then operational management is based on accepted performance indicators, followed by monitoring the results of its activities.

If it is an open-type, then the telecom operator needs to start searching for and selecting partners and participants for the business ecosystem, and involve them in joint work with the development of mechanisms for joint activities.

Step 5. *Search and selection of partners for the development of the business ecosystem.*

Once the telecom operator has determined its role in the business ecosystem, it should focus on searching for and selecting partners for collaboration based on their expected value and potential role in the business ecosystem.

The choice of a partner will directly depend on the analysis of the current capabilities of the telecom operator within the business ecosystem and the decision of what skills, resources, and opportunities need to be attracted and who can provide them. Additionally, when selecting partners, their reputation in the business environment can be crucial, as well as subjective characteristics such as the ability to negotiate and interact with each other, various personal traits, etc.

Step 6. *Partner attraction, goal setting, and mechanisms of joint interaction in managing the business ecosystem*

After making a list of potential partners and holding positive negotiations regarding their participation in the business ecosystem, the process of discussing the mechanism of their involvement begins: partnership, merger, acquisition, etc. At this stage, discussing the legal aspects of cooperation is crucial for structuring the deal.

During this process, it is crucial to develop mechanisms for joint interaction and coordination for effective management of the business ecosystem, including working out the rules (regulations) for the interaction of all involved participants within the business ecosystem, developing decision-making mechanisms, setting rights and responsibilities, agreeing on a management system, strategy, and the target function of the business ecosystem.

Step 7. *Modeling operational management of the business ecosystem based on accepted performance indicators*

This step involves forming an effective operational management system for the business ecosystem and a system for evaluating its performance indicators, allowing for the assessment of the effectiveness of expanding the business ecosystem. When forming the system of performance indicators, it is important to consider that for the telecom operator, the result may be expressed not only in generating profits from the operation of the business ecosystem but also in achieving a synergistic effect regarding traditional core products of the operator's business. This could be reflected in an increased number of users, higher loyalty among current users, and expanding access to consumers.

All these goals will require the telecom operator to form a system of indicators and corresponding values for the business ecosystem, which must be continuously monitored to control their achievements. Typically, goals and performance indicators will evolve as the business ecosystem develops and progresses through its lifecycle stages. In the initial stages, goals and indicators may be related to increasing the number of users, then focusing on improving service quality and consumer loyalty, and later concentrating on financial indicators.

Additionally, at this stage, it is important to develop changes in the current management system of the telecom operator, which it must implement to enhance the efficiency of the business ecosystem. Primarily, this involves creating a flexible adaptive organization with a quick response to changes. To achieve this, the telecom company must restructure its business and create a new innovative ecosystem-oriented organizational management structure.

If the telecom operator plays the role of a leader-organizer or a key partner and is functionally responsible for developing the production strategy of the business ecosystem and digital services, then the key task becomes to form of a new technological platform with a unified approach to management, both for the telecom services of the operator itself and for fundamentally new digital services of the created business ecosystem. Building such a platform will standardize all production activities, enable the development and launch of new digital services in shorter timeframe, and allow interaction according to accepted standards with the technological platforms of all partners and participants of the business ecosystem.

Step 8. *Monitoring and evaluation of the implementation of the business ecosystem development strategy*

This step involves organizing the monitoring the efficiency of the created business ecosystem and evaluating the results, which the participants planned to achieve.

The goal of monitoring is to gain the maximum possible efficiency in implementing the expansion of the business ecosystem. Monitoring the expansion of the business ecosystem should be conducted to achieve the following objectives:

- Ensuring maximum coordination of work among all departments of the telecom operator and management to achieve the comprehensive solution of set targets.
- Systematic control at all stages of the implementation of the adopted development strategy for expanding the business ecosystem.
- Establishing an effective feedback system on achieved results and providing timely information to top management for decision-making purposes.

At this step, it is also important not only to set up a monitoring system to assess how effective the expansion of the business ecosystem is but also to continuously monitor changes in the external and internal environment. This enables timely adaptation of all elements of the business ecosystem to the innovations and informs management about necessary adjustments to the management system and production activities of the business ecosystem in response to emerging opportunities or the need to utilize identified reserves for improving business processes within the business ecosystem.

Methodological approach to determining the target function of the feasibility of creating a business ecosystem

When forming a business ecosystem, developing a methodological approach on decision making regarding the inclusion of potential services into the scheme of the business ecosystem is utterly important. To achieve this, it is necessary to establish a system of criteria for deciding on the expansion (transformation) of the business.

When considering the future goals of a company's operations, the target function of expanding the scope of activities is regarded as determining the performance criteria based on the chosen system and corresponding indicators of such activities[380]. Thus, by defining the fundamental (internal) value of the company's business as the target function of a telecom operator with the aim of maximizing it when expanding the business ecosystem, which is achieved through the growth of positive net present value, the conclusion is drawn about the necessity of achieving efficient rates of company development through creation or expansion of the business ecosystem via best management practices of the enterprise, with the note of existing constraints.

Therefore, as a criterion for making decisions about the possibility of forming (creating) a business ecosystem based on the existing business of a telecom company, one can consider the possibility of maximizing the objective function F, which characterizes the development of the company's business compared to the current business situation, which can be represented by the following function, requiring its maximization:

$$F = \sum_{i=1}^{T} R_i - \sum_{i=1}^{T} I_i \rightarrow \max$$

where: F - the target function characterizing the feasibility of developing the business ecosystem when expanding activities beyond the scope of the company's business; R_i - the net present value obtained from the results of the business ecosystem's activities; I_i - initial investments in the development of the business ecosystem; T - the total of all services implemented within the business ecosystem.

The necessity to maximize the target function, characterizing the development of the business ecosystem when expanding activities, allows us to appreciate that all future potential services from other industries (areas of business), included in the expansion of the business ecosystem and planned to be integrated into the new framework of the expanded business ecosystem, must meet a certain optimization condition.

This condition whereby the target function of the business ecosystem's development would increase after including potential services due to the positive net present value from the implementation of this service or due to the synergistic effect that arises in the existing business ecosystem as a result of implementing a new service from another area of activity beyond the provision of services by the operator company (growth of the net present value in existing services of the business ecosystem) or due to both factors:

$$\Delta F_j = R_j - I_j + S_j$$

$$\begin{cases} \Delta F_j > 0 \\ \Delta F_j \in \mathrm{M} \\ F_1 = F + \Delta F_j \rightarrow \max \end{cases},$$

where: ΔFj - the increment of the target function of the business ecosystem due to the inclusion of the j -th service of the expanding business ecosystem; Rj - the net present value obtained from the results of the business ecosystem's activities; Ij - initial investments in the development of the business ecosystem; Sj - the synergistic effect obtained in the

[380] Ref.: Voitolovsky N.V., Chepkasova E.A. Implementation of the methodology of strategic management at Russian industrial enterprises // Problems of modern economics.– 2015. – № 1 (53). – P. 113–115

existing business ecosystem from the inclusion of the *j* -th service; *M* - the domain of the set of criteria that the potential service must meet to be included in the business ecosystem; *F*1 - the updated result of the target function of the business ecosystem after including the *j* - th service.

Thus, if the target function of the business ecosystem according to the analysis results is greater than zero due to the inclusion of the j-th service, then this service should be considered for inclusion in the new business ecosystem. However, when calculating the potential net present value and synergistic effect the management of the company should understand that there are many factors that in practice can significantly adjust the theoretical calculations of the target function. Therefore, it is necessary to develop, analyze, and evaluate a whole set of additional criteria that can directly influence the business of the operator company when including the new service in the business ecosystem.

Therefore, to analyze the potential outcomes of integrating a service into the business ecosystem, it is necessary to consider two key factors in addition to calculating the increase in the objective function:

1. Alignment of the potential service with the existing business ecosystem - the ability of the new service to enhance the effectiveness of the business ecosystem.

2. Alignment of the business ecosystem with the requirements for the development of the service - the ability of the existing characteristics of the business ecosystem to support the success factors of the service.

Criteria system used to assess potential services for inclusion into the telecom operator's business ecosystem.

When assessing services to be included in the business ecosystem from other industries, the decisions regarding service inclusion depend on the operator's management, which will integrate the service into the business ecosystem and be responsible for its effectiveness. The importance of using an effective methodological framework is associated with the need to make productive decisions when selecting services from a number of alternative options, given the resource constraints (financial, human, production, etc.) faced by telecom companies, as well as managers' view of strategic goals and ways to develop the business ecosystem.

To eliminate possible subjective opinion of management regarding the feasibility of integrating certain services into the business ecosystem, it is necessary to establish a formalized system of criteria and decision-making methods regarding the selection of services for inclusion in the business ecosystem within the framework of the operator's development strategy. This formalized system of criteria and decision-making methods for selecting services to create or expand the business ecosystem should reduce the time spent evaluating various options and mitigate potential subjective biases of the company's management regarding different services for expanding the business ecosystem.

Following are the main approaches to assessing and selecting services for inclusion in the business ecosystem:

1. Defining Strategic Goals and Development Function of the Business Ecosystem: Establishing methodological principles for building a model to assess and select services that best align with the development goals of the business ecosystem

2. Developing a Formal System of Evaluation Criteria: Creating a structured system of criteria for evaluating potential services within the business ecosystem.

3. Choosing Evaluation and Selection Methods: Selecting methods for evaluation and screening that align with the goals of expanding the business ecosystem's services.

4. Selecting Relevant Experts and Evaluating Potential Services: Identifying experts and assessing potential services for creating or expanding the business ecosystem.

T a b l e 4.7

Criteria evaluation system for making decisions on expanding services in the business ecosystem of a telecom operator

Areas of the business ecosystem	Evaluation criteria
1	2
Goals and development strategy	1. Alignment with strategic goals 2. Significance 3. Brand compliance 4. Expertise and team availability 5. Management attitude
Production and technology	1. Availability of technologies and equipment 2. Ability of existing technological systems to integrate 3. Assessment of service quality level 4. Availability of personnel for production 5. Need for capacity expansion or replacement of existing ones
Marketing and promotion	1. Overall capacity and assessment of potential market share 2. Level of competition and competitive advantages 3. Ability to integrate into the overall promotion strategy 4. Potential service lifecycle timeframe 5. Intersection and impact on existing services in the business ecosystem
Innovations and R&D	1. Service alignment with the R&D strategy of the ecosystem 2. Service protection by patents 3. Compliance of the service innovation with the development of the business ecosystem 4. Service lifecycle stage 5. Probability of technical success of the project
Finance and cost	1. Total investment amount into service development 2. Break-even 3. Investment payback period 4. Compliance with existing investment efficiency criteria 5. Impact on increasing the value of the business ecosystem
Other	1. Alignment with the ESG agenda 2. Assessment of public reaction to the service 3. Compliance with legislation and norm standards 4. Government assessment of the service 5. Project alignment with the company's attitude toward innovation

5. Final Service Selection for Inclusion in the Business Ecosystem: Making the ultimate decision on which services to include in the business ecosystem.

Among the main principles underlying the model for assessing and selecting services that best align with the development goals of the business ecosystem are:

- alignment with the goals and development priorities of the business ecosystem;
- proportionality compared to other services within the business ecosystem;
- significance for the development of the business ecosystem;

- impact on the growth of its intrinsic (fundamental) value, meaning that the new service should have development potential not lower than existing services in the business ecosystem and lead to an increase in its intrinsic value;

- achieving synergy within the business ecosystem, allowing the inclusion of a service in the business ecosystem to not only assess its financial performance but also evaluate the growth of financial indicators of existing services in the expanded business ecosystem;

- ability to integrate into a unified technological platform with other services of the business ecosystem without significant modifications

- if the service is implemented within a separate legal entity with a separate team, then the presence of unified management approaches is required. Therefore, it is important to note that when selecting services for the business ecosystem, the management of the telecom company must make decisions by first answering the following important questions:

- does the implementation of the selected service contribute to achieving the strategic development goals set for the business ecosystem;

- does the selected service align with the existing capabilities and limitations of the business ecosystem;

- can the service be successfully integrated and implemented within the business ecosystem with the specified quality parameters for users;

- how will the efficiency and intrinsic value of the business ecosystem increase after the implementation of a specific service.

Therefore, the main purpose behind forming methodological support and a model for evaluating and selecting services for expanding the business ecosystem is to create a list of services that most closely align with the strategic goals and development of the business ecosystem and will be beneficial for it.

Services for the business ecosystem should be selected based on a formalized system of criteria, which should assess them in terms of compliance with the principles listed above. An example of building such a system of criteria, used in methodological support for the evaluations, is provided in Table 4.7.

The criteria system should cover all areas and subsystems of the telecom operator's business ecosystem:

- Goals and development strategy;
- Production and technologies;
- Innovations and R&D; - Marketing and promotion;
- Finance and cost;
- Other.

At the same time, it should be noted that to simplify decision-making it is necessary to highlight a list of criteria that is most significant and mandatory for compliance. This will allow to promptly determine whether service for inclusion in the business ecosystem is suitable for it. Such criteria should be considered as a "filter" for service analysis—if the service does not meet these criteria, it is rejected from further consideration.

After the system of criteria has been formed, to obtain a formalized assessment it is necessary to use expert scoring, which consists of developing and using a system for assigning a certain number of points to evaluate various qualitative values of the selected criteria. An example of such a scale for evaluation criteria is provided in

Table 4.8. based on Table 4.7

After completing the scoring, to obtain a formalized assessment for each criterion, it is necessary to use an expert multi-factor model, which assigns weight coefficients to each

evaluated criterion (the total sum of weight coefficients always equals 1, according to qualified experts).

T a b l e 4.8

Example of grading when assessing the levels of service and ecosystem compliance using the scoring method

Business Ecosystem Area of the Operator	Assessment Criterion	Service Alignment with Business Ecosystem	Business Ecosystem Alignment with Service	Score
Goals and Development Strategy	Alignment with strategic goals	Absent	Absent	1
		Low	Low	2
		Medium	Medium	3
		High	High	4
		Highest	Highest	5

Further, by multiplying the coefficient by the number of points, we obtain weighted scores for each criterion, and then by summing them, we get the total number of points regarding the particular service in relation to the two factors

$$N = \sum_{i=1}^{V} B_i * X_i$$

where: N - the final score for the considered factor; B_i - the expert assessment obtained for each criterion; X_i - the weight coefficient of each criterion; V - the total number of considered criteria.

The methodology described has been tested and applied by telecom operators to make decisions about expanding their business ecosystems to include other services not related to telecom. Subsequently, a mechanism is applied to build the telecom operator's business ecosystem, representing a set of methods and tools used by the company's management based on the business ecosystem development strategy for its practical implementation.

Evaluation of the business ecosystem expansion results should become BAU applying both qualitative methods (research, surveys, expert assessments of achieved results, etc.) and quantitative analytical and cost methods.

In order to be confident in management decision regarding the inclusion of a potential service and its further development within the business ecosystem, the operator company needs to analyze all the factors of a positive assessment of the expansion of the business ecosystem and the possibility of developing the service within the existing business ecosystem, as well as the ability of this service to integrate into the existing landscape of the business ecosystem, contributing to the maximization of the stated target function and the growth of its fundamental value.

As previously demonstrated, in order to obtain a more accurate assessment for each designated evaluation criterion, various weighting coefficients can be calculated depending on their importance for subsequent evaluation of the business ecosystem's impact on the service's development, as well as the service's impact on the business ecosystem's development.

The proposed analytical methodology and model serve only as tools to assist operator managers in the decision-making process. However, the ultimate strategic positioning of the service during business ecosystem expansion depends on how well-prepared the questions addressing the designated evaluation criteria are, as well as the collection and processing of the results.

Answers and weighting coefficients can be verified by experts because potential manipulation with these questions can adjust the actual strategic position of the service in the decision-making matrix for business ecosystem expansion. It is also essential to ensure verification: how comprehensive the obtained evaluation results are to the application of alternative weighting systems.

Therefore, when managers consider the possibility of creating a business ecosystem based on a telecom operator company should take into account the relative subjectiveness of possible decisions and make final integration decisions for the services under consideration only after analyzing all available information and the complex of the received assessments.

The structure of the section is shown on the diagram (Fig. 4.34).

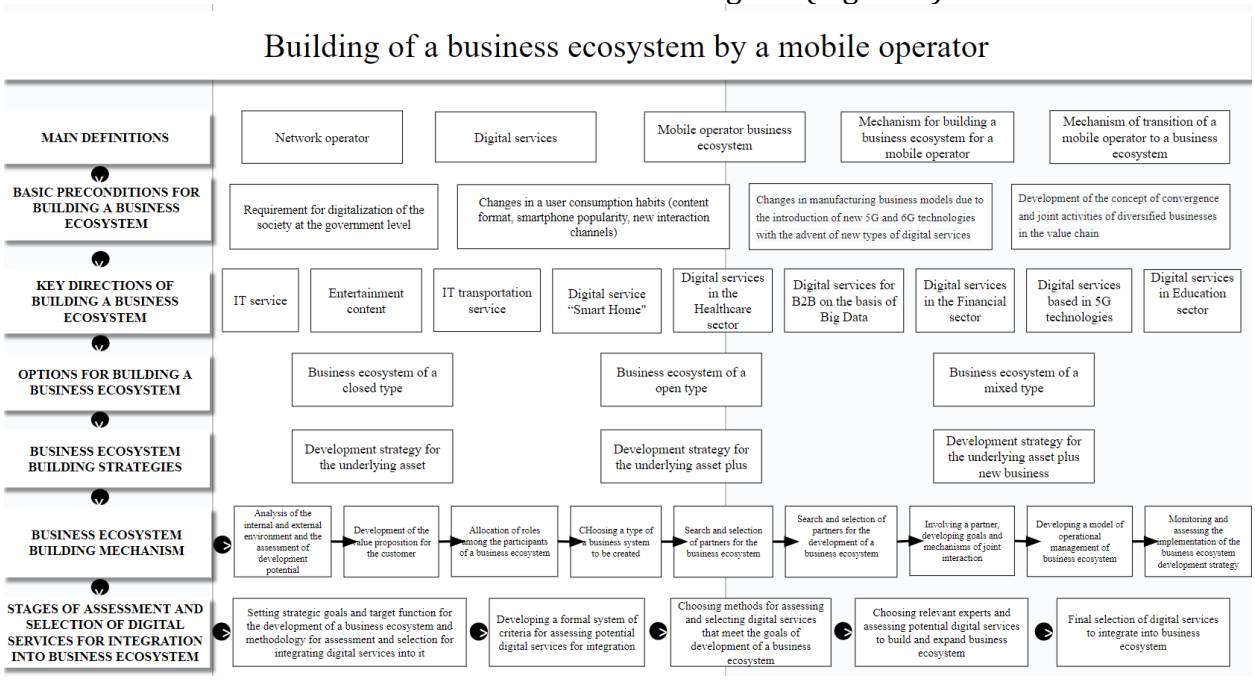


Figure 4.34. Visualization scheme of the section 'Methodological approaches to managing the construction of a mobile operator's business ecosystem'.

Control Questions

1. What is the difference between creating a business ecosystem and expanding a business ecosystem?

2. Will the emergence of new communication services on technological platforms other than the one currently used (fixed, satellite, wireless, etc.) be considered as creating or expanding the business ecosystem?

3. What target function do telecom operator companies choose to maximize when assessing the feasibility of expanding the business ecosystem?

4. Is it possible to include (expand) a new service into a new business ecosystem from other industries (business areas) if, as a result of the analysis, the target function of expanding the business ecosystem by including the *j*-th service will be less than zero, and why?

5. What are the two key factors that need to be considered in addition to the increase in the target function when analyzing the possible outcomes of including a service in the business ecosystem, and why?

6. List the main approaches used for evaluating and selecting services to be included in the business ecosystem.

7. How do the approaches to assessing the feasibility of expanding the business ecosystem differ for the three main types of construction: closed, open, and mixed?

8. Why is a criteria evaluation system used for deciding on expanding services in the business ecosystem of a telecom operator company?

9. List the main steps of the methodology for building a telecom operator's business ecosystem, applied during its creation or expansion.

10. List the problematic areas that telecom operator management needs to identify after analyzing the external and internal business environment, which could delay the achievement of strategic plans for creating a business ecosystem.

Practical Immersion Material

Business Case

Choosing a Business Ecosystem Development Strategy

A telecom operator plans to develop its business ecosystem and consider a list of potential services closely related to its core business for integration into the business ecosystem. It plans to implement a strategy to create its digital service business ecosystem based on its existing telecom business, where one of the key directions of the provided services is the extensive development of corporate services using Internet of Things, artificial intelligence, and big data technologies.

The telecom operator faces a dilemma: either independently develop expertise in big data processing and analysis platform and accumulate experience in monetizing solutions for optimizing business processes using such technological solutions, or attract a partner for accelerated launch of such digital services based on its business ecosystem using its own IT capabilities and existing advantages of the operator's business.

There are several companies - innovative startups - on the market that specialize in IT solutions for corporate businesses based on big data and artificial intelligence technologies. Startups develop and monetize IT solutions for processing and analyzing big data at the corporate level.

Questions for the Case Study

1. What evaluation criteria should the telecom operator analyze to make a decision on the business ecosystem development strategy?

2. Describe the main risks and issues that the telecom operator may face when choosing different integration options for new services into the business ecosystem. Justify your answer.

3. What recommendations would you give to the operator to make a decision?

Business Case

Banking Business as a Direction for Expanding the Telecom Operator's Business Ecosystem

The telecom operator considers the banking business as one of the most important directions for expanding its business ecosystem. There are two potential banking structures that the telecom operator is considering for acquisition and subsequent integration into the business ecosystem. One of the candidates under consideration is an unprofitable bank with a large retail network and a large number of retail customers, while the other is a highly profitable bank primarily serving corporate clients without wide branch network.

Questions for the Case Study

1. What evaluation criteria should the telecom operator analyze to make a decision on which of the two banking structures to acquire and integrate into the business ecosystem?

2. Describe the main risks and issues that the telecom operator may face when integrating either of the two banking structures. Justify your answer.

3. Should we expect an increase in the target function of the business ecosystem with the integration of each of the two banking structures?? Explain your answer.

Business Game

Development of Business Ecosystem Strategy

Objective

To practice persuasion skills and the ability to find arguments in favor of one's position when developing a business ecosystem development strategy.

Duration

30–40 minutes

Task

The group is divided into subgroups of 6 people. Each student is assigned a role according to the role table and prepares to speak at the Board meeting. Each student is asked to prepare a brief presentation with arguments for their position. After all participants have spoken, the Board must come to an agreement and form a unified position regarding the business ecosystem development strategy, taking into account the discussed restrictions. The CEO must present it to the Board.

Questions to be addressed during the presentations:

1. Why are you advocating for this particular development strategy position?

2. What risks do you see in defending your position?

3. Are there any circumstances/conditions that would allow you to change your perspective on business ecosystem development?

General introductory information about the agenda of the upcoming Board meeting:

The commercial department of the telecom operator has analyzed the existing market and customer needs, based on which about ten new development directions have been identified. The upcoming Board meeting will address the transformation of the existing closed business ecosystem into a hybrid version with the introduction of services provided jointly with partners. In recent years, the telecom operator has exclusively developed a closed multi-product business ecosystem, and the commercial department, facing long service implementation timelines on its own, insists on developing a partner network as it will help accelerate the launch of new services to the market (Table 4.9).

T a b l e 4.9

Participant Roles and Their Positions During the Board Meeting

Participant Roles	Discussion Positions
Chairman of the Board – CEO	Does not yet have a final position on a subject under discussion. Wants to hear from the Board members and, based on the information and arguments presented by the parties, make a decision on the business ecosystem development strategy.
Board Member – Commercial Director	Actively advocates for an open business ecosystem, arguing that there are opening opportunities to attract partners in terms of speed to enter the new markets and generate additional revenue.
Board Member – Financial Director	Adopts a wait-and-see position since, on one hand, has not yet received confirmation from the commercial director regarding potential revenues from the proposed services and the terms of working with partners on revenue distribution and planned investments. On the other hand, the financial director has already calculated the expected costs for enhancing existing IT platforms and the expenses for hiring project teams to develop new products internally, which are significant for the operator in case of project failure.
Board Member – Technical Director	Views the work on enhancing existing IT systems for integration with partner networks as very labor-intensive, as there has been no prior experience in implementing seamless integrations with partner IT systems, which, in his opinion, increases the risks of failure of working with partner networks. The option of developing a closed business ecosystem has already been explored and, despite its long implementation timelines, looks more preferable to the technical director.
Board Member – Legal and Corporate Affairs Director	Advocates for the development of the business ecosystem internally, as anticipates a lot of work for their department and foresees many legal risks in interacting with participants in creating and managing an open business ecosystem.
Board Member – Director of Human Resources and Administrative Affairs	Advocates for partner engagement, as sees a shortage of qualified personnel within the company in several areas and does not expect vacancies to be filled quickly due to existing labor market trends not favoring this.

4.7. HR Analytics as an Integral Part of a Business Ecosystem

HR analytics plays a crucial role in the business ecosystem because it enables companies to make informed decisions regarding personnel management based on data rather than intuition or assumptions. Through HR analytics, companies can gather information about their employees, including recruitment data, training and development, performance assessment, compensation, and other HR-related data.

HR analytics also helps companies identify which processes and investments in employee training and development bring the best results and which ones can be improved. This allows companies to effectively utilize their resources and increase employee productivity.

Furthermore, HR analytics helps companies identify trends and forecast changes in the field of personnel management. For example, based on the analysis of employee data and the labor market, companies can forecast how changes in the economy, technology, and other factors will affect their personnel needs, as well as which skills and competencies will be in demand in the future.

The use of HR analytics has become a relevant topic in organizations of all sizes. While the use of HR metrics and workforce analytics is not new, various factors have led to increased interest in them in the last decade.

Research conducted by hh.ru has shown that in 2022, the deepest shift of HR process automation in Russian companies is observed in salary, bonus, and incentive calculations (44%), staff recruitment (38%), and personnel planning and accounting (37%)[381].

The most common technological platform for automating HR processes in companies remains Excel, which is used by almost half (46%) of the companies. Following Excel in popularity are ATS/CRM systems (Talantix, E-staff, Huntflow, etc.), used by every fifth (21%) company.

Overall, companies evaluate their current level of HR analytics development as rather weak: 39% of respondents only produce ad-hoc reports upon request (reactive analytics), while almost every fourth (23%) company uses preventive HR analytics (operational reports for comparative analysis and decision-making). Advanced levels of analytics - in-depth (segmentation, statistical analysis, development of "human resources" models) and predictive (development of predictive models, scenario planning, risk analysis) - are the least common, collectively applied in only one out of ten (9%) companies. Nearly one-third (29%) of companies confirmed a complete absence of HR analytics.

In companies, the efficiency of HR departments is most commonly assessed based on functional indicators (e.g., recruitment period, employee turnover) (57%), regular goal setting and evaluation of their achievement (41%), and measuring satisfaction among "internal" customers (32%). Only 13% use financial and economic indicators of the company's HR evaluation (e.g., EBITDA/personnel expenses) and conduct market comparisons (benchmarking), and only 5% apply a balanced scorecard system. Nearly a third of companies (28%) do not evaluate the efficiency of their HR departments at all.

HR managers perception of artificial intelligence (AI) as a threat to their profession has decreased from 23% in 2018 to 17% in 2022, while the number of professionals confident that AI will completely change the role of HR in companies has increased from 16% in 2018 to 33% in 2022.

The main tasks that HR managers believe AI is currently solving include ranking responses to job vacancies (60%) and initial screening/ranking of candidate resumes

[381] Ref.: How companies use HR analytics: hh.ru study July 22, 2022– URL: https://hh.ru/article/30591

(58%). 44% of HR managers note AI's assistance in informing labor market participants about the company, while 42% find it helpful in assessing the quality of resumes. AI struggles more with tasks such as developing training programs tailored to individual employee profiles (31%), automating communication tasks for adaptation (31%) and organizational requests (28%), and predicting candidate success in specific roles (24%). Only 5% report seeing no benefit from AI in addressing any tasks.

The development of HR analytics became possible thanks to the widespread adoption of integrated Human Resource Management (HRM) systems, which converted most processes into electronic form and significantly increased organizations' capabilities to collect and analyze large amounts of data. New HRM systems allowed for improved connection through organizational networks and the Internet, as well as access to the latest versions of user-friendly analytical software. These changes fundamentally changed the dynamics of human capital assessment in organizations, reducing the marginal cost of evaluation, providing potential for real-time analysis and information spread.

The field of HR metrics and workforce analytics is currently undergoing a transitional period. Over the past 30 years, most medium and large size organizations have been engaged in HR process evaluation and analytics. However, these efforts were not systematic. Partly due to costs, they were done selectively and often only for a limited set of indicators. Recently, thanks to the development of powerful computer communication infrastructures and broader access to data, the implementation of integrated Human Resource Information Systems has enabled organizations to integrate consistent and systematic reporting on HR metrics.

It is worth noting that many organizations use metrics to measure or audit their programs and activities in the field of personnel management.

HR metrics and analytics form an information system, and information systems can only impact organizations if the data they provide supports managers to make more effective decisions than they could without this information. No information system, including HR metrics and analytics, yields a return on investment if management does not change their decision-making behavior for the better.

The focus on improving managerial decisions changes the dynamics that drive efforts in metrics and analytics assessment - raising the bar. It's no longer sufficient to merely collect data. These activities must be approached in such a way as to increase the likelihood that access to the information from these reports will change management decisions, making them more effective.

The fundamental problem is that many of the currently popular HR metrics do not have a clear impact on important managerial decisions. Therefore, the task is to identify metrics and analytical indicators that will provide managers with the information necessary to make more effective decisions regarding the acquisition and utilization of human capital.

HR metrics are quantitative indicators used to assess the effectiveness of human resource management. They help evaluate the efficiency of HR processes and make data-driven decisions. HR metrics may include:

- Average length of the workday.
- Average time spent on filling vacancies.
- Number of employees undergoing training and completed training.
- Job satisfaction level, among others.

Their use allows for the evaluation of HR strategies' effectiveness, planning of further actions based on data, and improvement of personnel management within the organization.

HR analytics (personnel analytics) is the process of collecting, analyzing, and interpreting data related to human resources to make more informed and effective decisions in personnel management. There are four key stages of working with data: data collection, analysis, visualization, and utilization. These stages can be represented as a cycle.

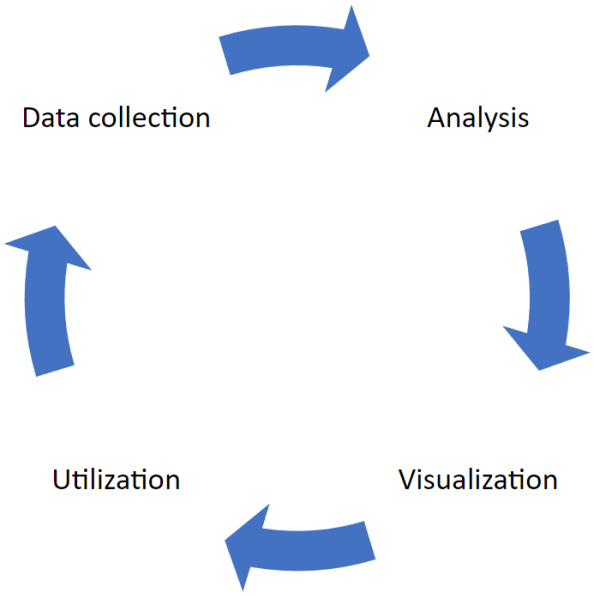


Figure 4.35. Stages of working with data

Data collection is the first step in the data processing cycle. Data can be collected from various sources such as databases, surveys, historical data, etc.

Data analysis involves using data analysis methods to obtain information and insights from the collected data. Methods may vary depending on the analysis goals, including statistical analysis, machine learning, deep learning, etc.

Data visualization involves creating graphs, charts, and other visual elements to present information in a convenient and understandable way. Data visualization helps to improve understanding of information and make conclusions based on this data more vivid and compelling.

The collected information is used for decision-making and planning further actions. Based on data analysis, decisions can be made that may affect business processes, operations, strategy, and other aspects of the company's activities.

Loads of HR data flow through every organization each day, resulting from existing HR practices and tools. HR specialists have a unique opportunity to use this information to gain insights into their employees and enhance response efficiency, regardless of the organization's size.

However, without a clearly defined framework for data gathering, prioritizing, and organizing data will be complicated and meaningless.

Key methods of data collection in HR analytics may include surveys to gather data directly from employees, including their opinions, work experience, satisfaction levels, etc.

Surveys can be conducted online, through paper questionnaires, or via interviews.

Collecting and analyzing personnel data (HR statistics) such as employment information, positions, salaries, age, and experience can be used to analyze the company's situation and identify issues such as pay inequality, inefficient resource utilization, etc.

Performance monitoring data can be collected using performance management systems, time tracking, and other systems that can provide information on how employees are performing their tasks and what results they are achieving.

Collecting and analyzing data on recruitment procedures and resume analysis can help assess the efficiency of the hiring process and find ways to improve attracting and selecting the most suitable candidates.

Many companies use social networks to gather data on the company's reputation, employee and customer opinions, as well as to search for potential candidates for vacancies.

The main methods of data analysis in HR analytics include:

1. Descriptive analysis: describing data and presenting it in tables, graphs, and diagrams. It can be used to identify trends, data distribution, outliers, and analyze differences between groups, etc.

2. Multivariate analysis: using statistical methods to determine relationships between different variables, such as employee satisfaction and productivity, age and employee turnover, etc. It can be used to identify key factors affecting productivity and employee satisfaction.

3. Time series analysis: used to study changes in indicators over time. It can be used to identify trends, cycles, and seasonality in data, as well as to forecast future indicator values.

4. Modeling: applying statistical models to forecast results based on data. For example, machine learning models can be used to forecast the probability of employee turnover or determine the most effective hiring methods.

5. Cluster analysis: used to determine groups of similar objects based on their characteristics. It can be used to segment employees based on various criteria such as age, work experience, salary, etc.

6. Statistical analysis: for hypothesis testing and determining the statistical significance of differences between groups. For example, statistical analysis can be used to determine the significance of differences in salary between different categories of personnel in the organization.

Let's consider the main areas of application for HR analytics:

Recruitment

HR analytics has broad application in the recruitment process. With HR analytics, the efficiency and accuracy of candidate selection can be improved, and the process can be optimized to reduce costs.

Methods of HR analytics:

1. Analysis of job requirements and identification of key competencies and skills necessary for successful performance in the position. This can help HR to develop a more accurate job description and target candidate search correctly.

2. Analysis of current labor market trends, including demand for specific professions and qualifications, allowing for attracting the most suitable candidates for the organization.

3. Analysis of candidate data, such as work experience, education, achievements, etc., to make more informed decisions about which candidates are most suitable for the position.

4. Evaluating the candidate's likelihood of success in the position, based on historical data of other employees with similar competencies and characteristics. This can help HR specialists select a candidate who is most likely to be successful in the position.

5. Evaluation of the effectiveness of the recruitment process, for example, to determine the time a vacancy remains open, the number of candidates, the overall cost of the process, for optimizing the process and reducing recruitment costs.

Assessment of Work Efficiency:

Some of the methods used in HR analytics to assess work efficiency include:

1. Comparing average work efficiency values between different groups of employees or departments. For example, one can compare the productivity of employees with higher education to those without higher education.

2. Identifying the reasons for low employee productivity. For instance, if a specific department has low productivity, HR analytics can be used to identify the reasons behind this, such as lack of training or bad equipment.

3. Evaluating how successfully the organization retains its employees. For example, analyzing turnover rates in a particular department can help identify reasons why employees leave that department or the organization.

4. Assessing the quality of employees' work. For instance, HR analytics can be used to estimate how effectively and efficiently employees perform their tasks.

Development and Training of Personnel:

HR analytics plays a crucial role in the development and training of personnel. Its main goal is to help organizations identify which training and development programs work best and what changes need to be made to training processes to improve their effectiveness.

With HR analytics, organizations can determine which competencies are most important for success in specific roles or departments, and which training and development programs will help employees improve these competencies. Additionally, the impact of training programs on employee productivity and efficiency can be assessed.

HR analytics allows for identifying the most effective training methods, including learning formats that are most effective for specific groups of employees. For example, interactive online courses may be more effective for younger workers; while mentoring or coaching may be more effective for more experienced employees.

HR analytics can also help evaluate the effectiveness of training programs. Through data analysis, organizations can determine which training programs are most effective and have the greatest impact on business outcomes.

Furthermore, HR analytics can help determine the ROI (Return on Investment) in training and development. This allows organizations to assess the cost of training and development programs, their impact on employee productivity and efficiency, and decide whether to continue investing in these programs.

Reward Management:

Through data analysis, organizations can determine which categories of employees receive higher or lower salaries, which criteria influence the size of rewards, and which positions and competencies are most valued in the labor market.

Data analysis also allows companies to compare their reward indicators with market standards and set more competitive rates to attract and retain talented employees. Tracking salary and bonus indicators also helps companies make decisions about when and how to increase salaries and bonuses.

HR analytics can also be used to evaluate the effectiveness of the reward system, identify areas that need improvement, and determine which types of rewards are most effective in motivating employees.

Data visualization in HR analytics is an essential part of analysis, allowing for quick and visual assessment of key metrics and trends. Below are some data visualization methods widely used in HR analytics:

1. Graphs and charts: the most common way to visualize data. They can be used to display various indicators such as workforce size, turnover rates, training and development expenses, employee satisfaction levels, etc.

2. Heatmaps: convenient for displaying large volumes of data using a color scheme. They can be used to visualize the distribution of indicators such as salary, length of employment, qualifications, etc.

Figure 4.36. Example of a heat map "Work Performance Level by Staff Category"

Interactive dashboards - are special applications that allow users to interact with data and create customized reports. They can be used to display various indicators such as training effectiveness, employee turnover, workforce composition, and others (Fig. 4.37).

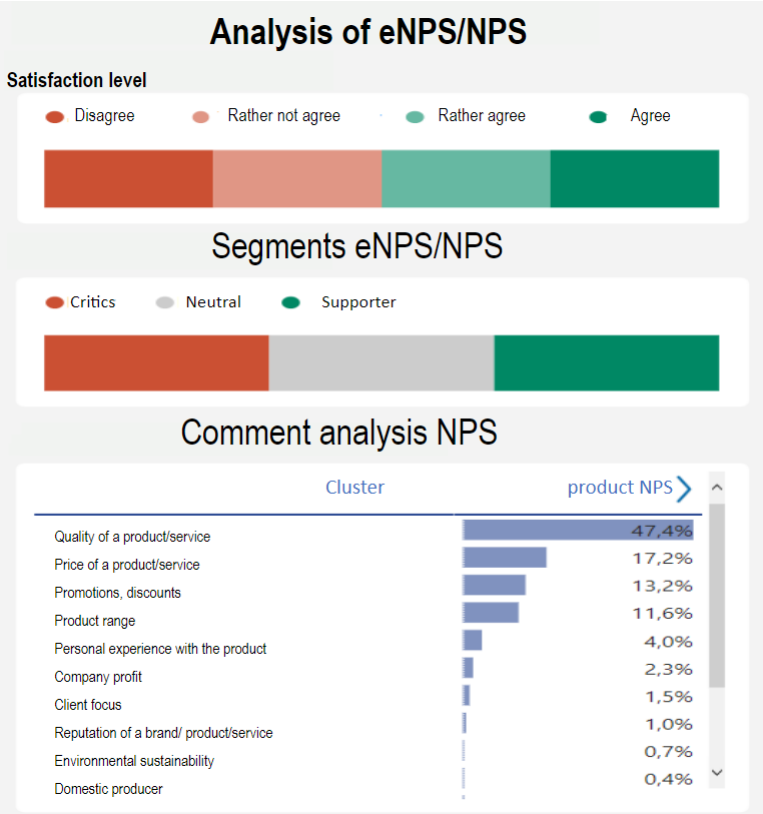


Figure 4.37. Example of Loyalty Assessment Visualization[382]

Geographical maps can be used to display the distribution of employees across geographic regions, as well as to analyze differences in salaries and other indicators between regions (Fig. 4.38).

[382] Ref.: Data-driven management. – URL: https://alexkolokolov.com/ru/gallery/ dashboards_manufacture (reference date : 21.04.2023).

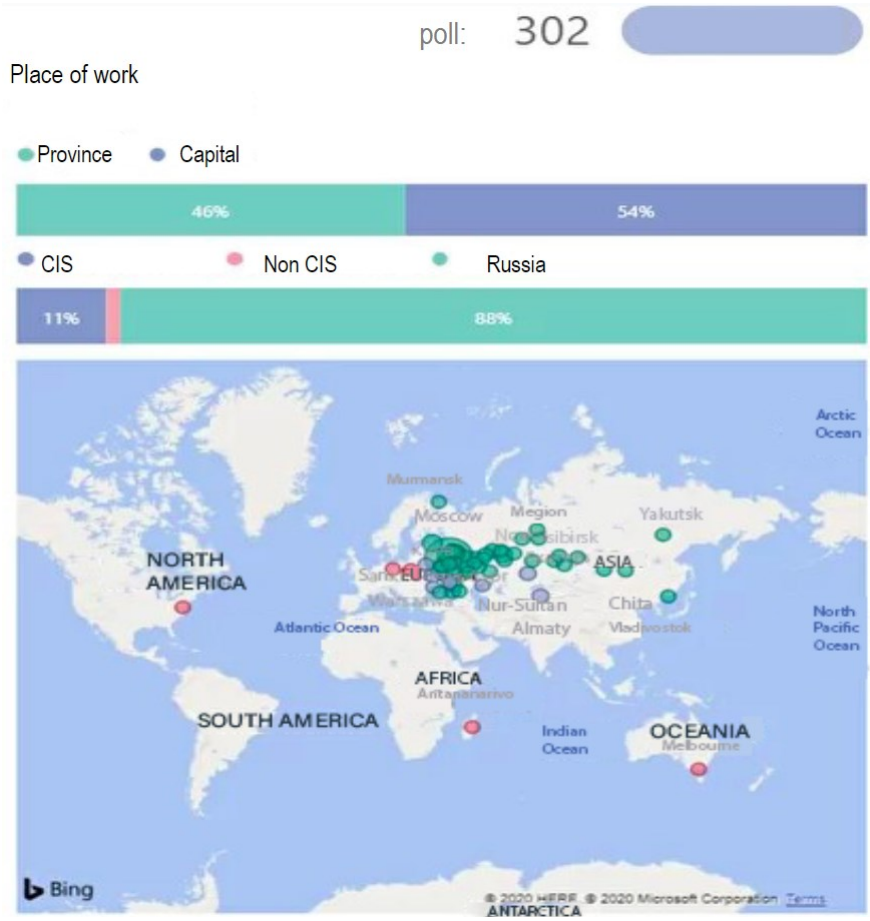


Figure 4.38. An example of a geographic map as a data visualization[383]

Word clouds is the representation of the most frequently occurring words in textual data, such as employee comments in satisfaction surveys. They can be used for a quick assessment of the main themes and issues that concern employees.

Correct data visualization allows HR specialists to quickly and efficiently analyze a large volume of information and make informed decisions based on facts.

Below are several successful cases of HR analytics:

1. Google: Google applies HR analytics to optimize its hiring processes. They use data from resumes and candidate profiles to determine which candidates are most likely to join the company and be successful.

2. Xerox: Xerox used HR analytics to reduce employee turnover. They analyzed data on high-performing employees to identify factors contributing to their success. Then, they used this information to create training and development programs that helped retain these employees.

3. IBM: IBM applies HR analytics to improve the effectiveness of its training and development processes. They use data on employee performance in various courses and trainings to determine which training and development programs are most effective. They then use this information to create more efficient training and development programs.

[383] Ref.: Data-driven management. – URL: https://alexkolokolov.com/ru/gallery/ dashboards_manufacture (reference date: 21.04.2023).

4. Kalinka Group uses analytical data in the daily management of brokers and for their annual certification, as well as for mentoring, targeted training, and coaching. By approving new sales plans for the reporting period, making decisions about developing new business directions or scaling existing ones, and inputting new data, the company can build any forecasts in real-time.

Although HR analytics can bring many advantages to personnel management, there are several common mistakes and failures that can occur when using it. Some of them include:

1. Underutilization of data: when organizations collect data but do not use it to make decisions. This can happen if managers do not know how to interpret the data correctly or if reports do not meet the organization's needs.

2. Data overload: which complicates processing and analysis. Organizations should ensure that they only collect the data necessary to achieve their goals.

3. Lack of qualified specialists: HR analytics requires certain skills and knowledge, and some organizations may not have enough qualified specialists to work with data.

4. Flaws in data collection and processing systems: which can lead to inaccurate results. Organizations should ensure that their systems are working properly and providing accurate data.

5. Unethical use of data: HR analytics may involve the use of confidential information, so organizations must be particularly careful in handling data and ensure that its use complies with legislation and ethical standards. Special care should be taken about employees' personal data.

The department's structure is shown in the flowchart (Fig. 4.40).

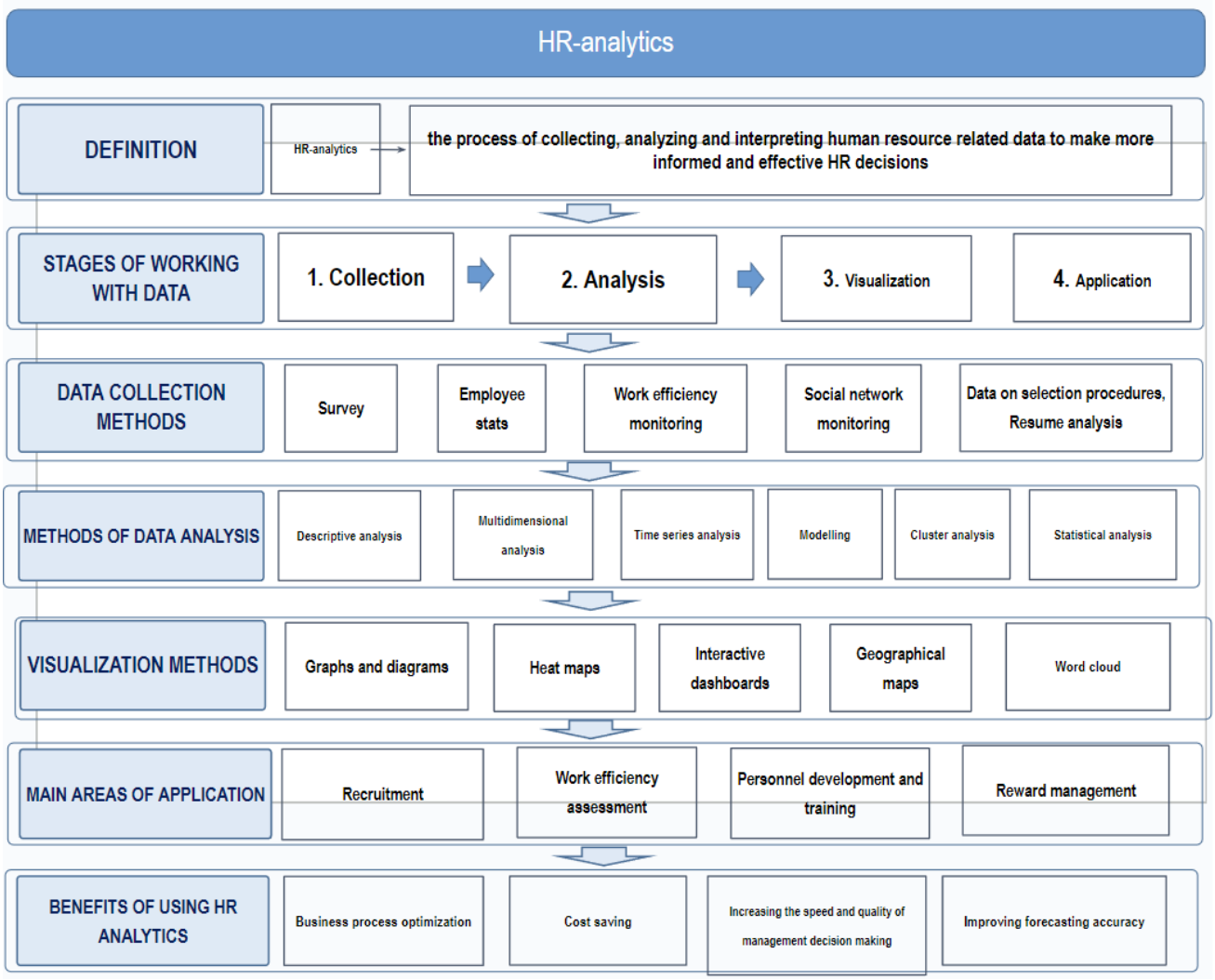


Figure 4.40. Visualization Scheme of the "HR Analytics as an Integral Part of the Business Ecosystem" Section

Control Questions

1. What factors have led to the growing interest of organizations in HR analytics?
2. What is the difference between HR metrics and HR analytics?
3. What is included in the data lifecycle?
4. What are the main methods of data collection used in HR analytics?
5. Name the main areas of personnel management where HR analytics is applied.
6. Name the main methods of data visualization.

Case Study

A tractor manufacturing company is the largest enterprise in its region, with a workforce of 680 employees. The core task of the plant management is to efficiently staff its workforce, considering the constant shortage of skilled workers, the aging workforce, and the ongoing competition with other employers in the region for employees with key skills. Employee expenses account for over 80% of the plant's total operating expenses, so identifying ways to optimally match skills and the number of employees is crucial for achieving sustained success.

However, individual department managers are making less effective staffing decisions, leading to constant overstaffing or understaffing of departments. These personnel problems potentially increase high service costs and labor efficiency, and also potentially increase the risk of raising employee turnover.

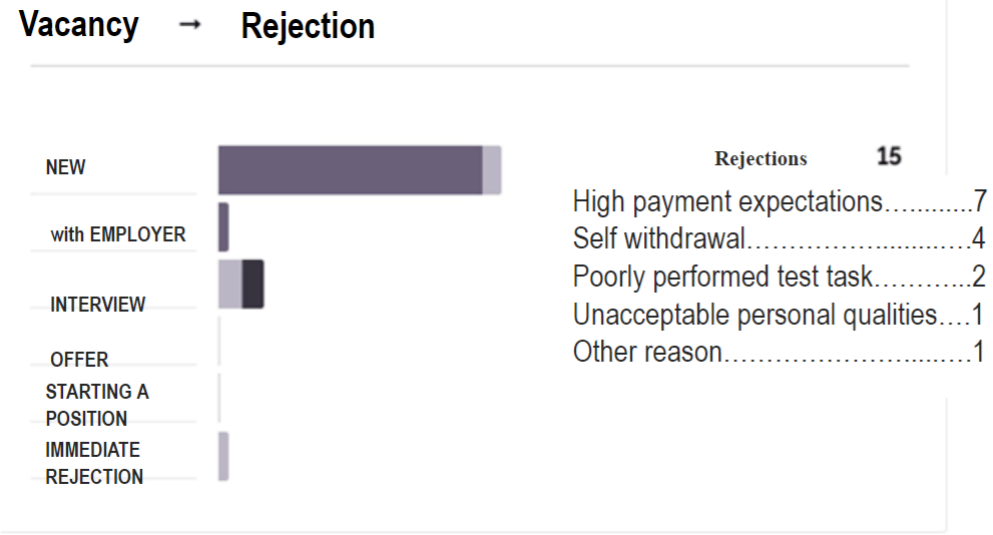
The plant owners recognize the potential of HR analytics for their organization and have turned to you for help. They want you to advise them on how to conduct HR personnel analytics.

Questions:

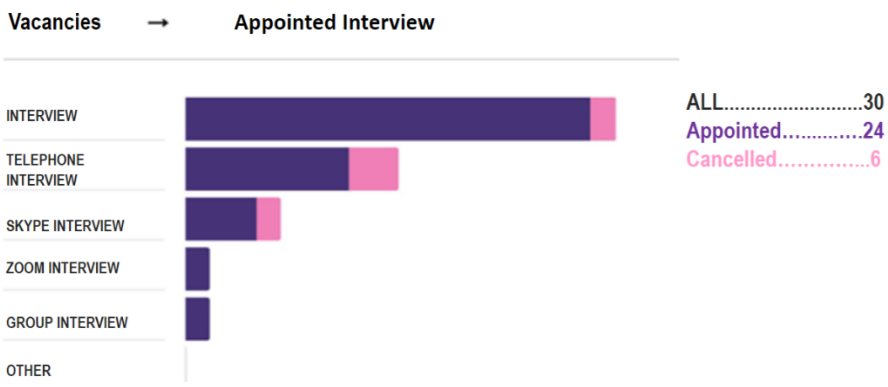
1. In your opinion, is HR analytics necessary for a successful management? If yes, why?
2. Identify the main areas of personnel management where HR analytics and metrics can be used.
3. How could the plant use benchmarking in its work with metrics and analytics?
4. What potential problems may arise when implementing HR analytics?

Task

You are looking for a marketing specialist and see the following picture.



1. Analyze the data and answer the question: "What is the main reason for rejections?" Suggest a solution.
2. Look at the data and answer the question: "Is there a need to take any action?" Suggest a solution.


Vacancies → Appointed Interview
INTERVIEW
TELEPHONE INTERVIEW
SKYPE INTERVIEW
ZOOM INTERVIEW
GROUP INTERVIEW
OTHER
ALL.....30
Appointed.....24
Cancelled.....6

4.8. Digital Approaches to Creating Ecosystems in Transport and Logistics Services

The significance of digitization for transportation and logistics

Globalization, force majeure circumstances triggered by global events in recent years, the development of e-commerce, and other factors of international matter have significantly changed the global economy, but have most greatly affected certain economic sectors, including transportation and logistics.

Business ties and the logistics chains have been disrupted. At the same time, new partnerships have started to develop, requiring alternative delivery routes and transport communications. Newly created logistic chains are characterized by an increased number of intermediary participants, longer delivery routes passing through a greater number of transit points, using greater number of transportation and more. The complexity and extended timeframe of supply chains lead to raising logistics costs. Besides there are many emerging tasks that require instant solutions.

The more complex conditions and the urge to meet the increased customer demands for delivery speed required rapid implementation of digital technologies and electronic document management into the work of transportation and logistics companies for prompt interaction with shippers and receivers. The transition to digital technologies completely changes the traditional models of coordination and cooperation between transport and manufacturing and trading enterprises, thereby creating new opportunities for the sustainable development of partner organizations and business ecosystems.

The digitization of business and the creation of ecosystems occur gradually, with *several stages*: digitization, automation, digital transformation, digital business model. Initially, digitization must be carried out, involving an analysis of such business components as communication culture, technological equipment, and the level of business development. Based on the analysis, it is necessary to select course of changes for each element, coordinate interaction, and develop a strategic plan for the digital transformation of the company or industry as a whole. The next step is to make an audit of business functions, including an analysis of the technologies used, and select best practices using benchmarking.

The digital transformation of the entire transportation complex involves the integration of existing digital solutions in individual modes of transportation into a unified ecosystem to create a single multimodal digital space. This will allow for information exchange among all participants in the transportation market.

The strategy for the digital transformation of transport system

The strategy for the digital transformation of transportation in the Russian Federation, in line with national goals and economic security interests, has been developed and approved by the Government of the Russian Federation until 2030[384]. According to the document, the following technologies should be implemented in transportation:

- Artificial intelligence technologies
- Big data collection and processing technologies
- Distributed ledger technologies
- Virtual and augmented reality technologies
- Spatial analysis and modeling technologies

[384] Ref.: Order of the Government of the Russian Federation of December 21, 2021 No. 3744-r "On approval of the strategic direction in the field of digital transformation of the transport industry of the Russian Federation until 2030."». – URL: https:// www.garant. ru/products/ipo/prime/doc/403211610/

- Information modeling technologies

These technologies will be applied in traffic control and management systems across various modes of transportation to optimize routes; during the transition of the entire transportation industry to electronic document management and electronic transportation documents; in the development of a national digital logistics framework for the ecosystem of digital transport corridors within the EAEU and a unified transportation complex management center; and for the use of digital twins (copies) of transportation infrastructure entities, necessary for their design, construction, maintenance, and keeping them in an up-to-date state. To reinforce the resilience of supply chains, significant attention is paid to the implementation of digital technologies such as predictive analytics, which is based on the analysis of large volumes of information.

Digitization should cover both freight and passenger transportation, with regards to their safety, reliability, and environmental sustainability. Launching of unmanned vehicles across all modes of transportation are being considered. Responding to customer demands, drones will be used to speed up delivery within the "last mile" (transitioning from same-day deliveries to express deliveries in less than an hour).

The digital platform will be designed for traffic participants, communication routes, and roadside infrastructure. By 2024, 82 constituent entities of the Russian Federation should be connected to the information and analytical system of transport regulation.

The Intelligent Transport System (ITS)

ITS is a smart system that helps process information correctly, quickly, and clearly. The ITS system is similar to a traffic manager, performing functions of operational response and coordination of all participants in the road traffic network, as well as specialized services and relevant authorities. The implementation of ITS will create a global breakthrough in the transportation sector, significantly improving road traffic safety; organizing intelligent traffic management; ensuring a reduction in traffic, congestion, and accidents; improving the quality of roads and highway infrastructure; and reducing environmental damage.

An important component of the ITS is security. In 2018, the Federal Law "On the Security of Critical Information Infrastructure of the Russian Federation"[385] was introduced. Transport information systems are part of the critical information infrastructure (CII) and require enhanced protection, without it significant negative social and economic consequences can occur.

In addition to addressing security issues, ITS aims to improve traffic organization: this includes smart traffic lights, tunnels, and roads, traffic flow detectors, information boards for drivers in major cities, where technological accidents or hacking can lead to irreversible consequences. Therefore, all processes in ITS are built on information and computer technologies which are embedded into vehicles and road infrastructure. The main outcome of ITS should be unmanned transport.

Smart transportation in Russia should be based on software and technical solutions mainly from domestic engineers, without the use of foreign input, aiming to increase the level of security and cyber security.

The ecosystem of railway infrastructure

The ecosystems in the railway sector have established themselves as engines of innovation, providing a powerful boost to development and creating a conducive environment for scientific and technological progress. The railway industry was one of

[385] Federal Law as of July 26, 2017 No. 187-FZ “On the security of critical information infrastructure of the Russian Federation».

the first to undergo a transformational shift towards digitalization and serves as a key global transportation artery. In the vast territories of Russia, digitalization of railways holds special significance, as a large amount of freight and passenger transportation is carried out by rail, owing to the extensive railway network and the country's geographical features. Russian Federation railway infrastructure includes 85 thousand kilometers of tracks, 1.3 thousand stations, 20 thousand bridges and viaducts, 1.5 thousand tunnels, and other facilities[386].

The Russian Federation allocates vast resources for the construction of new railways, introduces cutting edge locomotives and cars, modernizes infrastructure, creates a modern digital railway. Today railway transportation is the engine that should help to put the domestic economy onto sustainable tracks. The digitization of railway infrastructure is based on the long-term development program of Russian Railways (OAO "Russian Railways") until 2025, approved by the Government's Directive No. 466-r of March 19, 2019, which includes the transition to a "digital railway", specifically the development of integrated digital technologies for organizing the transportation process.

The Fourth Industrial Revolution has brought changes to the transport sector, changing the interaction between humans and machines. Russian Railways actively integrates digital twins into its production activities, business processes, and customer service, for example, by offering them new products and services.

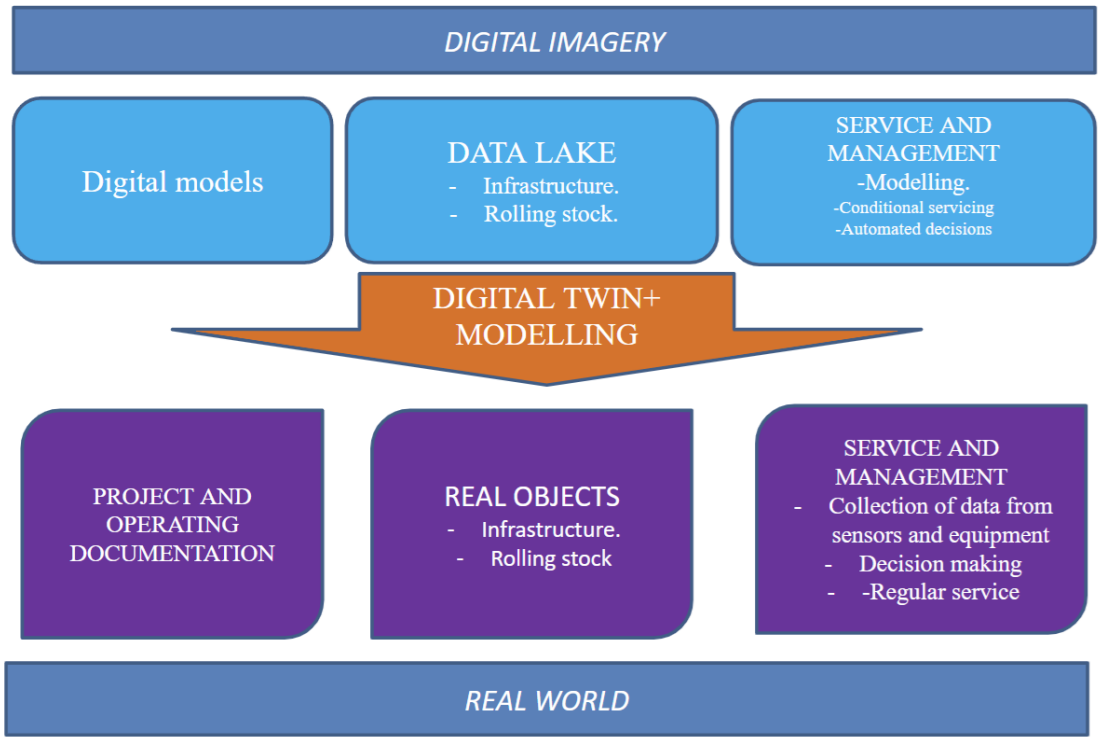


Figure 4.41. Modeling processes using digital twins in railway transportation

The use of Internet of Things (IoT) technology allows for real-time transmission of data about railway infrastructure through smart devices and sensors. Russian Railways installs sensors on various track elements (rails, switches, contact networks) for timely

[386] Ref.: Russian railway of the near future: digital technologies and intelligent systems. – URL: https://integral-russia.ru/2023/04/10/rossijskaya-zheleznaya-doroga-blizhajshego-budushhego-tsifrovye-tehnologii-i-intellektualnye-sistemy/

monitoring of operational service, conducting repair works, troubleshooting, and other elements, thus forming an ecosystem of sensory devices.

Big Data plays a significant role in digitization, involving large datasets obtained through satellite navigation, video surveillance, and other sources. Big data analysis enables forecasting and modeling of the railway system, as well as the development of the railway industry ecosystem using digital twins.

Intelligent management systems actively utilize elements of artificial intelligence (AI), machine learning, and neural networks in managing various processes on the railway sector. For instance, they are used to make train schedules with specified inter-train intervals and train locations on tracks. The development of a unified intelligent control and automation system in railway transportation (ICSRT) is underway, aiming to replace dispatchers with an intelligent software-hardware module.

Blockchain technology is widely used in various areas of railway sector, including transportation organization, railway track services, ticket sales, and cargo certification. The transparency, clarity, and quick decision-making provided by this technology make it highly effective in railway operations.

Russian Railways (OAO "RZD") utilizes computer vision systems (CVS), which enable the scanning and sorting of objects in photos and videos using cameras, radars, and sensors. On one hand, CVS gives informational assistance to the locomotive engineer, providing data on signal indications and hazards on the way; however, decisions are still made by the engineer. On the other hand, CVS can function as a control system, autonomously issuing commands for speed adjustments or braking. Over time, the visibility range of CVS has increased, currently reaching 150–200 meters.

CVS is a valuable technology as it allows for the precise detection of damages, failures, and defects, reducing the risk of accidents. This system is similar to the human brain but, unlike humans, operates tirelessly, reducing the error rate practically down to zero. This technology replaces professions like locomotive engineers and dispatchers. CVS is designed to ensure the safety, quality, and efficiency of the railways.

Virtual reality, as a digital technology, creates a platform for immersive simulators using smart and digital devices, which can be useful in training or retraining of staff. Thanks to this, personnel immersed in virtual reality can simulate various work situations without health risks or harm to the transport items. Additionally, virtual reality can be useful for train passengers as interactive entertainment during the train journey. This technology aims to diversify and expand the range of service offerings and enhance the competitiveness of railway transportation.

A project to develop smart trains and stations is necessary to adapt to changing conditions by utilizing the AI. The AI system is capable to autonomously manage train movement without human involvement. The system can also independently select various scenarios and combinations in terms of both environmental impact and interaction with other trains. For example, based on AI, a Cognitive Rail Pilot has been developed, tested, and is expected to be launched into operation. The smart train, using AI and neural networks, recognizes hazards, signs, and other objects on the track. This enables the locomotive to autonomously determine speed adjustments, stops, and braking.

By using AI smart stations enhance customer service responding to passengers' needs; they include a biometric data recognition system for passengers' faces or voices. All of this provides fast and comfortable access to trains without paper documents.

Russian Railways is a pioneer in the field of quantum technologies in the country. This technology will further enhance the safety and efficiency of railways, providing high

protection of information from tampering and hacking. A demo version of quantum communication was launched in 2021 between Moscow and St. Petersburg.

The implemented information technologies clearly indicate that Russia is not lagging behind, and often surpasses Western countries, with Russian Railways playing a key role in the field of digital technologies.

Business ecosystem in aviation transport.

Innovations have always played a defining role for the development of civil aviation. In recent decades, many innovations have been associated with information technologies. Nearly half of all civil aviation enterprises have actively supported the modern trend of digital transformation: they have developed strategies for digital transformation and import substitution of industry-specific software[387].

The digital business ecosystem within the entire civil aviation covers many diverse areas, allowing a shift away from competition in the aviation market towards cooperation. Examples include the exchange of new technologies and their convergence, inter-product cooperation in the tourism industry, including the use of services offered by airlines, airports, aggregator websites, and others.

Thanks to digitization, since 2019, passengers have had access to electronic boarding passes when checking in for flights. The pass can be saved on a smartphone or a tablet. The barcode on the electronic boarding pass is scanned at the airport when passing through turnstiles, and the passenger is granted access to pre-flight procedures. Paper passes still exist: they can be used at airports without special equipment, and at the passenger's discretion or in cases where documented proof of the flight is required for business trips. The implementation of airport information systems for reading electronic boarding passes started with the largest, high-capacity airports, while smaller regional airports do not have such technological innovations.

Airlines have started using blockchain platforms for ticket sales. Tickets are issued with payment by connecting to the banking system via blockchain using the international NDC standard. The first to implement this project was S7 Airlines in collaboration with "Alfa-Bank." This has optimized business processes for the airline and its partners. In particular, the speed of settlements has increased from 14 days to 23 seconds (and subsequently with the new version – to 15 seconds). Labor costs for ticket sales operations have been reduced, and the airline receives revenue without delays immediately after ticket issuance[388]. The capabilities of the blockchain platform allow for expanding functionality in the future and connecting providers of outsourcing services, such as onboard catering.

The feasibility of using blockchain technology is dictated by both the requirements for the security of financial transactions and the need to work with an extensive database including information about numerous organizations involved in flight operations (airlines, which can be multiple in the case of connecting flights; airports; air traffic control services; fuel, insurance companies; customs and border control authorities, etc.). Passport data of passengers (or PNR, Passenger Name Record), which is stored and processed in PSS (Passenger Service System), is also incuded into the database; aircraft parking positions at airports; information on the performance of aircraft maintenance, and much more. As a result, large amounts of information is generated, which need to be processed and exchanged.

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[387] Ref.: Information technologies in civil aviation. Digital transformation of the aviation industry. – URL: https://www.tadviser.ru/index.php

[388] Ref.: A blockchain platform for selling air tickets has been launched in Russia. – URL: https://3dnews.ru/956124/v-rossii-zapushchena-blokcheynplatforma-po-prodageaviabiletov

Not only big airlines use digitalization in their operations. The task has been set to create a unified ecosystem for aviation in general, covering Russian regions, many of which include remote, inaccessible, and poorly populated areas. In such areas, aviation is often the only means of transportation, however airports are not adapted to accommodate heavy aircraft. Most are designed for short takeoff and landing (STOL) or vertical takeoff and landing (VTOL) aircraft, with a payload capacity of 1–1.5 tons or less, and even drones capable of transporting cargo weighing several kilograms or tens of kilograms.

This ecosystem should include digital solutions for flight-servicing infrastructure, primarily aerodromes and repair bases; aircraft, including private ones; organizations providing ancillary services, and others. The small aviation ecosystem must be supported by a regulatory framework. The ecosystem of business processes in air transport, based on the application of modern digital technologies such as artificial intelligence, machine learning, biometrics, industrial Internet of Things, will allow to coordinate segmental solutions of individual companies and airports and connect them on a common platform, thereby improving passenger service, increasing flight safety, and enhancing profitability.

Digitization of automobile transport

It's progressing very intensively, but there is still no unified system. The strategy for the development of automobile transport is focused on information and management processes of transportation and logistics services. The goal is to create a unified digital field, making transportation and logistics a convenient, safe, high-quality service, and increasing road capacity.

Electronic logistics opens up a range of new possibilities related to the electronic flow of information. This format allows for much faster and easier transfer of information by reducing the number of paper documents, making the process less costly and environmentally friendly. Another important advantage is the reduction of errors in data entry. International standards form the basis of electronic logistics, based on digital encoding and reading of logistics units. This method minimizes human involvement in the supply chain and replaces the previous transaction format with codes.

The development of electronic logistics within the framework of partnership with the Eurasian Economic Union (EAEU) countries has led to the transition to the International Consignment Note (CMR) when transporting goods using road transport. The electronic consignment note (e-CMR) is another step towards paperless document flow in transportation. It allows for the input, storage, and exchange of data in real-time format. Involving more EAEU member states in the use of e-CMR is aimed at mutual benefit and reflects on transportation security: the electronic consignment note can be linked to the e-Call system, which provides automatic emergency calls.

Another example of digital technology in road transport is the electronic waybill. As of January 1, 2022, the option of using electronic transport documents has been legally confirmed. A unified end-to-end ecosystem has been created, automating the process of issuing waybills and including driver medical examinations, vehicle inspections, and a software module for issuing electronic waybills. Regarding medical examinations, this technology allows for sample collection, temperature measurement, blood pressure checks, and other health indicators.

The automobile industry is utilizing big data systems. At the state level, the automated system "ERA GLONASS" has been created, which provides emergency response in case of accidents (ERA), and the "Platon" system, which collects tolls for heavy

vehicles traveling on federal highways. These systems enable the collection and storage of large datasets, which can be used to develop new services aimed at making road transport transparent and safe.

The automobile industry is on the verge of a significant technological milestone. In a few years, freight transport will be connected to network nodes and integrated into the intelligent transportation system.

Digital services for the ecosystem of maritime transport.

The largest project is the creation of an IT ecosystem for the Northern Sea Route (NSR). According to the Government of the Russian Federation, 3.8 billion RUB will be allocated in 2023-2024 for the development of an "ice navigator" for the NSR. This is necessary to "accurately chart a safe route in the constantly changing conditions of the Arctic Ocean.[389]" The launch of the digital ecosystem is planned for mid-2025.

This large-scale project involves several steps. First of all, automated information-measuring complexes will be installed on vessels operating in the NSR waters. Similar onboard complexes will also be equipped on aircraft and helicopters for ice reconnaissance. These complexes will allow for more accurate assessment of meteorological and navigational conditions and transmit information to the Unified Platform of Digital Services for the NSR, which will accumulate data on weather conditions, ship and icebreaker locations, and port congestion. Registered users such as freight carriers, shipowners, ship captains, and insurance companies will be able to access this platform. All logistics on the NSR (issuing permits for vessel passage, vessel movement monitoring, dispatching, fleet management) will be built on the basis of the digital ecosystem.

The overall readiness assessment of the maritime transport for digital transformation has shown that significant innovative changes need to be made before starting the implementation of digitization projects. These changes will provide the foundation for the implementation of digital management methods.

Innovations in maritime logistics will contribute to transitioning to a model that offers value for customers. For example, the digitization of ports, along with infrastructure development, will increase cargo handling volumes and the quality of port services. It will also enhance comprehensive safety levels for navigation in port waters and approaches, promote coordination within port divisions, and improve the efficiency of port interactions with other transportation modes and stakeholders. This is particularly important as the specific activities of maritime ports have not received adequate attention compared to other transportation organizations for a long time. As a result, there is an imbalance in the development of port capacities, with a significant amount of unused capacity for export cargoes and a deficit in capacities for handling import cargoes, primarily containers and roll-on/roll-off cargoes. There is also a lack of specialized and high-tech complexes. A major constraint is the limited capacity of road and rail infrastructure leading to maritime ports, resulting in increased vessel idle time at ports and declining environmental index.

By its cargo potential in maritime trade, Russia ranks among the top six countries in the world (alongside China, the United States, Japan, the United Kingdom, and Australia). The growth of containerization has further intensified the competition among ports and raised the demands for the quality of logistic services in business processes. Macroeconomic risks and global changes in supply chains for advancing material flows in

[389] Ref.: The Northern Sea Route will have its own IT ecosystem. – URL: https://logirus.ru/news/transport/u_severnogo_morskogo_puti_budet_svoya_it-ekosistema.html

exports and imports have boosted the implementation of digital solutions in the operations of ports and shipping companies.

Strategically important is the implementation and support of maritime surveillance information systems (MSIS, MoRe, etc.). A regional maritime surveillance information system (MSIS) has been created in the Azov-Black Sea and Caspian regions: the Center for the Collection, Processing, Storage, and Analysis of Information operates in the port of Tuapse, where information from AIS in vessel traffic management systems (VTMS) of the ports of Novorossiysk, Tuapse, Sochi, Port Kavkaz, Taganrog, Yeisk, and Astrakhan is received.

Regional systems also operate in the Baltic Sea (Northwest MSIS). Moreover, a significant number of base stations with local data collection and processing points are operating within the existing VTMS on inland waterways. In the future, the integration of AIS into networks are considered as the basis for creating a unified Russian automated traffic management system.

Another course of digitalization in maritime transport is related to the introduction of unmanned navigation and the promotion of artificial intelligence (AI); opportunities for their use in logistics are being considered. The Concept of an Intelligent Navigation Network for autonomous navigation systems has been developed. The application of modern technologies based on AI in commercial shipping is an important component of the business ecosystem. The results of using these technologies for the industry and shipowners are expressed in the following:

- Increased safety of navigation and cargo preservation;
- Energy cost savings due to lower energy consumption;
- Savings on crew wages;
- Reduced risks to human life and health;
- Increased ecological sustainability of maritime transport.

Digitization of international transport corridors (ITCs)

The development of ITCs should not only bring commercial benefits to businesses but also play a strategic role in strengthening ties with friendly countries and supporting international trade and economic relations.

In the face of sanctions pressure on Russia, ITCs can be utilized in new logistics chains to supply goods bypassing sanctions. Therefore, special attention is paid to adapting the transport infrastructure of ITCs to the increased freight turnover resulting from the redistribution of material flows.

A transport corridor consists of a set of routes using different modes of transportation (multimodal transport), so digitizing ITCs differs from industry-specific digitization; it should integrate digital practices used in various modes of transportation into a unified digital environment. This is a more complex comprehensive task planned to be completed by 2025 when the Eurasian Economic Union (EAEU) will create an ecosystem of digital transport corridors (EDTC) with divisions into directions and services. According to estimates, the costs of EDTC over the entire period will reach 10 billion RUB, and the economic effect will amount to 154 billion RUB, indicating the high economic efficiency of the project[390]. As a result of creating EDTC, the expected reduction in the share of the transportation component in the price of end products within the EAEU will decrease from 20% to 12–15%[391].

[390] Ref.: By 2025, the EAEU will create a system of digital transport corridors. – URL: https://rg.ru/2020/11/17/k-2025-godu-v-eaes-sozdadut-sistemu-cifrovyh-transportnyh -koridorov.html

[391] Ref.: Lakhmetkina N. Yu. Development of transport systems in the digital agenda /

The main international transport corridors passing through the territory of Russia and of great importance in modern realities are the East-West Transport Corridor (Trans-Siberian Railway; direction: Asia-Russia-Europe) and the North-South Transport Corridor (direction: Northern Europe-Russia-Caspian Sea-Persian Gulf-India). These corridors are characterized by the highest freight intensity, which may further increase in the future. This determines the role of EDTC in the flowless operation of ITCs, where a common market for transportation services will be created, and incentives for the implementation of new technologies will emerge.

The infrastructure component of EDTC will be developed primarily through equipping roads with broadband wireless communication networks for the subsequent introduction of unmanned transport.

For the operation of the EDTC, it is necessary to overcome the barriers that exist both in internal logistics and in interstate interaction of transport companies and infrastructure facilities. One of such barriers is related to cross-border electronic document flow based on the integrated information system of the Eurasian Economic Union. Cross-border EDI is a fundamental technology aimed at enhancing international trade within the EAEU countries. To implement it, a cross-border trust space is necessary to create. So far, cross-border electronic document flow has not been established due to information security issues and the complexity of ensuring compatibility at both the level of national legislations and electronic document standards.

Within the TCC framework, it is necessary to create a data service that includes databases of vehicle owners and registration, container databases, aviation and railway logistics, maritime vessel tracking, customs clearance, vehicle location, ports, road conditions, meteorological data, etc. This entails network cooperation among companies and information resources for supply chain management at both national and international levels. This network cooperation will allow for a synergy through the cooperation and consolidation of segmental data and digital solutions into a single digital platform. Preconditions for the application of big data technologies (Big Data) are being formed.

Urban Transport Ecosystem in Russia

The term "smart city" is associated with digital technologies that influence the quality of life of urban residents, improving it through innovations. They form a concept of an ecosystem that encompasses all necessary components for living.

Transportation is one of the most important subsystems of a smart city. Digital technologies in the information age are aimed at making the city and its transportation smart. In recent decades, the significantly increased traffic in major cities and megalopolis in Russia has prompted considerations for change. Technological solutions allow for the modernization and digitalization of the city's transportation infrastructure. The modernization and restructuring of roads and highways, along with the development of digital technologies, are aimed at efficiently organizing the urban transportation system. Smart traffic lights, digital cameras, and innovative streetlights - all of these elements are changing the traditional infrastructure, creating a transportation ecosystem where a clearly defined vector of systematization makes transportation and its processes smart and environmentally friendly.

N. Yu. Lakhmetkina, I. V. Shchelkunova // Intellect. Innovation. Investments. – 2019. – № 4. – С. 114–120.

Digitalization of urban transportation is part of the digital economy ecosystem. A strong incentive for the transition was caused by the pandemic, which raised urgent issues such as cashless fare payment and the implementation of other digital measures to comply with infection control requirements. Before this time, digitalization in the transportation sector was developed locally. Urban transportation, in particular, responded quickly to sanitary requirements, and the functionality of the transport card noticeably expanded. In major cities, transportation innovations rely widely and actively on digital potential, while in regions, this adoption is slower. In Moscow, for example, in 2023, test trials of the virtual "Troika" card are underway, and payment via smartphone through the SBP system has become possible. Another innovation is the use of Face Pay for public transport, particularly in the metro, although passenger consent for the processing of biometric data is required for this option.

The urban transportation ecosystem relies on three main components:

1. The first (micro) layer includes elements of urban public transportation, as well as transportation within walking distance; transportation industry providers can also be included here.

2. The second (meso) layer covers participants directly involved in this process: municipal services, housing and communal services, etc.

3. The third (macro) layer involves stakeholders, investors, or other interested parties capable of influencing the development of ecosystems in this sector.

Especially in megalopolis Russia's transportation system, is among the global leaders in smart services, which undoubtedly makes urban life more convenient and comfortable. The creation of ecosystems in transportation, as an industry that receives primary attention in the face of systemic challenges, is an important condition for organizing the management of business ecosystems at the national and international levels.

The structure of the section is shown on the diagram (Fig. 4.42).

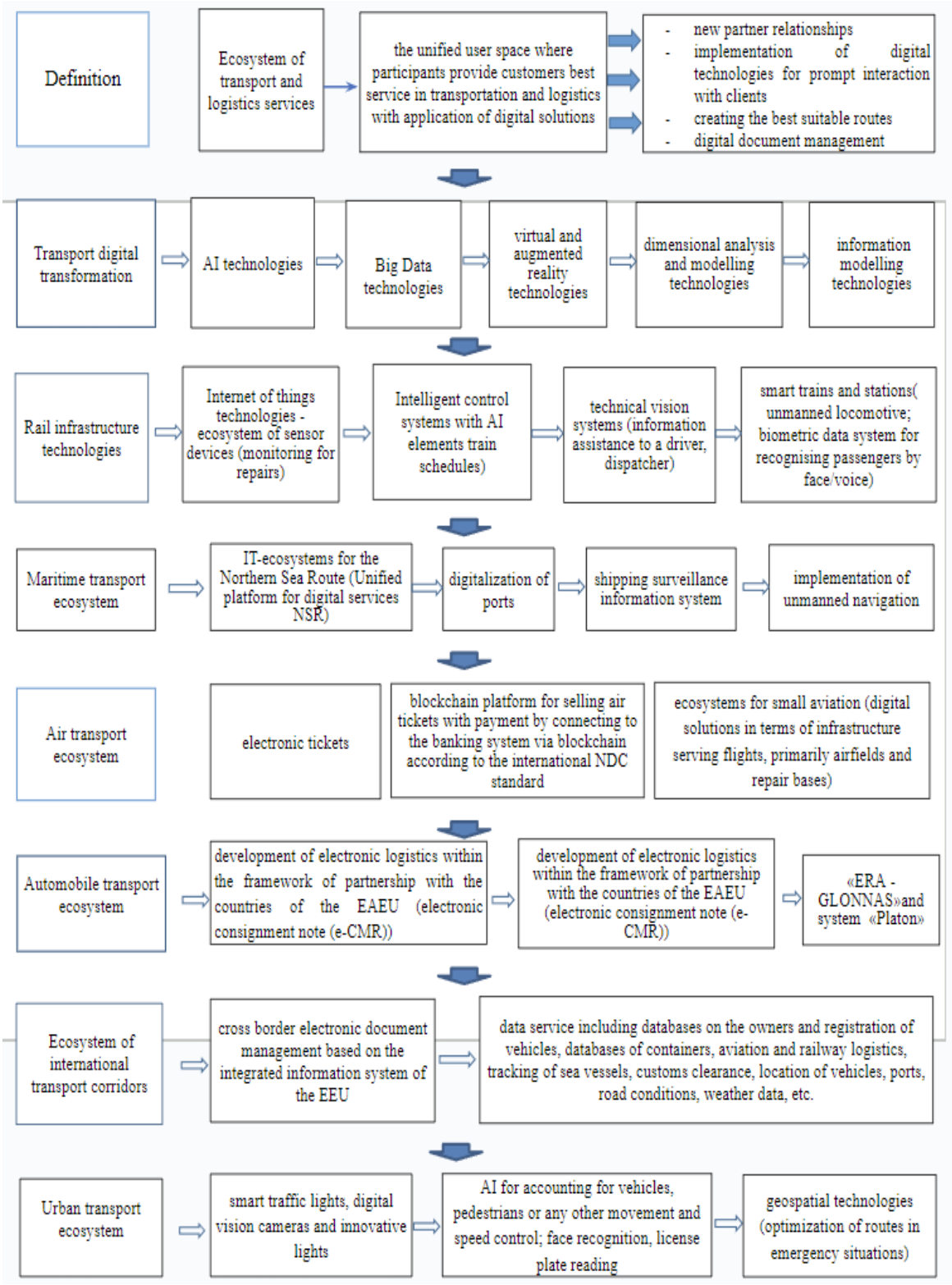

Figure 4.42. Diagram illustrating the section 'Digital Approaches to Creating Ecosystems in Transport and Logistics Services'

Control Questions

1. What factors justify the need to create ecosystems in transportation and logistics services?

2. Do you consider it necessary to start digitizing a business, progressively moving from the initial stage of digitization to digital transformation?

3. What are the advantages of introducing electronic boarding passes when registering passengers for a flight?

4. In which regions is it advisable to prioritize the implementation of unmanned navigation: in regions with favorable climate conditions or in regions where there are maritime navigation observation systems?

5. What barriers are on the way to creating an ecosystem of digital transport corridors?

6. What are the principles of building intelligent transportation systems focused on data analysis?

7. What is the characteristic of augmented reality technology?

8. What are the types of digital control over the movement of goods and vehicles on the road?

9. How do you see the future of using digital twins in railway transport?

10. What digital technologies are used in the urban transport system of Russia? Why are ecosystems important in modern megalopolis?

Practical Immersion Material

Case Study:

Choosing Digital Solutions for Maritime Logistics (*based on FESCO materials*[392])

Transport company FESCO and the Association of Market Participants in Transport and Logistics "Digital Transport and Logistics" have entered into a strategic partnership agreement in the field of digitizing maritime transportation. Cooperation is planned in the following areas:

- Implementation of electronic document management for maritime and multimodal transportation.
- Integration of corporate and government information transport systems.
- Implementation of pilot projects to develop Russia's transit potential involving maritime transport.

As part of the collaboration, FESCO will lead a working group on digitization. Its task is to prepare solutions for IT projects in the field of maritime, river, and multimodal transportation using water transport.

FESCO management is confident that the competitiveness and resilience of maritime transportation as an integral part of the transportation system largely depend on the systematic implementation of digital solutions, high-tech services, and software products. Therefore, FESCO and the Association "Digital Transport and Logistics," leveraging all their competencies and expertise, collaborate to participate in the selection and implementation of digital innovations that will help address operational challenges in organizing multimodal and maritime freight transportation.

[392] Ref.: FESCO and the Digital Transport and Logistics Association will jointly engage in the digitalization of maritime transport. – URL: https://www.fesco.ru/ru/press-center/news/ fesco-i-assotsiatsiya-tsifrovoy-transport-i-logistika-sovmestno-zaymutsya-tsifrovizatsiey-morskikh-p/

FESCO is a leader in the freight transportation market and actively integrates digital innovations into its operations. The company believes that to fully utilize Russia's potential as a country with vast territory, it is necessary to establish multimodal logistics, and digital solutions can help with this.

Task:

As a manager at FESCO, you are required to:

1. Determine and prioritize tasks in the digitization of maritime transportation based on their level of priority.

2. Assess the risks associated with the absence of digitization.

3. Prepare recommendations for developing a "roadmap" for the implementation of digital solutions in maritime transportation and integrating them into the digital platform of the transportation industry.

Case

Choosing Augmented Reality (AR) Mobile Devices for Use in Loading and Unloading Operations

The capabilities of modern logistics allow businesses and various stakeholders in the freight transportation market to assess the advantages of conducting business and multi-level customer support in a digital format. This issue is receiving attention not only from commercial companies but also from the government, which contributes to the successful and rapid digital transformation of the transportation sector.

The implementation of digital technologies should not only be driven by the demands of scientific and technical progress but also meet the commercial interests of the company. With their help, the company becomes more customer-oriented and increases its market share.

The logistics department of a transportation company is considering the feasibility of a digital solution - using mixed reality glasses in transportation and warehouse processes during multimodal transportation. The glasses will be used at the transport terminal by workers in storage areas, picking, and during loading and unloading operations. There are two alternative options: Microsoft HoloLens 2 mixed reality glasses and Magic Leap One glasses with controllers.

Task

You work in the logistics department of the transportation company. You are tasked with:

1. To analyze the competitiveness of using mixed reality glasses in cargo handling processes using the ideal point method.

2. Comparing Microsoft HoloLens 2 mixed reality glasses and Magic Leap One glasses with controllers and making a conclusion, reflecting the justification for choosing the best option for mixed reality glasses.

GLOSSARY

Automation - the change from manual operations to automated solutions implemented using IT.

Adaptability - the ability to adapt to changing conditions, characterized among other things by features such as multiple forms, species diversity, geographic distribution, and the dynamic processes.

Alibaba Group is a Chinese public company operating in the field of internet commerce. It owns web portals such as Taobao.com, Tmall, Alibaba.com, AliExpress, and several others. Its main activities include business-to-business (B2B) trading and online retail. Additionally, it owns one of the world's largest infrastructures for cloud computing, and it has assets in the media and entertainment industries. The company primarily operates in the People's Republic of China (PRC), with its headquarters located in Hangzhou.

Architectonics - the composition of contents, signs, and symbols, as well as compositional rules ensuring the integrity and coherence of the business ecosystem.

Artificial and cognitive systems refer to artificial intelligence. Computer algorithms are capable of acting autonomously and rationally, including taking into account information received from the external environment. Physical and biological cognitive systems can be considered autonomous only if they are operated without human intervention.

Artificial Intelligence (AI) is a field of computer science that deals with creating systems of programs capable of performing tasks typically requiring human intelligence. AI encompasses technologies such as machine learning, deep learning, neural networks, natural language processing algorithms. AI can be used for automating tasks, decision-making, data analysis, and pattern recognition.

Applicant Tracking System (ATS) is a human resources (HR) software application that helps streamline digital processes for recruiting and hiring employees.

Arithmetic mean is a statistical measure calculated by summing all values and dividing by their quantity.

Business - a separate economic entity or a set of such entities, operating within the framework of the goals and objectives specified by its founder (strategic and tactical development).

Business cluster - is an association of several homogeneous business structures and entrepreneurial organizations, which can be considered as an independent business unit with specific characteristics of economic activity.

Business co-evolution represents common interests between business structures and changes in organizational and target parameters under the influence of each other.

Business model - a concept, a pattern of implementing strategic goals into specific objectives, a model of business operation; it involves three main components: value proposition, value creation and delivery system, as well as revenue generation. Together, these components reflect the logic of strategic thinking about value.

Business process (BP) - is a set of sequentially and/or parallel operations that transform material and/or information flows into corresponding flows with other characteristics. A BP flows in accordance with management directives developed based on activity goals. During the business process, financial, energy, labor, and material resources are consumed, and constraints are imposed by other business processes and the external environment. Examples of business processes include organizational-business, technological, and others.

Business ecosystem (BE) - an economic agent (or group of agents united by the presence of coordinating mechanisms of activity) which sets itself the task of satisfying the diverse, including non-complementary, needs of the same consumer agent or group of them, a dynamic group of largely independent players who produce goods or services, collectively forming an interconnected solution.

Business ecosystem of a mobile operator - a combination of its own or partner services provided by various departments or business structures in various areas of activity using interconnected unified production, commercial, and managerial processes.

Business ecosystem thinking - the integration of natural and biological evolution with economic development through innovation, technological, and digital processes.

Biogeocenosis is a system that includes a community of living organisms and a closely related set of abiotic environmental factors within one territory, interconnected by the circulation of substances and the flow of energy.

Biodiversity is the variability of living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.

Biosphere is a complex phenomenon, powered by the sun and closely related to geological processes on Earth.

Biocenosis is a community of organisms, a historically formed collection of animals, plants, fungi and microorganisms that inhabit a relatively homogeneous living space (a certain area of land or water area), connected to each other, as well as to their environment.

Blockchain is a distributed database consisting of a chain of blocks that contain information about transactions or events. It uses cryptographic techniques to ensure data security and integrity. Blockchain is widely used in cryptocurrencies such as Bitcoin, but also has potential for applications in other areas (finance, logistics, healthcare, voting). Highly reliable due to its immutable digital record of actions.

Back office of an ecosystem is a part of the business ecosystem that does not directly interact with clients, but provides all technological components of the ecosystem activity, usually hidden from public view.

Boundary - a conditional line between the internal and external environment, separating the area of direct managerial influence from the area that is not a subject to managerial control.

B2B platforms – counterparts to online stores, allowing suppliers to place offers, sellers to buy goods and add requests for specific products. Cooperation is carried out with individuals and legal entities; individual conditions apply for each group of buyers.

Business network is a group of economic agents creating mutual external benefits for each other due to their commitment to the same institutions (routines, behavioural patterns) or technologies.

Business ecosystem management strategy - an action plan that addresses the following issues: determining the state of the ecosystem in real-time, predicting what the ecosystem will be like in 3-5-10 years and what transitional measures - technical, commercial, informational, social, political, etc. - need to be introduced using a set of digital methods of NMU (Network Management Unit) and IO (Intelligent Operations) to transition to a more advanced state with minimal losses, meeting market requirements.

Business ecosystem is a microeconomy where intense coevolution occurs, centered around innovative ideas. It encompasses various industries, with companies within them coevolving around innovations, working in cooperation and competition to support new products, meet customer needs, and drive the next wave of innovation.

Cluster (business cluster) is a group of economic agents that create mutual external benefits for each other due to one of two factors: territorial proximity or functioning in the same or related industry markets, which allows these agents to act for each other counterparties (suppliers of goods and services) or competitors.

Cells of industrial revolution are organizational forms that contribute to the accumulation, simplification, and dissemination of new knowledge associated with the use of new technologies.

Communications in the digital environment refers to the active interaction process among project stakeholders using various means of communication, as well as practical actions aimed at connecting them in collaborative activities to solve tasks and achieve goals.

Composite rules are rules and guiding principles that define how elements of an organization or business ecosystem should interact and be organized as a whole.

Competitive advantage is an economic concept that a company gains through the widespread adoption of flexible management systems, allowing them to adapt their offerings, increase product diversity, and do so without significant additional costs. In modern business, scale and scope are primary, but only if they contribute to a continuous innovative strategy, allowing the company to constantly reduce costs while simultaneously increasing productivity. A key task of leadership in achieving competitive advantage in business is the creation of communities with common goals and ways for entrepreneurial development.

Cluster analysis is a method for identifying groups of similar objects based on their characteristics.

Complementer- a participant in the industrial ecosystem who irregularly performs moderator functions within the industrial ecosystem, complementing the value proposition and contributing to solving end-user tasks. Creates goods and services for different ecosystems.

Consumer Loyalty Index (Net Promoter Score, NPS) - an assessment of the proportion of users willing to recommend a product to others.

Control is feedback that involves comparing the achieved outcome with the planned target value, aimed at ensuring that the organization achieves its goals, taking into account the internal and external circumstances leading to deviations from the designated course.

Concept of a business ecosystem is a philosophy or theoretical approach that describes the principles of functioning and development of business ecosystems, with particular emphasis on their interconnected and dynamic nature.

Cooperation is the process of interaction between individuals or groups, wherein they combine their efforts and resources to achieve a common goal or solve a shared problem. Cooperation may involve working together, exchanging information, supporting one another, and coordinating actions to achieve beneficial joint outcomes.

Coaching is an individualized approach that considers the unique needs and goals of each client. It helps the client unlock their potential and achieve their goals by using their own resources and potential.

Coevolution is a concept that refers to the joint development of nature and society, distinct from the two extremes of human submission to nature and domination over it. According to the principle of coevolution, humanity should not only alter nature but also adapt itself, evolving in harmony with nature.

Cloud technologies - a model for delivering computer resources, such as computing power, data storage, and software, over the Internet. Instead of storing and processing data on local computers or servers, cloud technologies allow access to these resources remotely over the network. Cloud technologies provide flexibility, scalability, and economic efficiency for organizations and individual users.

Crisis - a sharp decline in production and slowing down of economic processes, caused by various factors: financial, social, geopolitical, and others.

Communication is the means of organizing interaction, within certain framework, which enables the system to function as a unified whole, solve specified tasks, and achieve set goals.

CDP system - a platform for collecting and organizing customer data from online and offline sources.

CRM system (customer relationship management) - software for automating customer relationship management, which includes storage of information about customer interaction history, analyzing results, and optimizing these business processes.

Dashboard - a graphical interface that allows users to view and analyze key performance indicators (KPIs) and other important information related to a specific business process or area of company activity. Dashboards may contain graphs, tables, charts, and other visual elements for easy data perception.

Dendrogram - a graphical representation of the clusters formed during cluster analysis, used to assess the correctness of clustering.

Descriptive analysis describes data and presents it in the form of tables, graphs, and diagrams.

Digital ecosystem map is one of the most important planning tools, allowing businesses to understand which digital platforms best suit their needs, how they will manage and optimize them, and what resources and skills are necessary for success.

Digital platform is a software solution that helps organizations offer their products and services through online businesses, facilitates interaction among platform participants, enabling them to create and exchange value to effectively run their business.

Digital transformation is the process of changing business models and organizational structures using digital technologies, which affects the creation, distribution, and consumption of values in business ecosystems.

Digital ecosystem is a network of interconnected digital technologies, platforms, and services that interact with each other to create value for businesses and consumers.

Digitization is the implementation of digital and information communication technologies in the economy, making it possible to reduce the cost of services, both public and commercial, increase the availability of goods and simplify their introduction to global markets, reduce time spent on the enhancement of the offered products to meet the new expectations and needs of their potential users.

Digital twin is a digital (virtual) model of any object, system, processes, or human, which accurately replicates the form and actions of the original and is synchronized with it; it is used to simulate what will happen to the original (object or process) under certain conditions.

Digital transport corridor is a tool of transport logistics through which data processing and comprehensive information exchange among supply chain participants occur to optimize multimodal transportation.

Digital services are a set of digital services, commercial products, and solutions that a mobile network operator provides to its consumers.

Digital transport corridor ecosystem is an open digital environment created on the basis of advanced digital technologies and platform solutions, used for exchanging logistical information between carriers and cargo owners.

Economic physiology is a condition in which the economy, resembles the life activity of the human body.

Economic development cycle is the periodic fluctuations in business activity in the economic environment. It is defined by four classic stages - crisis, recovery, depression, and growth.

Ecological system is the complex of coexisting biotic organisms and abiotic conditions of their existence, which are interconnected in a regular relationship with each other and form a system.

Economic security of a state is a condition of the economy in which it is protected from threats and risks and has the necessary resources for further development.

Economic mechanism is a system of interaction between economic entities and institutions that ensures the functioning of the economy as a whole and certain areas and sectors in particular.

Ecosystem is an economic community of market participants producing goods and services and organizing their activities according to a common strategic direction set by one or more leading players, creating value and engaging in the exchange of values, attracting resources, and generating outcomes. In the biological world, it consists of a community of living organisms (biocoenosis), their habitat (biotope), and a environment system facilitating the exchange of matter and energy between them.

Ecosystem architecture is a structural description of the relationships between various components of a business ecosystem, including their roles, functions, and interactions, which ensure its operation and achievement of common goals.

Ecosystem transition is the transition of individual economic entities from individual business models to an ecosystem model of organizing activities.

Ecosystem approach is a management approach based on similarity with processes in the biological world; characterized by compliance with the following characteristics: integrity, self-reproduction, stability, self-regulation, self-recovery.

Element is the smallest possible component of a system in terms of solving tasks and achieving goals for which the system exists.

Empiriomonism is a concept that suggests the surrounding world is as humans perceive and feel it. "Nature" consists of inorganic and simple organic combinations, as well as higher organic combinations. Thus, at the core of the ecosystem lies the unity of the living and the non-living.

Entrepreneurial ecosystem is the interaction among various business entities and agents of diverse specialization, characteristic of a particular territory (region) considering the existing natural, institutional, economic, and other conditions.

External environment - conditions and factors that arise and exist independently of the organization's activities and impact it.

Flexible organizations - organizations that are oriented towards flexibility and adaptability in a changing environment, often using autonomous cross-functional teams.

Feedback - identifiable signals through which information about the output state is received, allowing for the adjustment of the state and operation of the control system and its elements.

Front office of a business ecosystem is the part of the business ecosystem that is responsible for its direct interaction with customers through various interfaces.

Financial centers are cities or regions that play a significant role in the international financial system and provide a wide range of financial services. These centers are home to banks, stock exchanges, investment companies, insurance organizations, as well as other institutions and organizations involved in financial operations and services. Financial centers typically offer a high level of financial expertise, liquidity, and access to international markets. Some of the most well-known financial centers include London, New York, Tokyo, Hong Kong, and Zurich.

Fiscal client-centricity is the concept of developing fiscal relations to meet the interests and needs of taxpayers in fulfilling their fiscal obligations.

Fiscal human-centricity is the approach to creating a process of interaction between taxpayers and their administrators of fiscal obligations as efficient, productive, and emotionally positive as possible.

Fiscal ecosystem is a set of organizational, environmental, process, and project components implemented in the field of fiscal relations, allowing for the long-term effective interaction of all its participants to form the revenue potential of the state and stimulate the growth of the country's gross domestic product (GDP).

Fiscal field - the set of tax and non-tax payments of a fiscal nature that constitute the fiscal obligations of the taxpayer, which can be a legal entity, an individual entrepreneur, or an individual.

Forms of interaction - various methods or ways of interaction between people or groups. Forms of interaction can include face-to-face meetings, telephone communication, email correspondence, teamwork, exchange of ideas, opinions, etc.

Genesis - the process of formation and development of business ecosystems, which occurs as a result of the influence of a whole range of factors and changes.

Goal is the final result, or the process of system functioning within certain parameters.

Globalization of business ecosystems - the process of expanding and integrating business ecosystems at the international level, leading to the development of global network interactions and operations.

Horizontal integration - the consolidation of enterprises, establishing close interaction between them "horizontally," taking into account joint activities of enterprises producing homogeneous products and applying similar technologies.

Heat map - a tool that visualizes data using different colors.

HR analytics (human resources analytics) - the process of collecting, analyzing, and interpreting data related to human resources to make more informed and effective decisions in the field of hr management.

HR metrics - quantitative indicators used to assess the effectiveness of work in the field of hr management.

Industrial ecosystem is an ecosystem created by an industrial enterprise based on establishing continuous interaction with external organizations holding resources that are absent or scarce within the enterprise.

Internal corporate bus - the path through which information is transmitted between different blocks of the business ecosystem; it is what enables the integration of all services and applications within the business ecosystem.

Internal environment - the elements of the system, as well as the processes that occur within the organization.

Input - a complex of necessary resources (including financial, material, human, and informational).

Innovation Ecosystem - a combination of various types of scientific institutions conducting research, making venture investments, and utilizing resources necessary for the creation and application of innovations within society.

Innovation Management - the process of planning, implementing, and controlling innovations within an organization or business ecosystem.

Institution - established rules of interaction among social entities in a social system, agreed at both formal (laws, instructions, legal norms, etc.) and informal (corresponding traditions, routines of social behavior, mass social norms that are customary to observe, agreements, codes of conduct, etc.) levels. Institutions, as fundamental bases for carrying out activities, exist and function in the economic system, and the area of their existence is designated as a separate environment, commonly referred to as the institutional environment.

Institutional Matrix - the primary model of basic institutions, i.e., interconnected economic, political, and ideological institutions, which are mutually identical.

Institutional field is a set of fundamental political, social and legal rules that form the basis for production, exchange and distribution.

Institutional field - is a set of fundamental political, social and legal rules that form the basis for production, exchange and distribution.

Integration is the union of economic entities, boosting their interaction, and the development of relationships between them. Economic integration manifests in the expansion and strengthening of production-technological ties, joint use of resources, capital consolidation, as well as in creating favorable conditions for each other's existence, conducting economic activities, and removing mutual barriers. There are two types - vertical and horizontal integration of companies.

Intelligent Transportation System (ITS) is the management of transportation movement in urban environments from a Unified ITS Control Center using information, communication, and managerial technologies based on coordinating traffic participants and monitoring vehicles on the roads.

Interface is a set of tools that allow the client to interact with the business ecosystem.

Information environment refers to a set of conditions for the technological processing and efficient utilization of knowledge in the form of an information resource.

Infrastructure of business ecosystem encompass all necessary resources, elements, and conditions that support the functioning and interaction of participants within the business ecosystem. This includes physical infrastructure such as buildings, equipment, transportation systems, etc., technological and information systems, communication systems, legal and regulatory aspects including laws, regulations, licensing, and social elements such as education, cultural values, and workforce.

Knowledge - a key factor in the development of the post-industrial economy, an object of management, and the main resource for future development.

Knowledge environment - everything surrounding knowledge management, influencing and often predetermining the success of knowledge management.

Knowledge ecosystem is a combination of entities involved in the educational process and resources aimed at creating new knowledge, values used for social development.

Landing - is a virtual page containing a brief presentation of a product or project, designed to encourage the client to take a specific action.

Median - a statistical indicator, the value of which falls in the middle of a ranked series of values.

Mentoring - a process of education in which an experienced and successful person (mentor) provides their knowledge, experience, and advice to an inexperienced or less experienced person (mentee).

Multidimensional analysis uses statistical methods to determine relationships between different variables, such as employee satisfaction and productivity, age and employee turnover, etc.

Modeling involves the application of statistical models to forecast outcomes based on data.

Mechanism for transitioning to mobile operator by business ecosystems is the process of digital transformation of production business models, driven by the need to explore new promising technological and industrial market niches based on existing production assets (e.g., telecom).The mechanism for building mobile operator business ecosystems is a set of methods and tools used in building business ecosystems by company management based on the ecosystem development strategy for its practical implementation.

Mechanism for building a business ecosystem is a synthetic category covering a set of principles, methods, subjects, models, forms, algorithms, technologies, structures, and resources used in building business ecosystems.

Mechanism of economic development (J. Schumpeter) - "Economic development... is a process of creative destruction that takes its start within the economic structure, changing its constants and creating new ones... This process of destruction - its driving growth factor - we can call the mechanism of economic development." [393]

Motivation - a combination of reasons, factors, and conditions generated by the organization's management to encourage its personnel to perform work according to the plan and in accordance with the responsibilities delegated to them. A deep understanding of what is needed for each object to join the platform strategy is the key essence of its design.

MVP (Minimum Viable Product) - in the context of ecosystems, it refers to the initial iteration of a platform strategy, aimed at testing the riskiest assumptions. It's typically used to minimize risk in overall strategy development, to verify the existence of the ecosystem, and whether the strategy is truly valuable.

Network carrier- a legal entity or individual entrepreneur providing communication services (fixed, mobile, satellite, etc.) based on a national license issued. [394]

National security of a state - the state of a country in all aspects and directions that ensures its stability in crisis conditions and forms the potential for further development.

Noosphere - a new state of the biosphere in which humanity plays a primary geological role, the nature of which is not predetermined.

Network structures are organizational forms that involve multiple interactions between various participants (organizations, individuals), which can quickly restructure to respond to changes in the external environment.

Network effects are specific network mechanisms where adding a new user (or producer) makes the product/service/experience more valuable for every other network participant. There are multiple network effects, including Metcalfe's law, which states that the increase in the number of users in a communication network leads to exponential growth in its value.

Organizational life cycle - the process of organizational development characterized by cyclical changes in its properties and structure depending on the influence of the macro- and micro-environment, consisting of stages separated by crisis points, in the immediate vicinity of which the risks characteristic of a particular stage is exacerbated.

Output - the result (finished products, rendered services).

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[393] Schumpeter J. Theory of economic development. – M.: Progress, 1982.

[394] Ref.: Federal Law as of July 7, 2023 No. 126-FZ (amended on August 4, 2023) "On Communications."

Operations research (OR) - methods of linear and nonlinear programming used to achieve the following strategic goals: increasing managerial and production efficiency, increasing the profitability of any activity and the competitiveness of a business for a long period of time, determining ways for an enterprise to exit unprofitability, development of investment projects, identification of promising market niches and solution of other urgently needed market business problems. The following information-digital and mathematical technologies are used: multi-criteria analysis of management decision-making, antagonistic games, target design and programmed control, linear and nonlinear, as well as integer programming, coalition games, discrete-event and stochastic modeling business processes, the formation and operation of neural networks, simulation modeling, Data Mining and other digital technology methods facing the ecosystem.

Organizational design model - a set of management subsystems and a system of interaction between them, ensuring the effective functioning and development of the organization.

Object - an individual, economic, and social player in the market with specific goals. An object can be a person, organization, institution, or team.

Omnichannel - the integration of all communication channels of an organization or business ecosystem into a unified system.

OPSTS (organization providing scientific and technical support) - an organization specializing in providing scientific, knowledge, and consulting services to interested clients based on existing legislation or on a commercial basis.

Optimization - a process aimed at directing the development of an object or method towards a better state.

Organizational basis is a combination of coordinated actions in space and time carried out by employees in the process of preparation, adoption, and implementation of management decisions aimed at ensuring the effective functioning and development of the organization.

Organization is the primary management function, covering actions such as setting deadlines, stages, and procedures to carry out operations, as well as distributing tasks among employees, including through delegation mechanisms, and so forth.

Partner is a secondary participant in an industrial ecosystem, consistently providing external support functions to the moderator's activities within the industrial ecosystem.

Planning is the primary function of management, involving setting up strategic and organizational goals, and actions required to achieve them.

Platform is an infrastructure or environment that facilitates the execution of applications, software, or services. It can be hardware-based, software-based, or a combination of both. It provides basic functional capabilities and services on which other applications or services can be developed and operated. Platforms often offer developers tools and resources for creating, deploying, and managing applications.

Platform strategy is a strategic approach to managing a business ecosystem, involving the creation and support of a platform that brings together various participants and facilitates the exchange of value and resources among them.

Platform ecosystem is a collection of entities and elements utilizing various digital platforms aimed at creating and satisfying demand through the advantages of digitization.

Platform narrative is a macro message including the "new rules of the game" that the platform developer wants to offer to industry entities, organizations, or markets. The platform narrative aims to persuade existing players to join the platform strategy, as it will make it easier for them to create value or exchange value. By joining the platform strategy, they will learn and develop much faster than without it. This narrative emphasizes positive opportunities: an attempts to redefine terms used by the sector or industry through a positive, encouraging message promising benefits to everyone who embraces the new conditions.

Participant - an individual or organization actively interacting with other people or organizations within a specific activity, project, or event. Participants may play different roles or fulfill various responsibilities depending on the scenario in which they are involved.

Participants of business ecosystem are various organizations, companies, or individual entrepreneurs that interact within a specific economic environment or industry. The business ecosystem is a network of interconnected organizations that collaborate and compete with each other to create, deliver, and capture value in the market. These participants may include suppliers, manufacturers, distributors, retail networks, consumers, and other stakeholders. Within the business ecosystem, each participant may have its specialization and contribute to the value creation chain.

Private sector is the field of economic activity that includes non-profit and for-profit organizations which are not controlled by the government. It encompasses private enterprises, corporations, non-profit organizations, and individual entrepreneurs that aim to generate profit or achieve other goals unrelated to the public sector. The private sector plays a crucial role in the economy by creating jobs, stimulating innovation, and providing a variety of goods and services in the market.

Range is a statistical measure calculated as the difference between the maximum and minimum values.

Resource is a measurable capacity or capability that enables the completion of a specific task or the achievement of a particular goal. Resources encompass various types, including physical resources like land and water, as well as intellectual assets such as knowledge and technology.

Role - in a platform solution, role is understood as a clustering of multiple entities into a single category of market players based on their motivation, means, and potential (the resources they can utilize). Transforming "entities" into "roles" helps to apply the platform solution.

Resource utilization is the process of applying available material or immaterial resources to achieve specific goals or complete tasks. Resources may include physical objects, raw materials, equipment, or infrastructure, as well as intangible resources such as knowledge, information, finances, etc.

Scientific Management Methods (SMM) - linear and nonlinear programming methods used in the adoption and implementation of a high-quality corporate business strategy in real business processes. A collection of methods, technologies, and models. A branch of mathematical modeling.

Subsystem is a part of a system that has a relative independence in implementing functions and processes, representing a lower-order system with its own subtasks and sub-goals.

Self-organization is the interaction of subsystems whereby more efficient structures of various orders emerge.

Self-regulation (self-adjustment) is the continuity and cyclical nature of processes occurring without external intervention.

Service ecosystem is a collection of subjects and elements (resources), interaction of which is directed towards providing quality service in a specific area.

Synergistic effect is the outcome of interaction among various elements of a business ecosystem, leading to the creation of shared value that exceeds the sum of each individual element's contribution.

Startup is a young company or venture in the early stages of development, aiming to create and implement new innovative products, services, or business models. Typically characterized by high levels of uncertainty, risk, and limited resources, startups strive for rapid growth and scaling of their business.

Statistical analysis - a method for testing hypotheses and determining the statistical significance of differences between groups.

Strategic management - the process of developing long-term goals and tasks related to the formation of a prospective production program (order portfolio, provision of financial,

material, and labor resources), establishing and maintaining relationships among stakeholders.

Strategy - the art of leadership and the overall plan for conducting this work, based on the current reality at this stage of the organization, corporation, business ecosystem, region, or a country development, amid the uncertainty of the future situation, which can only be speculated or conditionally calculated. It is the overall work plan to achieve the set goal.

Structure - a relatively stable arrangement and nature of connections between elements of a system, ensuring its functioning over time.

Sustainable development - a strategic approach in business aimed at balancing economic growth, environmental care, and social well-being to sustain long-term efficiency and competitiveness.

SSO (Single Sign-On) - technologies that enable users to navigate across various services within a business ecosystem without the need for repeated authentication.

Time series - collected statistical data at different points in time regarding the value of any indicators of the studied process.

Time series analysis - a method of studying changes in indicators over time.

Tools for building business ecosystems are the active components of the corresponding mechanism, means of influence that allow either to form a new business ecosystem or to facilitate the transition from the old to the new ecosystem organizational model of activity.

Third-party risk management - a methodology for managing the inherent risk that arises when working with external suppliers, partners, and solutions.

Tectology - the science of the general laws of organizing life. All phenomena in nature develop based on a systemic approach. The foundation of human life lies in systemic thinking, which unites all sciences into a unified structure. There are organizational principles that form the basis of systems of all types. Also, all relationships between biological elements have a systemic nature.

Transaction - the interaction between two objects. This process occurs within a communication channel or context and involves the exchange of units of value between the two objects. Transactions occur even before we transition to a platform strategy, however, the better the channel is designed to reduce the cost of the transaction, the more such transactions will occur.

Variance - a statistical measure calculated as the average arithmetic square of deviations of indicator values from the mean arithmetic value.

Vertical integration - production and organizational association, merger, cooperation, interaction of enterprises related by common participation in the production, sale, consumption of a single final product: suppliers of materials, manufacturers of components and parts, assemblers of the final product, sellers and consumers of the final product.

Moderator (Conductor, Orchestrator) - an organizer of the ecosystem, a company solving the user's key task, carrying out functions of initiation, creation, coordination, and control over the functioning of the ecosystem; forms relationships with partners, defines the conditions for participation in the ecosystem.

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