

ORIGINAL PAPER



DOI: 10.26794/2304-022X-2025-15-3-108-121

UDC 334(045)

JEL I15, B41, P5

The Role of Business Processes in Building a Healthcare Ecosystem

E.A. Pozhilenkova^a, T. Yu. Ageyeva^b^a Bauman Moscow State Technical University, Moscow, Russian Federation;^b Siberian Federal University, Krasnoyarsk, Russian Federation

ABSTRACT

The **purpose** of this study was to analyze ecosystems, including business, educational, and socio-economic ecosystems. The research defines the concept of a “healthcare ecosystem,” identifies its primary objective, and highlights the key element of ecosystem modeling. The article presents examples of successfully implemented models for integrating digital technologies into the operations of healthcare ecosystems abroad. It examines both the conceptual business model of a healthcare ecosystem and the contribution of business processes to achieving its goals and creating value. Universal trends shaping the digital future of healthcare are identified, along with the specific characteristics of the industry in Russia and the significant challenges faced by domestic healthcare ecosystems. The **methodological basis** of the study includes various forms of analysis, structuring, and graphical methods. The information base was drawn from the ELibrary scientific electronic database. The **findings** may be of interest to both public and private organizations seeking to create new value for individual health preservation while maximizing benefits and minimizing costs.

Keywords: business processes; model; integration; ecosystem; healthcare

For citation: Pozhilenkova E.A., Ageyeva T. Yu. The role of business processes in building a healthcare ecosystem. *Upravlencheskie nauki = Management Sciences*. 2025;15(3):108-121. DOI: 10.26794/2304-022X-2025-15-3-108-121

INTRODUCTION

Despite the widespread popularity of studies of ecosystem in healthcare, scholars have not suggested any unified viewpoint regarding the foundations of their construction. Using the tag “ecosystem in medicine, healthcare” in the scientific library database www.elibrary.ru, we have identified 3,794 sources published over the last five years. Our content analysis has demonstrated that the terms “digitalisation” and “digital” were mentioned 950 times in their titles, which constitutes 25 per cent of their total number and it indicates the predominant interest in the ecosystem strictly from a digital perspective. The word “process” appears only 152 times in these same publications, which we interpreted as evidence of insufficient attention paid to the essence of digitalisation and the principle of construction of ecosystem.

The term “ecosystem” introduced in economics from biology denotes a system, which arises from the interaction of living organisms with the environment [1]. However, nowadays this concept is widely used within healthcare, trade, education and other sectors of the national economy of the Russian Federation [2]. Possessing the properties of a system, the ecosystem exhibits specific characteristics as well, that distinguish it from the general understanding of systems. Concurrently, various scholars come to the same conclusion that all elements of an ecosystem are interrelated by the processes of production, consumption, distribution, and exchange of the results of their activity.

We suggest defining an ecosystem as a system of complex networks, which unite various participants on one’s own accord. From our perspective, its specific characteristics consist of common goals

among all the participants, as well as integrated interaction within their achievement.

Hence, for constructing an ecosystem in health-care, it is necessary to determine its subsystems and elements, as well as to substantiate the processes, which lay the basis for their integrated network interaction.

METHODOLOGY

The theoretical and methodological basis of the research was created by the concepts and approaches of domestic and foreign scholars, who developed it within the framework of the theory of socio-economic systems, business modelling, and business process management. The analysis was based on monographs, scientific articles, materials derived from the records of international and Russian scientific conferences, and other publications in peer-reviewed journals.

In the course of the research, the authors employed the *modus operandi* of theoretical cognition: such as dialectical and axiomatic methods, formalisation and analogy, as well as analysis (including comparative analysis), synthesis, methods of abstraction, deduction, induction, and modelling. Systemic, cybernetic, and process approaches ensured the comprehensive character of the research.

DISCUSSION

A meta-analysis of 41,546 publications from sources of the last five years, selected via the tag “ecosystem, processes” in www.elibrary.ru, demonstrated that scholars investigate among others the following terms: “digital”, “business ecosystems”, “forest-related”, “aquatic ecosystems”, “pharmaceutical”, “customs ecosystems”, “educational”, “medical ecosystems”, “IT ecosystems”, “territorial ecosystems”, “artificial ecosystems”, “closed ecosystems”, “innovation ecosystems”, “state ecosystem”, “socio-economic ecosystems” etc. However, currently, among the existing approaches to the formation of ecosystems, this term is predominantly used in the context of a digital ecosystem. This connotation is traced back

in such ecosystems as X5 Retail Group,¹ and Russian Postal Services.²

It can be pointed out that medical ecosystems are characterised by a variety of models for integrating digital technologies into their activities. **Russia** emphasises corporate digital ecosystems (Sber, Yandex, MTS)³ [3] and public-private partnership digital ecosystems («RZD-Medicine»)⁴.

International practice indicates a fragmented combination of commercial and state projects. For instance, **Brazil** introduces a large-scale integration of telemedicine into the national public health system via the instrument of the System Usability Scale in the Unified Health System,⁵ particularly in remote regions of Amazonia [4]. **India** advances unique hybrid models⁶ based on a successful combination of high-tech medical tourism (Apollo Hospitals) with its traditional Ayurveda service. **China** is distinguished with effective combination of AI platforms with elements of traditional national medicine, actively backed by the state support (a notable example is the company Ping An Good Doctor).⁷ **South Africa** solves the issues of healthcare accessibility by means of interaction of systems of high-tech private clinics (notably

¹ Useful services for the partners X5 Group. DIALOG X. URL: <https://dialog.x5.ru/> (accessed on 15.11.2023).

² Information Technologies of the Russian Postal Services. Tadviser URL: https://www.tadviser.ru/index.php/Статья: Информационные_технологии_в_Почте_России (accessed on 15.11.2023).

³ SBER: More Than Just A Bank. URL: <https://www.sberbank.com/ru/ecs> (accessed on 15.11.2023); Development of ecosystem MTS. URL: <https://ar2021.mts.ru/obzor-transformaczii-ekosistemy/razvitie-ekosistemy-mts/> (accessed on 15.11.2023).

⁴ RZD: We Are Open To Everyone. URL: <https://rzd-medicine.ru/about> (accessed on 06.04.2025).

⁵ System Usability Scale: a quantitative method for assessing system usability by means of a standardised questionnaire consisting of 10 statements rated by users on a 5-point scale. This instrument measures perceived facilitating use, interface convenience, and learnability of the product.

⁶ GenH New Generation Healthcare. Annual-Report-FY 2023–2024. URL: https://www.apollohospitals.com/apollo_pdf (accessed on 30.08.2024).

⁷ Alibaba Health Reports Robust Growth in 2024 Earnings. URL: <https://www.nasdaq.com/articles/alibaba-health-reports-robust-growth-2024-earnings> (accessed on 26.11.2024).

Netcare) and the programmes to combat socially significant diseases.⁸ **The United States** implements a market-oriented approach by means of commercial platforms (Amazon Care, Teladoc) and venture startups (Medable), with the highlight of the scalability of solutions and integration with private insurance systems, however, the problem of social disparity in access to high-tech care still persists there⁹ [5]. **The European Union** is developing state-regulated ecosystems with an emphasis on compatibility for these countries (for instance, the Italian monitoring system of patients), stringent data protection (GDPR),¹⁰ and the mandatory introduction of digital platforms for public medical institutions¹¹ [5]. **Turkey** successfully implements vertical integration from medical education (universities) to a system of high-tech clinics and laboratories through the model of Acibadem Healthcare Group, thus combining Western quality standards with competitive prices attractive for medical tourism¹² [6]. **South Korea** is deploying “smart hospital campuses” with completely digitalized processes from appointment to discharge of patients, integration of robotics into surgery operations, and national-system of electronic medical

records accessible through a single portal.¹³ **Israel** counts on a startup ecosystem (for instance, AI diagnostics platforms) in close collaboration with the military ecosystems (IT personnel employed), academic science, and venture funds, thus, creating export-oriented medical technologies. Singapore has developed a gold-standard model for a “digital twin” of health system for population: data from portable devices are transferred via polyclinics and research centres for consolidated analytical system of predictive medicine.¹⁴ **The UAE** is investing in medical free zones (Dubai Healthcare City), which integrate best international practices, cutting-edge diagnostics, and personalised wellness programmes to develop medical tourism in the high-end segment of the market.¹⁵

We can identify general consistent patterns in the development of medical ecosystems: universal trends determine the digital future of healthcare. **Managerial models** represent divergence: as to the USA, which relies on market mechanisms and competition among commercial platforms, the EU and Singapore adhere to efficient centralised regulation with rigorous quality standards. **Integration strategies** range from vertical (for example, Turkish Acibadem model is a combination of education, science, and clinical practice) to horizontal (inter-members’ systems in the EU ensures the compatibility of national digital solutions). **Sources of innovation** diverge too: whereas Israel generates a breakthrough system by means of startup culture and military-medical technologies, South Korea achieves successful accomplishments with corporate R&D and systemic digitalisation of medical institutions. **Economic models** differ from domestic market-oriented strategy (EU) to

⁸ Medicine and healthcare in South Africa: characteristics of the healthcare sector in South Africa. URL: <https://visitworld.today/ru/blog/1070/medicine-and-health-care-in-south-africa-peculiarities-of-the-field-of-health-care-in-south-africa#osobennosti-sfery-zdravooxraneniya-v-yuznoi-afrike> (accessed on 19.10.2022).

⁹ The Healthcare Ecosystem. Navigating the Healthcare Ecosystem: A Guide for Entrepreneurs. URL: <https://fastercapital.com/ru/content/Экосистема-здравоохранения—Навигация-по-экосистеме-здравоохранения—руководство-для-предпринимателей.html> (accessed on 21.03.2024).

¹⁰ GDPR — The Law on data privacy and security for all organizations that process information about residents of the European Union, even if they are located outside it.

¹¹ The Healthcare Ecosystem. Navigating the Healthcare Ecosystem: A Guide for Entrepreneurs. URL: <https://fastercapital.com/ru/content/Экосистема-здравоохранения—Навигация-по-экосистеме-здравоохранения—руководство-для-предпринимателей.html> (accessed on 21.03.2024).

¹² Acibadem hospitals and outpatient clinics. URL: <https://acibadem.com.ru/why-acibadem/integrated-healthcare-model> (accessed on 2021).

¹³ World Health Organisation URL: <https://www.who.int/publications> (accessed on 2025)

¹⁴ Israel: Medtech Innovation Hub for the World. URL: https://medical-technology.nridigital.com/medical_technology_jun19/israel_a_medtech_innovation_hub_for_the_world (accessed on 06.2019).

¹⁵ The Rise of Healthtech Startups in Dubai and How to Start One // URL: <https://www.duqe.ae/healthtech> (accessed on 07.01.2025).

the export of medical services (UAE, Turkey, which are actively developing premium medical tourism through building specialised clusters).

These global trends formulate benchmarks for the development of Russian ecosystems in healthcare, where currently there persists a gap between:

- corporate digital services (Sber, Yandex);
- state digitalisation programmes;
- academic research centres.

To bridge this gap, a thoughtful adoption of international experience is required as well as consideration of specific features of the national healthcare system.

Sber,¹⁶ Yandex [3], and MTS¹⁷ have demonstrated successful projects in this sphere with elements of ecosystem approach and digital transformation applied as a key driver (including the implementation of unified digital platforms, telemedicine solutions, and mobile services for patients). For example, the strategy developed by MTS assigns a top priority for the medical segment. A sustainable partnership with the clinical network “Medsi”¹⁸ has led to the foundation of an acceleration platform capable to identify and develop innovative projects in the field of personalised telemedicine. The implementation of this programme has contributed to choose three startups that gained access to the clinic’s infrastructure for testing and implementing their technological solutions.

“RZD-Medicine” constitutes a corporate ecosystem with comprehensive digital integration, embracing over a hundred of medical institutions throughout Russia aimed to run comprehensive care of the staff and their families of RZD.¹⁹ Its key features include the introduction of a unified digital

platform involving electronic medical records, online booking system, telemedicine consultations, as well as the development of preventive medicine by means of the programmes of prophylactic medical check-ups and health monitoring via portable devices.

“Medscan” represents a modern diagnostic ecosystem, which employs artificial intelligence (AI) technologies.²⁰ AI algorithms are used for a precise analysis of CT, MRI, and radiological data obtained within its network of diagnostic centres. “Medscan” system also operates in integration with state medical institutions, it ensures data transfer for subsequent treatment, and also develops partnership networking with pharmaceutical companies and scientific centres focusing on development of innovative, personalised diagnostic methods.

“Invitro” constitutes a thoroughly extensive laboratory-scale ecosystem with advanced digital services.²¹ In addition to traditional laboratory testing, the company actively develops innovative research areas, including genetic tests to predict hereditary diseases, mobile applications for easy-to-monitor tracking of test results, and integration with leading telemedicine platforms such as “SberZdorovye”.

However, Sber and Yandex face a number of limitations, due to their position of proprietors of their own services entitled “Health” and subsequently establishing themselves as ecosystem operators for developing AI in medicine. Firstly, the functionalism of these platforms is predominantly restricted to telemedicine services, thus preventing them from playing a significant role beyond specialised medical ecosystems. Secondly, their degree of market demand remains low: according to the survey held by “Romir” holding (polling sample included 1500 respondents from various Russian regions), only 10 per cent of interviewees

¹⁶ SBER: More Than Just A Bank. URL: <https://www.sberbank.com/ru/ecs> (accessed on 15.11.2023).

¹⁷ Development of ecosystem. MTS. URL: <https://ar2021.mts.ru/obzor-transformaczii-ekosistemy/razvitie-ekosistemy-mts/> (accessed on 15.11.2023).

¹⁸ The Rise of Health-Tech Startups in Dubai and How to Start One. // URL: <https://www.duqe.ae/healthtech> (accessed on 07.01.2025).

¹⁹ RZD-Medicine: We Are Open To Everyone. URL: <https://rzd-medicine.ru/about> (accessed on 06.04.2025).

²⁰ Why Medicine Needs Ecosystems. URL: <https://ict.moscow/news/medical-ecosystems> (accessed on 20.04.2021).

²¹ INVITRO uses “digital twin” technology to build and develop its network. URL: https://www.invitro.ru/moscow/about/press_relizes/invitro-ispolzuet-tehnologiyu-tsifrovogo-dvoynika-dlya-postroeniya-i-razvitiya-seti (accessed on 14.06.2023).

used the services at least once, while about 30 per cent were totally unaware of the existence of such medical services.²²

As we have mentioned previously, foreign countries are actively developing medical ecosystems. For instance, **Italy** is implementing a cooperation programme involving universities, hospitals, and the government in the sphere of introduction of remote patient monitoring systems and automating immunisation processes.²³ Among successful international projects are Philips, Amazon Care, and Acibadem. The international company Philips HealthCare/Philips HealthTech develops digital medical ecosystems, which integrate AI, telemedicine, and big data. Their cloud platforms provide networking for doctors and patients across Europe, while smart wearable devices with Internet of Things technology collect data to help predicting diseases and developing customised treatment plans²⁴ [6].

The American project Amazon Care operates based on a different approach: it integrates digital medical services with an e-commerce ecosystem. The platform provides telemedicine consulting, pharmacy supply, and integration with Electronic Health Records (EHR), which ensures the access to medical care for people in remote regions by means of cloud services and mobile applications.²⁵ International medical ecosystems resort to a more sophisticated approach. For instance, Acibadem (Turkey) involves clinics, educational institutions, technological developments (medical information systems), accredited laboratories, and mo-

bile medical services, which ensure a full cycle of health management. The given ecosystem includes Acibadem University, which trains a highly qualified staff of specialists by means of advanced educational programmes and scientific research. The latter involves the research activity of the Centre for Advanced Simulation and Education (CASE), which bear the status of “Centre of Excellence”.²⁶

Startup projects are especially noteworthy for the interest in the medical sphere. Specifically, the company Medable (USA) has launched an innovative platform for medical trials, speeding up pharmaceutical development employing digital tools and the automation of regulatory processes. The African project Zipline solves problems of access to medicinal products in remote areas by means of their rapid delivery by drones [5].

In general, we would note, that the existing medical ecosystems enhance the efficiency of healthcare system via digitalisation and innovations. The advantages of these systems include the following aspects: the digital integration of personal electronic medical records, telemedicine and mobile applications via unified platforms (as in “RZD-Medicine”, Philips HealthTech, and Amazon Care); tailored treatment using AI, big data, and portable devices (Medscan, Invitro); expanded access of healthcare through telemedicine solutions and medicine delivery (Zipline); support for innovations through acceleration programmes (MTS and “Medsi”) and strong cooperation with scientific and pharmaceutical enterprises; as well as development of hybrid models, which combine traditional and digital approaches (Acibadem, Chinese TCM platforms).

However, to build such a healthcare ecosystem, significant challenges must be solved: namely, the fragmentation of medical ecosystems; or the limited functionality of Russian services (SberZdorovye, Yandex.Zdorovye), which are predominantly telemedicine-oriented. Besides, there is a low public

²² Why does medicine need ecosystems? URL: <https://ict.moscow/news/medical-ecosystems> (accessed on 20.04.2021).

²³ The Healthcare Ecosystem. Navigating the Healthcare Ecosystem: A Guide for Entrepreneurs. URL: <https://fastercapital.com/ru/content/Экосистема-здравоохранения—Навигация-по-экосистеме-здравоохранения—руководство-для-предпринимателей.html> (accessed on 21.03.2024).

²⁴ Acibadem hospitals and outpatient clinics. URL: <https://acibadem.com.ru/why-acibadem/integrated-healthcare-model> (accessed on 2021).

²⁵ The Healthcare Ecosystem. Navigating the Healthcare Ecosystem: A Guide for Entrepreneurs. URL: <https://fastercapital.com/ru/content/Экосистема-здравоохранения—Навигация-по-экосистеме-здравоохранения—руководство-для-предпринимателей.html> (accessed on 21.03.2024).

²⁶ World Health Organization. URL: <https://www.who.int/publications>

awareness and insufficient demand for such platforms (used by only 10 per cent of Russians) and regulatory barriers make data integration quite complicated. In addition, a lack of unified standards lead to fragmentation of ecosystems, as well as the problems of technological risks related to AI algorithm errors and data vulnerability to cyberattacks.

Consequently, despite the activity of digital players, the abovementioned examples illustrate that a fully-fledged healthcare ecosystem requires more comprehensive integration of all participants involved (clinics, IT, science, the state) and flexible models (telemedicine in combination with real-life non-virtual services).

RESULTS

To distinguish the possible types of activities within a healthcare ecosystem, the authors studied the all-Russian classifier system OKVED-2²⁷ to determine the following classifications numerically indexed: 21 — Manufacture of pharmaceuticals and materials for medical use; 32.50 — Manufacture of medical instruments and equipment; 84 — Activities of public administration bodies in ensuring military security and compulsory social security; 85 — Education; 79 — Activities of travel agencies and other organisations providing services in the field of tourism; 86 — Healthcare activities; 58 — Publishing activities; 61 — Telecommunications; 62 — Computer programming, consultancy, and related activities; 63 — Activities in the information technology service, etc.

Healthcare in Russia constitutes a vertically integrated economic system. Contemporary domestic healthcare companies face the fundamental problem during transforming into rigid, monolithic structures with a unified business model. As an alternative to this approach, dynamic ecosystems should be generated with the integration of diverse products and innovative services (from classical medical services to digital solutions), multiple

business models (B2B, B2C, B2G), as well as projects with different level of developments (from tried-and-true solutions to promising experimental developments). A critically essential factor should become the balance between innovativeness and regulatory requirements, which implies building partners' relationship with regulatory authorities.

A major challenge is to ensure a successful intersubjective interaction. A medical ecosystem, by its very nature, cannot function autonomously, since its effectiveness is directly determined by the quality of integration with other socio-economic spheres. This is justified by the nature of health, where medical services by itself represent only one of many significant factors.

Key aspects include interaction with educational institutions through fostering a culture of healthy life-style and implementing preventive programmes; collaboration with social services aimed at supporting vulnerable groups of population and developing programmes of mental health, as well as integration with technology-oriented companies for introducing digital solutions.

An equally significant aspect is partnership with the business community, which involves attraction of investments and the implementation of corporate programmes, as well as coordination with regulatory bodies in the field of service standardisation and quality control. A particular problem is disparity: in case if there is interest in targeted technological solutions, there is a persistent lack of long-standing investment in the comprehensive development of ecosystems. This situation is most dramatic in the regions, which face a shortage of infrastructure and lack of qualified specialists.

The fragmentation of the healthcare system, which is divided into state, private, and corporate institutions, hampers strongly the creation of a unified information and service space. Developing interaction between state medical institutions, scientific centres and pharmaceutical companies is of significant potential, since it would enable the provision of aggregated services. The formation of a healthcare ecosystem presents an evolutionary

²⁷ OKVED-2 is the all-Russian classifier of types of economic activity.

process, which requires a balanced aggregation of market mechanisms, social responsibility, and state regulation.

One of the key challenges is the medical data fragmentation. Electronic systems often face the problem of incompatibility between each other, which hinders the exchange of information between ecosystem participants. The solution of such a problem requires not only technological innovations (for instance, block chain for secure data storage) but also changes to the regulatory framework. The most complicated problem of regulation framework is related to telemedicine services and processing of personal data, where the legislative framework falls behind technological expertise.

Digital gap between leading medical centres and provincial institutions becomes another restrictive factor due to a complicated integration of different information systems and equipment from a variety of manufacturers. Besides, strong risks exist in the field of cybersecurity and protection of patient personal data. Regulatory constraints escalate complications, for instance, the abovementioned outdated regulatory framework that cannot catch up to the development of telemedicine and AI diagnostics, excessive bureaucratic impediments to the implementation of innovations, or insufficiently transparent mechanisms of payment for digital medical services. Technological challenges also represent a digital gap: on one hand, medical professionals are not sufficiently ready to work with modern digital equipment, and on the other hand, senior patients and rural residents show inadequate digital skills²⁸ [16].

Social factors make a strong impact too: low digital literacy among the population (especially among the elder generation and society in rural areas), conservative mindset among part of the medical community relating to new technologies,

and persistent patient distrust of distant means of provision of medical care. Concurrently, there is a persisting trend towards combining economic efficiency with social orientation, which is quite characteristic of contemporary solutions for ecosystems in healthcare.

Restrictive nature of digital platforms also make a number of challenges. Even large technologically developed players, such as Sber and Yandex, encounter barriers when entering the medical sphere. Their services are still quite narrowly focused (telemedicine, appointments to visit doctors)²⁹ [3], whereas a real ecosystem should provide a complete coverage of medical care: from prevention and diagnosis to treatment and rehabilitation.

An ineffective use of resources is also noted within the framework of healthcare ecosystem (due to insufficient coordination between its subsystems and participants, which leads to duplication of functions), as well as a drastic shortage of qualified personnel, especially in remote regions where the outflow of specialists to large centres is rigorous [7].

The most developed is the educational subsystem, since medical education is continuously progressing. It involves institutions of higher and secondary medical and pharmaceutical education, and treatment-and-prophylactic clinics.³⁰

Solving the abovementioned tasks requires a comprehensive approach aggregating technological, organisational, and social issues. Moreover, such challenges envisage the development and coordination of measures within the framework of state policy, corporate strategies, and educational programmes. To build an effective healthcare ecosystem it requires not only updating existing business models, but also inventing a fundamentally new approach that takes into account the specifics of the industry, the diversity of stakeholders, and the dual nature of the consumer-tailored value.

²⁸ Shortage of Doctors and Medical Personnel: Vacancies in Khakassia Number in the Hundreds. URL: <https://vskhakasia.ru/press-centr/news/19540-nekhvatka-vrachej-i-medpersonala-vakansii-v-khakasii-ischislyayutsya-sotnyami> (accessed on 12.04.2014).

²⁹ SBER: More Than Just A Bank. URL: <https://www.sberbank.com/ru/ecs> (accessed on 15.11.2023).

³⁰ On the other hand, healthcare facilities are also part of the socio-economic ecosystem.

Within the analysis of definitions of ecosystems, the authors identified the most significant definitions for understanding the essence of a healthcare ecosystem. G.B. Kleiner interprets a business ecosystem as “a network consisting of organisations and individual representatives of business community, which do not only form collectively a system of mutual support, but also develop together” [8].

A similar approach to the content of an ecosystem is observed in the sphere of education. In scientific discourse, the authors of the given article [1] consider an educational ecosystem as “a dynamic network of interacting subjects aimed to the following activity: consciously build interdependent connections, purposefully create developing relationships and conditions for the emergence of new opportunities for continuous education”.

If business community and educational ecosystems focus on separate spheres of interaction, the socio-economic ecosystem unites them into an aggregated complex. It is perceived as a spatially limited system, which is distinguished by the existence of a network of interdependent economic and social players, the creation of specific products of activity, the capability for autonomous operation and evolution, and sustainability by means of the circulation of key resources [5, 6].

In the context of the abovementioned definitions, a healthcare ecosystem obtains some specific features. Unlike highly targeted (business and edu-

cational) ecosystems and compared to territorially limited socio-economic systems, a healthcare ecosystem has a large-scale structure and involves heterogeneous subjects (medical institutions, pharmaceutical companies, insurance companies, sanatoriums, disease screening and prevention centers, etc.), a multitude of categories of economic activity, as well as overlapping institutional fields. This factor requires to structure the ecosystem in view of functional, stable interdependence (similar to business ecosystems), social orientation (in the same way as educational ecosystems), and geo-referenced aspect (in line with socio-economic ones). We should also point out, that a distinctive feature of the healthcare ecosystem is its specific dynamics, characterised by a high degree of regulation (in contrast with business ecosystems) and stringent standardisation requirements (compared to educational ecosystems). At the same time, it maintains its adaptive potential, which is inherent in all types of ecosystems. Besides, being a highly organised interacted system it originates a fundamentally new quality of systemic integrity, which possesses a synergistic effect, however, the latter cannot be limited to the simple aggregation of the capabilities of individual elements.

Such nature of the Russian healthcare ecosystem is contingent on the necessity of combining economic efficiency, social responsibility, and clinical effectiveness within the framework of the national development objectives of the Russian Federation. Different scholars consider approaches to formulate the objectives of an ecosystem in relation to its purpose. For example, the objective of business ecosystems is to reduce transaction costs by means of overcoming restrictions specific to vertically distributed economic systems.³¹ In the course of analysis of educational ecosystems, contemporary researchers pay special attention to developing life-long learning programmes accessible to all categories of learners [1, 9]. However, in our view-

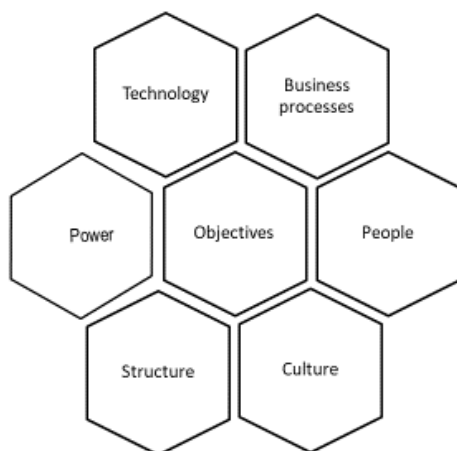


Fig. 1. Integral Model of Organization by Boddy – Peyton.

Source: Compiled by the authors based on [12,13].

³¹ Acıbadem hospitals and outpatient clinics. URL: <https://acibadem.com.ru/why-acibadem/integrated-healthcare-model> (accessed on 2021).

point, G.B. Kleiner most comprehensively expressed the essence of an ecosystem. In his opinion, its objective is expressed in evolution “in a temporal perspective with the preservation (and in some cases, perspective of the growth) of its spatial niche, which ensures the sustainability of its functioning”.

As far as the sphere of healthcare concerns, it is advisable to visualise the national development targets of the Russian Federation as the objective of the ecosystem.³² Considering the abovementioned analysed definitions, it can be stated, that a healthcare ecosystem is a complex socio-economic system structured as a network of interconnected autonomous subsystems. Their participants are economic, social, medical, and organisational subjects, developing in co-evolution, involved by the shared objectives of national development of the Russian Federation and integrated business processes that generate the added value (or benefit) of ecosystem, namely, the essentials for preserving the health of the national population.

Despite all lively discussions and the elaboration of theoretical and methodological aspects of development of ecosystem, currently, the issues related to the contribution of business processes to achieving its objectives and value generation are not revealed sufficiently. In this respect, we have studied the conceptual business model advanced by scholars from the Higher School of Economics: the key interacting subjects are suppliers, the manufacturer, and distribution channels, involved in the processes of value generation for the consumer [10]. Business processes generate and distribute value as the material and intangible results of the activities of participants. It is exactly the business process, which represents the foundation for its network-integrated interaction in order to ensure the sustainable functioning of the ecosystem. The objective of achieving the national development targets of the Russian Federation requires the gen-

eration and sustainable distribution of the added value of the healthcare ecosystem and it emphasises its business processes as the key aspect for its design, building, and functioning.

In the context of analysis of ecosystem, G.B. Kleiner's definition seems methodologically prominent, since it reveals the complex character of interconnections between participants of the system. To supplement his justified viewpoint, we shall observe, that the interaction of subjects of ecosystem is implemented through a multi-level system of relationship, which includes not only traditional material and financial transformations but as well as complex mechanisms aimed to distribute responsibility, authoritative requirements, and the dialectical combination of competitive and cooperative strategies of behaviour [8]. It is exactly the multidimensional nature of interactions, which combines elements of subordination and partnership, transforms an aggregation of autonomous subjects into an integral functional subsystem with new qualitative characteristics.

Such an ecosystem obtains the capability for self-sustainable development in the long-run perspective. Exactly such a capacity to generate the value through complex network interactions constitutes the distinctive feature of the ecosystem approach in healthcare.

The given approach acquires particular significance, when the professional autonomy of participants exists in a dialectical unity with the requirements of strict coordination; financial mechanisms are strongly bonded with ethical imperatives. Besides, competitive relations between healthcare providers are organically combined with the need of cooperation to achieve the main goal, namely, to provide the necessary requirements for preservation of the health of the country's population, as well as ensuring the health of each patient individually.

The potential of ecosystem approach:

- it opens fundamentally new opportunities for the proactive development of participants of ecosystem, allowing them to react flexibly to changes in the regulatory environment, which is essentially

³² Decree on the national development goals of the Russian Federation for the period up to 2030 and for the perspective up to 2036. URL: <http://www.kremlin.ru/events/president/news/73986>

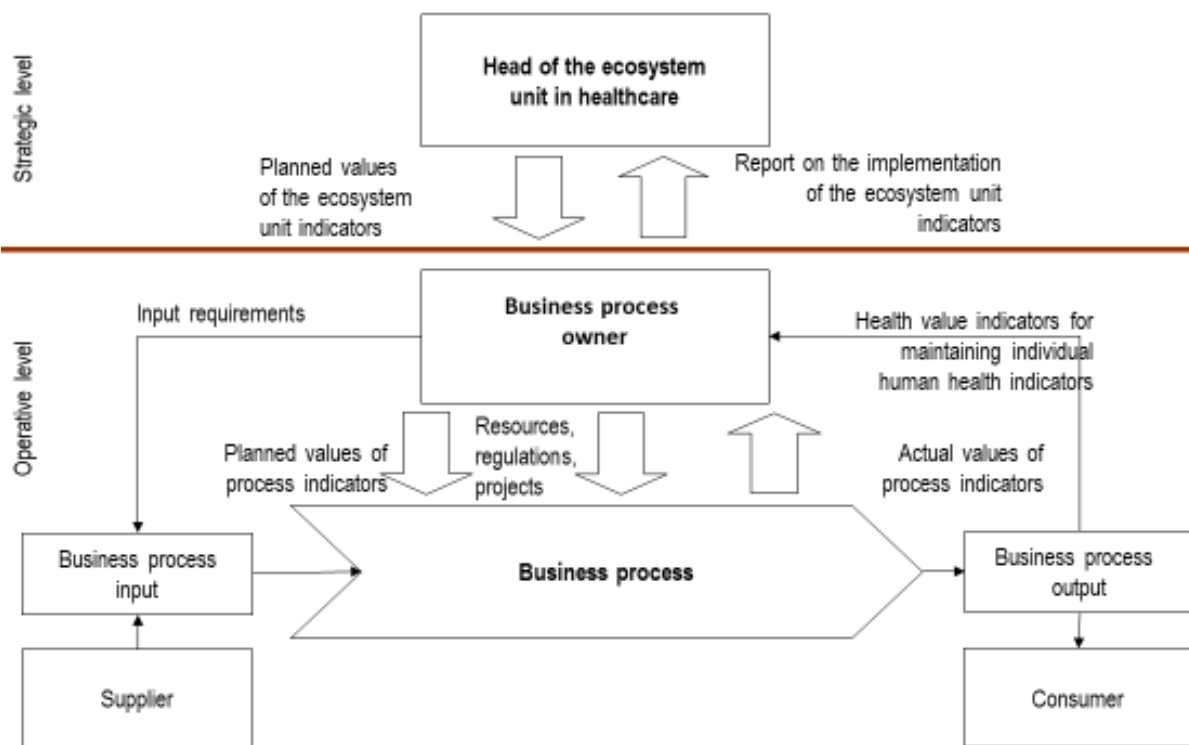


Fig. 2. Conceptual Diagram of Process Management within a Specific Component of the Healthcare Ecosystem

Source: Compiled by the authors based on [13, 14].

vital in the highly regimented sphere of healthcare. In contrast with business ecosystems, where the drivers are private companies, the state plays a key role in healthcare. The state must ensure regulatory flexibility (for instance, experimental legal regimes with limited access for testing innovations), financial support (financing prospective projects), and, lastly, infrastructure foundation (developing digital platforms such as the Unified State Health Information — USHISH³³);

- it involves the optimisation of both transaction costs and the distribution of resources between established and innovative directions of activity, and it also allows for the application of differentiated methodologies of management, from classical approaches for mature services to “agile”³⁴

³³ USHISH (The Unified State Information System in Healthcare) — an automated system that provides Russian citizens with rapid access to their medical data and healthcare services.

³⁴ Agile — a general term for a group of methods and

practices” aimed to develop fields and acceleration mechanisms for startups [11].

This kind of model becomes especially relevant under contemporary challenges, when medical organisations must simultaneously maintain traditional medical practices in clinics, introduce digital innovations (including telemedicine platforms and AI-driven diagnostic systems), build strategic partnerships with technology companies, and ensure compliance with ever more stringent regulatory requirements.

However, with regard to building a healthcare ecosystem, it is not simply a matter of adapting such a model, which takes into account of the number of subjects, their specifics, and diversity of their activities. It is mandatory to define its subsystems and subjects, their business processes, and the generated value for the consumer. These

approaches based on the values and principles of progressive project management.

processes ensure a synergistic effect exceeding the simple amount of the capabilities of separate participants.

Each subject (and subsystem) of the ecosystem can be analysed from a systemic viewpoint, and represent its internal environment in accordance with the Boddy-Payton model (*Fig. 1*).

As illustrated in *Fig. 1*, the objectives hold the central part of the presented model and all the activities of the ecosystem are aimed towards these objectives. Herein:

- people represent the participants of the unit, holding certain positions in the organisational structure;
- structure means the organisational framework that ensures vertical and horizontal division of labour for its coordination within the ecosystem unit;
- culture includes traditions and rules for executing business processes, which contribute to the effective solution of work targets to achieve the objectives of each unit;
- business processes represent grouped types of activities by means of which participants transform resources and create favourable outcome (new value);
- power ensures the priority of the common objectives of the ecosystem over the goals of separate units and individual plans of participants;
- technology encompasses the means of labour employed to transform resources into a valuable result [13]. The key integration mechanisms for ecosystem subdivisions are interconnected business processes. Within the systemic paradigm, we propose a visualised model for managing these processes at the level of an individual organisational unit (*Fig. 2*). Subsequently, there are the following essential aspects:
 - A leader of an independent economic, social, or organisational agent heads the ecosystem unit in healthcare, who accepts the ecosystem's objectives, transforms them into the goals of the unit in charge of, and receives feedback on their achievement. The leader interacts with the leaders of other ecosystem units.

- The owner of business process is a responsible official who coordinates the process and is liable for its results. The process owner's functional duties include organising interaction between suppliers of resources, consumers of the process results, and other process owners within the ecosystem unit.
- The process input represents a whole conglomeration of objects (products, results of the activity) that have value from the perspective of maintaining an individual's health. In the course of process transformation, inputs are converted into corresponding outputs (it should be emphasised, that the outputs of one process naturally become inputs for other process related to it).
- Process resource provision encompasses a variety of material and intangible assets, which are provided for the activity of its owner for the effective implementation of the process. They include the following: technical means (production, diagnostic and office equipment), qualified staff as a key human resource, necessary infrastructure (specialised premises, transport vehicles, and communication systems), financial and material assets, as well as a regulatory and methodological base substantiated by governing documents and project documentation.
- The consumer of the results is the entity that employs the process outputs, whose degree of satisfaction represents the key criterion for assessing the efficiency of the process. It is particularly complicated to identify the end consumer in the healthcare ecosystem, since, contrast to traditional business models, value is created simultaneously for several groups: patients (quality and accessibility of care), medical organisations (operational efficiency), insurance companies (risk management), and the state (public health).
- The supplier is the entity that ensures the process either with input resources or with components necessary for the implementation of the process.
- Process indicators represent a system of measurable characteristics based on which its owner accomplishes operational management and con-

trol, tracking back current values of indicators and dynamics of their transformations. Effective application of this approach requires elaborating a balanced system of value estimators (scorecard) that allows analysing and optimising economic and organisational interactions within the participants of the ecosystem. Business processes within this sphere are based on flexibility, digital integration, and network interaction. Business processes combine the automation of routine tasks through Business Process Management (BPM), as a concept of permanent sophistication of business processes, and AI with innovation, which implies a balance between standardisation and the specifics of local requirements [15]. Integration of management systems is a key condition to achieve maximum efficiency of the local process-related and the general one, since it enables coordinated actions of all elements of the ecosystem and lays the foundation for sustainable development.

The analysis of global practices of the leading players has indicated that contemporary medical ecosystems are drastically reorganising traditional business processes by means of implication of the following five key organisational principles:

Modular Process Architecture. Leading players (Acibadem, Philips) build flexible structures with clinical services, diagnostic laboratories, and IT solutions functioning as autonomous business units, however, technologically interlinked with each other. For example, Acibadem's Labmed laboratory operates as an independent revenue centre, serving as both internal clinics and external clients, thus, it increases the all-round efficiency of the system by 25–30 per cent [11, 13].

Digital Platform Integration. Ecosystems like Amazon Care reconsider value chains through the employment of unified digital entry points, automated end-to-end processes (from appointment to discharge of patients), and cross-service analytics. This decreases transaction costs by 20–35 per cent in comparison to traditional models [9].

Coordination through the medium of Innovative Business Models

- Medable: Platform solutions for clinical research [9],
- Zipline: Commercialisation of medical supply logistics [10],
- Acibadem: Synergy of education, science, and medical practice in clinics [13].

Deep Operational Automation. Major ecosystems implement automated tools to optimise up to 40–50 per cent of routine processes by means of AI monitoring of patients (Philips), algorithmic dispatch (Zipline), and smart contracts (Medable) [9, 10, 13].

Standardised Management Solutions. Successful projects include: embedded compliance (HIPAA in Amazon Care), international accreditations (Labmed in Acibadem), and corporate quality standards (Acibadem CARE) [9, 13].

To bottom-line the abovementioned aspects, we can draw the following conclusions:

1. The modular approach establishes flexibility and scalability.
2. Platform models ensure new income streams.
3. Automation of processes provides a competitive advantage.
4. Standards become industry filters.

For Russian players, it is of paramount importance to reinterpret differently organisational structures, monetisation models, key performance indicator systems (KPIs), as well as partnership strategies.

The analysis conducted by the authors of the given research leads to the conclusion, that effective management of a healthcare ecosystem requires a comprehensive approach, which integrates:

1. A system of indicators of processes which is use as an instrument for operational control and management.
2. Mechanisms for value creation and distribution concentrated on preserving the health of patients.
3. An equilibrated system for assessment of economic and organizational interactions.
4. Harmonious implementation of process management introduced in the integrated system of healthcare management.

The implementation of these principles in operation ensures a synergistic effect, which contributes to a sustainable development of the healthcare

ecosystem in the context of digital transformation in the industry. The subsequent research should be focused on the elaboration of specific methodologies for assessing the efficiencies of business processes, taking into account of specific features of various participants of the ecosystem.

Global experience confirms that transformation in compliance with such a model helps to cut down the time of the process and hit the market for new services by 2–3 times, as well as it yields a 30–50 per cent growth in operational effectiveness, ensuring fundamentally new opportunities for the development of the medical business.

CONCLUSIONS

A healthcare ecosystem, that represents a network of interrelated economic, social, and organisational subjects, requires a comprehension of business processes as collective labour focused on achieving a common objective: preserving health at the individual and population levels. The COVID-19 pandemic clearly demonstrated the importance of the concept of collective health, where the aggregation of interactions exceeds the amount of individual efforts.

In this context, business processes represent a mechanism for transforming resources into a new value by means of the following aspects:

- integration of performances — the coordinated interaction of heterogeneous elements of the system;

- cumulative effect — the mutual enhancing of the results of separate processes;
- systemic effectiveness — the achievement of values of indicator in the circumstances, when participants operate without interaction to each other.

The proposed model of ecosystem is focused on:

- the interdependence of processes;
- the complementarity of processes;
- criteria for assessing the contribution of each element to the all-round value of proposition;
- performance factors, which take into account both economic and social consequences.

Such a paradigm allows for the streamlining of management of resources, provided a balance is maintained between individual needs and requirements of society in the sphere of healthcare. The capacity of the ecosystem's architecture to maintain the stability of well-tested management practices, at the same time demonstrating adaptability to technological transfigurations, makes it the optimal model for sustainable development in the context of the fast-rising transformation of the healthcare industry. Such an approach allows participants of ecosystem to remain competitive using effective distribution of resources among various activities and applying the most suitable management instruments for each consumer.

REFERENCES

1. Utkin A. V., Shevchenko K. V. Ecosystem approach in education: From metaphor to methodology and practice. *Vestnik Cherepovetskogo gosudarstvennogo universiteta = Cherepovets State University Bulletin*. 2022;(2):175–189. (In Russ.). DOI: 10.23859/1994-0637-2022-2-107-14
2. Tretiakova E. A., Freyman E. N. Ecosystem approach in modern economic research. *Voprosy upravleniya = Management Issues*. 2022;(1):6–20. (In Russ.). DOI: 10.22394/2304-3369-2022-1-6-20
3. Umnova A. Yandex ecosystem — what it is. URL: <https://skyeng.ru/magazine/wiki/it-industriya/chto-takoe-ekosistema-iandeks/> (accessed on 10.12.2024). (In Russ.).
4. Frolova E. V. Healthcare in Brazil. *Spravochnik vracha obshchei praktiki = Journal of Family Medicine*. 2020;(7):63–68. (In Russ.). DOI: 10.33920/med-10-2007-09
5. Goldbach I. Digital ecosystem of medicine of the future. Panorama. 2018. URL: <https://panor.ru/articles/tsifrovaya-ekosistema-meditsiny-budushchego/37258.html> (accessed on 10.12.2018). (In Russ.).
6. Viswanadham N. Ecosystem model for healthcare platform. *Sāadhanā*. 2021;46(4):188. DOI: 10.1007/s12046-021-01708-y

7. Vysotskaya N.V., Moshkin I.A. The role and place of business ecosystems in the national economy. *Vestnik MIRBIS = MIRBIS Research Journal*. 2019;(2):136–141. (In Russ.). DOI: 10.25634/MIRBIS.2019.2.18
8. Zyrianov A.S. Digital ecosystem of an enterprise — as an object of scientific and economic knowledge. *International Journal of Professional Science*. 2024;(9–1):26–41. (In Russ.).
9. Kleyner G.B. Socio-economic ecosystems in the context of the dual spatial-temporal analysis. *Ekonomika i upravlenie: problemy, resheniya = Economics and Management: Problems, Solutions*. 2018;5(5):5–13. (In Russ.).
10. Luksha P., Spencer-Keys J., Cubista J. Educational ecosystems: Emerging practice for the future of education. URL: <https://www.skolkovo.ru/researches/obrazovatelnye-ekosistemy-voznikayushaya-praktika-dlya-budushego-obrazovaniya/> (accessed on 16.11.2021). (In Russ.).
11. Klimanov D.E., Tretyak O.A. Business models: Main directions of research and searches for the substantive foundation of the concept. *Rossiiskii zhurnal menedzhmenta = Russian Management Journal*. 2014;12(3):107–130. (In Russ.).
12. Viki T., Toma D., Gons E. The corporate startup: How established companies can develop successful innovation ecosystems. Deventer: Vakmedianet Management bv; 2017. 296 p. (Russ. ed.: Viki T., Toma D., Gons E. Korporativnyi startup: Kak sozdat' innovatsionnyuyu ekosistemu v krupnoi kompanii. Moscow: Alpina Publisher; 2021. 288 p.).
13. Boddy D., Paton S. Management: An introduction. Harlow: Pearson Education Ltd; 2013. 720 p.
14. Ageyeva T. Yu. The role of integrated management in the economics of a trade organization. In: Logistics — Eurasian bridge: Proc. 13th Int. sci.-pract. conf. (Krasnoyarsk, April 25–29, 2018). Krasnoyarsk: Krasnoyarsk State Agrarian University; 2018:5–9. (In Russ.).
15. Ageyeva T. Yu., Lukinykh V.F. Competitiveness enhancement mechanism for retail networks in regional markets. Krasnoyarsk: Siberian Federal University; 2025. 202 p. (In Russ.).
16. Kolennikova O.A. Using digital technologies by medical professionals. *Narodonaselenie = Population*. 2022;25(3):189–199. (In Russ.). DOI: 10.19181/population.2022.25.3.15

ABOUT THE AUTHORS



Elena A. Pozhilenkova — Cand. Sci. (Biology), Assoc. Prof., Assoc. Prof., Department of Biomedical Engineering Systems, Senior Researcher Scientific and Educational Center “Soft Matter and Fluid Physics”, Bauman Moscow State Technical University, Moscow, Russian Federation

<https://orcid.org/0000-0001-7857-0490>

Corresponding author:

pozhilenkova@yandex.ru



Tatjana Yu. Ageyeva — Cand. Sci. (Econ.), Assoc. Prof., Department of International and Managerial Economics, Siberian Federal University, Krasnoyarsk, Russian Federation

<https://orcid.org/0000-0003-0683-8114>

t.ageyeva@gmail.com

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 16.04.2025; revised on 03.06.2025 and accepted for publication on 05.08.2025. The authors read and approved the final version of the manuscript.