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Principles of Formation of the Company's Ecosystem Based on Platform Socio-Economic Interactions

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ABSTRACT

The purpose of this study was to develop principles for the formation of the company's ecosystem based on platform socio-economic interactions. In the course of the work, the peculiarities of ecosystem development are analyzed and the problem of systematization of the principles of formation of the external environment of an economic entity is determined. Based on minimizing transaction costs and the completeness of the application of management functions, the basic principles of the formation of the firm's ecosystem have been developed, including client-centricity, responsiveness to changes, hierarchical structure, diversity of participants and maintaining the profile of activity The author's approaches to the creation of such an ecosystem through platform interactions, as well as the application of advanced digital and information technologies to protect personal data, expand the number of services and activities provided, and preserve competition were formed. The research used methods such as various types of analysis, structuring, and the graphical method. The information base was made up of the bibliographic database of scientific publications eLibrary. This study of ecosystems will be of interest to firms that want to make more profit with lower costs by collecting and analyzing data received from customers.

Keywords: business ecosystem; platform interactions; management; principles of formation; digital technologies

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INTRODUCTION

In today's world, there is a trend of economic actors moving towards platform interactions. Firms developing digital technologies (including digital platforms) are more efficient, and the world's largest companies use them as a base for creating ecosystems [1], the core of which (according to domestic researchers) are such communication tools as technological platforms [2].

The transformation of business in terms of ecosystem development began in the 1970s [3], therefore, the principles of their formation in economic theory and practice are not fully represented, especially in view of the development of digital technologies [4].

PECULIARITIES OF DEVELOPMENT OF THE MODERN ECOSYSTEM OF THE FIRM

Today, consumer demand has become the main driver of the economy, with firms seeking to satisfy an increasing number of customer needs. McKinsey experts predict that by 2025 the share of ecosystems in global gross domestic product will be 30%, which equates to USD 60 trillion.[1]

Among the largest international ecosystems are the US companies Google, Facebook, Amazon, and Apple, as well as the Chinese companies Tencent and Alibaba. In Russia, Sber and Yandex are considered the most prominent ecosystems.[2]

An analysis of the experience of global digital ecosystem development shows that the US is the leader in this area; ecosystems in the country are regulated through anti-monopoly legislation to avoid unfair competition. In China, which has developed a plan for the transition to digitalisation and the development of digital ecosystems, control over these processes is implemented through the state's Civil Code, as well as laws on commerce, blockchain technology and financial consumer protection. Regarding the issue of monopolistic tendencies within ecosystems, China allows the use of customer data by third-party services (e.g., to gather statistical information on customer preferences), but this requires the consent of the customers themselves.

In Russia, ecosystems of firms, which are a set of services (or platforms) that allow users to obtain a product or service within one of them, are just beginning to develop. At the moment, the legal documents regulating this area are not fully formed. Therefore, ecosystems are subject to antitrust laws and are controlled by the Federal Antimonopoly Service [5].

There are many interpretations of the term "firm ecosystem", but no clear definition has emerged in modern literature. The concept of "business ecosystem" was introduced by J.F. Moore in his article "Predators and Prey: The New Evolution of Competition", implying that it is an association of companies that develop together on the basis of new technology and work on a competitive basis to create products to meet customer needs and eventually introduce more innovations. Moore analyses the business ecosystem by examining its life cycle, which consists of four main phases: birth, expansion, leadership, and self-renewal [6]. The authors of subsequent works fully agree with the definition given by this scientist or use it as a basis for further research. Thus, R. Ebner and A. Eisenberg complemented Moore's formulation: R. Ebner describes an ecosystem as "a coherent structure of a plural set of partners who need to interact to implement a core value proposition" [7]. E. Harting and T. Asseldonk consider a business ecosystem as "a network of interdependent actors centred around a key technology for success and survival" [7].

What these definitions have in common is the interaction of different stakeholders and co-operation of firms for joint development.

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[1] Ecosystems: approaches to regulation. Report for public consultations. Bank of Russia. URL: https://cbr.ru/Content/Document/File/119960/Consultation_Paper_02042021.pdf

[2] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation'. NP "National Council of Financial Market'. URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

In most studies to date, the "ecosystem of the firm" is the object of management.

The Boston Consulting Group identifies two main categories of ecosystems: solutions and transactions. The former emphasises product development, services and coordination of participants. Examples include configurations that integrate bank cards, merchants, consumers and banks, or smart home solutions that consolidate climate, lighting, entertainment and security devices. In the transaction ecosystem, the focus is on creating interactions between vendors and customers through a single platform. For example, eBay connects independent sellers with buyers, and Uber helps passengers find available taxis. In such systems, customers can themselves act as producers, as in the Airbnb platform where tenants become landlords by offering their accommodation. Thus, this type of ecosystem is close to the recently identified trend of platform ecosystems.

CLASSIFICATION OF ECOSYSTEMS

Ecosystems can be classified as follows:

Open, where the participation of any external partner that is willing to comply with common rules and has value from the point of view of other companies is welcome (the most common type). Internal competition is not restricted [8].

Closed, the access of partners to which is limited, there is a strict regulation of the number of participants (the least common type). As a rule, there is no internal competition [8].

Hybrid, which is a combination of open and closed platform solutions.[3]

Let us define the spheres of standard ecosystems (*Fig. 1*).

Finance combines payments, savings, lending, mortgages, insurance; *information technology* includes cloud and search services, operating systems, voice assistants; *e-commerce* is a marketplace; *lifestyle* is online learning, messengers and social networks, games, books, videos, taxis [5].

Let's look at the structures of the largest ecosystems — according to *Table 1*, they are similar to each other. This is because, for example, in the financial sector, an open ecosystem can reduce a bank's margins (one of the key profitability indicators of a financial institution), while giving consumers a choice of information technologies can negatively affect sales of basic goods and services. In e-commerce and lifestyle, open ecosystem types are prevalent, allowing customers to compare company offerings.[4]

[3] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[4] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

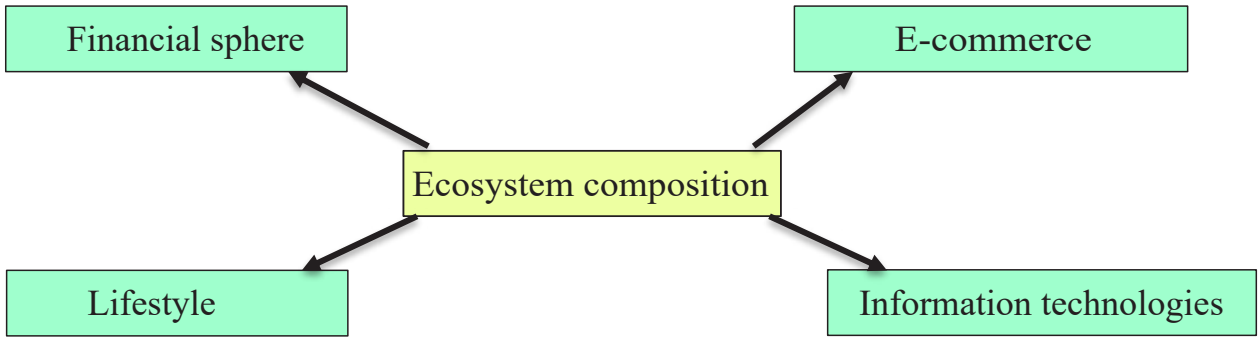

Fig. 1. **Areas of the standard ecosystem**

Source: compiled by the authors.

Table 1

The structure of the largest existing ecosystems

Ecosystem name	finance	Information technology	E-commerce	Lifestyle
Google	Closed	Closed	Open	Hybrid
Amazon	Closed	Closed	Open	Hybrid
Apple	Closed	Closed	Open	Hybrid
Tencent	Closed	Closed	Open	Hybrid
Alibaba	Closed	Closed	Open	Hybrid
Sber	Closed	Closed	Hybrid	Hybrid
Yandex	Closed	Closed	Open	Hybrid

Source: compiled by the authors.

At the same time, the firm's ecosystem includes various stakeholders who can influence the firm's activities in one way or another (*Fig. 2*).

DEVELOPMENT OF DIGITAL PLATFORMS

In the context of globalisation, there is a growing interest in a platform economy driven by technology; hence, businesses have to consider its impact when developing a company's development strategy. With information being the main competitive advantage today, companies are faced with analysing big data in one way or another. Collaboration between businesses enables the formation of a firm's ecosystem based on data collection and sharing, which creates new opportunities for business improvement. The use of digital technologies facilitates the emergence of intelligent products, blurs the boundaries between the virtual and real worlds, and opens up broad innovation perspectives [9].

Based on such technologies, digital platforms are formed, most often defined as a set of digital products, services, mechanisms and algorithms, a form of organisation of interaction between market participants, etc. [10].

Digital platforms have a great impact on the quality of life of consumers by making services available, lowering prices and expanding the range of products due to competition. But it should be

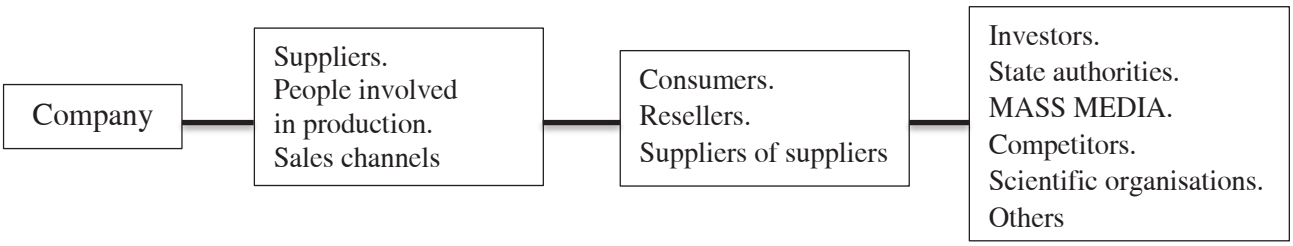

Fig. 2. **The content of the company's ecosystem**

Source: compiled by the authors.

noted that at the same time, consumer habits are being shaped. For example, the implementation of cashback or free returns on platforms has allowed the latter to identify the main approaches that allow them to expand their consumer base and subsequently their market share. Companies can remain unprofitable for a long time, as their main goal is extensive growth and brand building.[5]

If we talk about the differences of the platform ecosystem from traditional business alliances, it is necessary to highlight [5]:

- emphasis on innovativeness and speed of bringing products and services to market;
- co-operation without taking into account geographical and cultural limitations;
- cross-sector co-operation subject to the creation of intellectual property;
- development of new forms of co-operation, including flexible and short-term co-operation;
- shared and sustained value creation for all ecosystem participants.

At the same time, for successful business development it is necessary to adhere to certain principles of ecosystem building. However, it should be noted that there are no such principles when forming a firm's ecosystem based on platform socio-economic interactions [11].

RESEARCH METHODOLOGY

The object of the study is the ecosystem of the firm, and the subject of the study is the economic relations arising in the course of its formation on the basis of platform socio-economic interactions.

In the process of work such methods as system analysis of scientific articles, structuring and graphical method were applied. The information base was made up of scientific publications of the electronic library ELibrary on the topic of the study. The work algorithm can be presented in the form of the following stages: examination of previous research in this research area; formulation of the research problem, development of author's principles of business ecosystem formation on the basis of platform socio-economic interactions; discussion of ways to develop the firm's ecosystem on the basis of digital platforms.

Referring to the earlier statement that the firm's ecosystem acts as an object of management, as well as to the identified types of ecosystems, we will form the principles (including the basic principles) of the firm's ecosystem based on digital platforms. In doing so, we will rely on the five management functions identified by A. Fayol and the classification of transaction costs.

Management functions [12]:

1. Planning. It is the process of identifying strategic directions and goals for future success. It helps in identifying the necessary steps and resources to achieve the goals.

2. Organisation. It is a procedure of assigning tasks to participants in order to fulfil the set goals, helping to structure the firm's activities and dividing responsibilities among employees.

3. Coordination. Provides interaction between the employees of the company for effective performance of tasks in accordance with the set goals. This process helps the organisation to work more coherently.

4. Motivation. Involves stimulating personnel to fulfil tasks and achieve goals, helps to increase their productivity and efficiency.

5. Control. Evaluation of the fulfilment of the set tasks. Control helps to identify deviations, correct errors and improve business processes of the organisation.

Performing an analysis of management functions will allow us to most fully consider the management process associated with the formation of the firm's ecosystem.

Transaction costs. They are understood as costs arising from the conclusion of transactions

[5] Summary of answers to questions of the Bank of Russia Report for public consultations «Ecosystems: approaches to regulation». NP «National Council of the Financial Market». URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

and contracts and include the costs of searching, collecting and processing information, organising and conducting negotiations, as well as controlling the execution of agreements and providing legal protection in the execution of contracts [13].

Classification of transaction costs.

Firstly, coordination costs. They have a complex structure, which includes the costs of determining the details of the contract, market survey (to find out the needs of the buyer), as well as the costs of advertising, pricing, etc. [14].

Secondly, the costs of opportunistic behaviour. They arise both due to unfair actions (leading to violation of the terms of the transaction or its disruption) and due to actions, that lead to the intentional obtaining of unilateral benefits to the detriment of the counterparty. They also include costs of contract monitoring, insurance, legal costs, debt collection and legal fees. [13].

Thirdly, the costs of adaptation to unforeseen circumstances. Related to the adaptation of the firm to changes in internal and external factors [14].

Table 2 is a matrix of comparison of management functions and transaction costs, where "+" is the basis for the formation of the principles of the firm's ecosystem based on platform interactions (different from those used in the management of traditional companies) and a more accurate identification of the basis for building an ecosystem based on digital platforms, as well as managing it.

PRINCIPLES OF FORMING THE FIRM'S ECOSYSTEM

The interpretation of the term "principle" implies the beginning, the basis [15]. Principles serve as a foundation for the development of management methodology — they represent a set of general rules, methods, and forms of management, which are based on the knowledge and application of economic laws, regularities and the study of factors affecting the managed object [16]. It is also worth noting that with the development of society, the principles have the property to be supplemented and transformed in accordance with changing conditions and requirements. Thus, the general principles of ecosystem formation should underlie the principles of ecosystem management and be used to realise the firm's ecosystem. Let us consider the activities of successful platform ecosystems as well as academic research on the topic.

Table 2

Matrix of comparison of management functions and transaction costs

Management functions	Transaction costs		
	Costs of coordination	Costs of opportunistic behaviour	Costs of adapting to unforeseen circumstances
Planning	++		
Organisation			+
Coordination			+
Motivation			
Control	+	+	

Source: compiled by the authors.

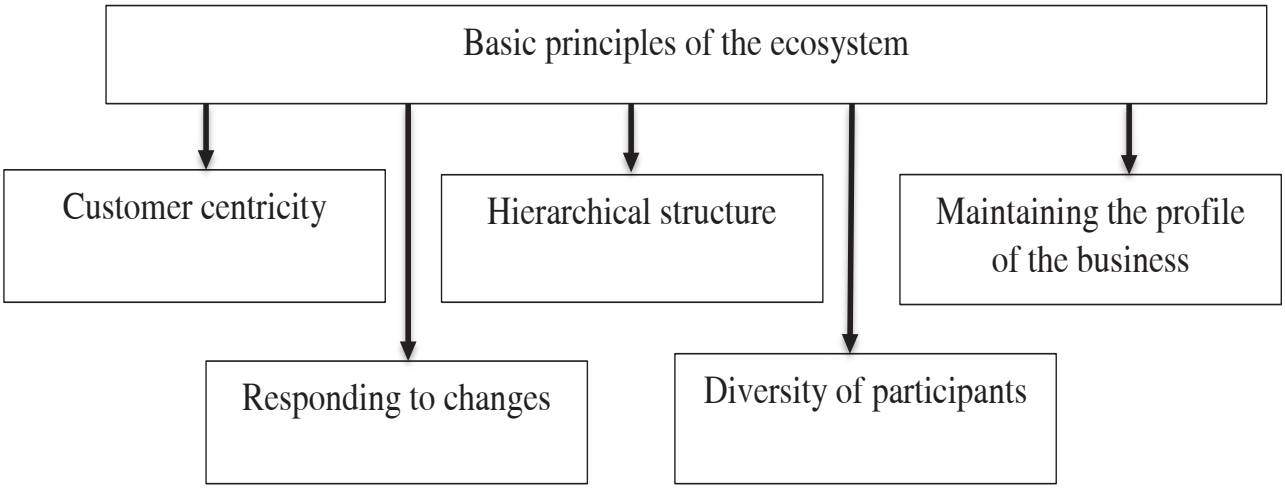

Fig. 3. **Basic principles of the ecosystem**

Source: compiled by the authors.

The academic literature identifies the basic principles of a firm's ecosystem (*Fig. 3*).

Let's comment on them.

1. Customer centricity. Business ecosystems are created in such a way as to maximise customer satisfaction. Companies collect, accumulate, and analyse data about them, which allows to make a portrait of the customer and his/her shopping basket. Consumer orientation allows developing and building complementary services [17]. For example, Yandex services: "Yandex. Navigator", "Yandex. Transport", etc., — are created on the basis of complementarity to meet the needs of more consumers (residents, couriers, taxis, etc.).[6]

2. Principle of hierarchical structure. As a rule, in a market, large players influence smaller ones — initiate alliances, regulate relations, distribute resources, etc. This model is usually referred to as hierarchical, but many authors believe that an ecosystem is built on the principle of complementarity, i.e., mutual correspondence. It consists of interconnected organisations that are interested both in long-term relationships with a large number of companies and in remaining competitive in the market — thus, cooperation and competition overlap. Such relationships are commonly referred to as competitive co-operation [18]. For example, T-bank embeds both its own products and partner services into its ecosystem through Open APIs.[7]

3. The principle of responding to changes. Currently, the speed of socio-economic and technological transformations is high, which prompts companies to conduct more detailed market analyses and develop technologies for rapid response [18]. For example, under the sanctions pressure of Western countries, ecosystem firms had to revise the list of consumers and suppliers of products for further smooth functioning. These changes also helped to reduce threats to the development of the country's economy as a whole, as "ecosystems allow to increase transparency and controllability of operations of individuals and legal entities, including in financial markets, through the

[6] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[7] Open API — is "unlocking" or sharing the interface and features of a product for third-party developers, partners, other players in the ecosystem.

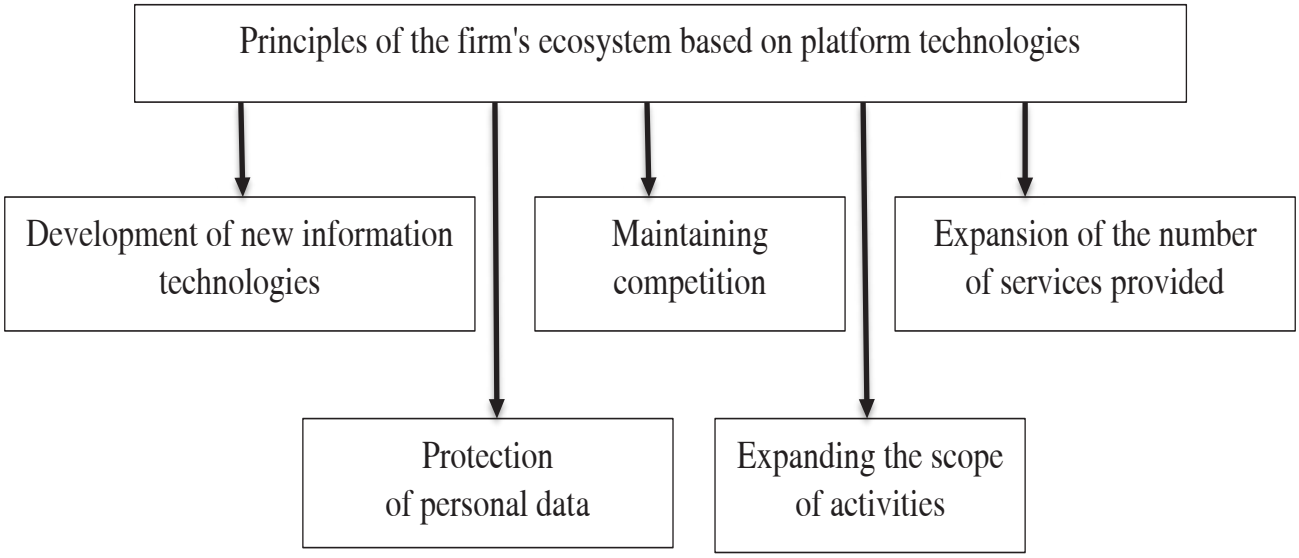

Fig. 4. **Principles of the company's ecosystem based on platform interactions**

Source: compiled by the authors.

use of a common infrastructure and common information space".[8]

4. The principle of diversity of participants. The heterogeneity of partners allows creating different combinations of relations between them, taking into account their strengths and weaknesses [18]. Thus, for example, ecosystem firms (as mentioned above) carry out their activities on the basis of interaction with stakeholders who can influence the creation of the final product to a different extent.

5. Principle of preserving the business profile. The company provides any service to the client — banking, communications or other. For a bank, the priority will always be the quality of financial services, while for a telecom operator the main task is to provide consumers with high-quality, innovative, and affordable communications. This principle is spelled out in the strategies of large ecosystems (MTS, Sberbank, etc.).

Further, in addition to the basic principles, it is useful to be guided by principles applicable to platform ecosystems (*Fig. 4*), among which are:

The principle of development of new information technologies (artificial intelligence) [18]. Due to the constant updating of digital platforms, the consumer carries out a "natural selection", in which the most innovative technologies win. For example, Mail.ru Group constantly modernises its Vkontakte project, which allows this long-standing digital platform to compete with new services.[9] Large technology firms are motivated to use artificial intelligence because they can capitalise on it by improving existing technology and producing a new product [19]: Google improves the predictive accuracy of its applications (Google maps and Google search) and Amazon improves its ability to more profitably set up targeting, i.e., a

[8] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[9] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

set of methods to "filter" audiences that meet predefined parameters [20].

Principle of personal data protection.[10] In the era of digitalisation, identity theft is rampant, with the potential to reduce the relevance of digital platforms. In order to avoid negative consequences, companies go to great lengths every year to spend on personal data protection. For example, major business ecosystems such as Apple, T-Bank, Sberbank, Yandex, etc. are developing increasingly sophisticated authentication — for example, Apple uses a password to protect against fraud, as well as quick login by fingerprint or facial recognition.

The principle of expanding the number of services provided to better meet the needs of customers in multiple ecosystems.[11] The consumer is interested in receiving a wide range of products and services along with various loyalty programmes, cashback, etc. For example, MTS is a provider of such service areas as finance (MTS Bank), information systems (MTS), electronic communication (online shop), content (Kids developing content and MTS TV), services (MTS Music).[12]

The principle of expanding the scope of activities [8]. The organisation of ecosystems allows firms to work simultaneously in different spheres, with different products due to joint innovative developments; as a result, the consumer receives complex products. For example, in 2020, the Yandex ecosystem included more than 120 different services, and the Sberbank

[10] Ibidem.

[11] Summary of Responses to the Bank of Russia's Report for Public Consultations "Ecosystems: Approaches to Regulation". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

[12] Summary of Responses to the Questions of the Report of the Bank of Russia for Public Consultations "Ecosystems: Approaches to Regulation". NP "National Council of Financial Market". URL: https://rosfinsovet.ru/site/public/elfinder/News/2021–05–19/270-Finteh15–4–3(Svod_otvetov_NSFR_po_KonsDokl_CB_o_regulir_Ekosistem)(17.05.21).pdf

Table 3

Principles of a company's ecosystem based on platform interactions

Principle	Contents
Principle of development of new information technologies (artificial intelligence)	Consumer switching to innovative technologies
Principle of personal data protection	Protection of personal data to avoid negative consequences for the company
Principle of expanding the number of services provided	Consumer's need for a single provider of the greatest number of services
Principle of expanding the scope of activities	Increasing the list of activities of the firm in order to further develop the business
Principle of maintaining competition	Supporting small businesses in the use of innovative technologies and compliance with legislation

Source: compiled by the authors.

ecosystem (oriented not only to business, but also to other spheres of life) — 75 [8].

The principle of preserving competition [21]. Since the ecosystem always includes a major market player, the innovative development of such associations is faster. There may be signs of the emergence of oligopoly or monopoly, which in the Russian Federation is controlled by the Federal Antimonopoly Service. The development of small businesses is important for the country's economy; therefore, limiting the size of ecosystems or accepting a noticeable number of small firms into them will allow small businesses to adapt to the conditions of rapid socio-economic development and maintain competition in the market. For example, in 2023, the Sber ecosystem included 85 organisations in digital interactions. Most of these services relate to small businesses, which shows a competent approach of the company, which cares about its business reputation and avoids signs of monopolisation [21].

Consider a brief characterisation of the principles of a firm's ecosystem based on platform interactions (*Table 3*). They distinguish ecosystems from other governance models and imply the creation, utilisation, and regulation of digital platforms through a close relationship between governance and technology, which further enables a product or service to be competitive in the marketplace.

AREAS OF DEVELOPMENT OF THE FIRM'S ECOSYSTEM BASED ON DIGITAL PLATFORMS

Scientific and technological progress does not stand still — new conditions for the functioning of companies are formed, thus the need for change arises. The basic principles of ecosystems can be supplemented with new ones, as presented in *Table 3*, as follows:

• The principle of expanding the number of technology products provided with multiple ecosystems complements the basic principle of customer centricity and aims to create a large platform with the ability to meet most customer needs.

• The principle of preserving competition allows large firms to comply with antitrust laws and operate on a competitive co-operative basis — in business ecosystems they work together, but also competitively, co-developing to share costs and information, and to access complementary resources and knowledge. Thus, firms co-operate in some areas to improve overall performance and compete in others for their own efficiency [22].

• The development of modern information technologies is essentially a response to external changes. Leading technology companies have played an important role in stimulating and financing such innovations. This suggests that they will continue to have no shortage of investment to develop innovative technologies and improve digital products to unify ecosystems [19].

• The principle of broadening the scope of activities and diversity of participants ensures the preparation of a maximum number of offers for consumers.

The effectiveness of an ecosystem depends on various factors [23]. With the development of the Internet, customers want to receive as many services as possible on one platform, which at the same time should be exclusive. A factor such as increasing competition in the market reduces the profitability of firms. Technologically advanced enterprises with their own ecosystems that offer the most innovative product to the consumer are a big threat in this regard. The development of data collection systems (e.g., Big Data technology) makes it possible to analyse large amounts of information about existing and potential customers. The increasing number of firms leads to market oversaturation, while reducing and limiting their potential for further development and growth.

All of the above factors reinforce the importance of monitoring the external environment, especially in terms of changes in consumer demand, competition and business process transformation.

Responding to market changes will further lead to more effective management of the ecosystem.

At the same time, we should not forget that the creation of an ecosystem is not a guarantee of business success — it requires qualified personnel to manage and contribute to the development of the company. At the same time, as the ecosystem improves, the number of companies within it grows, and therefore the scope of activities expands, the risk of a decline in the quality of management increases. It is highly likely that managers who are experts in one area are not experts in other areas.

It should also be noted that the development of ecosystems has a positive impact on the quality of life and health of employees. Firms are introducing more and more of the latest technologies into the work process, which have an impact on improving labour safety [24]. This factor helps companies to retain skilled workers who are specialists in a particular field.

The factor of ecosystem development can also include global problems, such as the COVID-19 pandemic, which became an incentive for the formation of innovative ecosystems [25].

CONCLUSIONS

In the course of this study, the following theoretical and practical results have been obtained, which may be useful for companies to maximise profits:

- peculiarities of the firm's ecosystem development were analysed and the problem of systematisation of the principles of formation of the external environment of the subject of economic activity was determined;
- on the basis of minimising transaction costs and full application of management functions, the basic principles of forming a firm's ecosystem have been developed, including client-centricity, responsiveness to change, hierarchical structure, diversity of participants, and preserving the profile of activities;
- author's principles of creating a firm's ecosystem based on platform interactions were formed, including mastering new information technologies, protecting personal data, increasing the number of services provided, expanding types of activities, and maintaining competition.
- directions for the development of the firm's ecosystem based on digital platforms are presented.

The theoretical significance of the results of the work consists in the systematisation of the principles of formation of the firm's ecosystem on the basis of platform socio-economic interactions, and the practical significance consists in the development of an applied apparatus for planning the development of the external sphere of an economic entity. Scientific novelty of the obtained result consists in the development of the principles of formation of the firm's ecosystem on the basis of platform socio-economic interactions, developing the theory of principles of formation of the external environment of the firm.

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