



Study of transformation of complex business associations to ecosystems

Estudio de transformación de asociaciones empresariales complejas a ecosistemas

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ABSTRACT

The new reality, determined, on the one hand, by the complexity and non-linearity of socio-economic relations and, on the other hand, by the development of digitalization and the expanding possibilities of integration of various processes, requires new approaches to the study of entrepreneurial forms and associations. Network and cluster scientific methodologies were quite revolutionary at the time but remain quite productive. The authors of the article investigate the evolution of views and discuss the feasibility of applying an ecosystem approach to the study of large business structures such as "group of companies". The logic is as follows: the larger the business association, the more it is embedded in the environment, formally (legally) located behind the contour of this structure. Therewith, it is important to take into account the current trends in the development of the ecosystem approach, the specifics and structure of the group of companies. The article attempts, based on a combination of inductive and deductive methods, to determine the prospects for possible research directions of Russian groups of companies based on an ecosystem approach.

Keywords: co-evolution, entrepreneurial associations, entrepreneurship ecosystem, IT platform, startups.

RESUMEN

La nueva realidad, determinada, por un lado, por la complejidad y la no linealidad de las relaciones socioeconómicas y, por otro, por el desarrollo de la digitalización y la expansión de las posibilidades de integración de diversos procesos, requiere nuevos enfoques para el estudio de formas empresariales y asociaciones. Las metodologías científicas de redes y clústeres fueron bastante revolucionarias en ese momento, pero siguen siendo bastante productivas. Los autores del artículo investigan la evolución de los puntos de vista y discuten la viabilidad de aplicar un enfoque ecosistémico al estudio de grandes estructuras empresariales como "grupos de empresas". La lógica es la siguiente: cuanto más grande es la asociación empresarial, más está integrada en el entorno, formalmente (legalmente) ubicada detrás del contorno de esta estructura. Por lo tanto, es importante tener en cuenta las tendencias actuales en el desarrollo del enfoque de ecosistema, las especificidades y la estructura del grupo de empresas. El artículo intenta, basándose en una combinación de métodos inductivos y deductivos, determinar las perspectivas de posibles direcciones de investigación de grupos de empresas rusas basadas en un enfoque de ecosistema.

Palabras claves: coevolución, asociaciones emprendedoras, ecosistema emprendedor, plataforma TI, startups.

1. INTRODUCTION

In recent decades, changes in the world economy have been occurring rapidly and are difficult to predict, prompting scholars to comprehensively study the phenomena occurring, take into account the diversity of connections between participants in economic systems, and include new components in the field of research. Vertical integration of business has ceased to be an effective form of organization with the advent of globalization and the development of network computer technologies. Inter-firm relationships with two or more participants in the form of alliances have become increasingly common, which subsequently became a necessary condition for survival in conditions of increasing competition. Firms began to focus on "Core competency" (according to G. Hamel and K. Prahalad (2005)), placing non-core activities on the side, building more or less close relationships with independent suppliers and distributors throughout the value chain.

In the early 80s, in the studies of R. Miles and C. Snow, the first attempt was made (Katkalo, 1999) to consider the patterns of development and the main characteristics of network inter-firm structures. The scientific community began to propose the "shell corporation", "hollow corporation", "modular corporation" names, and also highlighted the obvious advantages of a network inter-company organization:

- low unit costs and investments in the creation and introduction of new products to the market;
- minimizing transaction costs;
- more efficient creation and maintenance of competitive advantages.

The increase in the complexity of products and the expansion of the component base, primarily in mechanical engineering, has led to the concentration of enterprises in certain industries in specific geographical areas. Such agglomerations, combined with the presence of a skilled labor market, began to be called (Velikaya, Papyan, 2016) "localized industries" or "industrial zones" in which enterprises closely interacted with each other, as well as with suppliers of various kinds of services, raw materials and equipment, and which subsequently became known as clusters.

Initially, the issue of industrial areas was dealt with by the British economist A. Marshall, who empirically proved that the productivity of firms and the results of their activities directly depend on their location and the geographic proximity of economic agents (Babkin, Novikov, 2016). American scholar M. Porter has significantly developed the theory of clusters (Porter, 1993), shifting the focus in the study from geographical agglomeration to the system of cooperation and competition relations existing between cluster enterprises and stimulating mutually beneficial business development of participants. The advantages of developing a cluster form of doing business include the following:

- low production costs due to geographical proximity and the use of a common scientific and technological base;
- the ability of participants to enter into temporary alliances for the mutual improvement of competitiveness;

- The constant process of updating products and technologies in the region is the presence of clusters due to the deep integration and cooperation of participating firms.

The transition from an industrial type of economy to an information type, the customization of products for the orders of specific consumers began to orient manufacturers to continuously expand the "lines" of products created instead of simply increasing production volumes, which pushed production systems to a continuous process of innovation. All these actions led to an increase and complication of the connections between the participants of the systems, and the importance of the environment in which the participants interacted began to acquire great importance.

Considering the environment surrounding the actors, which some researchers began to interpret as organisms, led to the emergence of an **ecosystem approach**.

A great contribution to the development of ecosystem theory was made by J.F. Moore, who compared the business environment with an ecological system in which not only struggle takes place, but also evolution, cooperation, and interdependence. Instead of a strategy aimed at creating unilateral advantages, the company needs to become something like a gardener or forester, growing and maintaining an ecosystem. It combines the influence of the external environment, competition, and evolution, and J.F. Moore called this phenomenon "co-evolution" (Simakova, 2016). Moore attaches particular importance to cooperation, arguing that ignoring the context or the environment in which entrepreneurs conduct business is detrimental to the firm (Vartaev, Bystrov, 2019).

The evolution of the described approaches, indicating the authors and the year of the main publication, characteristic definitions, and features of the systems is presented in Table 1.

Table 1. Evolution of integrated approaches to the development of complex business entities

Author (Year of main publication)	Defining the ecosystem of entrepreneurship	Domains and ecosystem features
1	2	3
Network approach		
R. Miles, C. Snow (1984)	An organization model that assumes the presence of a select, stable, and structured circle of autonomous firms (as well as non-profit) agencies involved in the creation of goods and services based on implied and indefinite contracts that contribute to adaptation to unforeseen environmental circumstances, as well as coordination and protection of exchange transactions (Ioda et al., 2015)	Uniformity of participants, industry specialization, specific structure, coordination mechanism, the local nature of innovation, common business goals
Cluster approach		
A. Marshall (1920), M. Porter (1990)	An industrial cluster is several industries connected through buyer-supplier or supplier-buyer relationships, or through common technologies, common procurement or distribution channels, or common labor associations A cluster is a geographically close group of related companies and interacting institutions in a specific area, connected by commonalities and complementarities (Babkin, novikov, 2016)	The geographical proximity of participants, legal independence of participants, different types of participating organizations, competition between participants, collective strategic vision
Ecosystem approach		

Author (Year of main publication)	Defining the ecosystem of entrepreneurship	Domains and ecosystem features
1	2	3
J.F. Moore (1993, 1996)	An economic community supported by a basis of interacting organizations and individuals – organisms of the business world (Ramenskaya, 2019)	The possibility of both geographical proximity and remoteness of participants, heterogeneity of participants (including from other ecosystems), diversity of economic activities, lack of hierarchy, decentralized control, co-evolutionary development of the ecosystem, self-organization

Thus, the ecosystem approach is a logical continuation of the development of a systematic approach to the study of entrepreneurship and its management, which allows considering socio-cultural, institutional, and other factors, the specifics of the economic system (region, group of companies, industry, etc.), as well as providing flexibility of evaluation and calculation and analytical methods.

2. MATERIALS AND METHODS

The study of the logic of the development of this aspect of economics allowed formulating a hypothesis for future research: we believe that the ecosystem approach contains the significant potential for the study of such complex entrepreneurial entities as a "group of companies" with their features and specifics.

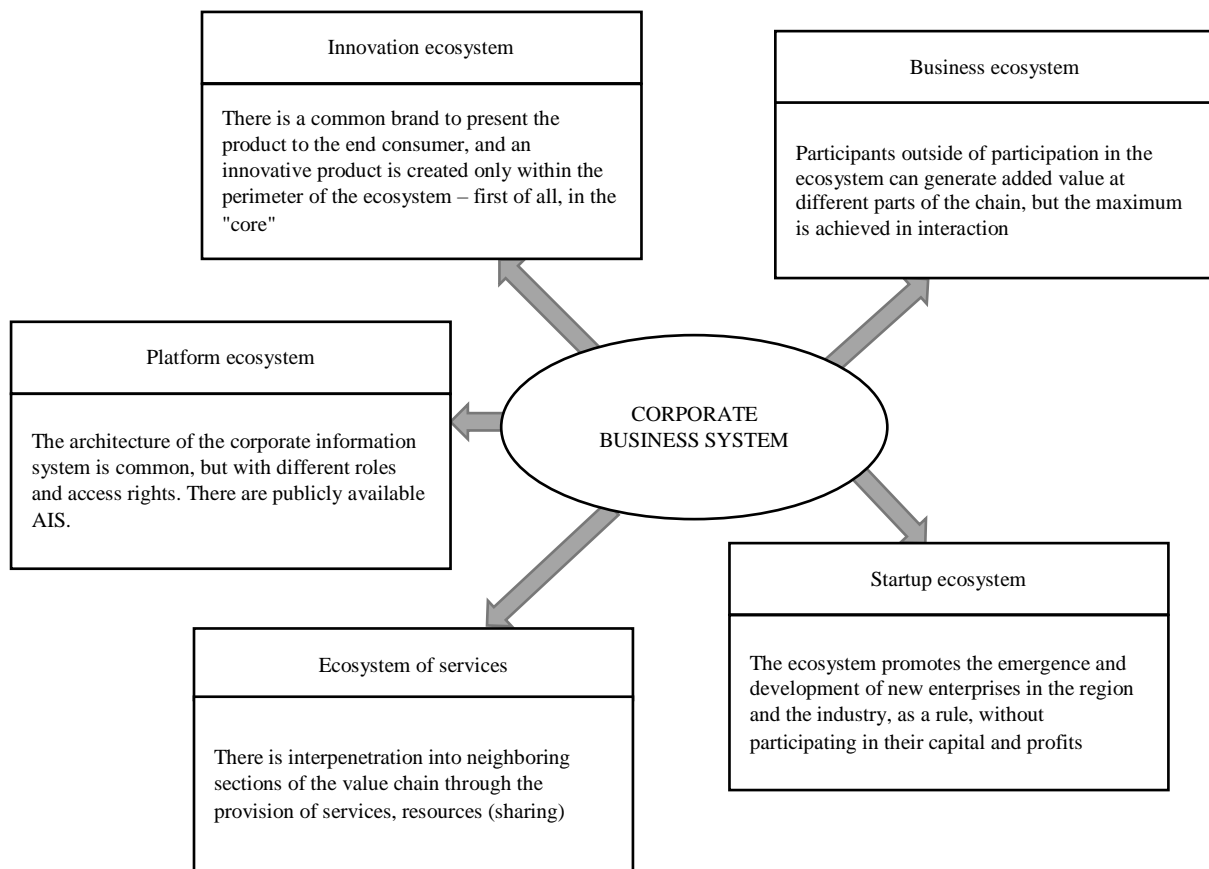
It is proposed to understand the ecosystem in a broad economic aspect as the interaction of different (there are at least 2 identical) economic entities and social actors (institutions) to maximize a certain public good (systemic value, cost) through the sharing of resources (assets). That is, a business ecosystem is a broader concept compared to complex entrepreneurial networks by including actors which are interdependent in less formal and more free ways: for example, through a value system (Vargo et al., 2015), goal and intentions (Taillard et al., 2016), or a technology platform (Gawer, Cusumano, 2014).

For our research, it is important to define the "ecosystem" term in a narrow sense, i.e. concerning the interaction of economic entities and social actors (institutions), most of the relationships between which somehow affect a large corporation or group of companies. Let us consider whether it is possible to do this based on traditional, well-established concepts mentioned in the sources. Ecosystem approaches have been quite fully and systematically outlined by L. Aarikka-Stenroos and P. Ritala (2017). The authors compare the following different variations of the ecosystem approach: the business ecosystem, the innovation ecosystem, the ecosystem of entrepreneurship and startups, the platform ecosystem, and the ecosystem of services. It has been concluded that J. Moore's (1993) "business ecosystem" can be viewed as a general overarching concept, with which it is difficult to disagree. It is this point of view that justifies the productivity of ecosystems: the interdependence of subjects appears in them more than in networks. That is, an ecosystem is an ecosystem as long as all subjects evolve together (i.e. it has the so-called "coevolutionary logic"). The elaboration of technologies, the development, and implementation of innovations, and, accordingly, the increase in value and the increase in public goods are the result of the cooperation of a large number of multisectoral participants, who in turn are influenced by information technologies, politics, social networks, new forms of investment, etc.

Since the purpose of our study is to analyze how appropriate, timely, and productive it is today to use the ecosystem approach in the research and management of a group of companies, it is necessary to clearly outline the terminological boundaries so as not to enter the territory of experts who study other aspects of

ecosystems and therefore highlight the most diverse characteristics and elements in the latter. Therefore, the "corporate business ecosystem" term is the most terminologically accurate for us, on the one hand, confirming the basic approach to the business ecosystem that we share, on the other hand, clarifying and limiting our research to the framework of interaction between a large public company, a network of its daughter and granddaughter companies, outsourcing enterprises, partner-enterprises, a wide range of stakeholders (including users and customers), as well as a large number of diverse social institutions that influence technology, personnel, finance and other aspects of the group of companies and vice versa – influenced by it. Thus, the corporate business ecosystem is the interaction of enterprises of the group of companies, other economic entities located outside the perimeter of the group, and social actors (institutions) to maximize system value through the sharing of resources and mutual enrichment of private economic potentials.

Figure 1 visualizes the possibility of applying the ecosystem approach in its diverse variations to the study of corporations and their management. As we can see, the following features are more or less inherent in such entities: innovativeness, the business focus of joint activities, the interpenetration of elements in the context of value chains, sharing of resources, etc.



Compiled by the authors

Figure 1. Features of different approaches in the corporate business ecosystem (CBE).

In recent years, in addition to well-known ERP, PRM systems (AIS of interaction with partners) have been widely used, as well as various integrators that allow enterprises of the Group of companies to work in the same information environment or on the same IT platform. It should be noted that these features, of course, will manifest themselves to varying degrees in each specific case. Thus, the existence of the

category "corporate business system" (CBE) is quite logical from the point of view of the current state of theory on this issue.

A corporate business system from the perspective of an ecosystem approach should have the following properties:

1. Complementarity – additionality (maximum utility, value, value is achieved only together)
2. Modular architecture – relative technological independence of subsystems (modules)
3. The ability to reproduce, to reproduce subjects, to restore emerging gaps
4. Value chains are almost all closed inside
5. Coevolutionary logic – interrelated (complementary) development
6. Multiplication of effects due to the sharing of intangible assets is higher than effects due to the sharing of tangible assets
7. Absence of hierarchy (if there is a conditional center or core to some extent). Manageability is achieved by standards, interfaces, access
8. Openness (constant influx/outflow) and blurring of borders: the composition is more stable to the center, less stable to the periphery. Diffusion with the peripheries of other ecosystems (elements may simultaneously belong to 2 or more ecosystems).

The study of these properties, although they, as a rule, characterize any ecosystem, can allow developing computational and analytical techniques and practical tools for managing groups of companies and their efficiency, which goes far beyond the trivial cost of business, etc.

3. RESULTS AND DISCUSSION

The majority of Russian groups of companies are the result of (Iudina, Tsovma, 2019) unlimited growth of large single-industry joint-stock companies (JSC) and holdings. The "group of companies" term began to be actively used in Russia at the end of the zeros, when, in addition to the parent and subsidiary companies, numerous legal entities affiliated with JSCs (with minimal participation of JSCs in the capital) and "grandchildren" companies began to be included in the corporate governance perimeter. Outsourcing, popular in the first half of the "tenth" and offering a completely effective mechanism for building a complex business, also contributed to the development of new forms of control of the dependent business by a large company. On the other hand, social processes (increased education and growth of social activity of the population), acceleration of innovation processes (crowdfunding, investment funds, etc.) – all this leads to increased interconnection and interpenetration of a group of companies and economic actors outside the corporate contour. Therefore, several "problem areas" arise in groups of companies that cannot be solved within the framework of network and cluster approaches.

From our point of view, the following circumstances can be attributed to such problems.

1. What if we try to consider a large automotive giant (for example, KAMAZ both as a kind of technological platform and as a legal entity) as an operating system with applications (i.e., a car with modern options – unmanned vehicles, attachments, etc.)? These options, at a minimum, increase the cost of the KAMAZ car, and at a maximum – ensure sales in a competitive market. In this case, KAMAZ

provides uniqueness (a combination of brand, capacity, and investment), and other elements of the ecosystem are unessential, but valuable in some cases. In other words, KAMAZ as a "core" ("leading firm", "architect") does not seek to do everything by itself but welcomes relationships with small actors who can offer a valuable addition to the basic product. Such an approach is certainly capable of stimulating innovation and high economic efficiency. How to maintain a balance between self-organization of entrepreneurial cells and startups (including those existing based on universities) and business value management?

2. The above-mentioned coevolution of ecosystem elements can be both with a plus sign and a minus sign. Moreover, the assessment of the "plus" and "minus" can be implicit for a long time. In general, changes in large formations are rarely accompanied by bright indicators. It requires a separate study, for example, the co-evolution of specific branches of Russian industry in the 90s and "zeros" and the decline in the quality of training specialists for these industries in universities. None of these phenomena can be unequivocally recognized as primary in relation to the other, even though, chronologically, production was first closed, and then negative trends in vocational education began to manifest themselves. Meanwhile, growth in industries does not give instant and noticeable progress in education, and vocational education and science itself do not always become a "pulling" factor for enterprises and industries. Why does positive coevolution sometimes work, and sometimes it doesn't? In combination with which variables (external and internal), positive changes in the elements on the periphery of the group of companies will be multiplied throughout the business?

3. The even *greater* blurring of the ecosystem boundaries compared to the network and the cluster creates additional risks for managing value chains, accounting for the cost of sharing assets and intangible assets, etc. If a group of companies, in cooperation with numerous partners from their ecosystem, begins to strictly regulate and administer the boundaries of the transfer of property rights, processes, procedures, and operations, such an entity ceases to be an ecosystem, since the organic approach is replaced by the mechanistic one. If for the sake of preserving organics, a group of companies prefers autonomy and initiative to order, then the task of quantitative accounting and evaluation of cost and performance characteristics of activities becomes non-trivial.

In addition to the above bottlenecks, areas are fixed that, on the contrary, can become a kind of driver of entrepreneurship ecosystems. It should be noted that the basis for the development of IT components in large and successful ecosystems is the stability and development of the main business, the so-called "core". For example, developed banking accommodations and services for legal entities in the Sberbank ecosystem served as an impetus for further in-depth interaction with customers (Ivanovich, 2020). In the case of the Massachusetts Institute of Technology, the development of the academic component of the activity prompted the creation of a system for the effective exchange of knowledge, its integration with research, and transformation into innovation with the participation of researchers and entrepreneurs. The KAMAZ company began to develop an IT platform, having a stable process of production of wheeled vehicles and a developed network of suppliers and partners. The prerequisites for the development of ecosystems with a digital component, the forms of implementation of IT initiatives, and the benefits obtained from the development of the IT component are presented in Table 2. The development of the core business allows companies to enter new, sometimes completely non-core industries. In general, according to IDC analysts, 60% of the companies from the Global 2000 list (the world's largest public companies) will develop digital ecosystems by 2023 (Stolyarova, 2020).

Table 2. Examples of ecosystem development with a digital component

Ecosystem	Prerequisites for the emergence of the IT component	Form of IT implementation	Internal coordinator	The benefits obtained
1	2	3	4	5
MIT	The need to support and develop entrepreneurial initiatives within the Institute	Startups, EdX Platform	Center for Industry and Innovative Research	Outstanding innovations, leading positions in the world
Sber	Changes in consumer behavioral preferences	Subsidiaries and affiliates (services)	"SberX" division	Increasing the customer base
KAMAZ	The need for the digital transformation of the company	IT projects, Startups	Digital Transformation Center	Improving the internal efficiency of the company, the formation of a digital culture

Compiled by the authors

4. CONCLUSION

Thus, as the company's core business stabilizes and develops, the emergence of its own IT platform for the further development of the ecosystem is a logical continuation of building harmonious and mutually beneficial relations between the company and consumers, both internal and external. The IT-sphere as the most important modern component of economic development should also become an object in the context of the study of forms of entrepreneurial structures and larger entities.

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