

Innovative Business Model of the Cluster as an Ecosystem

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Abstract. Business modeling is an innovative form of representation of inter-firm interactions of enterprises and organizations, united by formal and informal economic relations. The business model is a graphic illustration of the structure of these relations, helping to understand their logic and complexity in the context of globalization. Networking and clustering are the responses to the global challenges of the external environment. In these conditions, new variants of an interaction of economic agents arise in conditions of uncertainty and risk. The most common form of intrafirm interaction in the conditions of one territory is clustering, which, as practice shows, have network structures. In our opinion, the purpose of the regional cluster as a network is to implement the key competencies of the territory and improve the quality of the economic situation in the region by improving the business climate of the environment. There are many efforts of scientists and business practitioners to design and make configurations for illustration of the cluster's relations and interactions. The main goal of this article is to show a new way of graphic design of clusters from the position of ecological approach instead of the UML. The article describes the configuration of the cluster business model in its interpretation as an innovative network ecosystem. Theoretical views about the cluster were extended in the direction of the configuration of its business model and the definition of its main structural elements. Particular attention is paid to the partnership interaction of the main groups of economic agents in the cluster, which include: key business structures, key educational organizations, key research organizations, and the state.

Key words: cluster, network, innovative ecosystem, business model, configuration, business climate, key competencies, partnership, regional development

1 Introduction

Until recently, clusters were considered autonomously as a kind of independent economic phenomenon. However, studies of economists of the last decade make some adjustments to this point of view. Many researchers come to the opinion of the network character of regional

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clusters [1]. The concept of “ecosystem” is borrowed by economists from biology – along with the concept of “ecology”. In an economic context, both terms are commonly used in combination, within the framework of the ecosystem approach, and are considered as concepts that describe the evolution of the nature of interactions of economic agents, models of their innovative activity and their relationship with the environment of functioning [2]. Authorship of the term “business ecosystem” belongs to James F. Moore [3, 4]. He starts with a simple question: “How is it, that the company that created the whole business community – how IBM created personal computer loses control and profitability in the same business?” [4]. The author is coming to the idea of the coevolution of natural and social systems, considering an example of joint development two types at different levels of food (trophic) chain – predator-prey at work anthropologist G. Bateson "Mind and Nature" [5]. Based on the above, we propose to consider the cluster as an innovative ecosystem.

The idea of attracting and borrowing analogies from wildlife into the economy is not new. A. Marshall (referring to the works of G. Spencer) in his work "Principles of Economic Science" noted that "... The mecca of an economist is rather economic biology than economic dynamics. But biological concepts are more complex than theories of mechanics ... ". And "... Economic science, therefore, deals mainly with human beings who are forced to move along the path of progress ... Fragmentary static hypotheses are used as temporary auxiliary tools for developing dynamic – or rather biological – concepts, but at the center of economic science, even when it comes to its fundamentals, there must be a living action and movement ... " [6]. Similar ideas with the views of J. F. Moore can also be found in the work of M. Rothschild “Bionomics. Economy as Ecosystem”, where the author tries on biological concepts for real economic phenomena, already using the concept of “ecosystem” and highlighting its approach to the hotel direction of research, called “bionomics” [7].

Another group of the authors described six research streams in innovation ecosystem: industry platform × innovation ecosystem; innovation ecosystem strategy, strategic management, value creation and business model; innovation management; managing partners; the innovation ecosystem lifecycle; innovation ecosystem and new venture creation [8]. Ecosystem concept also adhere to Gomes et al. [9]. The ecosystem approach considers innovation systems of all levels (national, regional, cluster, etc.) as living social organisms, subject to continuous variability under the influence of new motivations of participants and new circumstances. In this perspective, the innovation ecosystem looks not only as a dynamic set of organizations and institutions, but also as a mobile set of their multidimensional internal connections [10]. According to one of the interpretations, it includes economic agents, their mutual relations, as well as an innovative environment consisting of ideas, technologies, rules of the game, social interactions and culture [2]. The ecosystem approach proposes a number of important policy principles for economic policy that diverge from the settings of the static system model. First, if static systems can be regulated exclusively by the method from above, by the state's influence on organizations and institutions, then the ecosystem has its own, market mechanisms of self-development, i.e. it is controlled by the bottom method, which creates preconditions for the continuity of innovation processes, eliminating excessive government intervention. Secondly, the ecosystem approach focuses not so much on the system participants themselves, but on the nature and dynamics of their interactions (with each other and with potential participants), emphasizing that the collaboration provides for the creation and diffusion of knowledge flows, transforming these flows into innovations and further spread of innovation throughout the economy [10, 11].

Although ecosystems, unlike systems, are not constrained by spatial boundaries, the collaboration of network participants occurs in specific territories and is associated with the factor of localization of innovation processes. The importance of this factor was realized before others in Finland and Sweden, where already in the early 1990s. using the bottom method, regional innovation systems based on network interactions began to be created. In

Finland, the State Innovation Research Council and the TEKES agency were involved in the development and implementation of the ecosystem approach, and in Sweden the Swedish Governmental Agency for Innovation Systems VINNOVA. In the following years, Scandinavian ideas spread widely across all OECD countries, which adapted them to their national and regional specifics. Today, not only in Scandinavia, but also in many other economies of the world (USA, Canada, UK, South Korea, China, Australia, etc.) regional innovation ecosystems are being formed that are designed to achieve world-class innovation effects [10]. They are innovative hubs, or network innovation communities, which allow territories to continuously update goods produced, flexibly responding to technological and market changes.

Adapting to the new cluster-network paradigm, regional innovative economic systems are moving to a cluster structure with a predominance of network inter-firm and inter-organizational interactions. It can be stated that most of the regions that gravitate toward clustering enter the era of cluster-network interaction. One of the first authors who has demonstrated interest into the network structures was Manuel Castells [12] in the context of the formation of a post-industrial society. In his opinion, the main feature of the information society is the network logic of information use. At the same time, hierarchical systems gave way to a network method of coordinating links consisting of network information flows, network structures and network interactions [13]. The authors Bragina, Irodov, & Maslova [14] argue reasonably that network interactions ultimately inevitably lead to the formation of a networked economy. Of interest is the work of Romanova & Lavrikova, in which the thesis was expressed that «... network is a promising form of functioning of the regional economy, and clusters are tools for creating this form» [15].

The development of business modeling allows us to take a fresh look at the phenomenon of regional clusters. The tendencies of networking and clustering are traced in the development of regional economic systems not only on the territory of the Asia-Pacific Region, but also practically in all territories of developed modern states [16, 17, 18]. Business modeling is a modern innovative tool for representing regional economic systems developing in the face of global changes in the external environment [19]. The scientific problem is that, on the one hand, science knows a lot of attempts to graphically depict the spatially organized territorial systems to which the cluster belongs, on the other – none of them explains the patterns of their development and functioning. The use of analogues with biological systems of wildlife sharply changes the idea of clusters [20]. Capra believes that any socio-economic systems have many similarities with biological systems, since both are “living”, mobile, constantly changing systems with many internal connections. Agreeing with this opinion, based on this perspective, we will begin to build a cluster business model as a network ecosystem.

2 Method and Methodology

If we consider the integration of economic entities into a cluster in an evolutionary context, then it can be noted that the models of innovation activity of actors participating in the cluster change over time, because each of them, through various devices, exchanges information with many other partners and simultaneously belongs to another one or several networks.

Therefore, this study takes the view that the cluster for the above reasons can be represented as a network ecosystem – a kind of «living» organism that, in order to ensure the ultimate effect of its existence and destination, goes through all stages from creation and development to stagnation. The term «ecosystem» for describing the cluster is also used in the context of the description of the evolution of the interactions of all its basic elements [17].

Before proceeding to the description of the proposed business model of the cluster, we note that the founder of business modeling in its current form is rightly considered to be the

Osterwalder and his followers [21]. Chesbrough also made a great contribution to the development of business modeling [22].

Turning to the living biosystems, we can see that they all have a complete cycle, passing through all the stages of growth and development from roots to flowers. According to the authors, the cluster as a socio-economic system should also be presented as a "living" organism, which, in order to ensure a guaranteed final effect, must pass through all stages of growth and development. Investigations of key elements of regional systems made it possible to depict the cluster as a biological system or a "business ecosystem" explaining all the structural relationships in the cluster.

Until recently, clusters were considered autonomously as a kind of independent economic phenomenon. However, studies of economists of the last decade make some adjustments to this point of view. Many researchers come to the opinion about the network character of regional clusters. Adapting to the new paradigm, regional innovative economic systems are moving to a cluster structure with a predominance of network inter-firm and inter-organizational interactions. It can be stated that most of the regions that gravitate toward clustering enter the era of cluster-network interaction. One of the manifestations of networking is the emergence of associative holdings, based on the virtual interaction of actors. Such economic categories as a mutual trust of partners, a balance of mutual interests, etc. come to the forefront. As early as the end of the twentieth century, Reiss M. predicted a great future for network organizations. Some researchers emphasize that entrepreneurial networks and clusters among a variety of network structures, noting the similarities in terms of their management [23].

Before proceeding to the consideration of the business model of the cluster, we want to define the concept of "ecosystem", which is borrowed from biology. In the economic context, this term is usually used and is viewed as a concept that describes the evolution of the character of interactions of economic agents, models of their innovation activity and their relationship with the environment of functioning. According to Smorodinskaya N.V., at the meso- level, a typical ecosystem of network links that determines the model of the organization of the modern economy from the point of view of the recruitment of its productive sectors, are the trans-sectoral clusters that have their own specialization and territorial localization [24].

3 Results

Now let's look at the configuration of the cluster business model. Attempts to depict the cluster graphically at different times were undertaken by different scientists. For a long time, none of the graphic images was consistent with the proposed philosophy of clusters. Turning to the "living" biosystems, you can see that they all have a complete cycle, passing through all the stages of growth and development from roots to flowers. According to the authors, the cluster as a socio-economic system should also be presented as a "living" organism, which, in order to ensure a guaranteed final effect, must pass through all stages of growth and development [25].

In our opinion, the treatment of a cluster as an ecosystem deserves special attention and allows one to resort to an unconventional form of representing a business model of a cluster in the form of, for example, a flower. The image of a cluster in the form of a flower with leaves and roots not only reflects its structure, but also reflects the logic of the interrelations of its structural elements, as well as the principles of interaction of all subjects within the cluster. The main of these principles is interdependence. "All members of the ecological community are interconnected through a vast and complex network of relationships, the web of life. They acquire their vital properties and, in fact, their very existence through relationships with other objects. Interdependence – the mutual dependence of all life

processes from each other – lies in the nature of any ecological relationships. The behavior of each living member of the ecosystem depends on the behavior of many others. The success of the entire community depends on the success of its individual members, just as the success of each member depends on the success of society as a whole. «Understanding ecological interdependence means understanding relationships. Therefore, it was this configuration of the business model of the cluster that we accepted as the basis for this research [26].

Analyzing the proposed configuration of the business model of the cluster (Fig. 1), it should be noted that the partnership between the four leading groups of economic agents—the institutional sectors of the cluster—key business structures, key educational organizations, key research centers and the state, placed in petals of a flower, by analogy with the «triple helix» of Etzkowitz-Leydesdorff [27]. The core of the flower – the business core – is an innovative cluster-forming products and services. The territorial basis of the cluster as an ecosystem is the link to its territory (following the classical definition of M. Porter) with its industrial orientation, infrastructure, geographical location, campuses, platforms for cooperation, etc. In the root of the root system, on which growth and development depends, are placed the ideas and talents of people, human capital. Here also are all possible sources of funding: venture funds, business angels, direct investment funds, seed investors, etc. The most important assets of the cluster are Clients, which can be attracted at the early stages of innovative solutions, as well as specialized suppliers of raw materials.

Considering a cluster as an ecosystem, one cannot help noticing that all the elements that make up its structure interact not only with each other, but also are involved in horizontal (network) interactions. And, for example, any university can become a participant in an educational alliance based on network relations; business structures are united in entrepreneurial networks; scientific research organizations form their networked scientific communities; banks, insurance companies and various credit institutions are also participants in various networks. However, this does not prevent them from fulfilling their direct role in the cluster. The network nature of the cluster gets its most complete embodiment; it begins to function most fully in this environment. Being in a cluster, economic agents in certain cases can make mutual concessions (local trade-offs) and financial losses to maintain their positions in the long term. But for this, business partners must absolutely trust each other. All of the above allows us to state the competence of the cluster representation in the form of a network innovation ecosystem. At the same time, in our opinion, the innovation of the cluster should be ensured not by the enterprises included in it, but by the cluster-forming types of products and services that make up the business core of the cluster.

4 Discussions

Evolutionary processes occurring in nature and society affect also socio-economic systems, including clusters. Business entities participating in the cluster are connected by horizontal network interactions with a multitude of non-cluster agents, so clusters can be considered network ecosystems, and innovation is given to these systems by innovative cluster-forming products and services. The configuration of the business model of the cluster in the understanding of its essence as an ecosystem can be the appearance of a plant, in our case, a four-leaf flower. Regional clusters tend to the territory on which they are located, and "absorb" all its advantages and disadvantages. The purpose of the regional cluster as a network, in our opinion, is to realize the key competencies and potential of the territory and improve the quality of the economic situation in the region by improving the business environment.

Further studies of the regional cluster business model as an innovation network ecosystem should be conducted in the direction of studying economic mechanisms for replenishing the missing resources and competencies of the territory not only through direct partners in the

cluster, but also through network entities located in the second network ring of the geographical limits of the regional cluster. The logic of reasoning about the possibility of using examples of living nature to characterize inanimate objects has led us to the fact that, since a cluster can be regarded as an innovative network ecosystem, the configuration of a plant (tree or flower) can be used for its graphic representation, in our case it is a flower.

5 Conclusion

In conclusion, it can be noted that the parameters of the cluster as an innovation ecosystem vary from ecosystem to ecosystem, but in any of the metrics are based on measuring and measuring performance functioning in several aspects: 1) participants – financial analysis and organizational characteristics, roles and functions in a cluster, business models economic entities, their strategic and tactical behavior, capabilities and potential development companies, input and output material flows, production capacity and output, sales volumes and sales, the history of the development of successful firms; 2) structure – “types” of companies and their dynamics, information value channels and values business platforms, ways interactions and forms of cooperation, institutional aspects of economic practice; 3) competitiveness in comparison with other ecosystems, including by product, services, innovations, technologies, personnel, brands; 4) business activity in terms of interaction, network formation, transactionality, trade turnover between partners; 5) strategic vision in terms of opportunities, risk, and development. If you summarize the parameters of the cluster as innovation ecosystem and metrics to measure effectiveness then can be traced four basic principles of construction and organization this kind of systems: complexity, self-organization, coevolution, and adaptation. Generally, these principles are properties of any complex socio-economic systems and are the result interdisciplinary synthesis of the following scientific directions: systems theory, synergetic and technology. It may be noted that the theory of clusters also appeals to them. It means, that between ecosystems and clusters more common than differences. The formation and functioning of clusters represent the stage of development of the innovation ecosystem, and the cluster itself is a transitional form ecosystem in terms of evolution economic space. As they accumulate critical mass and capital cluster becoming a full-fledged business ecosystem.

In the work theoretical concepts about a configuration of business models of clusters in a direction of their image as some element of animate nature, in our case – a flower-four leaf are expanded. In this case, a meaningful explanation is given to all the key elements included in the business model. The main elements (blocks) of the business model of the cluster are "key business structures", "key educational organizations", "key research centers", "customers", "key suppliers", "territory" and "key sources of financing ". The increment of scientific knowledge on the subject matter in question is the proposed configuration of the cluster business model in the understanding of its essence as an ecosystem depicted as one of the elements of living nature, namely, the four-leaf flower. Further research, in our opinion, should be carried out in the direction of developing a configuration of entrepreneurial networks, which are similar in many respects to clusters, but also have their differences.

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