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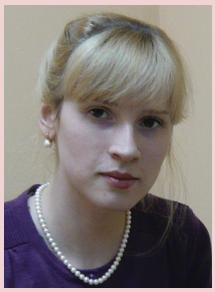
Substantiating the Efficiency Criteria for Cluster Spatial Development of the Territory Based on the Hermeneutics of the Category of "Efficiency"*

Elena Valer'evna
BAZUEVA
Perm State University
Perm, Russian Federation, 15, Bukirev Street, 614990
E-mail: bazueva.l@mail.ru



Tat'yana Yur'evna
KOVALEVA
Perm State University
Perm, Russian Federation, 15, Bukirev Street, 614990
E-mail: kovalevatu@yandex.ru

Abstract. Modern studies consider the issues of spatial development of territories from different theoretical-methodological and scientific-practical positions. At the same time, scientific literature pays increased attention to clusters as tools of development of socio-economic space in regions and countries. The review of relevant literature that we have carried out shows that foreign studies on clusters focus more on determining the success factors of clusters and on the development of state programs to support them. While Russian scientific literature mainly tackles the issue of developing

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methodological foundations and techniques for identifying and assessing clusters for the purpose of developing the cluster potential of territories. Moreover, if we consider world's best practices of cluster development, we see that in many works of Russian and foreign researchers on identifying clusters their effectiveness as highly organized self-developing systems is postulated and not subjected to thorough consideration. Therefore, the goal of our research is to study and develop fundamental criteria of efficiency of development of territorial clusters on the basis of achievements of economic science in the understanding of essential nature of the category of "efficiency" and to analyze a system nature of the cluster. Methodological basis of the research is represented by hermeneutic, system integration and institutional approaches. The most significant results that characterize scientific novelty of our research are as follows: 1) we postulate and prove that the differentiation of approaches to the hermeneutics of the category of efficiency is determined by the stages of evolution of scientific knowledge (classical, nonclassical, post-nonclassical) and complexity of the research object (development of simple, self-regulating and complex self-developing systems); 2) we clarify the definition of the cluster as a self-developing system based on decomposing the essential content of the term "cluster" as a complex system in the works of Russian and foreign scientists; 3) we determine and characterize the following distinctive features of the cluster as a self-developing system: stability, complexity, openness, dynamic organization, differentiability, controllability, cognition; 4) we develop a model of criterial configuration for the efficiency of cluster spatial development of economy, taking into account the interdependence and integration of institutional, organizational, managerial, economic, innovative and social aspects of cluster cooperation in the cluster system. We associate the prospects of future studies with the urgent need to identify and study the determinants of institutional technology for cultivating and supporting efficient cluster structures.

Key words: efficiency, hermeneutics, quality, system, efficiency criteria, configuration, cluster, regional economy.

Introduction

The end of the 20th century – the beginning of the 21st century was marked by increased interest in the problem of purposeful formation of regional clusters as growth poles for regional competitiveness. The countries of the European Union that have accumulated significant experience in developing successful clusters and that are leaders in economic space clustering carried out large-scale cluster studies, which can be divided into two groups.

The first group includes analytical reports on cluster development that help identify key drivers of their success and, in a broad sense, get an idea about the European understanding of the concept of cluster development in general[1]. In this connection, special attention can be paid to the project "European Cluster Observatory"[2] aimed to identify cluster structures and form a cross-country statistical database on the clusters. The second group consists of the studies that analyze advanced

[1] See, for example [35; 42], and also the Global Cluster Initiative Survey. Survey summary report. Available at: http://www.clusterobservatory.eu/common/galleries/downloads/GCIS_2012_SummaryReport.pdf].

[2] European Cluster Observatory. Official website. Available at: http://www.clusterobservatory.eu/index.html.

tools of governmental support of cluster initiatives and projects. It is a kind of manual for regional and local authorities responsible for the implementation of cluster policy[3].

However, analytical reports and the mechanisms for applying the cluster approach presented by the European scientific community do not provide a clear answer to the question: why do some clusters become export-oriented leaders in the industry, while others either cease to exist after the completion of state support and funding programs, or are transformed into other structures? On the one hand, this is due to the fact that European research focuses on choosing best practices of cluster development of the territories rather than on identifying the fundamental causes and conditions necessary for efficient formation and functioning of clusters. On the other hand, differences in the formulation of the question are due mainly to the current level of socio-economic development and scientific and technological progress, the quality of entrepreneurial infrastructure, investment and financial opportunities, innovation potential and human capital accumulated in the countries under consideration. In fact, foreign researchers have focused on exploring the success of clusters, which is an applied category, while the efficiency of cluster-based spatial development from the position of deep theoretical analysis remains virtually unexplored even in the works of prominent researchers of the cluster theory. So, for example, M. Porter measures the effectiveness of clustering of a territory through the prism of international competitiveness and points out that the indicator of success of clusters can be the share of exported goods in the global exports of this commodity, which was produced on the basis of local capital. It links performance with productivity[4] in the following context: firms cannot function efficiently (productively), for example, in the conditions of excessive legislative regulation or in the absence of developed transport infrastructure and in other adverse circumstances [17, pp. 218-219]. In other words, in order to increase productivity, it is necessary to improve the quality, level of specialization and efficiency of production factors [17, p. 219].

E. Feser critically evaluates the diamond of national advantage proposed by M. Porter as a fundamental model with static characteristics in explaining the success of clusters and proves the importance of concentration of technology related to human, material and financial resources to support innovation activities sufficient for competition at the international level [34, pp. 6 and 22-23]. Therefore, according to E. Feser, the success of the cluster depends on its innovativeness, which can be measured with the help of various indicators characterizing the pace of innovation [34, pp. 38-39].

In our opinion, the fact that scientists have focused on analyzing only successful clusters in order to design the ideal model of cluster structure in other industries in different

[3] See, for example: *Competitive Regional Clusters: National Policy Approaches*. Paris: OECD Publ., 2007. 296 p.; *Clusters and Clustering Policy: a Guide for Regional and Local Policy Makers*. INNO Germany AG, 2010. 195 p.; *Cluster Policy in Europe. A Brief Summary of Cluster Policies in 31 European Countries*. Kristiansand, Norway: Oxford Research AS Publ., 2008. 34 p.

[4] Productivity is the amount of output produced per working day per unit of the capital or material resources used [17, p. 218].

countries and regions is in many respects the reason why the conceptual framework of the research on the effectiveness of clustering economic space as a whole remains underdeveloped. In this regard, the modern cluster concept urgently requires the development of a theoretical and methodological approach to understanding the effectiveness of cluster development of territories on the basis of achievements of economic science in understanding the essence of the category of "efficiency". Therefore, the aim of the present research is to study and develop fundamental criteria of efficiency of development of territorial clusters that would develop scientific understanding of evolution of cluster structures and make it possible to specify the directions of related public policy in the future.

Hermeneutics of the category of efficiency

At all the stages of development of economic science special attention is always given to the development of the category of efficiency as one of the key concepts of this branch of scientific knowledge. M. Najmi, M. Etebari, and S. Emami point out that over the past fifteen years we can observe a significant intensification of scientific research in this direction [37]. Thus, according to B. Marr and G. Schiuma, in the period from 1994 to 2002, there emerged an article or a report on management efficiency once in every five hours [36]. Moreover, according to the authors, the number of publications on this subject continues to grow every day. Consequently, various models, mechanisms and methodologies that analyze the content of efficiency as a category are designed by practitioners, consultants, and scientists [37]. Under the circumstances, many researchers are still trying to justify the need to unify the approaches to its definition. However, in our view, the ambiguity of hermeneutics of the category of efficiency depends objectively on the stages of development of science in general.

It is known that the historical development of science consists of three stages: classical, nonclassical and postnonclassical. V.S. Stepin points out the following criteria for their distinction: 1) features of the system organization of the objects that science deals with (simple systems, complex self-regulating systems, complex self-developing systems); 2) a set of research ideals and standards inherent in each stage (explanation, description, rationale, structure, and knowledge construction); 3) specifics of philosophical and methodological reflection over the cognitive activity, ensuring the inclusion of scientific knowledge in the culture of the corresponding historical era [23, p. 18]. The very specifics of their manifestation typical of each stage in the evolution of scientific knowledge determine the trajectory of development of conceptual and methodological foundations in a specific area of scientific knowledge. For example, the mechanical picture of the world, which serves as the basis of the categorical grid in the description of simple systems, and which is typical of the classical stage of science development, predetermined the development of "reductionist views of efficiency... associated exclusively with the idea of ... conservation, maximization of results and minimization

Table 1. Determinacy of the differentiation of the approaches to the hermeneutics of the category of efficiency by the stages of evolution of scientific knowledge

Object of study	Methodological foundations of the science	Approaches to the hermeneutics of the category of efficiency	Interpretation of the content of the category of efficiency	Authors of the theoretical approach
Classical stage of scientific knowledge development				
Simple systems	Reductionist approach (Laplace causality) The possibility of a single true theory	**Efficiency as economy***	Efficiency is the result of rational behavior of sovereign individuals, who optimize their objective function of utility or seek to obtain maximum results	D. Ricardo, L.Walras, S. Reiteru, F. Taylor, and others
		Efficiency as performance	Efficiency is the assessment of the impact of various governmental or private measures on processes in economic life	W. Petty, F. Quesnay
Nonclassical stage of scientific knowledge development				
Complex self-regulating systems	Probabilistic target causation Admission of alternative descriptions of reality Correlation between the ontological bases of science and characteristics of the method	Efficiency as economy	The state of efficiency of the economic system implies that no one's situation can be improved without the deterioration of someone else's situation	A. Pigou, V. Pareto, N. Kaldor, J. Hicks, T. Scitovsky, H. Bergson, A. Sen, P. Samuelson, K. Arrow, R. Zerbe, M. Allais
Postnonclassical stage of scientific knowledge development				
Self-developing systems	Determinacy with objective reality. Reflection of scientific concepts. Necessity to consider the nonlinearity, historicism, human-sizedness of systems	Efficiency as economy	Efficiency is achieved by minimizing transaction costs	D. North, R. Coase, T. Eggertson, O. Williamson, and others
		Efficiency as performance	Social efficiency means achieving social goals and the productivity of creating social benefits and satisfying merit interests of society	O.S. Sukharev, J. Huerta de Soto
			Adaptive efficiency is the success in the adaptation of various subsystems to external changes and environment	D. North, R. Nelson, S. Winter, T. Buck, G. Hodgson, S. Pejovich, and others
		Efficiency as an element of the management system	Efficiency is a complex category that combines the categories of economy, performance and quality.	D.S. Sink, A. Neely, N. Slack, G.B. Kleiner, O.S. Sukharev, S.N. Rastvortseva, M.S. Solodkaya, E.V. Bazueva, and others

* Note: the dominant approach, which on the basis of the characteristics of the stage allowed us to give a true theoretical description of the hermeneutics of the category "efficiency" is highlighted in bold.
Source: compiled by the authors based on the study of the works [10; 14; 15; 16; 19; 20; 21; 23; 25; 27; 28; 38; 41].

of losses... of (known or given) economic resources" [27, p. 4]. The emergence of the ideas of "probabilistic causality" and "target causality" at the neoclassical stage of development of scientific knowledge made it possible to supplement the concept of efficiency through the interpretation of the category of optimum in the spirit of mechanistic determinism contained in the works of L. Walras, with the use of the methodological principle of relativity[5] (Pareto approach). We cannot present the full research of the author on the correlation of the evolution of scientific thought and the hermeneutics of the category of efficiency[6] in the framework of the present paper, so let us systematize basic author's provisions in *Table 1.*

The limited format in which we present the authors' provisions on the determinacy of differentiation of the approaches to the hermeneutics of the category of efficiency by the stages of evolution of scientific knowledge does not allow us to show the allocation of different kinds of efficiency at the present stage of development of economic science; these kinds of efficiency are as follows: internal and external (O. Romanova), potential and actual (V.E. Dementyev, Yu.V. Sukhotina, D. Tisa, etc.), static and dynamic (J. Huerta de Soto), D. North, O.I. Williamson, A. Abel, N. Mankiw, L. Summers, P. Zeckhauser, A.N. Asaul, H. Alonso, C. Garcimartin, etc.) and, in our opinion, they are related to the increasing complexity of the object of research – the development of complex self-developing systems.

In general we can say that the vector of modern research on understanding efficiency has been formed in the context of dialectical unity of qualitative and quantitative characteristics in the complex self-developing systems for which the defining characteristic of evolution is the qualitative development characterized by quantitative certainty. In the broader, global sense, efficiency as a determinant of quality is currently a defining element in the interpretation of the term. We will use this provision to determine fundamental performance efficiency criteria for cluster-based spatial development of the territory.

We think it necessary to start modeling the configuration of performance efficiency criteria for cluster-based development of economy by clarifying the concept of cluster as a self-developing system and considering the essence of the term "cluster" as it is presented in the works of Russian and foreign scientists.

Interpretation of the cluster as a self-developing system

Studying clusters from the viewpoint of a system approach provides an indisputable basis for the development of a multi-criteria approach in the study of effectiveness of cluster-based spatial development with the dominance of the qualitative feature in the analysis. A review of the literature on this issue shows that the works of authoritative foreign scientists acknowledged as founders of the cluster

[5] According to the principle of relativity, all physical processes in inertial systems of reference occur in the same way, regardless of whether the system is stationary or it is in a state of uniform and rectilinear motion.

[6] The authors will present this research in a separate publication.

Table 2. Decomposition of the content of interpretations of the category "cluster" in the works of foreign scientists on the basis of a system approach

Authors	Main features of the system			
	Integrity/divisibility	**Presence of stable relations**	**Orderliness**	**Emergence/synergism**
M. Porter	The cluster is characterized by common activity of the participants working to achieve a commonly set goal. The composition of the cluster is defined in terms of geographical, sectoral and functional aspects.	The border of the cluster is determined by the degree of development of horizontal and vertical (structural links)	The cluster has a complex multicenter form of organization of its activities	The significance of firms and organizations within the cluster as a whole exceeds the simple sum of its parts
M. Enright	The cluster is represented by the geographical agglomeration of firms in related industries	Stability in the cluster is achieved with the help of vertical and horizontal links and a system of interdependent relationship of competitive cooperation that ensures long-term interaction of the participants	The nature of interaction within the cluster is organized, and it is manifested in the ability to form an organizational management structure unique to this area for the purpose of coordinating and regulating the relations between the participants	The integration of the firms in the cluster is due to an opportunity to obtain benefits and advantages derived from their location in the same area
E. Bergman, E. Feser	The cluster consists of a group of independently operating and competing industrial enterprises and organizations concentrated on a geographical basis	Sustainable links in the cluster are established between geographically concentrated companies and organizations. It is allowed to form links between members of the cluster for other reasons (joint R&D, suppliers and buyers from different regions, etc.)	Internal order and coherence in the cluster is achieved through organized cooperation between three groups of actors: producers of cluster production, related industries, and supporting organizations	When the cluster is formed, it provides businesses and organizations with additional advantages and benefits they cannot get outside the cluster-based interaction; it makes the participation in a cluster appealing to them (formation of an innovation ecosystem of the cluster and the so-called "tacit knowledge")
S. Rosenfeld	The cluster is identified as a form of spatially limited critical mass of companies, between which there is a system of relationships based on complementarity and similarity of the firms	The cluster is formed and developed by forming a system of relations between the participants	The structure of the cluster depends on the formation and specifics of the dialogue between the participants, communication channels, and established networks.	Synergistic effect in the cluster is created due to the geographic proximity of its member firms and their interdependence

Source: compiled by the authors based on the study of the works [17; 31; 32; 33; 34; 39].

methodology describe clusters as structures possessing the features of highly organized systems[7].

The results of the review of scientific works of M. Porter, M. Enright, E. Bergman, E. Feser, and S. Rosenfeld are summarized in *Table 2*, which considers foreign interpretations of clusters according to four key characteristics of the systems: 1) integrity and divisibility; 2) presence of stable relations; 3) orderliness; 4) emergence and synergism.

Thus, having decomposed the essential content of the term "cluster", we see that clusters, as understood by foreign researchers, are sophisticated systems that interact with the external environment and benefit from cooperation in conditions of competition.

Beyond our theoretical overview that defines the system characteristics of clusters, there remains the question of evolution of the cluster as a system. We emphasize that foreign scientists pay special attention to the problem of development of clusters, factors and stages in the evolution of cluster structures, specifics of modification of individual cluster elements and management models in the framework of the life cycle theory developed in the works of M. Porter [17], S. Rosenfeld [40, pp. 13-14] T. Andersson [30], Ch. Ketels et al. [42]. Thus, from the viewpoint of life cycle, clusters as open systems interacting with the external environment are considered as stable, but not static, objects.

In the context of the system research of clusters it is also important to pay attention to the publications of domestic scientists. For instance, the works of G.B. Kleiner, R.M. Kachalov and N.B. Nagrudnaya [7; 8] contain an in-depth understanding of clusters as economic systems and highlight the following five main characteristics of the innovation-industrial cluster:

1) the cluster is a multifunctional and multidimensional system possessing the properties of four types of systems – object, environmental, process and project[8];

2) key feature of the cluster is complex in nature and involves institutional, contracting, harmonization and transformation-innovative components;

3) stability of the cluster is achieved through the synthesis of object, environmental, process and project strategies of development;

4) intensive manifestation of object properties of organizations participating in the cluster in a harmoniously developed cluster structure is compensated by emphasizing alternative, design, process and environmental properties of the cluster.

5) in order to meet the challenges of strategic planning in the cluster, it is necessary to search for and provide the balance between objective, design, process and environmental features of the cluster as a whole and of its participating organizations [8, p. 9].

The results of a system analysis of the clusters obtained by G.B. Kleiner and his colleagues are the basis for a definition of cluster as an object of system analysis proposed

[7] In the article, the system is understood as "a part of the world that is relatively stable in time and space, possesses the properties of external unity, internal diversity, and epistemological integrity at the given level of observation" [7, p. 7].

[8] See more in [7].

by E.V. Bochkova, E.L. Kuznetsova and V.A. Sidorov who systematized cluster features according to 17 characteristics of the system object [1, p. 32]. In our opinion, it is the most detailed system description of clusters; it takes into consideration properties such as integrity, hierarchy, dynamism, spatial and temporal certainty, causality, persistence, adaptability, etc. inherent in cluster structures and highlighted in domestic and foreign scientific literature.

Among the numerous works devoted to clusters we would like to name the research of M.P. Voinarenko: he adheres to a system-institutional paradigm and formulates the definition of cluster as an institution and the institutions [2, p. 151]. However, the definitions he proposes are dominated by an institutional characteristic, while system characteristics are to a greater extent disclosed by M.P. Voinarenko in model representations of the cluster [2, pp. 158-160].

E.A. Shastitko uses empirical observations and interviews of representatives of companies in various industries to show that it is more appropriate to consider cluster as a system, in which there is a "core" – i.e., a firm whose activity and value are essential for the existence of the cluster [29, p. 25]. Such a firm, in a certain sense, can be called a "systemically important company". In our opinion, the critical role of a leader company in the establishment and development of the cluster, which E.A. Shastitko proved empirically, is of fundamental importance from the standpoint of determining the drivers of stability of the cluster as a system.

A.S. Danchenko in [3] analyzes basic units of system approach ("system", "economic system", "systemacy principle") and on this basis in the first approximation proposes a cluster configuration in a regional economic system that needs further elaboration.

Researcher T.V. Uskova considers theoretical and methodological approaches to the creation of cluster systems, proposes a "technology" of their formation taking into account the conditions of and prerequisites for clustering at the meso-level of the economy. She substantiates an algorithm for creation of clusters in the region and a scheme of interaction of enterprises within the cluster that describes relationships and communication in the cluster system [26].

O.S. Kovalevskaya proves the effectiveness of applying a cybernetic approach to the analysis of regional clusters as complex dynamic systems which are embedded as management objects in the management system of the region [11]. The approach proposed by O.S. Kovalevskaya is interesting from the point of view of applying the concept of managing the system to cluster analysis. However, this aspect is beyond the scope of our study.

The results of the literature review that we carried out suggest that, despite the availability of research works on the subject, so far there is no certainty in the study of clusters as self-developing systems. From our point of view, cluster as a self-developing system is a type of system integrity in the form of a set of interconnected and geographically localized firms and organizations (or those that do not have clear geographical boundaries) that

Table 3. Distinctive features of clusters as self-developing systems

No.	Distinctive feature	Essence
1.	Sustainability	The ability of the cluster to maintain system integrity when functioning in a dynamically changing environment
2.	Complexity	The ability of the cluster to organize system interaction between a large number of participants, uniting them to achieve common goals and implement joint projects taking into consideration diverse linkages and interaction of heterogeneous actors with each other and the external environment
3.	Openness	The ability of the cluster to interact with the subjects of the external environment, to organize mutually beneficial exchange of resources, information, knowledge, technology
4.	Dynamical organization	The ability of the cluster to develop new levels of organization and embed them in the management hierarchy
5.	Controllability	The ability of the cluster to manage internal elements of the system and exercise controlling influence on the external environment
6.	Differentiability	The ability of the cluster to create new and relatively independent subsystems resulting from the emergence of new levels of organization in the hierarchy of control
7.	Cognition	The ability of the cluster to create special information and knowledge subsystems that contain the specifics of interaction with the external environment significant for its development and accumulate the experience of previous interactions
Source: compiled by the authors with the use of [5; 6; 22; 24].		

interact with the external environment and can, with the help of such interaction, develop at the expense of their own resources and qualitative changes in target, structural, and functional characteristics.

In our view, clusters as self-developing systems, in addition to the basic system properties, possess the following distinctive characteristics: sustainability; complexity; openness; dynamical organization; differentiability; controllability; cognition[9].

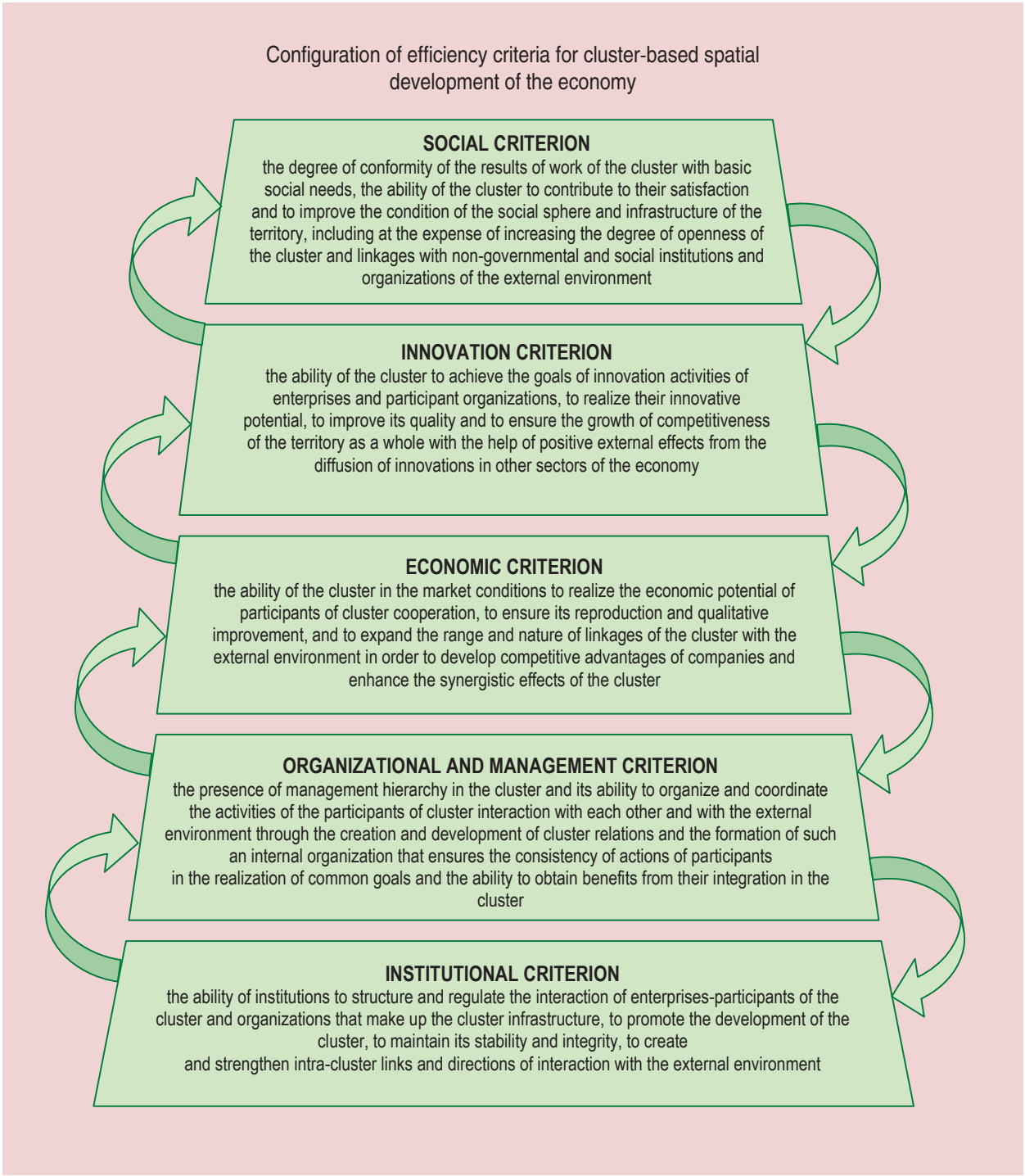
Table 3 presents the authors' description of distinguishing features of clusters as self-developing system.

We believe that further in-depth interpretation of clusters as self-developing systems is in-demand in science and should be subject to independent theoretical research. However, the amount of research works currently available and the author's conclusions and results obtained on its basis that expand the interpretation of the categories of efficiency and system nature of clusters help clarify and supplement the criteria-based framework of the analysis of efficiency of regional clusters.

Criteria-based framework of the studies of the efficiency of clusters as complex self-developing systems

As for reviewing the efficiency of clusters and the efficiency of cluster development of a territory (primarily, region), we were unable to define a single methodological line of research in domestic and international publications. For

[9] When defining the self-developing system and its characteristics we relied on philosophical research by V.S. Stepin [22; 24], and also on the works of V.N. Edronova, A.O. Ovcharov [5], E.A. Zakharchuk, A.F. Pasynkov [6].


Configuration of efficiency criteria for cluster-based spatial development of the economy
SOCIAL CRITERION
the degree of conformity of the results of work of the cluster with basic social needs, the ability of the cluster to contribute to their satisfaction and to improve the condition of the social sphere and infrastructure of the territory, including at the expense of increasing the degree of openness of the cluster and linkages with non-governmental and social institutions and organizations of the external environment
INNOVATION CRITERION
the ability of the cluster to achieve the goals of innovation activities of enterprises and participant organizations, to realize their innovative potential, to improve its quality and to ensure the growth of competitiveness of the territory as a whole with the help of positive external effects from the diffusion of innovations in other sectors of the economy
ECONOMIC CRITERION
the ability of the cluster in the market conditions to realize the economic potential of participants of cluster cooperation, to ensure its reproduction and qualitative improvement, and to expand the range and nature of linkages of the cluster with the external environment in order to develop competitive advantages of companies and enhance the synergistic effects of the cluster
ORGANIZATIONAL AND MANAGEMENT CRITERION
the presence of management hierarchy in the cluster and its ability to organize and coordinate the activities of the participants of cluster interaction with each other and with the external environment through the creation and development of cluster relations and the formation of such an internal organization that ensures the consistency of actions of participants in the realization of common goals and the ability to obtain benefits from their integration in the cluster
INSTITUTIONAL CRITERION
the ability of institutions to structure and regulate the interaction of enterprises-participants of the cluster and organizations that make up the cluster infrastructure, to promote the development of the cluster, to maintain its stability and integrity, to create and strengthen intra-cluster links and directions of interaction with the external environment

example, on the one hand, there are works on assessing performance efficiency of clusters as regional forms of industrial organization and the need to create appropriate mathematical tools for this purpose. On the other hand, modern publications provide interpretations of clusters as efficient tools, mechanisms, forms, structures, elements and even catalysts of socio-economic development. In this case, the basis according to which clusters are studied are not analyzed in this aspect, i.e. its efficiency is postulated *a priori*.

This gap is partially reduced in the writings of L.S. Markov, M.A. Yagolnitser [12; 13], A.B. Drozdov, N.V. Drozdova [4], S.N. Rastvortseva, N.A. Cherepovskaya [18], and P. Teekasap [43].

For example, L.S. Markov, and M.A. Yagolnitzer describe the cluster as a special form of territorial organization of industrial production, the efficiency of which can be assessed on the basis of indicators showing the number of the employed, profitability and their changes. Despite the fact that the efficiency criteria have not been elaborated thoroughly, this method of cluster analysis takes into account not only endogenous, but also exogenous indicators of clusters activity, and by applying the econometric tools it helps establish and measure the relationship of the following levels: between individual characteristics of related factors; between various factors; between factor-based and resulting features [13]. L.S. Markov in his later work complements the system of efficiency indicators with the specific added value of companies in the cluster [12, pp. 168-169].

A.B. Drozdov and N.V. Drozdova propose an economic-mathematical model for forecasting the development of regional clusters; the model is based on the interaction of enterprises with the cluster and analyzes the efficiency of functioning of the latter. The criteria of efficiency of cluster functioning were the indicators proposed by L.S. Markov and M.A. Yagolnitzer [4, pp. 58-60]; but this fact does not expand the criteria-based framework of assessing the efficiency of cluster development in regional economy.

S.N. Rastvortseva and N.A. Cherepovskaya build their research on the processed data on the average number of employees on the full range of organizations in the statistical database of the Russian Federation and modify the approaches of M. Porter and the European Cluster Observatory in order to identify those economic activities, in which the construction of clusters will be efficient [18, p. 129]. After the technique they propose was tested in the Belgorod Oblast, five efficient clusters have been identified in which the total number of employees was 134,847 people (or 26% of the total number of people employed in the economy of the region) [18, p. 130]. It is worth mentioning that the approach developed by S.N. Rastvortseva and N.A. Cherepovskaya is original and possesses practical importance, but it has certain limitations relating to the process of collecting statistical data in Russia; besides, it does not reveal causal relationships in the cluster, as indicated by the authors themselves [18, p. 129].

P. Teekasap offers a system dynamic model for assessing the impact of governmental policy on the performance efficiency of clusters with the use of the following variables: size of the cluster; number of employees willing to work in the cluster; availability of employment; resource limitation; average wages; wages of employees of the cluster [43]. P. Teekasap's approach to the modeling of cluster development efficiency is unique because the logic of his analysis is built on the basis of three groups of model limitations: firms are divided into three types, eight types of resources are taken into account, and six options of market demand and production capacities are considered. But it is not possible to apply his approach to the Russian reality without introducing radical modifications in the model.

All of the above suggests that the efficiency of development of territorial clusters has not been studied thoroughly. In order to fill this gap to some extent, we attempt to integrate the methodology of studying the concept of "efficiency" described in the first paragraph of the present article and the system and institutional view of the cluster by identifying the criteria of cluster development efficiency in certain areas (locations) or economic space as a whole. This approach can serve as a unifying theoretical and methodological basis for further studies of clusters, understanding the nature of their efficiency, and conditions and possibilities of its enhancement.

Considering the cluster as a system operating in a certain institutional environment and possessing a structure that is institutionalized from the point of view of availability of formal and informal rules and norms that affect the behavior of the participants and their interaction, we propose to introduce the concept of configuration of efficiency criteria for cluster-based spatial development, and to simulate this configuration with the help of a system integration concept of enterprises developed by G.B. Kleiner [9, p. 129]. We believe that this concept provides a comprehensive (as opposed to fragmented) way to determine the internal space of the system; it takes into account all the components necessary for its functioning and their interaction with each other and with external environment, and also the establishment of systemically important links that ensuring the system stability.

We shall consider the configuration of efficiency criteria for cluster-based spatial development as a certain order of efficiency criteria that reflects their position and proportion in relation to each other. The configuration and definition of each of the proposed criterion is presented in the *Figure*.

The original assumptions for constructing the configuration were as follows:

1. The selected criteria show the aspects of interaction between the participants and the arrangement of intra-cluster space that are critical to the establishment and functioning of the cluster as a system.

2. The order in which the criteria are arranged meets the principle of stratification, the use of which allows us to present the criterial structure of the cluster. The lower layer is allocated to the institutional criterion that constitutes the foundation of the cluster structure, which includes mental, value-based, cultural and cognitive institutions, followed by functional layers that define the specifics of the

cluster activity in key areas, resource limitations and targets the alteration of which is linked to specific actions and decisions of enterprises and member organizations.

3. Relationships between the criteria are of a unifying and interacting nature; they can be extended and modified at different stages of the life cycle, taking into consideration specific features of the cluster as a self-developing system.

When defining the criteria, we considered the following provisions as decisive:

1) efficiency is determined by qualitative characteristics, i.e. the criterion reflects a qualitative feature in the development of the cluster, the feature should include primarily the development of intra-cluster structure, quality improvement of intra-cluster cooperation and development of relations, forms and mechanisms of interaction of the cluster with the external environment;

2) the content of the criterion does not create any obstacles to establishing quantitative indicators ono its basis or to its evaluation with the help of expert surveys;

3) the task of quantitative measurement is set without the prevalence of the principle of "maximizing behavior", although it is assumed that cluster members may seek to obtain profit with the lowest costs or expect to receive the highest net positive effect.

Thus, the model-based representation of the configuration of efficiency criteria shows that there can be no single criterion (for instance, economic criterion) when determining the efficiency of cluster-based spatial development. In turn, the systemic-institutional factor and the cluster's link with the external environment, which the institutionalists call "friction", do not speak in favor of the neoclassical efficiency criterion. Therefore, in the elaboration of regional cluster-based development programs, when designing the territorial structure of clusters, one should take into consideration a system of criteria similar to the criteria-based configuration that we propose, based on the understanding of efficiency as a quality determinant of the cluster system that takes into account both the interests of participant firms and the needs of society.

Conclusion

Studying the category of efficiency from the hermeneutic standpoint in many respects proves the relativity of this concept. It is corroborated by the diversity of approaches to the interpretation of efficiency, definition of its types and criteria based on many features that synthesize different aspects of social relations. However, modern science in the course of evolution of scientific knowledge about efficiency, from the mechanical picture of the world to neo-classicism and other trends, has developed such a methodology that makes it possible to analyze the efficiency of different socio-economic systems from system and institutional-evolutionary positions on the basis of modification of qualitative determinants of development. This aspect of analysis was realized in our study of efficiency on the example of territorial clusters.

Thus, when studying clusters as complex self-developing systems, qualitative characteristics associated with the complexity of intra-cluster relations and formation of new mechanisms and forms of interaction with the external environment become crucial.

Thus, efficiency becomes the most important qualitative characteristic of a cluster-type system.

The efficiency of functioning of regional clusters is shown on the basis of the configuration of five criteria that reflect the system nature of cluster-based interaction of participant firms. The model of criteria-based configuration in the form of a stratified pyramid sets a certain order of institutional, administrative, economic, innovative and social performance criteria, reflecting their relative positions, correlation, interdependence, and integration in the cluster system.

The configuration that we propose creates prerequisites for the development of the cluster theory for the organization of economic systems not only in theoretical but also in practical aspects. It helps simulate five interrelated sections of a high-performance cluster on the example of a particular cluster or cluster initiatives and projects.

In the future, the hermeneutics of the category of efficiency and the proposed criteria-based configuration will form the basis for elaborating the classification of efficiency of cluster-based spatial development and a system of indicators to assess the performance efficiency of regional clusters. An important aspect of future research consists in the development and improvement of state policy aimed to support and cultivate efficient cluster structures and identify qualitative determinants of this institutional technology.

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Information about the Authors

Elena Valer'evna Bazueva – Doctor of Economics, Associate Professor, Associate Professor at the Department of World and Regional Economics and Economic Theory, Perm State University (15, Bukirev Street, Perm, 614990, Russian Federation; e-mail: bazueva.l@mail.ru)

Tat'yana Yur'evna Kovaleva – Ph.D. in Economics, Associate Professor, Associate Professor at the Department of World and Regional Economics and Economic Theory, Perm State University (15, Bukirev Street, Perm, 614990, Russian Federation; e-mail: kovalevatu@yandex.ru)

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