

Efficiency of construction cluster innovative potential management

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Abstract. Creation of cluster structures in Russia contributes to efficiency increase in using resource capabilities of the national economy, its individual territories and branch sectors, including innovative potential of investment and construction complex enterprises. The proposed structural model of the management system of innovative potential of the region construction cluster is aimed at intensification of the processes of introduction and practical implementation of technological, organisation and management and economic innovations by enterprises in the cluster structure. Organisation and economic mechanism of implementation of such a system takes account of participation of all the entrepreneurship subjects in innovation activity, each having a certain position in the innovation cycle as it has different capabilities to implement own innovative potential. The developed method of quality assessment of construction cluster innovation potential management system provides evaluation of the integral economic effect received as a result of effective interaction between enterprises in the integrated structure under conditions of optimal usage of innovative potential by them. Thus, the authors' research will contribute to strategic planning of development of a territorial construction cluster, intensification of innovative thinking, stimulation of innovative activity of its subjects, regulation of management processes of the integrated structure innovative potential.

1. Introduction

Generation of competitive advantages of construction cluster is stipulated by the fact that within its framework, optimal conditions for generating innovations, efficient development of innovative potential of construction organizations are provided. Process control of development of innovative potential of construction cluster will substantially develop the capabilities of construction organizations in solving the housing problem. This determined the research objective: development of methodological approach and practical recommendations to efficiency assessment in management of innovative potential of construction cluster.

2. Literary survey, analysis of the main theoretical aspects



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Many modern economists substantiate the use of cluster structures [1] as an efficient method to increase quality of interaction between the subjects of investment and construction complex. The cluster strategy of branch development is concentrated on the links between various subjects of economy [14].

The notion “cluster” means integration of independent elements of socio-economic systems in single space for implementation of a definite goal system [2]. Clusters unite a large quantity of entrepreneurs’ structures: vendors of technological equipment, raw materials, additional products, innovative technologies, services, infrastructures etc. [3]. Cluster general characteristics also include location close to big research centers established preferably from small private companies [4], availability of work experience of employees in different organizations of a specific branch within which the cluster is created [5]. Thus, clusters provide strengthening of inter-company interaction, efficient cooperation and agreement of plans of various business subjects participating in entrepreneurship [6].

Taking into account the specificity and features of created in Russia construction clusters [7], one can state that in modern economy, clusters become one of the most efficient forms of integration of financial and intellectual capital within the framework of investment and construction complex providing the necessary competitive advantages of its participants [8].

Within the framework of the existing management system, the available innovative potential of investment and construction complex subjects is not implemented fully [10], that's why the steady development of construction organizations is inseparably connected with generation of new approaches to innovative potential management within the cluster amalgamation [13]. Housing construction subjects amalgamation resource potential management meaning coordination of activities of its structural elements taking into account generation and implementation of integral resource potential [11] substantially increases efficiency of organization and management, and industrial and commercial business processes [12].

Construction cluster innovative potential management system is based on close interaction with key management elements of innovative potential of the main cluster participants [15]. While contributing to concentrated expression of investment politics and intensification of construction processes, establishment of housing and construction amalgamations [9] stimulates productivity increase [16], provides successful implementation of integral resource potential and strengthens competitive advantages of each subject in the amalgamations [17]. Available resources integration efficiency depends on rationality of total resource potential management [18].

3. Development of construction cluster innovative potential management system

In accordance with the core of system approach, the structural model of the construction cluster innovative potential management system consists of the following: external environment, including “entrance”, “output”, connections with external environment, resource management processes, feedback of internal structure including six elements (support subsystem, control subsystem, management tools, management mechanisms, managed subsystem, management process) (figure 1).

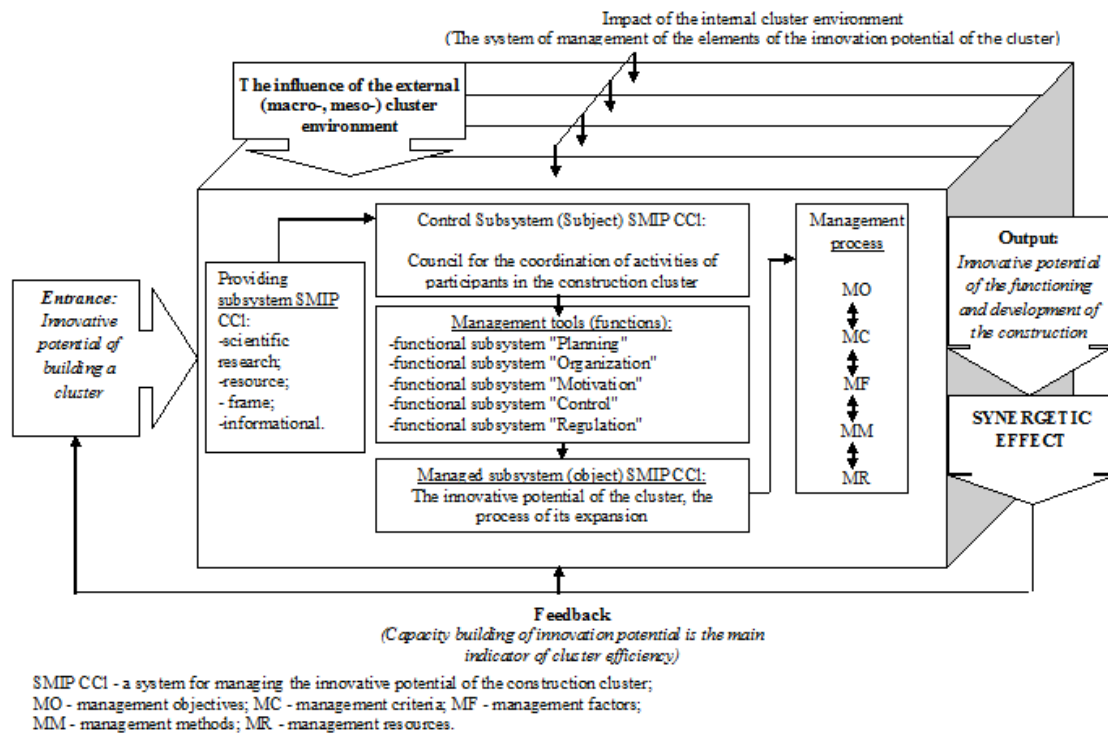


Figure 1. The structural model of construction cluster innovative potential management.

Innovative potential is managed subsystem (innovative flow, in motion; innovative stock, at rest), a management subsystem is unit, service, department or an authorized person on management of innovative potential of enterprises included in the cluster “nucleus”, and also Council of coordination of construction cluster participants activity. With the use of the model reflecting the managed process, the control subsystem generates management decisions transformed into specific management impacts, and they are transferred to the control subsystem as a sum of organization measures.

4. Building of organisation and economic mechanism of construction cluster innovative potential management

Cluster innovative potential management provides implementation of functions related to planning, organization, motivation, monitoring and control of construction cluster innovative potential development. To provide efficiency of this process at enterprises participating in cluster, the corresponding systems for implementation of the said functions shall be created, i.e. it is necessary to pay separate attention to generation of organization and economic mechanism of cluster innovative potential management (figure 2).

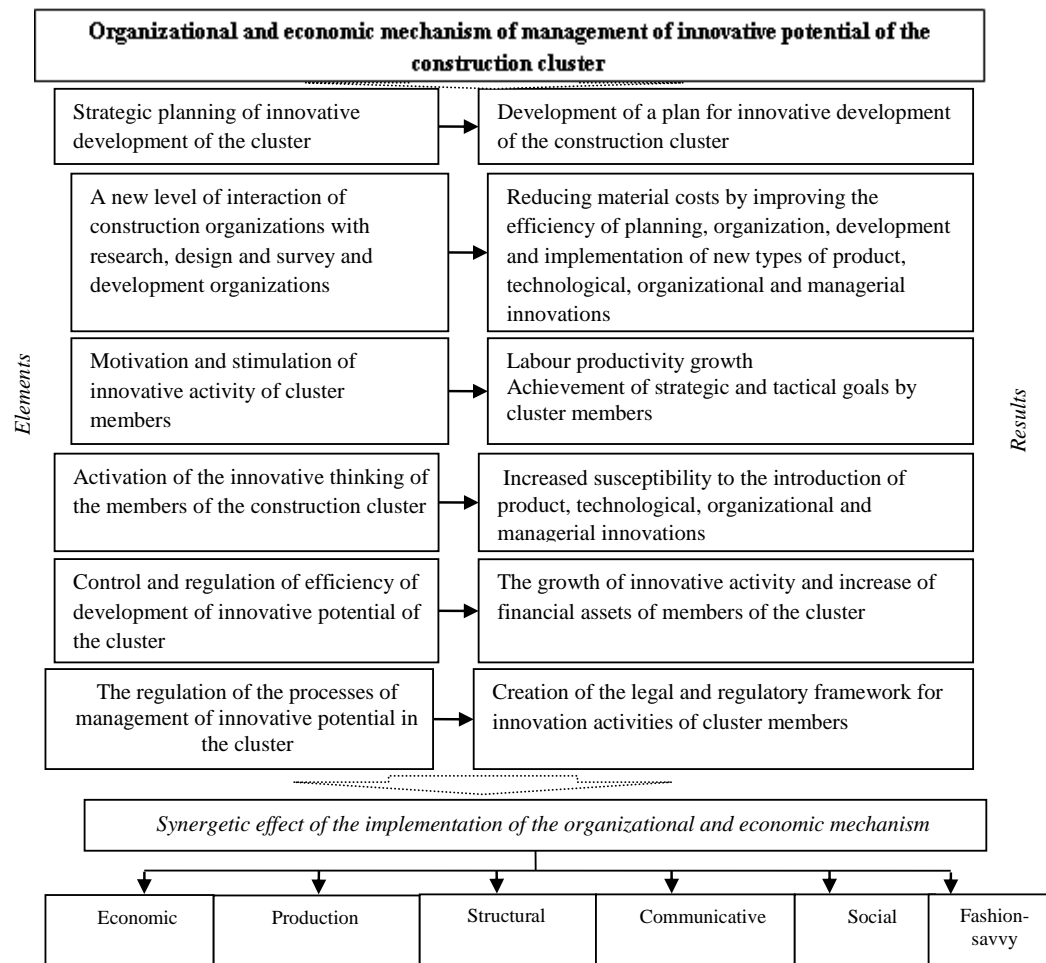


Figure 2. Organisation and economic mechanism of construction cluster innovative potential management mechanism.

Construction cluster innovative potential management mechanism is an active component of management system and provides (by means of impact on internal and external factors) efficiency increase of managed object activity, cluster innovative potential and its build-up.

The main purpose of the mechanism is providing favorable organization and economic conditions for implementing innovative activity within the framework of construction cluster taking into account the uncertainty and risk of competitive environment.

5. Assessment of construction cluster innovative potential management efficiency

In the opinion of the authors, to assess the quality of construction cluster innovative potential management, mostly substantiated is application of the method based on the theory of efficient competition. In accordance with this theory, the most competitive are enterprises, where the operation of all structural units is at best organized at all the stages of life cycle of construction products.

Quality assessment should provide joint impact of financial and organization and management factors.

Assessment of financial factors is relation of integral economic effect received as a result of efficient interaction between enterprises being part of construction cluster to the value of capital investments into system integration based on stimulation of innovative activities of the participants and implementation of their innovative potential (E):

$$E = \frac{\sum_{i=1}^n \sum_{j=1}^m (\Pi_{ij} + \Delta\Pi_{ij}) - \sum_{i=1}^n \sum_{j=1}^m I_{ij}}{\sum_{i=1}^n \sum_{j=1}^m P_{ij}} \geq 0, \quad (1)$$

where i is the quantity of investment project participants, $i=1\dots n$; j is the number of investment projects implemented within the accounting period, $j=1\dots m$; Π_{ij} is the operating profit of investment j -project received under autonomous conditions of functioning of i -organization for the account period in mlns. of rbls.; $\Delta\Pi_{ij}$ is operating profit growth from investment j -project implementation received by i -organization for the account period as a result of efficient interaction with other participants of the cluster in mlns. of rbls.; I_{ij} is the value of investments into integration and development of innovative potential of i -organization for j -investment project implemented for the account period in mlns. of rbls.; P_{ij} is the cost of resources (sales prime cost) at the disposal of i -organization and directed for implementation of investment j -project implemented for the account period in mlns. of rbls.

While assessing the efficiency of management activity, special attention shall be paid to quality assessment of the organisation structure of the management system of cluster innovative potential development (K_{org}), which features correspondence of organization structure to the production organization and management process quality indices achieved:

$$K_{org} = 1 - \frac{Z_{SUIP}^{ud} \cdot K_{up}}{I_{voop} \cdot I_{otd}} \quad (2)$$

where Z_{SUIP}^{ud} are expenses for innovative activity management for one employee of cluster of the company management apparatus; K_{up} is the percentage of employees of the management system of innovative activity in the total number of the cluster enterprise; I_{voop} is the index reflecting the ratio of cost of innovative resources to the total number of the company employees; I_{otd} is the index of return from innovative activity representing the relation of the volume of products sold to the cost of innovative resources spent.

6. Research results

Calculation of synergetic effect from rational management of innovation potential of construction cluster and assessment of forecast indices of competitiveness of construction products made by the authors at specific enterprises proved the efficiency of integration activity of innovation-active participants of investment and construction process.

Thus, the contribution of both authors to science includes development of system approach in the area of management of innovative potential of integrated structures (by the example of construction cluster), expanding scientific and theoretical boundaries in understanding the value of innovations in economic integration of entrepreneurial activity subjects.

References

- [1] Doeringer P and Terkla D 1995 *Economic Development Quarterly* **9** (3) 225–237
- [2] Roeland T 1999 *Cluster analysis and cluster — based policy. New perspective and rationale in innovation policy* (Paris: OECD)
- [3] Christian H M 2004 Ketels Cluster-based Economic Development: What Have We Learned, <http://www.hbs.edu/faculty/Pages/item.aspx?num=47012>
- [4] Maly N 2008 Cluster as a New Form of Entrepreneurial Association, <http://www.unece.org/ie/wp8>
- [5] Selentyeva T, Ivanova M and Kulibanova V 2018 *Proc. 31st Intern. Busin. Inform. Manag. Ass.* 1963–1966
- [6] Gutman S S, Zaychenko I M and Kalinina O V 2017 *29th Intern. Bus. Inform. Manag. Ass.* 1430–1438
- [7] Russian Clusters Map, <http://map.cluster.hse.ru/list>

- [8] Suire R and Vicente J 2014 *Entrepreneurship and Regional Development* **26** (1–2) 142–164
- [9] Lukmanova I G and Adamenko M B 2015 *Industrial and Civil Construction* 752–756
- [10] Khrustalve B B 2014 *Modern Problems of Science and Education* **3**
- [11] Delgado M, Porter M and Stern S 2015 *Journal of Economic Geography* **3** 1–38
- [12] Audretsch D B and Feldmann M P 1996 *Review of Industrial organizations* **11** 253–273
- [13] Echterhoff N, Amshoff B and Gausemeier J 2013 *Intern. Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering* **74** 606–16
- [14] Graboy P G 2013 *Real Estate: Economy, Management* **2** 14–19
- [15] Monasturnyi E A 2006 *Innovative cluster. Innovations* **2** 38–43
- [16] Dvas G V and Dubolazova Y A 2018 *Proc. 31st Intern. Busin. Inform. Manag. Ass.* 5654–5657
- [17] Rudskaya I and Rodionov D 2017 *Academy of Strategic Management Journal* **16** 1–11
- [18] Rudskaya I A and Rodionov D 2018 *ESPACIOS* **39**

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