Modeling of program-target organization and management of competitiveness of territorial reproduction systems in construction

A M Krygina¹*, N M Krygina², M A Shchenyatskaya¹, and M I Oberemok¹

¹Department of Construction Management and Real Estate, Construction Engineering Institute, Belgorod State Technological University named after V.G. Shukhov, Kostyukov St., 46, Belgorod, 308012, Russia
²Department of Constitutional and Civil Law, Kursk Academy of State and Municipal Service², Stantsyonnaya St., 9, Kursk, 305044, Russia

E-mail: kriginaam@mail.ru

Abstract. This study examines modern theoretical and methodological approaches to solving the problem of program-target organization and management of meso-competitiveness in construction as a prerequisite for effective practical implementation of transformational development according to key monitoring indicators such as productivity, organizational and technical reliability. Taking into account the inevitability of the involvement of territorial construction complexes in the reproduction processes as a meso-economic competitive territorial-reproduction construction system, the article substantiates the need to develop special program-target methods for regulating these processes. It shows the expediency of combining the competitiveness, productivity of territorial construction complexes and reproduction processes in construction by the program-target method. The adopted programs should essentially become mortgage and investment programs for long-term management of the reproduction of territorial-portfolio land and property complexes in various industries and infrastructures. The study presents the efficiency of using consortium-type structures to implement the idea of forming high-performance cluster systems in construction at regional and inter-regional levels. Mortgage and investment programs for sustainable development of residential construction should become a tool for managing the process of transformational regulation of competitiveness from its local level to the interregional and international levels with a clear system organization.

1. Introduction

Over the past decades, enterprises of the domestic investment and construction complex (ICC) have faced a whole range of problems, the temporary solution of which determines the competitiveness of any construction enterprise [1]. The optimal combination of all organizational, technical and managerial aspects that should be the purpose of long-term planning of construction production and its innovative development [2].

The aim of this study is to develop the theoretical foundations of the program-target organization and management of the competitiveness of the ICC as a prerequisite for the effective practical implementation of the idea of transformational development according to the key indicators of monitoring such as productivity, organizational and technical reliability [3, 4].
The conceptual idea of applying and developing the concept of competitive territorial-reproduction building systems in relation to the meso-level of the construction industry should be promoted through program-oriented methods of management organization at the regional and municipal levels, as well as at levels of local construction business communities [5, 6]. It requires special program-target methods for regulating these processes [7]. Creating high-performance and high-level investment-construction business systems in the building will exit the crisis phase transformation and go to stage sales growth enterprises of territorial and construction complexes (TCC) on domestic and foreign markets [8].

For the purposes of developing competitiveness, special temporary organizational structures can also be created to implement the idea of forming high-performance cluster systems in construction, especially for the formation of production cluster systems at the regional and interregional levels. Mortgage and investment programs for sustainable development of residential construction should become a tool for managing the process of transformational regulation of competitiveness from its local i-level to interregional and international j-levels with a cluster organization of the system [9, 10].

2. Materials and methods

The structure of such consortia should be created with the involvement of the banking sector, research and innovation developments of a technological, organizational, economic and managerial nature as a basis for improving competitiveness. The preliminary analysis showed that the consortium can be organized as a simple form or a complex one. The simple form provides for the formation of a consortium as a partner system based on purely contractual relations between each other for the period of implementation of a highly effective innovative project and its project financing. The participants finance or perform their part of the project's work and bear the risks as part of their participation. The complex form of a regional or interregional consortium represents a partnership as a cooperation agreement. Such associations are the most promising for the implementation of particularly large innovative projects for the eco-housing construction [11].

The effect of competitive advantages of mortgage and investment complex programs (MICPI-J) is presented in Figure 1 in the form of a functional model of system program-target interactions for the development of local and cluster type competitiveness in construction at the meso-level.

![Figure 1](image-url)
The function of the lifecycle state regulation of competitiveness for the construction of ecological houses based on mortgage-investment programs MICP3:1 can be represented as a kind of “the catalyst”, when the administrative resource combined with budget financing-leads to considerable amounts of extra-budgetary investment. The focus of such systems should be concentrated exclusively on business communities, the banking sector and other partners within the framework of consortia for the formation of innovative and technological development of eco-housing, ensuring the development of competitiveness of the construction of territorial production systems at the meso-level.

3. Results and discussions

The process of mortgage and investment programming of competitive advantages at the meso-level of construction is considered through the implementation of five main situations. The analysis made it possible to identify the following situations as the main stages of building the model (Fig. 2).

**Figure 2.** Principal model of the cycle of state program-target planning for the development of competitiveness of eco-housing programs within the framework of the consortium’s functioning.

At the first stage (situation 1), there should be a registration of the problem situation in the territorial real estate markets and search for competitive advantages of eco-housing construction, worthy for their implementation in investment projects and programs.

Situation 1 is replaced by situation 2, in which a consortium is formed to develop the competitiveness of TCC in the direction of building eco-housing. At the same time, these consortium systems, as
noted earlier, can be focused both on creating local advantages in the territorial real estate markets, or on forming cluster business systems with access to interregional, federal and international markets.

In situation 3, the degree of economic sustainability of the consortium increases, the payback stage begins and the return of funds to temporary members of the consortium begins.

Situation 4 implies a reduction in state participation, access to sustainable functioning in the process of self-sufficiency of eco-housing construction projects. The restructuring of projects and the consortium begins with the aim of withdrawing its temporary participants from this mortgage and investment system, as well as the process of exiting as the payback of investment projects is completed. The commercial effects of the TCC should be transferred to social ones, as well as to the growth of sales of eco-housing or its lease in this territorial-production business system of the construction type.

In situation 5, there is an autonomous economic functioning of highly productive business systems in construction with their own self-regulation on market conditions, but with residual state monitoring. In the future, this cycle of evolutionary stages may be repeated.

In the most general form, program-target interactions in eco-planning at the regional level can be represented in Figure 3 as a functional model.

![Figure 3. General algorithm of innovative and technological solutions of program-oriented interactions for the implementation of eco-projects at the regional level.](image)

4. Summary

Implementation of the proposed models of program-target organization and management by the competitiveness of the territorial-reproducing systems in the implementation of reproduction of real estate and development companies of *territorial investment and construction complexes (TICC)* involves
modeling the five situations for the implementation of programs of reproduction of real estate within the framework of functioning of organizational and production consortium.

Research has shown that in order to ensure innovative sustainable development of the region, an appropriate regional program is needed, which ensures balancing the interests of regional management bodies, enterprises of the region and the reproductive capabilities of the environment. This requires the development of a scientific concept for the organization and development of housing construction, taking into account modern innovative requirements. Conceptual model of formation of organizational and economic mechanism of realization of the regional program of investment construction and environmental projects developed by the author allows to balance the performance of organizational-economic system and the efficiency of capital investment in regional production business systems developer through complex organizational and managerial consortia aimed at sustainable development of a regional residential construction and ensure the availability of housing.

5. References
[1] Krygina A M, Avilova I P, Oberemok M I, Grebenik AG 2020 Modeling of organizational and functional components of investment and construction controlling in the reproduction of eco-residential real estate IOP Conference Series Materials Science and Engineering 012020
[2] Maslyukova E, Anoshina Y, Khakimov A, Aleksandrovskiy M 2018 Methodology for the development of innovation projects on the basis of competitiveness indexes MATEC Web of Conferences 08012
[3] Danilenko E P, Shcherbakova M I 2016 "Second life" of municipal real estate Bulletin of the Belgorod state technological University named after V G Shukhov 7 216-221
[4] Tsatkhlanova T T, Ubushaeva B G, Erdnieva E V 2018 Formation of a competitive environment in the regional economy Municipal Academy 3 93-99
[5] Abakumov R G, Shchenyatskaya M A, Ursu I V, Oberemok M I 2020 Innovative Approaches to Residential Development Using Large-Panel Elements Lecture Notes in Civil Engineering 95 118-124
[6] Gumba Kh M, Belyaeva S V, Voronov D S, Erypalov S E 2017 Assessment of the competitiveness of the construction industry and enterprises: methodology and practice Economy and entrepreneurship 3-1(80) 894-900
[7] Avilova I P, Krygina A M, Krygina N M, Koshlich Y A, Oberemok M I 2020 Sustainable development of residential real estate Erdnieva E V 2018 Form of a competitive environment in the regional economy Municipal Academy 3 93-99
[8] Kudratova G M, Makarova L V 2018 Comprehensive analysis of the competitiveness of products and construction industry enterprises Science alley 3-5(21) 382-387.
[9] Yusufova A M, Cetin T E 2018 The practice of formation of economic conditions for stimulation of construction production development in Russia Regional problems of economic transformation 12(98) 90-98
[10] Klyuev S V, Khezhev T A, Pukhareno Y V, Klyuev A V 2018 Fiber concrete for industrial and civil construction Materials Science Forum 945 120-124
[11] Amran M, Fediruk R, Vatin N, Mohammad Ali Mosaberpanah, Aamar Danish, Mohamed El-Zeadani, S V Klyuev, Nikolai Vatin 2020 Fibre-reinforced foamed concretes: A review Materials 13(19) 4323

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