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Methodological approaches to the formation of flexible structures for managing construction groups

In the article the main aspects of the formation of flexible management structures of corporate associations of construction enterprises — construction groups are considered. The subjects of the investment and construction complex must quickly respond to changes in the external environment, should have possibility to adjust to possible changes in the economy and other spheres. Such an opportunity can be realized on the basis of the formation of flexible management structures of organizations. A flexible management structure is an organizational structure that allows an enterprise to respond quickly and effectively to the changes in the external or internal environment. In general, flexible management structures are a set of system elements that can adapt to changing environmental conditions in order to ensure an acceptable level of efficiency and production optimization and management processes under conditions of changing environment. In this case, the formation of organizational structures is implemented at the following levels: intra-company level, organizational and functional level, organizational and contractual level. Formation of flexible organizational structures for the management of a construction group should be realized within the limits of the certain strategy, while fulfilling the conditions for maximizing the level of strategic development while ensuring a sufficient level of general stability of the construction group.

Keywords: *construction companies, investment and construction complex, construction groups, corporate unions, flexible structures, management structures, adaptability*

Construction is a complex of organizational, survey, design, construction and installation and commissioning works, the ultimate goal of which is the construction of buildings (structures), capital or current repairs, as well as reconstruction and restoration. Construction processes are carried out on the basis of interrelated elements representing a set of enterprises, organizations, institutions involved in the value chain of finished construction products [1, 2].

The cooperation of various production systems into a single whole contributed to the development of an intersectoral construction complex, which in turn began to solve the basic needs of construction (from design work to finished buildings and structures). In this regard, it can be concluded that the “construction complex” is a developed system of enterprises and industries that perform common production, technological and economic ties for the creation, expansion, reconstruction and modernization of final construction products, buildings and structures [3–5].

The increase in the development level of the subjects of the investment and construction complex is influenced by [6–9]:

- level of investment attractiveness of the industry;
- quantitative, qualitative composition, degree of development and deterioration of the material and technical base;
- level of demand for the products of the industry;
- conditions of regulation of the industry by the state;
- quality and efficiency of management;
- level of innovation activity.

For a cumulative assessment of the functioning of the investment and construction complex as a whole and its individual elements, indicators are used, which can be conditionally divided into three groups:

1. Quantitative indicators assessing the volume of construction, the number of capital construction projects under construction, the volume of built-up areas, the number of functioning organizations, the number of employees employed in the construction sector, etc.
2. Qualitative indicators assessing the effectiveness of the development of ownership forms in the construction complex, the policy of investment distribution and their sources, the place of the construction complex in the state economy, etc.
3. Structural indicators that assess the structure and correlation of types and categories of objects being built, construction and installation works performed, construction materials used, types of organizations, types of investments, etc. [10].

The set of interacting subsystems and processes that ensure the specified functioning of the enterprise is an enterprise management system.

The general principles feature: unity of command, centralization of management, various types of moral and material interests, and the influence of elements of the external environment.

General management principles [11]:

- the principle of complexity. The principle assumes that all management tasks are solved in an interconnected way;
- the principle of purposefulness. The principle assumes that managerial influence should be aimed at achieving certain goals;

Zhelikhovskiy D.O.
Beliakov S.I.



Zhelikhovskiy Denis Olegovich,

Applicant of the Department of Organization of Construction and Real Estate Management; Moscow State University of Civil Engineering (National Research University) (MGSU); 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; do.z@list.ru



Beliakov Sergei Igorevich,

Candidate of Economic Sciences, Associate Professor, Associate Professor of the Department of Organization of Construction and Real Estate Management; Moscow State University of Civil Engineering (National Research University) (MGSU); 26 Yaroslavskoe shosse, Moscow, 129337, Russian Federation; osun_kaf@mgsu.ru

- ▶ • the principle of democratization. Assumes direct participation in the management process of all employees of the organization;
- the principle of economy. According to this principle, decisions made in the management process should be studied for economic benefits;
- the principle of optimality. It involves a combination of the principles of centralization and decentralization in management decision-making;
- the principle of hierarchy. According to this principle, decision-making powers are distributed based on the levels of the management pyramid.

The subjects of the investment and construction complex should promptly respond to changes in the external environment, should be able to adapt to possible changes in the economy and other spheres. Such an opportunity can be realized on the basis of the formation of flexible management structures of organizations.

As a result, the key condition for ensuring the necessary level of controllability, stability and adaptability of the system functioning is the choice of adequate structures at various hierarchical levels of the management system in the current conditions of the internal and external environment.

A flexible management structure is an organizational structure that allows an enterprise to respond quickly and effectively to changes in the external or internal environment. In general, flexible management structures are a set of system elements that can adapt to changing environmental conditions in order to ensure an acceptable level of efficiency and production optimization and management processes in a changing environment.

An adequately constructed flexible management structure should create conditions in which management entities would have the opportunity to develop and implement effective solutions aimed at ensuring the necessary level or increasing the levels of productivity and efficiency of the organization's functioning, ensuring the stability of the production system as a whole in changing business conditions.

A relatively high degree of sustainability and effectiveness is demonstrated by large business entities with project portfolios and more developed resource bases. A steady trend towards a decrease in the share of small and medium-sized organizations — developers.

The tendency involving enterprises in sustainable cooperation within the framework of construction groups is significantly important, which allows them to benefit from combining their production potentials and specialized competencies.

Thus, the problematic area of ensuring the sustainable functioning and development of enterprises in modern conditions can be defined as insufficient development of mechanisms for strategic management of enterprises, including on the basis of planning activities, taking into account modelling of changes in the external and internal environment in conditions of macroeconomic instability and the lack of formed approaches to flexible management of enterprises.

A construction group is the most common form of corporate association of entities. A construction group may include contractors, design organizations, engineering and consulting companies, as well as companies specializing in the procurement and supply of construction materials and equipment and other functions. The group may include companies specializing in certain stages of construction, for example, design, construction, procurement, project management, etc. At the same time, the key

element of the organizational structure of the construction group, as a rule, is the management link — organizations that perform the roles of customers-developers and management functions in relation to the entire system of the construction group.

The formation of construction groups can occur on various grounds [12, 13].

1. Specialization by type of work. A group can be formed from companies specializing in certain types of work, for example, design, construction, installation, supply, etc. This allows us to ensure a high level of specialization of each participating company.

2. Geographical localization. A group can be formed from companies located in the same region or on a close territory. This facilitates interaction between group members and allows you to quickly respond to changes in the external environment.

3. Technological solutions. A group can be formed from enterprises using the same technologies and methods of construction. This allows you to reduce the cost of training and training of personnel and increase work efficiency.

4. Financial decisions. The group can be formed on the basis of financial mechanisms, for example, by creating special funds to finance construction.

5. Partnership. The group can be formed on the basis of an established partnership between enterprises that have successful experience in joint implementation of projects. This allows for deeper interaction and a high level of trust between the group members.

The content of the activities of construction groups includes the following main types of work and services:

- design and development of project documentation;
- preparation of the construction site, including geodetic works and infrastructure preparation;
- supply of construction materials, equipment and mechanisms;
- execution of construction works, including foundation construction, installation of structures, finishing works, etc.;
- project management and coordination of work between group members;
- quality control of work, compliance with deadlines and budget of implemented projects.

The typical composition of the construction group involves 4 blocks combined into a single whole based on the choice of various organizational and contractual models of functioning:

- core of the construction group (management unit): developer (customer-developer, developer);
- investment block: investors of various organizational and legal forms;
- production unit: design, construction and installation organizations, manufacturers and suppliers of materials and equipment, etc.;
- enterprises of related industries: operating organizations, real estate firms, research, development, engineering organizations, insurance companies, etc. Enterprises that are not directly related to the construction complex, but are related to the chain of creation of construction products, i.e. enterprises from related industries that create additional effects within the framework of investment and construction activities.

At the same time, the formation of organizational structures is implemented at the following levels:

- 1) intra-company level;
- 2) organizational and functional level;

3) organizational and contractual level.

The intra-company level presupposes the choice of optimal organizational forms of management at the level of the core of the construction group and individual subjects of its structure.

In terms of the organizational-functional and organizational-contract levels, the processes of forming optimal organizational and contractual models of interaction between the participants of the construction group during the implementation of its strategic management plans are considered [14].

The content of the main organizational and contractual models of construction is shown in Figure.

A characteristic feature of the development of organizational forms at the organizational-functional and organizational-contractual levels at the present stage is the coexistence of traditional, based on the general contracting scheme, and modern, based on the principles of the concept of project management, organizational forms of management. At the same time, the choice of one or another organizational form depends on many factors and, first of all, is determined by the characteristics and parameters of the construction projects being implemented [15].

A comparative assessment of alternative organizational management models in terms of the strategic development of the construction group in accordance with the concept of project management should be carried out based on the availability and rational combination of four main blocks of parameters that determine the time, cost and quality performance features of functioning.

Each of these blocks is characterized by a system of indicators and parameters, while it is possible to describe each of them, their specifics and the range of their changes:

Block A_1 — characteristics of finished construction products made by enterprises operating within the construction group.

Block A_2 — characteristics of the production and economic potential of ISC enterprises operating within the construction group.

Block A_3 — characteristics of the adaptability of the management system of ISC enterprises operating within the construction group.

Block A_4 — characteristics of the investment potential of enterprises operating within the construction group.

$$C_v = f(A_1, A_2, A_3, A_4) \rightarrow \max, \quad (1)$$

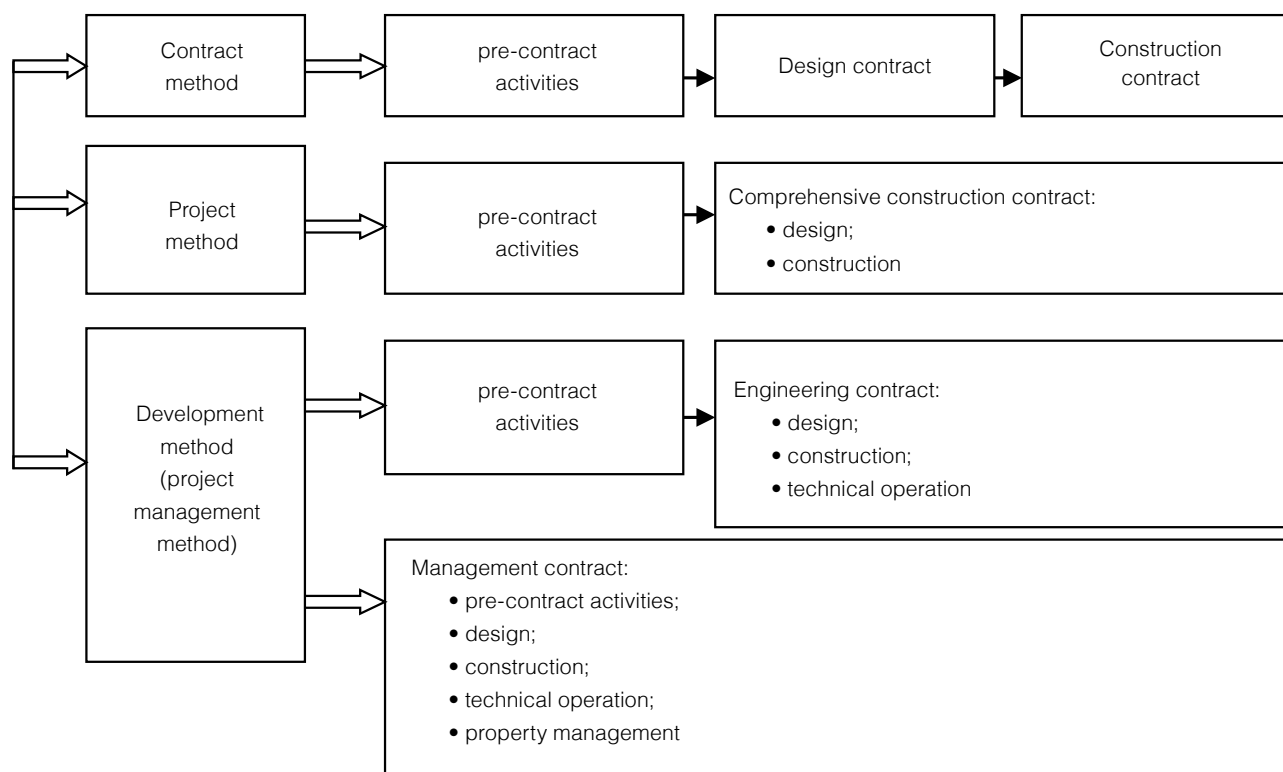
where C_v — a variant of the formation of flexible management structures for enterprises operating within the construction group.

The strategic development of enterprises as part of a construction group can occur in several directions:

- vertical (transition to new markets) — market strategy;
- horizontal (product (service) improvement) — innovative strategy;
- internal (capacity building, improvement of management relations) — internal company strategy;
- diagonal (simultaneous improvement of the product (service) and transition to new markets by attracting investments) — investment strategy.

At the same time, the formation of flexible organizational structures for the management of a construction group should be implemented in terms of a certain strategy, while fulfilling the conditions for maximizing the level of strategic development while ensuring a sufficient level of general stability of the construction group.

A range of values is defined as the boundary condition of the general stability of the construction group: $0.75 \leq K_{st} \leq 1.0$.



The content of the main organizational and contract models of construction



$$K_{st} = K_r \cdot K_{sp} \cdot K_o \cdot K_s \cdot K_p, \quad (2)$$

where K_{st} — coefficient of general stability of the construction group;

K_r — the level of capital return of production;

K_{sp} — specialization level;

K_o — output per employee;

K_s — stability of the staff number;

K_p — the level of profitability of production.

Thus, it is possible to compare different options for the strategic development of the construction group not only at each step, but also the effectiveness of the entire chain of development stages.

The flexible management structure of the enterprises of the investment and construction complex as part of the construction group should ensure effective interaction of all stages of the production of finished construction products. It should ensure effective interaction of the main institutions of innovation, investment and production activities in construction.

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Методические подходы к формированию гибких структур управления строительными группами

В статье рассмотрены основные аспекты формирования гибких структур управления корпоративными объединениями строительных предприятий — строительными группами. Субъекты инвестиционно-строительного комплекса должны оперативно реагировать на изменения внешней среды, должны иметь возможность подстраиваться под возможные изменения в экономике и других сферах. Такая возможность может быть реализована на основе формирования гибких структур управления организациями. Гибкая структура управления — это организационная структура, которая позволяет предприятию быстро и эффективно реагировать на изменения во внешней или внутренней среде. В общем виде гибкие структуры управления представляют собой совокупность элементов системы, способных адаптироваться под изменение условий внешней среды с целью обеспечения допустимого уровня результативности и оптимизации производственных и управленческих процессов в условиях изменяющейся среды. При этом формирование организационных структур реализуется на следующих уровнях: внутрифирменный уровень, организационно-функциональный уровень, организационно-контрактный уровень. Формирование гибких организационных структур управления строительной группой должно реализовываться в рамках определенной стратегии при выполнении условий максимизации уровня стратегического развития при обеспечении достаточного уровня генеральной устойчивости строительной группы.

Ключевые слова: строительные предприятия, инвестиционно-строительный комплекс, строительные группы, корпоративные объединения, гибкие структуры, структуры управления, адаптивность

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Об авторах: **Желиховский Денис Олегович** — соискатель кафедры организации строительства и управления недвижимостью; **Национальный исследовательский Московский государственный строительный университет (НИУ МГСУ)**; 129337, г. Москва, Ярославское шоссе, д. 26; do.z@list.ru;

Беляков Сергей Игоревич — кандидат экономических наук, доцент, доцент кафедры организации строительства и управления недвижимостью; **Национальный исследовательский Московский государственный строительный университет (НИУ МГСУ)**; 129337, г. Москва, Ярославское шоссе, д. 26; РИНЦ ID: 587836, Scopus: 39763951700; osun_kaf@mgsu.ru.

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Л.И. Павлова. Москва. Особняк Рябушинского. Рисунок, тушь перо.