REVISTA ESPACIOS

Strategic planning of resilience organizational structures in construction

Planificación estratégica de estructuras organizacionales de resiliencia en la construcción

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Content

ABSTRACT:

Purpose. It is essential to develop a methodological approach for strategic planning of resilience organizational structures in construction. It is necessary to establish the fundamental features of the construction industry, construction products, and recourse potential of a construction firm which are required to be taken into consideration when developing methods of strategic resilience management. *Design/methodology/approach.* They include methods of economic, system, strategic, and portfolio analysis. *Findings.* The directions of achieving the resilience of the construction firm as a complex system and their corresponding economic indicators: functional resilience which is defined by the level of production competitiveness and organizational resilience which is defined by the system of inter-firm relationships are determined. The models for evaluation the system resilience of inter-firm relationships and the

RESUMEN:

Propósito. Es esencial desarrollar un enfoque metodológico para la planificación estratégica de las estructuras organizacionales de resiliencia en la construcción. Es necesario establecer las características fundamentales de la industria de la construcción, los productos de construcción y el potencial de recurso de una empresa constructora que se deben tener en cuenta al desarrollar métodos de resiliencia estratégica gestión. *Diseño/metodología/aproximación*. Incluyen métodos de análisis económico, de sistemas, estratégicos y de portafolios. *Resultados*. Las orientaciones para lograr la resiliencia de la empresa constructora como sistema complejo y sus correspondientes indicadores económicos: resiliencia funcional que se define por el nivel de competitividad de la producción y resiliencia organizacional que es definidos por el sistema de relaciones entre empresas se determinan. Los modelos de evaluación del sistema

competitiveness of the construction firm, that allow to establish resilience organizational structures within the realization of construction and investment projects, are developed. *Research limitations*. Limitations on the use of the developed methods can be defined by the specifics of the national investment and construction complex of Russia. *Practical implications*. The use of the developed methods and tools allow to ensure the effective and stable functioning and the development of construction firms under unstable conditions. *Originality/value*. The developed models for strategic resilience planning of the construction firm variables of which are presented by the production competitiveness of the construction firm and the resilience of inter-firm relationships under specific contracts allow creating a production plan of the construction company according to the criteria of functional and organizational resilience.
Keywords: stability of a construction firm, competitiveness, organizational flexibility, strategic analysis, inter-firm relationships

de resiliencia de las relaciones entre empresas y la competitividad de la empresa constructora, que permiten establecer estructuras organizacionales de resiliencia dentro de la realización de proyectos de construcción e inversión, son desarrollado. *Limitaciones de investigación*. Las limitaciones en el uso de los métodos desarrollados pueden ser definidas por los detalles del complejo Nacional de inversión y construcción de Rusia. *Implicaciones prácticas*. El uso de los métodos y herramientas desarrollados permite asegurar el funcionamiento efectivo y estable y el desarrollo de las empresas de construcción en condiciones inestables. *Originalidad/valor*. Los modelos desarrollados para la planificación de la resiliencia estratégica de la empresa de construcción variables de las cuales son presentados por la competitividad de la producción de la empresa constructora y la resiliencia de las relaciones entre empresas en contratos específicos permiten crear un Plan de producción de la empresa constructora de acuerdo a los criterios de resiliencia funcional y organizacional.
Palabras clave: estabilidad de una empresa constructora, competitividad, flexibilidad organizacional, análisis estratégico, relaciones entre empresas

1. Introduction

The improvement of the stability mechanism is one of the main objectives in socio-economic management system. The current global crisis situation consists in the disparity of resources allocation and usage that leads to economic, environmental and social imbalances. Every year the relevance of research associated with the category "stability" and attention to the concepts of "sustainable development" is increased as the importance of the approaches of "green building" (Lvov, 1999).

The construction sector is one of the most significant sectors of the world economy that provides "sustainable development" objectives and determines the level of society development and its productive forces. The stability of individual construction firms can be defined as opportunities to achieve goals of "sustainable development" conception, and as the practical implementation of green standards.

Resilience of construction firms is associated with applying methods of strategic management. Its goals are resilient competitive advantages, optimization of potential profitability, organizational structure flexibility, and balanced economic portfolio (David, 1995; Kwakye, 1997; Thomson and Strickland, 1995).

However, there is no sufficient solution of the problem of strategic planning of resilience of construction firms. It is connected with the construction industry, construction products, and resource potential of construction firms has a number of significant features that are not considered in the methods of strategic management that are used in practice. As a result, there is a necessity to develop different methods, because applying "classical" methods of the strategic and portfolio analysis we do not solve the problems of resilient functioning and development of construction firms.

2. Theory

The construction sector was and remains one of the most important economic sectors. The economic growth of dynamics and socio-economic development of the regions and the state depends on its development. The dynamics of construction products volumes is a general indicator of the national economy of the state. The construction industry aims at changing production assets on a modern technical basis, developing and improving the social sphere, it also aims at reconstruction, modernization, technical re-equipment of material goods

production (Gusakov, 1983; Dickman, 1988). Today construction, that has always been considered a special sector of the national economy, is one of the pillars in the realization of economic, environmental and social aspects of the concept of "sustainable development".

The stability of work of Modern Russian construction firms depends on the flexibility of the organizational and management structures. The practical features of management shifted from optimizing internal company processes carried out on the principles of reengineering to inter-firm relationships, new forms of organization of the construction business and network technologies (Kwakye, 1997; Vikhansky and Naumov, 2004; Dickson, 1969). In the construction complex, the problems of inter-firm relationships are twice important because of the separation of functional responsibilities between different firms in the implementation of investment projects and programs. The work of modern construction firms is multidimensional, dynamic, and probabilistic. Being done in an uncertain and complex environment, their work has special requirements for the management tools of individual construction companies, the stability of which encourages the stability of the investment-construction sector at the regional level and in the national economy as well.

The main problems of management in the construction industry today are due to the following factors: competition with other construction firms; decline in the volume of produced products; shortage of orders for construction and installation work; inadequate contractual arrangements; loss of traditional markets; customers' insolvency; shortage of skilled workers; high level of taxeshigh cost of materials; depreciation of fixed assets; high percentage of commercial credit; insufficient use of new technologies

To solve these problems it is necessary to develop tools for strategic planning for the stability of construction firms on the basis of the system approach, an interdisciplinary research and comprehensive consideration of the peculiarities of the construction industry and construction products.

The problems of stability of systems of different nature and complexity are among the most important in the various sciences. The management of sustainable development is one of the management paradigms of the 21st century. One comes across the concepts of "resilience" and "sustainable" very often in various fields of activities. Since the concept of resilience is the attribute characteristic, it is impossible to give it an unambiguous "objective" definition, it will vary depending on the application object. Usually the ability to save itself and the ability to exist are meant under resilience when the external and internal factors change;

Nowadays the methodological basis of dynamic and multifaceted theory of the stability includes the following components: fundamental principles of mathematics, mechanics, physics and chemistry; issues of economic theory and microeconomics; fundamental principles of the theory of systems, system analysis, and synergetics; principles of theories of production organization and special methods to increase the efficiency of activity of firms; laws of biology, ecology, and other natural sciences.

Can we characterize the stability of the company? The categories "economic stability" and "financial stability" are the most often used. In Russian economic analysis, there is a rule that the essence of financial stability is the security of stocks and expenses by their own means (a three-dimensional function of financial stability), and its external manifestation in the short term is liquidity and solvency, as for the long term it is a capital structure. Estimated indicators of financial stability are current, quick and absolute liquidity, solvency, autonomy coefficients and the threat of bankruptcy. To control the economic stability there are levels of organizational management, economic-financial and technological resilience, defined as the arithmetic mean or a geometric mean of indicators of state and use of fixed assets and equipment, material and labor resources (Harrington and Wilson, 1986; Shim and Siegel, 1986; Bakanov and Sheremet, 1999; Anonymous, 2007).

The disadvantages of the existing methods of stability analysis of a construction company are: recommended methods do not take into account the sector features of production and financial

cycle, financing, structure of assets and liabilities of construction firms; problems of resilience forecasting in strategic decision-making in conditions of uncertainty are not considered in the methods; existing methods do not solve the problem of providing dynamic stability and sustainable development of the construction firm, taking into account sector characteristics.

In the context of the objectives of sustainable development management of construction firms, it is necessary to study some fundamental features that characterize construction industry, products and their resource potential.

Peculiarities of the construction industry.

Among them there is a high degree of state regulation, control and monitoring of the construction industry, a great influence of the state on the activity; close interdependence between production volumes, efficiency indicators of construction firms and the overall economic and political situation in the country.

It is mainly a regional level of competition; competition between secondary and primary markets of real estate; high duration of production and financial cycles and the long period of planning, which presuppose the requirement of the time account, building models of cash flows and thorough justification of design decisions.

Characteristics of construction products:

Property, variety of architectural and structural plans, territorial fragmentation, capital intensity, material consumption, high cost, duration of creation and operation; possibility of future consumption of construction products, high quality requirements and high innovation requirements, localization; social importance of products and possibility of its impact on the environment, natural conditions of the territories, mental and physical condition of a person.

The seasonality of construction works and not regular production; continuity of production and sales phases; high risks of obsolescence and technology development, impact of the activities of the construction company on the ecological situation of the territory.

The peculiarities of the internal resource capacity of a construction company.

The instability of the logistic system (the composition and quality of consumed resources) is determined by the variety of technological decisions of buildings construction. The presence of technological breaks in the work of individual teams requires the need to use a balanced production planning.

The complex organizational structure of the firm, including investors, contractors, subcontractors, customers, realtors, intermediaries, supervisory authorities, etc., activities of which are exposed to negative influence. This extends and complicates the system of inter-firm relationships, which is fundamentally different from other industries.

The great importance of operated machinery and mechanisms, building materials and labour recourses determines the safety of construction and safety of further exploitation of construction objects (Barbarskaya, 2012; Nebritov *et al*., 2012; Rybyanceva and Moiseenko, 2014).

It is literally the construction industry that possesses the most significant features making the sustainable development in construction firms slower. It is necessary to take into consideration industry characteristics of construction firms when creating analytical tools to support strategic decisions.

3. Data and methods

Doing business, which is focused on the strategy (Strategy Focused Business) is one of the principles of management in XXI century (Chandler, 1962; David, 1995; Pearce and Robinson, 1985; Thomson and Strickland, 1995). Features of strategic management are: first of all, scenario-based nature of planning, and a focus on achieving results in the external

environment; second, the appearance of adaptation solutions that are complementary added to planned solutions; third, continuity of management process; fourth, a complication of functions and management results.

Development and implementation of the strategy is an important and necessary task not only for large construction companies or unique, state buildings and structures in building projects, but also for the activities of construction firms that are interested in resilient operation and development. Moreover, sector characteristics of construction firms turn contracting processes into strategic ones.

Strategic management includes three interrelated areas: strategic analysis, strategy development for the company and development of a strategic plan.

A system of principles, objectives, and methods present the existing in the world practice methodology of strategic management. The most popular analytical tools are matrix methods of analysis of the economic portfolio and the choice of strategy of the company (Chandler, 1962; David, 1995; Pearce and Robinson, 1985; Thomson and Strickland, 1995): the matrix of the Boston consulting group (BCG matrix); the product-market matrix proposed by I. Ansoff; the public sector matrix by Montanari and Broker; the matrix "General electric" / "MCKinsey"; the Hofer and Schendel matrix; the Abell matrix; the matrix of directional policy Shell (Shell/DPM); the matrix of a life cycle by Arthur D. Little (ADL\LC).

The use of matrix methods in the strategic planning of activities of construction firms seems to be appropriate for the following reason. The construction firm always has a certain degree of diversification associated with the processes of contract activity and contracting, including a search for the contracts implemented by the construction firm for some reward and the contracts according to which other firms will provide the contractor with services.

According to the matrix methods, the choice of strategy is a function of two variables: first of all, a characteristic of the external environment of the firm, its attractiveness and level of uncertainty; second, a characteristic of the internal environment of the firm, its resource potential and competitive status.

These variables can be aggregated taking into account various factors, the composition of which is determined by a management task for managers of the firm. The matrix methods of economic portfolio analysis do not take into account either any of the essential features of the construction industry and internal resource capacity of a construction firm or peculiarities of construction products.

The comprehensive review of the analyzed features is presented by the characteristics of the system of inter-firm relationships of a construction company and competitiveness of construction products. In our opinion, these aggregate variables are appropriate to be used in tasks of strategic planning of resilience of the construction company. Let us study the role of these variables in the sustainable development of construction firms in detail.

Nowadays, in the economic science there is a new paradigm system that replaces neoclassical, institutional and evolutionary paradigms. According the academician Kleiner it is based on the use of the methodology of the system analysis and the system theory. A person or an employee used to be the main object of management and management itself was about human resources control but according to the system paradigm the main management object is an intercompany economic system. As a result "human resources management becomes management of systems". The system management includes not only control over intercompany subsystems but also control over a firm as one independent system. This system maintains space and time as well as the necessary internal diversity. The main object of the enterprise management is its economic subsystem, in which time and space components are combined as it is in the strategic management (Kleiner, 2015).

The stability of a construction firm depends on its resource, organizational and informational characteristics, which are determined by the level of production organization and management (Bertalanfi, 1974; Bogdanov, 1989; Van Gig, 1981; Dickson, 1969; Economics, 1975).

The construction firm as a system is resilient if it is able to perform its functions in terms of perturbations of the factors of the external and internal environment. Despite the fact that the modern construction firms are multifunctional systems that operate on several markets (capital, labor, supplies and contracts), and perform several functions (social, urban development, demand, and others), their main function is production. It is reflected in the volume, timing, cost and quality of construction works and it forms the basis for the functional stability.

The construction firm can achieve the functional stability due to its competitiveness. The competitiveness of construction firms is a complex of resource, information and organizational characteristics, which allows to face competition and to participate in tenders.

The analyzed characteristics of the construction industry define the essential features in concepts "competitiveness of the construction company" and "competitiveness of construction production"

1. One of the features of the construction industry is that the main factors of competitiveness of firms are formed and manifest themselves at the national and regional markets. The concentration of the competitive relations is formed within the investment-construction complex of the region, inter-firm relationships of the mesolevel.
2. The situation of perfect competition is not usual for the construction industry. The main type of competition in the level of investment-construction complex of the region is price competition. The competitiveness of construction structures can be evaluated through the efficiency of the contractual activities and processes of contracting, and also through the ability to win tenders (Barbarskaya, 2012; Nebritov *et al*., 2012; Rybyanceva and Moiseenko, 2014).
3. Among five groups of factors distinguished in the theory of competition (global, cultural, innovative, technical and resource) resource, technology and innovative factors have the greatest importance in construction. The experience with Russian construction firms has proven that the most important factor is the administrative resource. It is the administrative resource that determines the effectiveness of participation in tenders for contract works, the possibility of construction contracts, reconstruction and restoration of large objects for various purposes.
4. Unlike other industries, the standard ration "price - quality" in order to determine the level of production competitiveness is undergoing significant changes in the analysis of the competitiveness of construction products. Violation of the established norms in construction leads to an increase in the cost of construction works not significantly increasing its customer value. The most commonly used criterion for the competitiveness of construction products is the ratio between the average supply price in a given region and the internal price of the company at a specific point in time.

The competitiveness of construction firms is formed on three interrelated levels: operation (the competitiveness of construction products and demand for them); tactic (operational processes, competitiveness of investment and construction activities, a creation of conditions for the optimal combination of factors and conditions of production); strategy (competitiveness of development, processes of reproduction and adaptation to the environment, resilient strategy, structure and competition).

Due to long production and financial cycles in the construction industry, warranty maintenance these levels are often interconnected with each other and at each of them, the system of inter-firm relationships and interactions has a special importance.

Let us consider how the system of inter-firm relationships affects the stable functioning of the enterprise. To achieve the functional resilience (time, cost and quality of construction) there are opportunities for the construction firm dealing with creation and development of new organizational structures in the implementation of construction works (work contracts) and investment projects. These opportunities are characterized by the organizational flexibility of construction firms. Unlike industrial production the team that builds the object is always a new organizational structure.

The construction output in the form of buildings, constructions and their complexes with the use of raw materials, construction equipment, ancillary buildings and electricity presupposes the existence of adequate conditions of production and operation of the following subsystems

(Kwakye, 1997; Voropayev, 1975; Dickman, 1988): material preparation of production; technical and engineering preparation of production; production service; organizational preparation of production; production management.

Let us emphasize that flexible organizational structures that are able to adapt in accordance with changes in requirements of internal and/or external environment are becoming popular not only in the construction industry. These structures successfully combine positive aspects of both linear and functional structures.

In the theory of organizational management there are two types of flexible organizational structures: project temporary organizational structure that is created for specific tasks, and stops functioning after their implementation; constant matrix organizational structure or functional one, which is a characteristic of firms operating according to the project type (Vikhansky and Naumov, 2004; Dickman, 1988).

Considering the peculiarities of the organizational flexibility of construction firms it is necessary to emphasize the following. The organizational flexibility of construction firms is achieved through purposeful management of the system of inter-firm relationships.

There are different types of relationships between the elements of the production process in construction: man-man; man-team; community-community; man-society, man-tool, etc (Bakanov and Sheremet, 1999; Anonymous, 2006).

These relations can be subdivided as follows: technological relations, reflecting the characteristics of the production process; organizational relationships, namely, the need to organize technologies, equipment, people, the relationships in the team, and relationship between teams; social relations relevant to the situation in the society, to social roles and the interdependencies, interactions between people.

For example, let us consider the system of relations in the housing sector: relationship between builders and territorial authority (can be expressed by the level of site assessment); relationship between builders and investors can be expressed in the input housing, the quantity, and quality of housing; relationship influencing building capacity of companies and the situation on the construction market (equipment, materials, construction work) are characterized by the estimated cost of construction or by a contract price (can be expressed in terms of the estimated cost referred to the number meters of floor space in the facility); relationships that affect how people are provided with housing (can be expressed in the price of housing per 1 m2); relationship between builders and consumers (can be expressed through the level of housing affordability); relationship between owners of housing and providing service companies or housing and municipal relationship (can be expressed in terms of the housing payment).

4. Methods or Model

Strategic planning of resilient organizational structures in the construction consists of two interrelated areas of analysis activity.

The first is a comprehensive analysis of the competitiveness of certain types of construction production (construction works). The competitiveness of construction products determines the functional stability of the company (the formation of the financial result, sources of formation of inventories and costs).

The second direction involves the assessment, diagnostics, and forecasting system of inter-firm relationships. The stability of inter-firm relationships determines organizational flexibility (the ability to make new and effective organizational structures for implementation of project tasks).

Assessment of construction products competitiveness

The competitiveness of construction firm can be determined through a comprehensive assessment of the actual competitiveness level of certain types of construction products in comparison with competitors. The level of competitiveness of construction products is changing

along with the object of comparison. The primary valuation parameters are: indicators that estimate the cost of construction; indicators of construction time; indicators of quality construction , including compliance of construction works BREEAM (UK) LEED (USA), the "Green standards" (Russian Federation); the guarantee system for customers and future users.

Determining the competitiveness the level of separate kinds of construction materials occurs through complex comparative assessment, multidimensional comparisons and a (nonparametric) ranking analysis (Bakanov and Sheremet, 1999; Anonymous, 2007). The indicator of complex assessment allows users to integrate various parameters of the competitiveness of construction products (price, quality, construction schedule, etc.). The multivariate rank analysis allows taking into account different units of measurement, quantitative and qualitative parameters of competitiveness and the different assessment of the direction of their changes. Comparative evaluation allows taking into account their varying importance or contribution of the individual parameters in the integral indicator of the competitiveness of construction products. Then there is a comparison of competitiveness parameters achieved by the enterprise with the reference values. The benchmark is either normative settings or their average market values. For example, it is the average price of supply in the region.

The evaluation method of the integral level of construction products competitiveness

1. Quantitative and qualitative parameters of competitiveness are presented in the form of the original matrix a_{ij}, the dimension of which is determined by the number of types of products used to estimate the parameters.
2. The development of a matrix of the reference (the best) values of parameters for each type of construction product- max a_{ij}.
3. The development of a matrix of standardized coefficients, calculated by dividing the actual value of the parameter to a reference value.

The evaluation method of the integral level of competitiveness of construction products

1. Quantitative and qualitative parameters of competitiveness are presented in the form of the original matrix aij, the dimension of which is determined by the number of types of products used to estimate the parameters

2. The development of a matrix of the reference (the best) values of parameters for each type of construction products - max aij.

3. The development of a matrix of standardized coefficients, calculated by dividing the actual value of the parameter into a reference value.

$$x_{ij} = \frac{a_{ij}}{max\,a_{ij}}, \qquad (1)$$

where x_{ij} – coordinates of the points of the matrix – standardized indicators of j-th product of the company.

1. The development of a new matrix where for each type of construction product a dimension from the actual parameter of competitiveness to the point of reference is calculated.

2. Then the values are summed for each type of construction products. The integrated model of estimation of competitiveness level of construction products can be represented in the following form:

$$K_j = \sqrt{\left(1-x_{1j}\right)^2 + \left(1-x_{2j}\right)^2 + ... + \left(1-x_{nj}\right)^2}, \qquad (2)$$

3. If the individual parameters of competitiveness have different impact on the competitiveness level of construction firm, we introduce the weight coefficients factors - $k_1...k_n$, determining the importance of each parameter. The sum of each parameter is equal to 1.

$$K_j = \sqrt{k_1\left(1-x_{1j}\right)^2 + k_2\left(1-x_{2j}\right)^2 + ... + k_n\left(1-x_{nj}\right)^2}, \qquad (3)$$

4. The result of the analysis is the evaluations of the competitiveness of certain types of construction products

$$(K_1\ K_2\ K_3\ ....\ K_n), \qquad (4)$$

5. In the most simplified form (one kind of construction products, one quantitative parameter for its evaluation), the model of evaluation of the competitiveness of the construction company is as follows:

K= Average supply price in the region /Domestic price of the enterprise for construction products (5)

The greater the value, the higher the level of the construction company competitiveness is.

Diagnostics of stability of the inter-firm relationships system

Contemporary strategic marketing in the construction industry is relationship marketing. Intercompany relations between participants of investment and construction activities have a certain level of abstraction and can be expressed in the form of contracts for a certain amount of cooperation. The essential strength characteristic of connections is not their presence /absence in a pure form and the constancy of repetition. This constancy is reflected in space in the form of treaties and in time – in the form of stability of inter-firm relationships.

The analysis of the stability of inter-firm contractual relations occurs through applying the approach of information dynamics (Bertalanfi, 1974; Liiv, 2001; Anonymous, 2007; Economics, 1975). The information entropy is a measure of changing non-certainty in contractual activities described by the probabilities of occurrence of contractual events. It is possible to identify the relation between the characteristics of inter-firm relations, an opportunity of making contracts and probability of carrying out construction works according to this contract.

The stability of inter-firm relationships is a function of a number of contracts and the frequency of its concluding:

$$Y = F(V, n) ,$$
(6)

where V — volume of contracts; n — number of contracts.

To assess the stability of the relations the entropy according to contracts can be calculated according to the formula:

$$H_f = -\sum_{i=1}^{n} P_i^f \ \log_2 P_i^f$$
(7)

where H_f – the actual value of the entropy of relationships; P^f – probability of occurrence of contractual relations.

In the case of the critical state of the system of inter-firm relationships, decrease in the number of contracts and with the maximum stability of relations the entropy can be calculated according to the formula:

$$H_{lim} = \begin{cases} -\sum_{i=1}^{n} P_i^{lim} \ \log_2 P_i^{lim} ; \\ \\ H_n = -\sum_{i=1}^{n} P_i^n \ \log_2 P_i^n , \end{cases}$$
(8)

where H_n –the standard value of the entropy determined by the equal distribution of probability of occurrence; P^{lim} –probability of possible contractual relationships; H_{lim} –the limit value of the entropy defined with the equal decrease in the probability of event occurrence; P^n –probability of the ultimate combination of contractual relations.

To find the negentropy of relations stability the following formula is used

$$S = H_n - H_f ,$$
(9)

where S – negentropy of the system; H_n –standard value of the entropy; H_f – actual value of the entropy.

Depending on obtained relationships between the actual, the standard and the limit entropy of the system of inter-firm relationships a conclusion on the stability of inter-firm contractual relationship can be drawn.

5. Results

Strategic planning methodology of the construction company resilience:

1. Definition of the main types of construction products, construction works and/or construction investment projects implemented by the firm.

2. Diagnostics of contractual activities of the construction company: contracts, counterparties, amounts, timing, estimated cost of construction and installation works.

3. Assessment of construction firms competitiveness, using 3 levels of competitiveness level of various types of construction products: high, medium and low. The analysis of the stability of inter-firm relationships for each type of contract, using 3 levels of inter-firm relations stability: high, medium and low.

4. The positioning of the production activities of the construction company within a double-coordinate matrix. Using three levels of each indicator, we get the matrix consisting of 9 cells. They can be divided into the following development activities: the zone of growth and development of construction activities; the zone of selective positions; the zones of reducing activity and/or cancellation of the contract.

5. Planning firm behavior according to various types of construction works within the existing possibilities for resilient functioning and sustainable development .

Table 1
Matrix of strategic planning of construction company resilience

		The competitiveness level of products of construction company		
		High	**Medium**	**Low**
The level of stability of inter-firm Relationships of construction company	**High**	Growth and development of construction activities	Growth and development of construction activities	Selective position
	Medium	Growth and development of construction activities	Selective position	Reducing activity and/or cancelation of the contract
	Low	Selective position	Reducing activity and/or cancelation of the contract	Reducing activity and/or cancelation of the contract

6. Discussion and Implication

Possible directions of development of analytical tools in the strategic planning of resilience of organizational structures in construction are as follows:

The development of models for synergistic effects an account in different types of construction and/or for implementation of various investment and construction projects.

The development of models to predict changes in the resilience of construction companies for a certain period of time which is determined by the timing of the production program and/or timing of individual investment construction projects.

The development of dynamic models to find opportunities for sustainable development of the construction company when factors of the external and internal environment change.

The development of systems of automated support of management solutions by monitoring parameters of competitiveness and resilience factors of inter-firm relations.

The solution of problems of strategic coordination between different types of building products and the choice of specific development strategies.

7. Conclusions

The results of theoretical and methodological studies presented in the article allow formulating conclusions in the strategic planning of the resilience of construction firms.

1. The construction industry plays a special role in the implementation of social, environmental and economic challenges within the concept of "sustainable development". The stability of individual construction firms is defined as the possibility of achieving the objectives of the sustainable development and as the practical implementation of green standards.

2. The developed methods of strategic planning do not allow to solve tasks of ensuring the stability of construction firms, do not take into account the fundamental features that characterize construction industry, construction and resource potential of a construction company.

3. Applying matrix methods of the portfolio analysis in the strategic planning of construction

firm resilience is very appropriate as the construction firm always has a certain degree of diversification associated with the processes of contract activity and contracting.

4. The stability of the construction company as an open socio-economic system is determined by its functional, structural and stability information, which are determined by the level of competitiveness, organizational flexibility, and stability of the system of inter-firm relationships.

5. The organizational flexibility of construction firms is achieved by purposeful management of inter-firm relationships. Strategic marketing in the construction industry is relationship marketing.

6. The competitiveness or resource, information and organizational characteristics of construction firm allow achieving the functional stability of a construction firm that means to overcome the forces of competition and to participate in tenders.

7. The main type of competition in the construction industry is price competition at the regional level, which is assessed by the efficiency of contracting processes. The most significant competitive advantage is the administrative resource. Conditions and factors of the competitiveness of construction firms on strategic, tactical and operational levels are interrelated because of continuing significant production and financial cycle in the construction industry.

8. Strategic planning of resilient organizational structures in construction industry includes two directions: a comprehensive analysis of the competitiveness of certain types of construction products, which ensures functional stability of the firm and the diagnostics of the resilience of inter-firm relationships that provides organizational flexibility (making effective organizational structures for solving new project tasks).

9. Methods of multivariate comparisons and integrated assessment of certain types of construction products competitiveness are applied for estimation of a competitive level of construction firms.

10. To analyze the stability of inter-firm relationships system it is appropriate to apply the approach of information dynamics. The stability of inter-firm relationships is a stochastic function of a number of contracts and the frequency of their formation.

11. Strategic planning of the construction company resilience is done through the positioning of certain types of construction works (construction contracts) on a double-coordinate matrix, divided by the zone of growth and development of construction activities; the zone of selective positions and the zone of reducing activity and/or cancelation of the contract.

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References

[Anonymous, 2006] Details omitted for double-blind reviewing.

[Anonymous, 2007] Details omitted for double-blind reviewing.

Asaul, N. (2004), *Theory and methodology of institutional interactions of regional subjects of investment construction complex.* Saint Petersburg: Gumanistika

Bakanov, M., Sheremet, A. (1999), *The Theory of economic analysis: textbook*, 4-th edition. Moscow: Finance and statistics

Barbarskaya, M. (2012), "Management of a construction firm competitiveness". *Basics EUP*, 1(1), 63-66.

Bertalanfi, L. (1974), *General systems theory: a critical review. A study of general systems theory*. Moscow: Soviet radio

Bogdanov, A. (1989), *Tectology. The universal organizational science*, Moscow: Economy

1. Chandler, A. (1962), *Strategy and Structure*. Cambridge: MIT Press

David, F. (1995), *Strategic management.* New Jersey: Prentice Hall.

Dickman, L. (1988), *Organization and planning of construction industry. The management of construction enterprises with the basics of ACS: a tutorial for construction universities*, 3rd ed. Moscow: Higher School

Dickson, J. (1969), *System engineering: invention, analysis, decision-making*. Moscow: Mir

Gig, D. Van. (1981), *Applied general systems theory: in 2 books.* Moscow: Mir

Gusakov, A. (1983), *The technique of systems in construction*. Moscow: Stroyizdat

Harrington, D. and Wilson, B. (1986), *Corporate Financial Analysis*. 2-nd ed. Moscow: Business Publications.

Kleiner, G. (2015), "State — region— industry — enterprise: foundation of system resilience of Russian economy", *Region's economy*, 2, 3.

Kleiner, G. (2015), *Why is economics not a systems science? The development of the economic theory: reproduction, technologies, institutes*. The materials of X International symposium on the evolutionary economics and methodological workshop on the topic of institutional and evolutionary economics. Saint Petersburg: Aleteiya, pp. 92-107.

Kwakye, A. (1997), *Construction Project Administration in Practice*. London: Longman

Liiv, E. (2001), *Infodynamics as the world view of information society. Problems of Informatization*, 1, 31.

Lvov, D. (1999), *A path in the 21st century: strategic challenges and prospects of the Russian economy*, Moscow: Economics

Mathematics and cybernetics in economics: dictionary-reference book (1975). Moscow: Economics

Nebritov, B., Vasilenko J. and Poryadin V. (2012), "Industry features, defining the direction of improving methods of integrated assessment of the economic effectiveness of construction companies", *Online Journal science studies*, 13(4), 180.

Pearce, J. and Robinson, R.B.Jr. (1985), *Strategic Management*, 2-nd ed., Homewood: Richard D. Irwin.

Rybyanceva, M., Moiseenko, A. (2014), "Industry features of construction firms: structure and contents", *Scientific Journal of KubSAU*, 101, 8

Shim, J. and Siegel, J. (1986), *THEORY and PROBLEMS of Managerial finance*. New York: McGraw-Hill.

Thomson, A. and Strickland, A. (1995), *Strategy Formulation and Implementation: tasks of the General Manager*. Boston: IRWIN

Vikhansky, O. and Naumov A. (2004), *Management: a textbook for the economic specialists of high schools*, 3rd ed. Moscow: Gardarika

Voropayev, V. (1975), *Models and methods of planning in automated systems of construction management*. Moscow: Stroyizdat

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