

Specific character of sustainable innovative development of transport construction in self-regulation conditions

Khuta Gumba¹ and Svetlana Belyaeva²

¹Moscow State University of Civil Engineering, 26, Yaroslavskoye shosse, Moscow, 129337, Russia

²Voronezh State Technical University, Moscow Avenue, 14, Voronezh, 394026, Russia

E-mail: belyaeva-sv@mail.ru

Abstract. The providing of sustainable development is impossible without activating the innovative activity of backbone economical sectors, in particular of transport construction. The system of self-regulation of activities is a specific feature of the transport industry development. The authors carried out the correlation analysis of innovative activity of construction enterprises, which proved the necessity of improving the normative and technical documents. The authors proposed and calculated the index of the legislation stability in the industry. The article suggests recommendations on the activation of innovative development in construction industry basing on the results of the modeling.

1. Introduction

The statistical data analysis, as well as the results of studies on the issue pursued by experts indicate a fairly low innovation activity of enterprises in the construction industry not only in Russia but in the rest of the world. Speaking of the conservatism of the construction industry in terms of innovation, however, its aggregated nature should be taken into account [1].

The products of various national economy branches, including ones characterized as innovative, are used as resources in the construction industry. But still there are several problems arising on the way of accelerating the innovative development of the construction industry, most of which are of institutional nature. Among these problems are, for instance, the complexity of the organizational structure of the contract agreement (the subcontractors, the change of ownership of the object, etc.), the existence of regulatory and technical documentation for construction and design fields (it is worth noting, that sometimes this documentation does not take into account the current state of technology and equipment), the duration of the life cycle of construction products (as well as imperfection of liability system of construction workers for the further facility functionality and quality), and the actual existence of non-price and unfair competition in the construction market [2].

At the same time, insufficient standard-setting activity remains one of the most important problems of the construction industry, being one of the obstacles to the development of innovation activity [3]. Russia's participation in the global integration process requires reconciling the legal norms with the global trends of economic deregulation, which lie in the cooperation of the state, the business community and the scientific community. It determines the necessity of the augmented self-regulation implementation into a number Russian economy sectors, including the construction industry.

2. Methods

Analysis of the current situation in the field of technical regulation in Russia shows that there is no



united and coordinated regulatory framework for managing construction activities. The concept of technical regulation is based on the principle of dividing the exclusive responsibility of the state from the responsibility of business entities in the system of normative technical documentation, as well as on the principle of high activity of design and construction organizations in the development of technical regulation instruments [4].

One of the main responsibilities of self-regulating organizations in the construction sector are the development of standards for self-regulatory organizations that establish rules for the execution of works affecting the safety of capital construction facilities, writing the requirements for the work execution control system, and involvement into the process of improvement of the technical regulation system.

It is obvious, that such a situation requires not only the analysis of the amount of adopted regulatory documents, but primarily the analytical treatment to their quality.

The authors offer to accept the sustainability of the regulatory, technical and legislative base in the construction industry as a measure of its quality. The adoption of a large number of legislative acts affects the situation in the construction industry ambiguously. Many acts are not approved and abolished by higher authorities. Therefore, when analyzing the quality of the regulatory framework, i.e. the sustainability of legislation, it is necessary to follow the dynamics of adoption, cancellation and suspension of normative acts. The undertaken approximation showed that there are similar trends for the series of adoption and cancellation (suspension) of normative acts. For this reason, the legislation sustainability criterion is proposed to be taken as the ratio of the number of adopted and canceled (suspended) legislative acts to amended acts (Figure 1).

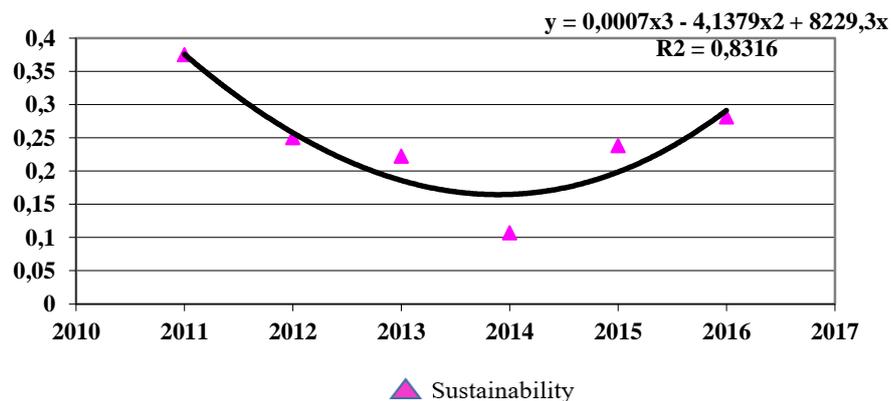


Figure 1. Legislation sustainability in the construction industry

In order to validate the influence of the self-regulation system on the innovative activity of business entities in construction, a correlation analysis of the relationship between the innovative activity of enterprises and a number of factors was conducted, including the dynamics of updating regulatory and technical documentation. The results of the analysis are shown in Table 1.

The data in the Table 1 show that the dynamics of norm-setting have the greatest interrelation with the innovative activity of small and medium-sized enterprises. The innovative activity of small and medium-sized enterprises is also more dependent on the volume of investments into capital stock and on the dynamics of shell and core works.

The innovative activity of large enterprises is more correlated with the operationalization of facilities. This situation is due to greater financial independence of large enterprises, the possibility of creating its own base of regulatory documents for users, the availability of its own research base [5].

It is worth noting that the consideration of regulatory and legal factors during strategy elaboration of innovative development of construction enterprises is offered to be implemented using methods of the matrix games theory due to weak, high uncertainty and the absence of generally accepted evaluation methods of those enterprises.

Table 1. The results of the correlation analysis of the relationship between the innovation activity of enterprises and a number of factors

	Innovation activity of small enterprises	Innovation activity of medium-sized enterprises	Innovation activity of large enterprises	introduced regulations	Current regulations	operationalization of the core funds	capital investments	Construction and assembly work	Volume of unfinished construction
Innovation activity of small enterprises	1	0.99	0.60	0.19	0.98	0.76	0.98	0.96	0.97
Innovation activity of medium-sized enterprises	0.99	1	0.70	0.18	0.96	0.84	0.97	0.98	0.96
Innovation activity of large enterprises	0.60	0.70	1	-0.18	0.47	0.98	0.56	0.66	0.53
Introduced regulations	0.19	0.18	-0.18	1	0.34	-0.12	0.38	0.38	0.42
Current regulations	0.98	0.96	0.47	0.34	1	0.65	0.99	0.96	0.99
Operationalization of the core funds	0.76	0.84	0.98	-0.12	0.65	1	0.71	0.79	0.69
Capital investments	0.98	0.97	0.56	0.38	0.99	0.71	1	0.99	1.00
Construction and assembly work	0.96	0.98	0.66	0.38	0.96	0.79	0.99	1	0.99
Volume of unfinished construction	0.97	0.96	0.53	0.42	0.99	0.69	1.00	0.99	1

3. Results

There are two types of reasons for the construction industry being so inert. First type of reasons is objective, which are related to the specifics of the construction industry, and subjective, reflecting shortcomings in its regulation (including organizational and economic aspects).

The duration of the life cycle of construction products and the relevance of planning methods of regulation and organizational changes form the need for determining the innovative and strategic development of constructional enterprises and the construction in general. The strategy enables to determine the actual opportunities for development, resource limitations, and to determine the consequences of development [6]. This becomes especially important under conditions of achieving sustainable development.

The authors consider that the most adequate definition of the concept of innovation and strategic development, taking into account the features of the innovation cycle, is the understanding of the innovation strategy as a process of achieving and adjusting the main long-term goals and objectives of the construction enterprise, relating to the entire length of the innovation cycle, from research to production, marketing And use, and providing for measures to regulate and monitor actions agreed upon by resources and terms, while ensuring the best economic result in resonance with the self-development of the system.

The main stage of choosing the direction and ways of implementing innovative and strategic development involves the determination of many factors and fluctuations of the system. Moreover, the authors suppose that the hardest restrictions on the formation and management of the strategy of innovation and strategic development of the enterprise are imposed by their external environment. The environment consists of various components including consumers of construction products, suppliers, the state, various public organizations and political parties.

The consumer sets the strongest restrictions on the life of a construction company. Suppliers also significantly affect companies, because the opportunities for economic growth depend on the quality and volume of supply.

The state regulating by laws, decrees and other normative acts sets the economic rules for the enterprise. Political parties, public organizations and trade union organizations set environmental,

political and other rules to act. The authors consider that it is the environment that outlines both the area of the construction enterprise activity and its regulations.

It seems reasonable to point out the following stages of planning the innovation and strategic development of an investment and construction complex or a certain enterprise: the diagnosis (assessment) of the current state of the company's innovative development; forecasting of the economic situation in the external environment; reasonable option of the scenario forecast; forecasting the structure of innovations; generalization and determination of an innovative strategy for the enterprise; management of the implementation of the enterprise innovative strategy.

All possible external innovations are deduced due to the diagnostics and forecasting of the state of the external environment. The forecasting of the innovative potential of the construction enterprise allows to form a set of potentially enable internal innovations.

The received structure of innovations is elaborated and specified during the process of coordination with available material, labor and financial resources.

The structure of innovations determined during this stage is the structure of manufacturing certain types of construction products having properties required by a consumer and the necessary changes in technology and manufacturing organization [7]. So the consequences of any innovation create a fairly complex system of branches and interrelationships, and consequently almost all aspects of organizational and economic adaptation undergo certain changes

4. Discussion

According to the authors, the point of managing the development strategy is the correct assessment of the trends, the consequences of changes in the external environment and the appropriateness of taking worthwhile measures. Managing implementation of the innovation and strategic development being the final phase of the whole process combines the previous stages and brings them to a logical conclusion.

Specific directions of research and development works (R&D), their volumes and terms of execution are ascertained basing on the structure of innovations. At the same time, the structure of innovations is clarified on the basis of the possibility and expediency of using external innovations instead of conducting their own R&D. One ascertains the most effective relationship between the conducting their own R&D in full, the participation in inter-firm cooperation and cooperation, the purchase of patents, licenses, know-how or prototypes is revealed. In addition, the process of reconciliation with available resources is being carried out, as well as risk analysis and accounting, which is particularly important at this stage [8].

The determined innovative strategy is formalized in the strategic plan of innovative activity of the construction enterprise. However, it worth noting that our aims did not contain the development of its specific sections and indicators at this stage. It is a complex and important issue that worth being the subject of an individual study. The successful implementation of the innovation strategy depends on the correct solution of this issue, since it is the strategic plan where the adopted strategy gets its concretization and quantification in the strategic plan of innovation

5. Conclusions

One can distinguish two types of reasons for the construction industry inactivity. The reasons of the first type are objective, related to the specifics of the construction industry. The second type reasons are subjective, reflecting the problems of construction industry regulation and including organizational and economic aspects. As the result, when developing a strategy for elaboration of both the investment and construction complex in general and enterprises forming it in particular, it is necessary to implement a full cycle of organizational and economic changes including institutional aimed at solving the main problems, taking into account completeness Principles of completeness, entirety, optimality and ecological compatibility.

References

- [1] Belyantseva O and Uvarova S 2014 *Sovremennaya economica: problem i resheniya* **6** 55-61

- [2] Duvanova I, Bubnova T and Romanovich M 2016 *Procedia Engineering* **165** 1794 – 1800
- [3] Murgul V 2015 Reconstruction of the Courtyard Spaces of the Historical Buildings of Saint-Petersburg with Creation of Atriums *Procedia Engineering* 117 pp 808-818
- [4] Uvarova S, Belyaeva S, Kankhva V and Kochetova L 2016 *Economica i predprenimatelstvo* **5** 453-456
- [5] Kankhva V, Uvarova S and Belyaeva S 2016 *Procedia Engineering* **165** 1046-1051
- [6] Serpell A and Alvarez R 2014 *Procedia Engineering* **85** 464-472
- [7] Horta I M, Camanho M S and Moreira da Costa 2012 *International Journal of Production Economics* **137** 84-93
- [8] Chirkunova E, Kireeva E, Kornilova A and Pschenichnikova J 2016 *Procedia Engineering* **153** 112-117