Reengineering of construction organizations and reengineering of the construction industry

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Abstract. The change of technological and managerial processes caused by scientific and technological progress and designated in the state strategy as the digital transformation should be reflected in the qualitative transformation of organizational structures and methods of implementation of investment and construction activities both at the corporate level and at the industry level. This qualitative transformation is commonly referred to as re-engineering. As a practice and as a methodology reengineering has in its genesis certain phenomena, and for justification uses theoretical tools advised by them. In this regard, the authors in the article argue that digital transformation should be a component of a deeper change in the sectors of the national economy - technological transformation.
In terms of practical value reengineering for the industry and its corporate level can be seen as an effective technology for managing the timing and cost of construction, taking into account the needs of the population in the formation of a comfortable and safe environment of life.

1 Introduction

Reengineering of construction organizations and industry have their own features directly related to the specifics of the investment and construction sphere, with the prevalence of management processes at these levels, as well as the need to form regulatory impacts on construction production and its provision. At the same time, the connection with production processes at these levels weakens. If at the corporate level along with general corporate management and planning the planning and management of a specific construction object is carried out, then at the regional and then at the branch level the connection with the objects (except for socially important or falling within the sphere of state interests) becomes abstract, and planning and management are implemented mainly on the basis of cost indicators, rather than natural (physical) as at the level of a construction object. In this regard, it seems possible to formulate the main directions, as well as theoretical and methodological foundations of reengineering of construction organizations and industry.

2 Methods

The theoretical basis of the study was the system approach, the logistics of regulatory

influences, structural and functional analysis, methods of investment design, strategic and operational management. The information base of the study was the authors' earlier scientific search, which was reflected in published articles on the subject. Additional sources were the scientific works of domestic and foreign scientists, as well as practical materials in this area of application.

3 Results and Discussion

Reengineering of construction organizations can develop in the direction (Figure 1):

1. Changes in the organizational structure;
2. Transformation of business processes and technological processes.

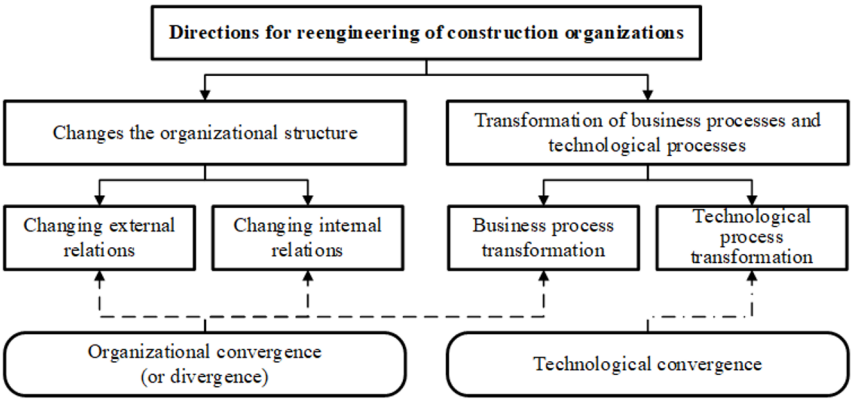

Fig. 1. Directions for reengineering of construction organizations

In direction 1 - changes in the organizational structure of the construction organization, it is assumed:

1.1 Changing the external links of the organizational structure by:
- entering or leaving various integrated structures (horizontal, vertical);
- Specialization or diversification of activity of the business entity;

1.2 Changes in the internal links of the structure due to
- creation or elimination of subdivisions;
- Redistribution of functions.

In direction 2 - transformation of technological and business processes, respectively, are implemented:

2.1 Transformation of technological processes through:
- use of new materials;
- Use of new technologies;
- mechanization, automation and robotization of construction processes;

2.2 Transformation of business processes by:
- automation of management procedures;
- wide application of BIM-, CIM-technologies, cyber-physical systems.

There are two approaches that can be used to explain re-engineering as a phenomenon. The first approach is related to the provisions of the theory of the social division of labor. Reengineering activities of an economic entity can be considered within the framework of organizational forms: specialization, co-operation and combination, as well as the factor of placement of construction objects. This approach is a traditional

direction in the organization and economics of construction and was non-alternative for a long period of time in our country.

However, well explaining the external and internal integration of a business entity in terms of deepening specialization and development of cooperation, then diversification, disintegration, as well as the transformation of management and technological processes the above approach highlights is not so slender with some assumptions and additional elements associated with the development of the technical component of productive forces.

In the context of the study in this regard, it should be noted another approach, according to which the reengineering activities of the construction organization are explained by the principles:

- organizational convergence (or divergence) - direction 1, par. 1.1, 1.2, direction 2, 2.2;
- technological convergence - direction 2, clause 2.1.

Technological convergence is a process of integration of unrelated technologies into their new types (additive, nature-like technologies, nanotechnologies, etc.).

Organizational convergence is the combination of different highly specialized subdivisions in one structure. In this case subdivisions can differ not only by the type of work performed, but also by functionality, belonging to different types of construction (for example, within an engineering company).

The processes of technological and organizational convergence can be interrelated. So, for example, as a result of the above-mentioned integration activities there may be a need (which often happens) for workers or employees to acquire additional knowledge, skills, abilities (competencies) not related to their specialty, then in such a situation we can talk about professional convergence. A particular case of which can be considered mastering related professions (plasterer-painter, concrete worker-carpenter, etc.).

The opposite phenomenon to organizational convergence can be the divergence of the same name, which manifests itself in the deepening of specialization of the economic entity.

Although convergence and divergence have opposite vectors, they are not only equally present in modern social production, but also in a sense are different manifestations, sides of one phenomenon.

Considering the reengineering of the construction industry, it seems appropriate to note the following:

- The need to take into account the peculiarities of reengineering at the lower levels of the hierarchy;
- the presence of the phenomena of territorial convergence.

As mentioned above, the reengineering of construction organization has specific features, which can be strengthened by individual characteristics of a particular business entity. In this regard, the qualitative transformation of the construction industry will include transformations of the corporate level, but in some integral representation, and can be explained by the phenomena of organizational and technological convergence.

It would be logical to project these considerations to the reengineering of territories (renovation, reclamation) and buildings (renovation, reconstruction, change of purpose) and consider them in further research.

The level of development of productive forces employed in construction also varies by territory. But at the same time, due to the mobility of participants in investment and construction activities, these differences are smoothed and it can be defined as a productive aspect of territorial convergence.

Given the above, as well as the provisions of the theory of regulatory impact in investment and construction activities, we can point to the dominant sectoral level in creating a regulatory framework of qualitative transformation of technological, managerial processes in the construction of the building, as well as similar transformations of capital

construction objects themselves at the stages of the life cycle. Direct realization of these reengineering measures is the prerogative of corporate level.

The fundamental provisions of the reengineering of construction organizations and industry can be formulated and implemented in the theoretical and methodological framework of convergence. Depending on the level and purpose of the re-engineering measures the principles of technological, organizational and territorial convergence can be used.

4 Conclusions

Based on all the above it can be stated that re-engineering of both construction organizations and the construction industry as a whole has as its goal the formation of competitive advantages through the qualitative transformation of existing management and technological solutions based on permanent changes in science and technology. The consequence of re-engineering for the industry and its corporate level can be a reduction in the duration of construction, reducing costs and more fully meet the needs of the population in the formation of a comfortable and safe environment of life.

References

1. Zharov Y.V. Information modeling of construction on the basis of the block cluster structure. Norming and Payment for Labor in Construction, **11**, pp. 10-14 (2019)
2. Zharov Y.V. Organizational and technological design in construction based on intelligent planning unit. Bulletin of Civil Engineers, **6**(77), pp. 193-199 (2019)
3. Ermolaev E.E. Methodological aspects of the new model of development of the construction complex. Internet-journal Naukovedenie, **1**(20), p. 34 (2014)
4. Simanovich V.M., Ermolaev E.E. Implementation of construction, reconstruction, overhaul of the object of capital construction. Norming and payment of labor in construction, **12**, pp. 4-8. (2018)
5. Sborshikov S., Markova I., Zinoviev A. Complex measures to develop informatization and automation of construction and technical expertise. In E3S Web of Conferences, **365**, p. 02009 (2023)
6. Sborshikov S., Vvedenskiy R., Markova I. The application of simulation modelling in making operational decisions in construction. In E3S Web of Conferences. 24. Cep. "24th International Scientific Conference "Construction the Formation of Living Environment", FORM 2021, p. 2047 (2021) DOI: 10.1051/e3sconf/202126302047
7. Yazhlev I.K., Popkov A.G., Belogurova O.A. Problems of regulatory and legal support for the introduction of resource-, energy-saving technologies in urban planning activities, Economics and Entrepreneurship, **3**(116), pp. 1000-1002 (2020)
8. Burenin V.S., Ezersky V.A., Monastyrev P.V. Study of modern trends in the design of residential buildings in Russia and abroad, Architecture and Time, **5**, p. 2 (2017)
9. Sborshchikov S.B., Maslova L.A., Zhuravlev P.A. Reengineering in Construction. Industrial and Civil Engineering, **7**, p. 71-76 (2019)
10. Sborshchikov S.B., Lazareva N.V. Formation of additional effect in managing the cost of the investment project due to re-engineering activities. Bulletin of Civil Engineers, **2**(79), pp. 252-263 (2020)
11. Klyuev V.D., Zaitsev D.A., Zhuravlev P.A. Regulatory basis for the cost estimate of capital repair of apartment buildings. Apartment Building Management, **1** (2015)

12. Zhuravlev P.A. Nomenclature of the required objects of capital construction for resource and technological modeling. Industrial and Civil Engineering, **7**, pp. 52-57 (2020)
13. Kharisov I., Sborshikov S., Artamonova I., Bilenko P. Management of the implementation of a construction project based on integrated digital models. Lecture Notes in Civil Engineering, **231**, pp. 113-124 (2022) DOI: 10.1007/978-3-030-96206-7_12
14. Sborshikov S., Vvedenskiy R., Markova I. Development of methods of operational and production management of construction of nuclear facilities. In E3S Web of Conferences. 24. Cep. "24th International Scientific Conference "Construction the Formation of Living Environment", FORM 2021" (2021) DOI: 10.1051/e3sconf/202126302047