

Designing of structural and functional organizational systems, formed during the re-profiling of industrial facilities

D Topchiy¹ and A Tokarskiy¹

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

89161122142@mail.ru

Abstract. When implementing a project for the re-profiling of industrial facilities, a complex multi-factor system of interactions is formed, which includes a large number of functional subsystems, formed by organizational and technological modules. Taking into account the object orientation of the system aimed at achieving optimal results of industrial site redesign, the most significant are the following groups of organizational and technological modules: investment, design, production, information, management. The study of qualitative and quantitative characteristics of subsystems, the system under consideration, will allow to formulate the basic requirements to the initial data necessary for creating a structured system of organizational design and management of projects for the re-profiling of industrial enterprises. Thus, the system must function reliably in the interaction of all the integrated structures of the project under the influence of the external environment. The system and its elements at all levels should be open and flexible, ensuring reliability in the operation. When operating, the system must provide an operational response to impacts, integrated modules or the external environment. The system should create the most concrete resultant solution intended for managers of the project management structure. The system should be formed on the maximum number of typical and representative subsystems, as well as standardization, unification and continuity, while remaining open and not localizing the choice of solutions to project managers. The main objective of the system should be to increase the financial attractiveness of the project, as well as to increase the processability of the project implementation processes. Approaching the solution of the problem from a scientific point of view, it is expedient to conduct research consisting of structural and functional modeling of multi-level and multi-criteria links of organizational, technological, managerial structures and information support for the re-profiling of industrial facilities; multifactorial analysis of the dynamic system of organizational and technological transformable matrices of industrial facilities redevelopment; multistage analysis of polyvariant design; deterministic factor analysis of organizational and technological modules that ensure the achievement of optimal solutions for the conversion of industrial facilities. The objectivity of the results of the above methods will provide an opportunity to comprehensively study the issue under consideration.

Production territories occupy about 20 thousand hectares in Moscow that is practically the fifth part of all square of the megalopolis. The main tendency of Moscow as leader among the Russian cities which are actively realizing programs for renovation of similar zones develops in two directions: without change of the functional purpose of the territory, and having only reorientated them in innovative, knowledge-intensive and not having ecological influence of the enterprise or with change of the



functional purpose of territories, actually always the providing demolition of buildings and a recuperation of a soil.

Developing production territories the city authorities create new jobs with accommodation of locals on the periphery of the urban environment in close proximity. This approach allows to solve including a part of logistic city problems as traffic flow which will be in the direction from the central part in the morning, and in the evening – from the periphery. Thus transport city infrastructure considerably unloads and it is formed more dynamic logistic transport schemes giving the chance to use the territories located on the considerable removal from megalopolises.

Reprofiling of industrial buildings forms base for realization of a large number of projects of the quarter housing estate and also social objects, transport networks, and recreational "green" territories. For example, in the territory of Moscow it is offered to reprofile nearly 15 thousand hectares of the earth, at the same time about 5 thousand from them will get under the complete stripping of all objects, a recuperation of soils and further construction, and about 8 thousand hectares – partial, providing reconstruction and reprofile of a part of buildings and their further use for social needs of the population, and this also will solve sensitive city issues – the sports centers, parkings, the entertainment family centers, cinemas, etc.

However, processes bound to projects of the renovations and reprofiling of the industrial territories are not systemic today that leads to a great many as manufacturing expenses, and to decrease in economic efficiency and technological safety at implementation of similar projects.

Building uniform selection criteria of elements of system of implementation of the project on renovation and reprofiling of the industrial facilities, four main stages are revealed.

At the first stage it is necessary to reveal the basic social and business directed elements of the formed system. Uniting in it as the common relation of society to the project of reprofiling, and as the state, from the point of view of various authorities.

At the second stage it is expedient to build mathematically related network of communications, criteria and responses on internal and external activators. To estimate and to create a possibility of structure to develop, provide the tool for convenient input of information and receiving an operational response. To estimate influence level from out of and also to provide stability and serviceability under various operating conditions.

The third stage of formation of systems approach to conversion of the industrial facilities has to provide applicability of this system for various projects, the bound to renovations of production territories.

And the finishing, fourth stage – assessment of activity of system, identification of critical ways of implementation of projects, determination of levels and criteria for evaluation of efficiency of the created system.

Thus, it is apparent that for formation of systems approach to processes of renovation and reprofiling of the industrial facilities, it needs identification and formulation of a backbone factor is. This problem also becomes a concept of System, and its application in research to the devoted development and formation of uniform system of reprofiling of the industrial facilities.

The main signs of the similar formed system is a number of provisions, so they are:

- theoretically created system can become common if unites all participants, all isomorphous regularities of processes and mechanisms of interaction for various modules of system;
- the revealed isomorphisms of various modules of system, it is possible to estimate if criteria of an isomorphism are rather powerful and significant. And the amount of criteria gives in to assessment and a calculus.
- when forming "The common theory of system" it is necessary to reveal and describe a backbone factor of isomorphism.

Organizational and technological system of reprofiling of the industrial facilities as, however, any other system describing interrelation of participants of structural processes, is based on the mathematical theory of systems. At the same time the system serves not only for a research of processes of the projects happening at realization, but also for an explanation of various proceeding processes. Mekhaylo

Mesarovich in details explained an essence of realization of mathematical model in his works, and formulated the sequence of application of mathematical model to studying of characteristics of the considered model (a deduction method) or by using a computer model operation. Thus the methodology of systems approach is built in the following structure:

- Formalization. Formation of system on the basis of the requirement specification;
- Deduction. A research of the created system;
- Interpretation. Studying of the received results of action of system.

So, the sequence of use of the mathematical theory in structure of organizational and technological system of interrelations of participants of reprofiling, is formulated by the following principle: theoretical formation is carried out in the beginning, and only then make functioning it on a concrete object, and then carry out assessment of the received results and other phenomena.

The received result is subject to the multifold analysis as to a decisive link of activity of system. First, it is necessary all activity of system, and various turned-out variation ranks, to expedient to present in various terminological results, thereby having noted a significance of mathematical model. This influence can be expressed by the following interrelation (figure.1).

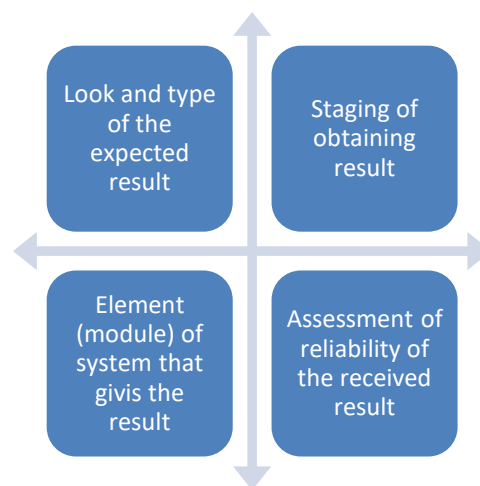


Figure 1. Elements of system of interrelation of organizational and technological model.

At implementation of the project on reprofiling of the industrial facilities, the composite organizational system of interactions forms and includes a large number of the functional subsystems and modules which are falling into to investment, design, production and informational components of structure of the project. Having studied qualitative and quantitative characteristics of the making elements of the considered system, it is possible to formulate the main requirements to input datas, necessary for creation of the structured system of organizational projection and project management.

When studying of the similar developed systems of interrelations the systematization of the studied elements that is formed on the principles of empirical and practical studying of really operating communicational networks is taken for a basic technique. Formation of basic structure of management at exercise of structural monitoring on reprofiling subjects became a result of this research and also need of creation of the program complex giving an opportunity of management of multifactorial systems is revealed and proved. Besides, the system has to function reliably at interaction of all integrated structures of the project under the influence of the external environment. The considered system and its elements at all levels have to be open and flexible, providing reliability when functioning.

When functioning the system has to give an operational response to influences of the integrated modules or the external environment.

The system has to form the most concrete resultant decision intended for heads of structure of project management.

The system has to be formed on the maximum quantity of standard and representative subsystems and also standardization, unification and continuity, at the same time should be open and not to localize a possibility of the choice of decisions to project managers.

The purpose on increase in financial appeal of the project and also on increase in technological effectiveness of processes of implementation of the project has to be a primal problem of system. At the same time, the ergonomics of system has to become not an unimportant fact, for this purpose it has to be based on the maximum quantity of the same and standard subsystems and modules and also not to form a frame for activity of the performer during realization of various stages of the project (figure 2).



Figure 2. Structure of basic system.

The system has to give an opportunity of mass use on various computers, tablets and smartphones. At the same time it is necessary to provide updating of the program complex which is the basic of covered systems.

Main objective of functioning of system has to be reductions of terms and cost of implementation of the project on reprofiling of an object, and at the same time to ensure safety, quality and operational reliability of an object.

One of basic elements of similar system is informational technologies.

Symbiosis of the specified characteristics of system created on the basis of positive experience of implementation of similar projects together with a theoretical evidence-based method of creation of similar administrative models of the project, gives the chance to formulate structure and to build a chronological of elements of informational technologies of all participants of reprofiling project.

It is expedient to group basic elements of this information system in four main functional and informational macroblocks (figure 3).

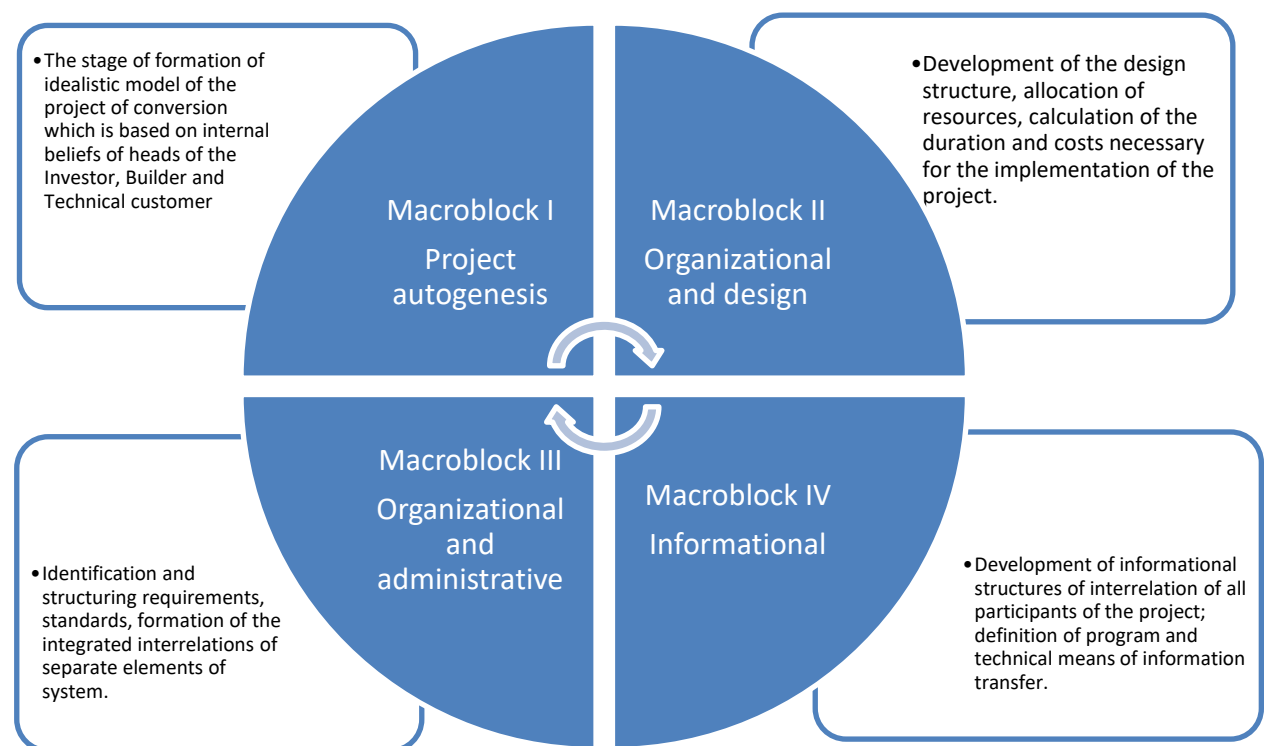


Figure 3. Basic elements of system.

Thus, having applied the offered approach to formation of an information system of the project of reprofiling, the uniform determined structure of all participants is created. Giving thus ability to integrate data at all stages of realization, and estimating a response of the created system on critical indexes. Besides, the described information system is not only open, but also provides flexibility to internal and external action and also is steady.

Considering separate parameters and methods of reprofiling, it is impossible to estimate all risks and potential expenses as temporary, and also economic and reputation. The different approach at the choice and design of organizational and technological model of work on reprofiling of the industrial facilities describing all multifactority of processes and also allowing to operate it is necessary in essence.

To develop the most efficient organizational and technological scheme of works, with optimized by duration, labor input and cost of realization, it is necessary to reveal the parameters exerting it impact.

Using such concept as the complex index of effectiveness (CIE), the investor or the customer can make the reasonable choice of organizational and technological model of carrying out reprofiling of the production territories. At the same time considering all difficulties of carrying out construction and reconstruction works in the conditions of the dense developed building.

References

- [1] *Federal Law of the Russian Federation "Urban Development Code"* of December 29, 2004 № 190-FZ.
- [2] *Federal Law of the Russian Federation "On Technical Regulation"* of 27.12.2002 № 184-FZ.
- [3] *Federal Law of the Russian Federation "Technical Regulations on the Safety of Buildings and Structures"* dated 30.12.2009 № 384-FZ.
- [4] *Technical regulation in construction. Analytical review of world experience 2010* [Text]: Snip Innovative Technologies; Hands of Gray A. - Chicago: SNIP, p.889

- [5] *German Construction Contract Procedures (VOB 2006): English Translations of German Standards* 2007 (Übersetzung aller DIN Normen der VOB, Teile A-C.-DIN).
- [6] Billington M J 2007 *The building regulations* (Blackwell publishing) p.85.
- [7] Billington M J 2005 *Using the Building Regulations: Administrative Procedures* (Elsevier) p.224.
- [8] A beginner's guide to resource and building consent processes / Department of Building and Housing / Ministry for the Environment. New Zealand Government, 2008.
- [9] Decree of the Government of the Russian Federation of June 21, 2010, No. 468 "On the procedure for conducting construction control in the construction, reconstruction and overhaul of capital construction projects".
- [10] *Monitoring of accidents and incidents* [Electronic resource]. - Access mode: http://nostroy.ru/information-disclosure/monitoring_proishestviya/ - The title from the screen. - (Date of circulation: September 14, 2017).
- [11] Lapidus A 2016 *Forming the integral potential of organizational and technological solutions through decomposition of the main elements of the construction project* (Vestnik MGSU No. 12) p. 114-123.
- [12] Lapidus A 2017 *Formation of professional orientation of specialists in the field of construction on the basis of analysis of their employment in various sports* (Theory and practice of physical culture No. 5) p. 33-34.
- [13] Afanasyev A 2017 *Efficiency of pipe-concrete structures in the construction of frame buildings and structures* (Construction and reconstruction No. 4) p. 111-120.
- [14] Topchiy D and Tokarskiy 2017 *A Increase of organizational and technological reliability of the objects of re-profiling in the implementation of construction supervision* (Science and Business No. 10 (76)) p.15-19.
- [15] Topchiy D and Skakalov V. 2017 *Structural and functional modeling of multi-level and multi-criteria links of organizational, technological, managerial structures and information support in the implementation of construction control during the conversion of industrial facilities* (Prospects of Science No. 10(97)) p. 44-50.
- [16] Afanasyev A 2016 *Pipes for construction of frame buildings* (Academia. Architecture and construction No. 2), p. 113-118.
- [17] Oleinik P 2016 *Conditions for ensuring the comprehensive production of earthworks* (Scientific Review No. 14), p. 239-243.
- [18] Zhadanovsky B and Topchiy D 2017 *Strengthening the foundations of the foundations of emergency and reconstructed buildings of the textile industry enterprises* (Innovations and investments No. 12) p.264-268.