RESEARCH OF THE RELIABILITY OF FORMATION OF CALENDAR PLANS IN RAILWAY CONSTRUCTION

Bekmurodov Boburbek Bahodir o'g'li

Toshkent State University

Scientific supervisor**: Ergashev Zuxriddin Zaynitdinovich**

Toshkent state transport university, Tashkent, Uzbekistan.

Annotation: However, the implementation of modern transport construction programs, characterized by high cost, complex interrelationships of various work complexes, tight construction times, severe natural and climatic conditions, lack of necessary infrastructure, qualified personnel, construction capacity, resource insecurity, etc., requires a radical improvement in planning methods. and organization.

Key words: high cost, climatic conditions, infrastructure, specific features, railway construction programs.

Annotation: Однако осуществление современных транспортных строительных программ, характеризующихся большой стоимостью, сложными взаимосвязями различных комплексов работ, сжатыми сроками строительства, суровыми природно-климатическими условиями, отсутствием необходимой инфраструктуры, квалифицированного персонала, строительных мощностей, ресурсной необеспеченностью и др., требует кардинального улучшения методов планирования и организации.

Ключевые слова: дороговизна, климатические условия, инфраструктура, особенности, программы строительства железных дорог.

The development of the Far East and the North determines the reorganization of the existing railway network and the creation of new railway communications. However, the implementation of modern railway construction projects, characterized by complex interrelationships of various sets of work, tight construction terms, difficult natural and climatic conditions, etc., requires a significant improvement in planning and organization methods. The number of new and relevant research areas in railway construction should first of all include a set of problems of organizational and technological reliability of construction production, that is, the ability of organizational, technological and economic solutions to maintain their projected qualities within specified limits under the influence of disturbing factors, inherent in construction as a very complex probabilistic system. Research, as well as the experience of using methods for optimizing scheduling, shows that taking into account the probabilistic nature of construction production is a necessary condition for ensuring the required stability of the parameters of the production process and reveals significant reserves for increasing the economic efficiency of construction. The purpose of the work is to study the fundamental issues of the relationship between the optimality and sustainability of organizational decisions on the example of the functioning of control systems in railway construction, as well as the development of some methods for increasing the reliability of railway construction programs, taking into account the specific features of the construction of railway facilities and complexes. Research, as well as the experience of using methods for optimizing scheduling, shows that taking into account the probabilistic nature of construction production is a necessary condition for ensuring the required stability of the parameters of the production process and reveals significant reserves for increasing the economic efficiency of construction. The purpose of the work is to study the fundamental issues of the relationship between the optimality and sustainability of organizational decisions on the example of the functioning of control systems in railway construction, as well as the development of some methods for increasing the reliability of railway construction programs, taking into account the specific features of the construction of railway facilities and complexes. Research, as well as the experience of using methods for optimizing scheduling, shows that taking into account the probabilistic nature of construction production is a necessary condition for ensuring the required stability of the parameters of the production process and reveals significant reserves for increasing the economic efficiency of construction. The purpose of the work is to study the fundamental issues of the relationship between the optimality and sustainability of organizational decisions on the example of the functioning of control systems in railway construction, as well as the development of some methods for increasing the reliability of railway construction programs, taking into account the specific features of the construction of railway facilities and complexes. that taking into account the probabilistic nature of construction production is a necessary condition for ensuring the required stability of the parameters of the production process and reveals significant reserves for increasing the economic efficiency of construction. The purpose of the work is to study the fundamental issues of the relationship between the optimality and sustainability of organizational decisions on the example of the functioning of control systems in railway construction, as well as the development of some methods for increasing the reliability of railway construction programs, taking into account the specific

features of the construction of railway facilities and complexes. that taking into account the probabilistic nature of construction production is a necessary condition for ensuring the required stability of the parameters of the production process and reveals significant reserves for increasing the economic efficiency of construction. The purpose of the work is to study the fundamental issues of the relationship between the optimality and sustainability of organizational decisions on the example of the functioning of control systems in railway construction, as well as the development of some methods for increasing the reliability of railway construction programs, taking into account the specific features of the construction of railway facilities and complexes.

The research methods are based on a systematic approach, probability theory and mathematical statistics, scheduling theory, correlation theory, methods of reliability theory, new information technologies and systems, which made it possible to develop comprehensive methods for assessing scheduling models, obtain quantitative parameters of existing scheduling information systems, propose new approaches to the modeling and formation of construction schedules of railway construction.

The gradually accumulated practical experience of the functioning of the information systems of scheduling, developed on this basis, puts forward the task of its analysis and generalization. But since there are still not enough analogs in this area, in turn the problem of developing a methodology for conducting such studies arises. An important place in this should be occupied by modern methods of assessment. As the analysis has shown, the existing methods for assessing the systems of informatization of the scheduling of railway construction do not meet the requirements. The main methodological shortcomings of these methods are: a deterministic approach that does not take into account the probabilistic nature of construction production, underestimation of the feedback factor, the lack of a systematic approach in assessing scheduling as a functional subsystem. The probabilistic nature of the construction of railway facilities and complexes leads to uncertainty both at the stage of developing the schedule and in the process of implementing the schedule. This means that elements of uncertainty in the performance of a construction organization require consideration of the problem of assessing plans from the point of view of organizational and technological reliability.

Highlighting the problem of organizational and technological reliability leads to the conclusion that it is necessary to study the issues of ensuring the reliability of all scheduling procedures, starting with the methodologies for developing the initial models of scheduling plans. In the light of the foregoing, it is very important to develop methods for designing the initial models of the construction production scheduling, taking into account the reliability requirements. When creating them, it is also necessary to take into account the difficult conditions for the implementation of transport construction projects, determined by insufficient development of the construction site, low population density and a shortage of labor, an underdeveloped network of transport communications, a large distance from supply bases, and difficult natural and climatic conditions.

The development of new approaches to modeling the scheduling of the construction of railway lines does not simplify the territorial dispersion of construction objects, construction organizations and construction industry enterprises, a large variety of objects built by the forces of one division, a variety of objects in terms of capital intensity, structure of construction and installation works and complexity, inequality in the volume of work on structural elements, a large number of objects under construction at the same time by the forces of one construction department. All of the above confirms the importance of the problem of increasing the reliability of organizational and technological modeling and scheduling of railway construction production, the solution of which is the research of the joint venture. Pershina, M.I. Ivanova, PN. Zhinkina, E.S. Spiridonova, A.A. Rusakova, V.I. Rybalsky, Yu.A. Kulikova, Yu.A. Avdeeva, GS. Pereselenkova, L.V. Lukashuk, B.A. Volkova.

Based on the results of the study, the following main conclusions can be drawn:

1. As a result of the conducted research, it was found that one of the primary tasks of improving the scheduling of the construction of new railway lines is the development and practical development of methods of formalization and informatization of organizational and technological modeling. The dissertation defines the basic requirements for organizational and technological models of railway facilities and complexes and methods for their development in the context of the use of information systems for scheduling.

2. For the development of methods for the formalized description of construction processes in railway transport, the problem of improving the assessment of schedules is of great importance. The studies carried out allowed us to develop methods for assessing the models of calendar plans based on taking into account the feedback between the schedule and the conditions and results of its implementation.

3. For the first time, the quantitative parameters of the existing information systems of scheduling were obtained (the coefficient of implementation of schedules for the nomenclature of work, the probability of performing work on schedule, the indicator of the reliability of the construction system for the timely commissioning of objects, etc.) on the example of the use of the informatization system in the scheduling of the information system in the OA and its grassroots building divisions that quantify the sustainability of the schedules.

4. The studies carried out have shown that the stability of optimal schedules largely depends on the quality of the initial models, and therefore, at the present stage, their improvement should be given priority.

5. The methodological basis for solving the problems of scheduling sustainability should be considered taking into account the probabilistic nature of construction production and its organizational and technological reliability.

6. It has been established that in the conditions of various types of railway construction, numerous organizational and technological failures of the production process can be divided into two main types: a) associated with the loss of living labor; b) not directly related to the loss of living labor. In the dissertation, for the first time, the specifics of the analysis of the reliability of "calendar plans, taking into account the failures of the second type, are investigated.

7. It is shown that in the conditions of various types of railway construction, when determining the reliability indicators of calendar plans, it is necessary to take into account the time reserves in the system (temporary redundancy of the system). Taking into account temporary redundancy allows you to significantly (up to 30-40%) increase the accuracy of assessing the indicator of the reliability of the schedule. In the dissertation, methods have been developed for determining the amount of excess time that occurs during the implementation of the schedule.

8. A methodology has been developed for the formation of an organizational and technological model for the construction of an object and an assessment of the stability of the model based on the optimization of the intensity of construction processes. Experimental verification of the methodology for the informatization of the tasks of scheduling work and resources, monitoring and accounting for the implementation of production programs for bridge construction has shown that the model can be used to draw up work schedules at various levels of management (construction site, facility, grassroots construction unit, trust).

9. Methods developed in the dissertation for assessing the stability of optimal schedules, analyzing the reliability of schedules, as well as the reasons that cause disruptions in the production process in conditions of various types of railway construction can significantly increase the efficiency of informatization. As a result of the implementation of these proposals in bridge construction in the Far East, the overall efficiency of the scheduling information system increased from 9% to 12% of the OA's annual work program.

In the light of the implementation of scientific programs, the issues of scheduling the timely completion of transport facilities for the implementation of the above programs become especially relevant, since there is a need for the timely development of the investment allocated by the investors. The construction of railway lines is a complex process and has a pronounced probabilistic nature. The estimated and actual duration of work, the estimated and actual requirements for material and technical and labor resources, etc. differ significantly. The features of railway construction can be described as follows. Firstly, a feature of railway construction is the fulfillment of a dual task: the combination of linear and concentrated, site types of construction together. For each of them, their own approaches and principles of work can be applied. Secondly, the uncertainty in the methods of work execution, which is caused by significant deviations of meteorological conditions, especially in spring and autumn, from long-term forecasts. This affects the amount of work and leads to the need to change the technology, organization and methods of work. Third, for linearly extended objects, the amount of work along the route varies significantly depending on the profile and plan of the line, which leads to a difference in technology and organization of work even for two adjacent sections of the railway. Fourth, poor geological, hydrological and other types of surveys during the survey period lead to accidents, peak situations during construction, which sometimes causes the need for a sharp change in the organization or technology of work provided for in the POS and PPR (construction organization projects, work production projects), and accordingly adjusting the estimated timing. In addition, the construction of new railways is being carried out in uninhabited or sparsely populated areas: our country, where developed industrial production, a network of roads and other communications are almost completely absent, and therefore construction organizations are forced to carry out repairs, maintenance of the available fleet of machines and mechanisms on their own. This greatly affects the timing of the work. It should be noted that there is significant uncertainty in the appointment of the timing of work performed by subcontractors and related organizations, on the transfer of underground communications, electrical networks, signaling and communication lines, etc. Large fluctuations can occur in the time associated with the receipt of materials for construction from external suppliers, which leads to uncertainty in the organization of transport and handling operations. Changes in the duration of labor processes in the course of the production of work inevitably cause corresponding changes in the costs of labor and material and technical resources, that is, the labor intensity of work changes. Any deviations from the pre-calculated parameters of the construction process increase over time, which can lead to a change in the organization of work and the technology for performing construction processes at the stage of completion of the construction of the line. So, for example, the period of erection of the subgrade during the construction of the railway is calculated according to the productivity of the leading machine of the set according to the standards. In fact, the productivity of the machines will change depending on the change in the height of the embankment or the depth of excavation, since in these cases the working area of the working body of the unit, the duration of the cycle of the machine, etc. change. A similar situation takes place also during the construction of culverts and during other work in transport construction. System analysis, applied to solving problems arising in the practice of railway construction, contributes to the development of optimal organizational and technological solutions. Moreover, the optimality is assessed according to the criteria of efficiency: general - for the entire system and local or private - for its individual parts. The selection of the local criterion should be made in such a way that so that the local optimum contributes to the improvement of the performance of the system as a whole. In practice, the choice of the parameters of the system as a whole by the criterion of efficiency or the parameters of all parts by local criteria is often reduced to solving the following mathematical problem. There are m objects: $x_1, ..., x_n$ and a limited amount of funds is given. It is required to find such a law y_i for the distribution of these funds over the objects, which provides the greatest value of the average payoff m $R = i = 1$ $F_i (y)$ under the conditions $Y_i 0; i = 1 Y_i Y$; where $F_i (y)$ is the payoff function, which is a measure of the payoff resulting from the allocation of funds in the amount of y to the i-th object. Depending on the problem, the function $F_i (y)$ can be concave, convex-concave, differentiable, and even discontinuous. The corresponding mathematical apparatus is used to solve the problem.

To determine the effectiveness of the technological process of construction production, it is necessary to perform the following sequence of operations: present the process in the form of all its possible sequential states, determine the transitions from one state to another and the corresponding transition probabilities, compose a system of differential equations of transitions and calculate the probabilities of the system (process) staying in each of its states, assign the price of the system (process) being in each state, calculate the process efficiency indicators, set the priority of the states and paths of the process. The end result of long-term

forecasting should be the requirements for the possibilities of construction of a transport facility, its organization, management and a reasonable technological solution for the construction.

Refrences:

1. Afanasyev V.A. Methods of organizing work in construction: Textbook / V.A. Afanasyev, A.I.Shishkin - Petrozavodsk: Publishing house of Petrazavodsk. University. 1983.-168s.

2. Afanasyev V.A. New forms of the flow organization of construction / A. V. Afanasyev, V. A. Afanasyev, V.K. Valeeva L.: LISI, 1991.-153s.

3. Afanasyev V.A. Stream organization of construction. L .: Stroyizdat, Leningrad. Separate, 1990, S., ill. ISBN 5-274-00918-2.

4. Sokolov G.K. Technology and organization of construction: Textbook / Gennady Konstantinovich Sokolov. M .: Publishing Center "Academy", 2002.-528s.

5. Igoshin N.V. Investments. Organization of management and funding: Textbook for universities. 2nd ed., Perab. And add. M .: UNITI-DANA, 2001.-542s.

6. Tatievsky T.B. Development of methods and means of organizing production in the field of housing construction based on a program-targeted approach. Abstract of the thesis. dissertation. Cand. tech. Science. Ivanovo, 2003.

7. Vladimirsky S.R. Organization, planning and management in bridge and tunnel construction: a textbook for universities g. D. of transport / S.R. Vladimirsky, G.M. Eremeev, V.A. Milenin, V.N. Smirnov. M .: Route, 2002 .-- 416s.

8. Dickman JI.G. Organization of construction production / Textbook for construction universities M .: ASV Publishing House, 2002. -512s.

9. Organization, planning and construction management: Interuniversity. Topic. Sat./ LISS. L., 1981.

10. Khibukhin V.P. Mathematical methods of planning and construction management / V.Z. Velichkin, V.I. Tyurin, V.P. Khibukhin. -L .: Stroyizdat, 1990.

11. Sobolev V.I. Optimization of building processes / V.I. Sobolev.-Rostov n / D .: Phoenix, 2006.-256s.

12. Building norms and rules of the Russian Federation SNiP 12-01-2004 "Organization of construction"

13. Gusakov A.A. Methods of improving the organizational and technical preparation of construction 'production / A.A. Gusakov, N.I. Ilyin M .: Stroyizdat, 1985 - 156s.

14. Strokinov V.N. Organization and technology of buildings and structures repair: Special course. Moscow: Association of Construction Universities / V.N. Strokinov - Perm: IGZh "Zvezda", 2003. - 535s.

15. Sabirov E.S. The influence of the decomposition of objects and the formation of teams on the flow organization of construction. Abstract of the thesis. dissertation. Ph.D., SP-b., 1992.

16. https://tekhnosfera.com/sovershenstvovanie-metodov-kalendarnogo-planirovaniya-stroitelstva-novyh-zheleznodorozhnyh-liniy;

17. https://tekhnosfera.com/sovershenstvovanie-metodov-kalendarnogo-planirovaniya-transportnogo-stroitelstva;