УДК 330.322:338.47(571.6)

Victor Aleksandrovich Anisimov – Candidate of Technical Sciences, docent, professor of the research and design of the railway and highways chair of the Far-Eastern state transport university (Khabarovsk). *Ph.: (4212) 40 75 73*
Olga Aleksandrovna Levchenko – Candidate of Technical Sciences, docent, docent of the research and design of the railway and highways chair of the Far-Eastern state transport university (Khabarovsk). *Ph.: (4212) 40 71 15*
Galina Erikovna Putivets – Candidate of Economics, docent of the economy and financial right chair of the Far-Eastern institute of management – branch of RANEPA (Khabarovsk). *E-mail: pytivecgalina@mail.ru*
Anzhelika Chulyevna Kim – graduate student of the research and design of the railway and highways chair of the Far-Eastern state transport university (Khabarovsk). *E-mail: kim.dvtgik@gmail.com*

Problem of justification of investments into the development of the Eastern ground of the railroads

In this article the problem and the questions of justification of investments into modernization of the Eastern ground of the railroads of Russia in the conditions of limited investments and taking into account some uncertainty of information on the perspective volumes of freight transportation are considered. The special role in the solution of this problem belongs to the development of railway system of the Far-Eastern federal district. The noted uncertainty is caused by a change of internal and external economic and political conditions. Application of probabilistic models of the forecasting of freght traffics on the basis of statistical data isn't possible in view of heterogeneity and instability of the external environment. In this regard, the problem of further improvement of the theory, methods and technique of forecasting of the rail transportation taking into account the objectively existing uncertainty of their nomenclature and volumes is still actual. Along with it, development of information technology of justification of the investment projects of modernization of the railroads of Russia, in particular the Eastern ground, on the basis of technique of formation of the economically effective strategy (the general scheme) of technical development of the ground in interrelation with the improvement of transportation process on the ground and taking into account the reliable development of transportations, despite the noted uncertainty is necessary. As initial basis of the specified technology the program and technological ERA complex developed by the specialists of the Far-Eastern state transport university can be adopted.

Проблема обоснования инвестиций в развитие Восточного полигона железных дорог

В статье рассматриваются проблема и вопросы обоснования инвестиций в модернизацию Восточного полигона железных дорог России в условиях

ограниченных инвестиций и с учетом некоторой неопределенности информации о перспективных объемах грузовых перевозок. Особая роль в решении данной проблемы принадлежит развитию железнодорожной сети Дальневосточного федерального округа. Отмеченная неопределенность обусловлена изменением внутренних и внешних экономических и политических условий. Применение вероятностных моделей прогнозирования грузопотоков на основе статистических данных не представляется возможным ввиду разнородности и нестабильности внешней среды. В связи с этим, по-прежнему актуальна проблема дальнейшего совершенствования теории, методов и методики прогнозирования железнодорожных перевозок с учетом объективно существующей неопределенности их номенклатуры и объемов. Наряду с этим, необходима разработка информационной технологии обоснования инвестиционных проектов модернизации железных дорог России, в частности Восточного полигона, на основе методики формирования экономически эффективной стратегии (генеральной схемы) технического развития полигона во взаимосвязи с совершенствованием перевозочного процесса по полигону и с учетом надежного освоения перевозок, несмотря на отмеченную неопределенность. В качестве начальной основы указанной технологии может быть принят программно-технологический комплекс ЭРА, разработанный специалистами Дальневосточного государственного университета путей сообщения.

Keywords: *Strategy of development of the railroads, investments, the Eastern ground, the Far-Eastern federal district, forecasting of rail transportation, information technology.*

Ключевые слова: *Стратегия развития железных дорог, инвестиции, Восточный полигон, Дальневосточный федеральный округ, прогнозирование железнодорожных перевозок, информационная технология.*

The development of transport infrastructure of the Far-Eastern federal district is directed on: ensuring social and economic progress of the district; improvement of the quality of transport communications of the regions of Russia; expansion and deepening of economic integration of Russia with the countries of the Pacific Rim. In this regard, as one of priorities of the development of transport in the district the Transport strategy of the Russian Federation for the period till 2030 [10] establishes the completion of formation of the basic high-level railway system: modernization of the Trans-Siberian Railway, development of infrastructure and strengthening of the Baikal-Amur highway, construction of a number of new lines of the Eastern ground of the railway system of Russia.

In the Strategy of development of the railway transport in the Russian Federation till 2030 approved by the Order of the Government of the Russian Federation of June 17, 2008 it is specified that the eastern sites of BAM and the Trans-Siberian Railway master the essential volumes of transportations, connected, first of all with the comings to the large ports of the Khabarovsk territory

(Sovetskaya Gavan, Vanino) already now. The volumes of transportations in this direction by 2030th year are planned to be increased by 7 – 10 times in comparison with the base 2007th year (7 million tons-km). It is connected with the development of mineral deposits in the Far-Eastern region, construction of terminals in the ports of Vanino and Sovetskaya Gavan, strengthening of commercial relations with the countries of the Pacific Rim [9].

In the project of the Strategy of development of the railway transport in the Russian Federation till 2030 (edition from 4/29/2015) the increased demand of national economies of the countries of the Pacific Rim (further – PR) on the Russian fuel raw materials is stated [8]. In this regard, "… significant increase in the volumes of transportation of goods on the railway directions providing, first of all, cargo delivery in the seaports of the country from the regions of origin of freght traffics is in the long term predicted … It will lead to an increase in the volumes of transportation of goods on the sites of a network of the railroads of Russia on the way to the Vanino-Sovgavansk transport hub by 2030 by 3 – 4 times in relation to the existing level; to the transfer points of the Primorsk territory – by 1,5 – 2 times" [8].

Thus, technical re-equipment of the sites and highways of the Eastern ground and improvement of the technology of transportations across the ground in the conditions of insufficient investments and taking into account some uncertainty of the nedeed volumes of transportations is very actual problem of development of the railway transport of Russia. As the main sources of financing the budget funds of the country, JSC “RZhD” and the private investors are specified. In a view of limitation of budget funds of the country and JSC “RZhD” the problem of increase of the appeal of private investments into development of the Far-Eastern federal district of Russia is of particular importance.

At the solution of these problems "… at the center there is a forecast of development of the volumes of freight transportation in the Eastern ground of the network of the railroads: the forecast demanding high extent of study, quality, specification and validity of the indicators confirming the expediency and efficiency of the corresponding capital-intensive directions of investments" [6]. The questions of forecasting of these transportations are a prerogative of the institute of economy and development of transport (further – JSC “IEDT”) and the relevant competent organizations. However, apparently from the given estimates, uncertainty of perspective volumes of transportations across the ground objectively takes place.

The considered uncertainty is generated by the following factors of casual character: the adverse situations and consequences arising in connection with a change of international situation and political conditions; lag of the rates of development of the territories gravitating to the highway; a possibility of bankruptcy and failure of contractual obligations of the companies and organizations interested in transportations across the highway; change of the economic legislation and regulatory base of development of the projects; change of the investment opportunities of JSC “RZhD”, the government and potential private investors; underestimation of a use of other means of transport; and the other

factors [4], which authentic forecast is difficult or objectively impossible. Action of these factors leads to the fact that uncertainty of the expected volumes of transportations and the nomenclature of freights increases in the process of distance of a year of development of the ground within the planning horizon.

So, for example, for the site Komsomolsk-on-the Amur – Sovetskaya Gavan, determining the volumes of transportations across the Baikal-Amur highway, expected project volumes changed repeatedly and with a considerable deviation from each other. After 2012 these volumes have reconsidered again. Now the point of view prevails that the volumes of transportations in the route Komsomolsk-on-Amur – Sovetskaya Gavan in 2020 can exceed 70 million tons. Considering the influence of development of transport on the economic and social development of the served territories, it is easy to assume that in the near future the following variant of the volumes of transportations can appear.

Thus, objectively there is a risk of essential difference of the actual and predicted (project) volumes of transportations. The last, as we know, are adopted in the task for development of the projects of technical development of the stations, sites and directions of the ground. When understating the expected volumes the project of development of the ground will be insufficient. As a result, there will be a problem of actual deficiency of capacity of the ground sites that will slow down economic development of the regions of Siberia and the Far East and the country in general, and also the economic cooperation with the Asia-Pacific countries. From a position of investors, insufficient technical development of the railway ground can become the reason of low economic efficiency.

Opposite case – excessive strengthening of the railway ground for development of the overestimated predicted (project) volumes. At a stage of implementation of the similar project excessiveness of capital investments in the development of the ground and, therefore, increase in the term of their payback will become clear. Operational costs will also be unfairly overestimated by the maintenance of constant constructions.

The works of B.A. Volkov [4], N.V. Pravdin, M.L. Dykanyuk, V.Ya. Negrey [7] and the other researchers are devoted to the methods of forecasting of cargo streams. The offered methods are based on the use of mathematical statistics and the expert estimation. It should be noted that the use of methods of mathematical statistics demands existence of statistical data which collecting has to be carried out in the genetically homogeneous environment that in the real economic conditions isn't possible. The expert evaluationt as the main shortcoming has the subjective approach. In this regard, the problem of further improvement of the theory and methods of forecasting of the structure and volumes of rail transportation is still actual.

In general, the above causes relevance of three components of modern technology of development of the investment projects of modernization of the Eastern ground of the railroads of Russia: 1) techniques of forecasting of the perspective transportations taking into account the objectively existing uncertainty of their nomenclature and volumes; 2) techniques of formation of the economically effective strategy (the general scheme) of technical development of the ground in

interrelation with the improvement of transportation process on the ground and taking into account the reliable development of transportations, despite the noted uncertainty; 3) information technology of expeditious updating of the available project (in a case of minor change of the of transportations) or developments of the new project of development of the ground (at essential change of this forecast)

The second and third components of the noted triad have to be based on the uniform information model of the ground providing the solution of three tasks: 1) identification of restrictions of the throughput and carrying ability of the ground on a condition of its infrastructure and the organization of train service (identification of "narrow" places [9, 10]); 2) establishment of the possible ways of elimination of these restrictions (taking into account the limited investments); 3) formation of the optimum plan of modernization of infrastructure of the ground and improvement of the technology of transportations (by the adopted criteria of efficiency) with the development of projects of technical development of the stations and sites of the ground.

Along with minimization of the risk caused by the uncertainty of information on the nomenclature of freights and the perspective volumes of transportations, the considered technology has to provide the solution of such essentially important and mutually connected tasks in the mode of through automation as: optimization of traction service of the ground, increase of the allowed speeds of train service and the formation of rational schemes of the admission of trains on the sites of the ground.

Integrated technical criterion of the solution of these tasks is the minimum of predicted deficiency of the throughput and overworking ability of the stages and stations of the ground with a growth of the volumes of transportations. Existence and size of this deficiency indicate the sequence of increase of the throughput and overworking ability of the stages and stations limiting carrying ability of the sites of the ground. It is logical to assume that such approach to the solution of the considered tasks allows purposefully and in a short time create the economically reasonable plan of modernization of infrastructure of the ground and transportation process for its sites.

The considered approach step by step is realized in thew program and technological complex of ERA in relation to any highway or direction of the railway system, and also in relation to the certain ground [1 - 3, 5]. The complex provides examination, alternative calculations and the analysis of weight, speed and time of the trains, throughput and carrying ability of the new railroads and the operated lines of the railway ground with the detrmination of losses from the restrictions of speed of the trains. Now the next development of the complex regarding the solution of problems of optimization of the traction service of the ground and formation of the rational schemes (schedules) of passing of the trains on the stages and stations of the ground in coordination with increase of the allowed train service speeds is carried out. As the technical criterion of optimization of these tasks the minimum of deficiency of the throughput and overworking ability of the stages and stations limiting the carrying ability of lines at the development of perspective transportations is used. As economic criterion

the operational costs depending on the volumes of freight transportation and the sizes of passenger and local services of trains are used.

The solution of problems of the advancing development of the railroads of the Eastern ground (including the transport Far-Eastern federal district network) in the conditions of limited investments and taking into account some uncertainty of the volumes of transportations has special value for realization of the Transport strategy of the Russian Federation for the period till 2030 and the social and economic development of Siberia and the Far East. The successful solution of this problem will allow finish the formation of the large-scale transport corridors: The Asian – North-American highway (ANAH) and the transcontinental highway Europe – Russia – Asia – America (ERAA). It will allow bring to the new level the international relations and mutually beneficial cooperation of Russia with the countries of Europe, Asia and the North America in the economic, cultural and other spheres.

Literature and the sources:

1. Анисимов, В. А. Комплекс ЭРА – базовая подсистема информационной технологии разработки проектов переустройства железных дорог / В. А. Анисимов, В. В. Анисимов, О. А. Левченко // Вестник РГУПС. – Ростов на Дону : Изд-во РГУПС, 2007. – № 3. – С. 113 – 118.

2. Анисимов, В. А. Формирование схемы развития железнодорожной линии на основе логико-сетевого моделирования / В. А. Анисимов // Вестник РГУПС. – Ростов на Дону : Изд-во РГУПС, 2007. – № 1. – С. 116 – 120.

3. Анисимов, В. А. Математические модели и методы решения задач оптимального развития линейных транспортных систем // В. А. Анисимов // Проектирование развития региональной сети железных дорог: сб.науч.тр. ; под ред.В. С. Шварцфельда. – Хабаровск : Изд-во ДВГУПС, 2013. – Вып. 1. – С. 6 – 18.

4. Волков, Б. А. Экономическая эффективность инвестиций на железнодорожном транспорте в условиях рынка / Б. А.Волков. – М. : Транспорт, 1996.– 191 с.

5. Левченко, О. А. Формирование схемы развития железнодорожной линии с обоснованием экономически эффективных норм массы и допускаемых скоростей движения поездов / О. А. Левченко // Особенности проектирования и строительства железных дорог в условиях Дальнего Востока : межвуз. сб.науч.тр. / под ред. В. С. Шварцфельда. – Хабаровск : Изд-во ДВГУПС, 2009. – С. 94 – 100.

6. Материалы научно-технического совета открытого акционерного общества «Российские железные дороги». – М. : ОАО «РЖД», 2014.

7. Правдин, Н. В. Прогнозирование грузовых потоков / Н. В. Правдин, М. Л. Дыканюк, В. Я. Негрей. – М. : Транспорт, 1987. – 247 с.

8. Проект Стратегии развития железнодорожного транспорта в Российской Федерации до 2030 г. (редакция от 29.04.2015 г.) [Электронный ресурс] –.– Режим доступа: http://www.mintrans.ru/activity/detail. php? SECTION_ID=2202#document_27557 (дата обращения август 2015 г.)

9. Стратегия развития железнодорожного транспорта в Российской Федерации до 2030 г. (утверждена Распоряжением Правительства РФ от 17 июня 2008 г. № 877-р) // Справочно-правовая система Консультант Плюс.

10. Транспортная стратегия Российской Федерации на период до 2030 г. (утверждена Распоряжением Правительства РФ от 22 ноября 2008 г. № 1734-р) // Справочно-правовая система Консультант Плюс.