

ФОРМИРОВАНИЕ МЕТОДИЧЕСКОГО ПОДХОДА К РАЗВИТИЮ ЛОГИСТИЧЕСКОГО КОМПЛЕКСА РОССИЙСКОГО ГОРНО- ХИМИЧЕСКОГО ПРЕДПРИЯТИЯ (НА ПРИМЕРЕ НИВЕНСКОГО ГОКА)

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Аннотация: глобальные экономические тенденции и экспортная ориентация российской экономики формируют потребность в развитии транспортной инфраструктуры, интегрированной в международный экономический рынок. Это одна из приоритетных задач для России, наряду с разработкой научно-методических подходов для создания более эффективных логистических комплексов предприятий минерально-сырьевой отрасли. В статье представлено авторское определение термина «логистический комплекс». Сформирован методический подход к развитию логистического комплекса промышленного предприятия. На примере Нивенского ГОКа по производству минеральных удобрений с использованием разработанного подхода проведена экономическая оценка эффективности развития его логистического комплекса. Практическая значимость результатов исследования заключается в том, что они позволяют объективно обосновать необходимость и эффективность развития собственного логистического комплекса промышленного предприятия с учетом отраслевой специфики его развития. Сформированный подход направлен на эффективное управление логистической деятельностью промышленного предприятия.

Ключевые слова: логистический комплекс, методический подход, Нивенский ГОК, горно-химическое предприятие, промышленность, промышленное предприятие, минеральные удобрения.

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Formation of a methodological approach to the development of the logistics complex of the Russian mining and chemical enterprise (on the example of Nivensky GOK)

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Abstract: Global economic trends and export orientation of the Russian economy form the need to develop transport infrastructure integrated into the international economic market. This is one of the priority tasks for Russia, along with the development of scientific and methodological approaches for the development of more effective logistics complexes of in the mineral sector companies. The article presents the authors' definition of the term «logistics complex.» A methodical approach to the economic evaluation of the development efficiency of the development of the logistics complex of an industrial enterprise has been formed. On the example of the Nivensky GOK (Mining and Processing Plant) for production of mineral fertilizers, using the developed approach, an economic assessment of the effectiveness of the development of its logistics complex was carried out. The practical significance of the results of the study lies in the fact that they can objectively substantiate the necessity and effectiveness of the development of its own logistics complex of an industrial enterprise, taking into account the sectoral specifics of its development. The formed approach is aimed at efficient management of the logistics activities of an industrial enterprise.

Key words: logistics complex, methodical approach, Nivensky GOK, mining and chemical enterprise, industry, industrial enterprise, mineral fertilizers.

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1. Introduction

In the context of growing competition and globalization of the economy, one of the most important tasks in Russia is the comprehensive development of the transport infrastructure. The urgency of this task is confirmed by the fact that the efficiency of the Russian economy is closely connected with the industrial sector, extraction and processing of natural resources. This connection exists due to the scale of production processes in the industrial sector and the dependence of the economy on export-oriented industrial enterprises, where logistics systems are the link between the enterprise and the consumer [1].

Historically, modern Russian industrial enterprises use logistics systems created in the USSR, so today the Russian industrial sector has a situation where the development of logistics systems lags behind the pace of industrial production.

In this regard, new solutions are needed in the development of logistics systems of industrial enterprises, including systematic development of seaports with

the transformation of a number of them into modern logistics hubs; creation of mechanisms to stimulate fleet modernization; development of the road transport system; technical re-equipment of the railway network; construction of transport routes necessary for the development of promising mineral deposits and the formation of new industrial centers [2–3].

The authors are convinced that the basic principle of functioning of an industrial enterprise is that a new logistics system should be created when creating a new business or designing a new traffic pattern, which happens once [4]. After that, the formed logistics system must be repeatedly adapted to the changing conditions of the internal and external environment, introducing new organizational, technical, and technological solutions [5–6]. To achieve the goals of effective design and development of the logistics system of an industrial enterprise, it is important to use an adaptive and scientifically practical approach to the economic assessment of the development of the logistics system of

an enterprise to monitor its effectiveness at different points in time and under different conditions.

Given the practical need for an economic assessment of the effectiveness of the development of the logistics system of an industrial enterprise, the purpose of this study is to form a scientific and practical approach to this assessment. Proceeding from the purpose of the study, the following tasks were set :

- Study of the theoretical base associated with modern approaches to assessing
- Analysis of existing theoretical approaches to assessing
- Formation of a scientific and practical approach to assessing

- Economic assessment using the formed approach. The object of the study was the logistics complex of the Nivensky GOK of the mineral fertilizer manufacturer OOO K-Potash Service The construction project design for the Nivensky GOK is shown in Fig. 1 [7].

The choice of the Nivensky GOK is based on the following characteristics:

- The main product of the projected Nivensky GOK is potassium sulfate, a valuable chlorine-free mineral fertilizer that can be used to grow valuable crops on various types of soils.
- The unique location plays an important role compared to other industrial enterprises. In terms of logistics, there are great

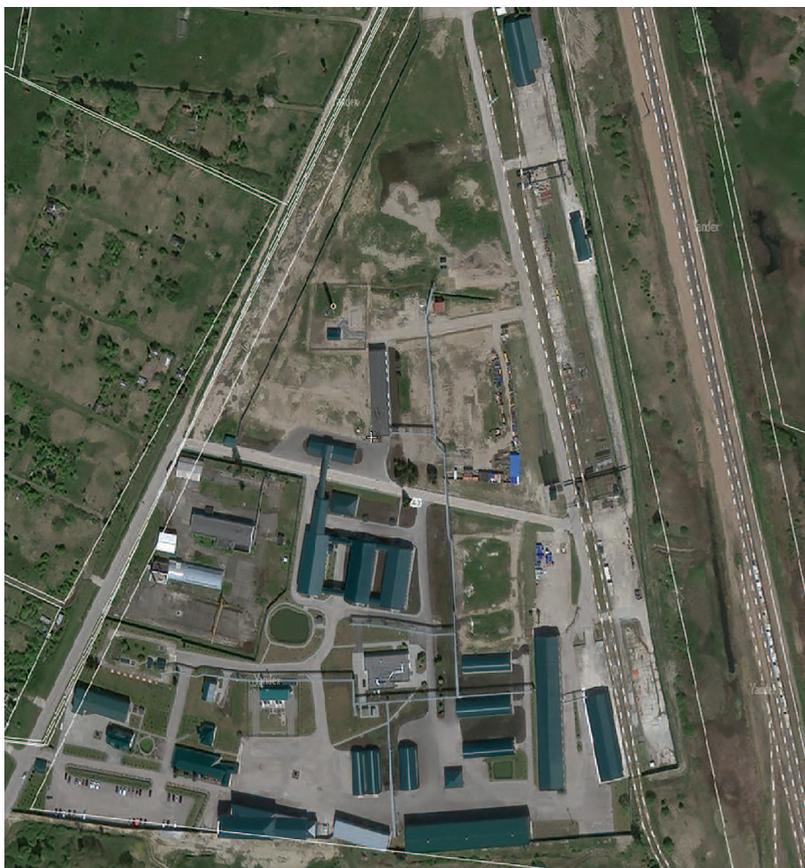


Fig. 1. The current state of objects on the surface of the industrial site of the Nivensky GOK (satellite image, June 2021)

opportunities for the choice of logistics facilities: automobile road, sea, rail.

– The transport complex of the Kaliningrad Region is strongly integrated into international transport corridors, including the presence of a non-freezing seaport and land borders with Lithuania and Poland, a developed network of roads and railways capable of providing sales to foreign markets.

– K-Potash Service is focused on foreign markets. In particular, the entire planned sales volume of 1.5 million tons of potassium sulfate will be directed to the world market.

– The region is independent in its supply of energy resources.

– The region has the status of a special economic zone [8–11].

The subject of the study is a set of theoretical, methodological, and practical approaches to assessing the effectiveness of the development of the logistics complex of an industrial enterprise.

2. Methodology

Based on the above, the formation of an approach to the economic assessment of the effectiveness of the development of the logistics complex of an industrial enterprise is an urgent scientific and practical task. First of all, to solve this task, the authors investigated the modern theoretical foundations for the economic assessment of the effectiveness of the development of the logistics system of an industrial enterprise [12–14].

The conducted study is based on current modern scientific approaches in the field of logistics, economics, and marketing. The theoretical basis for the study was associated with the scientific works of the following authors: H.-M. Beyer, B. Herzog, A. M. Gadzhinsky, N. K. Lekarkina, N. Didenko, D. Skipnuk, K. Kikkas, O. Kalinina, E. Kosinski, S. Ilyashenko, M. Belyakova, A. Zvereva,

K. S. Krivyakin, N. N. Makarov, A. A. Polukhina etc [15–20].

The analysis of the scientific provisions and approaches of the above authors revealed the lack of a unified definition of the logistics system of an industrial enterprise [21–23]. In this regard, the authors introduced the concept of «logistics complex», which represents the relationship in a single system of logistics facilities, which is associated with the loading and unloading of goods, packaging, storage, labeling, change of vehicles.

The authors recognize the importance of the scientific work of the above authors. However, it is important to note that among the analyzed approaches, the issue of the forming a scientific and practical approach to assessing the effectiveness of the development of logistics complexes of industrial enterprises, taking into account the Russian specifics of the regions, has been little studied. The authors have highlighted below the main approaches that are now integrated into the practice of economic assessment of the development of logistics complexes of enterprises. These approaches are presented in Table 1.

According to the authors, one of the most appropriate approaches to assessing the effectiveness of the development of the logistics complex of an industrial enterprise in Russia is a systematic approach. The essence of this approach is to study and evaluate the objects that make up the logistics complex as a whole. However, given the heterogeneous specifics of Russian regions and regional economies of Russia, the use of a systematic approach alone is not a sufficient condition, since the systematic approach does not allow considering various options for the economic development of an industrial enterprise, given the unique conditions.

In this regard, below the authors have identified factors that affect the efficiency

Table 1

Approaches to economic assessment of enterprise transport system development efficiency

Name	Functionality	Cons
Full Value Analysis	Accounting for all economic changes, identification of all costs in the logistics system, possibility of price variation	It does not allow calculating the «hidden» cost of the logistics system, namely, taking into account the arising «hidden» costs.
Expert system	A computer program used at various stages of the logistics system facilitates the evaluation of systems, which normally requires considerable experience and time.	Due to the many operations in the operation of the logistics system, it is problematic to evaluate all its features.
ABC analysis	Allows to allocate the most significant object in the multiple system. Subsequently, it is on these objects that the efforts are concentrated.	Allows to evaluate only a group of specific services, does not provide a comprehensive picture of the effectiveness of the transport system.
XYZ Analysis	Optimizes conditional groups based on homogeneity criteria of demand and prediction accuracy.	
Evaluation of natural performance indicators of the logistics system	Allows to analyze existing performance criteria and methods of evaluation of logistics systems, reveals their shortcomings.	Does not provide a comprehensive picture of the evaluation of logistics systems
Systems approach	considers the objects of the logistics complex as a whole	Is universal, but does not take into account the specific features of a particular region and the design of the logistics complex of an industrial enterprise.

of the development of the logistics complex of an industrial enterprise in Russia, which must be taken into account when conducting a comprehensive economic assessment [24].

Given the above factors, the results of the study and analysis of modern approaches to economic assessment, the focus of the concept of a systematic approach, the need for comprehensive economic assessment, the authors formed a scientific and practical approach to economic assessment of the effectiveness of the development of logistics complexes of industrial enterprises in Russia. The generated approach is shown in Fig. 2.

Following this approach, a comprehensive economic assessment of the logistics complex of an industrial enterprise is divided into stages: the preparatory stage, the methodological stage, the stage of economic assessment. One of the most important stages is the economic assessment of the effectiveness of the development of the logistics complex of an industrial enterprise. At this stage, it is necessary to form alternative options for this development, and also take into account the following economic indicators: time, transport costs, fixed capital, and economic effect (net present

Table 2

Factors that are affecting the development of the logistics complex of the enterprise

Nº	Factor	Concretization
1	Geography	distances, climatic conditions
2	Demography	population density, settlements near the infrastructure
3	Economics	tariffs, cost of logistics services, bulk cargo
4	Infrastructure	infrastructure density, capacity of the sea, road and rail transport, energy capacity, availability of specialized warehouses, port development, availability of terminals
5	State support	taxation, tariff regulation, investment

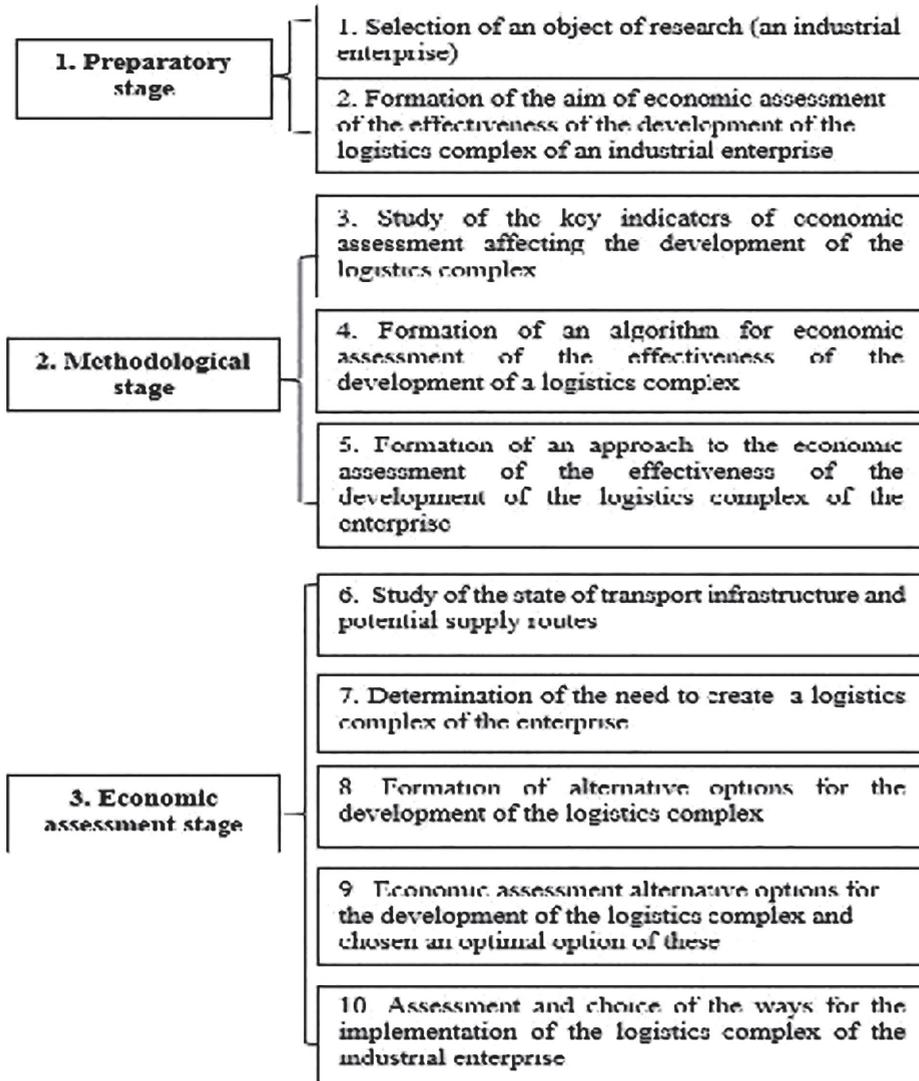


Fig. 2. The approach to economic assessment of the development of a logistics complex of industrial enterprise

value – NPV) [25]. Assessment of alternative options for the development of the logistics complex and consideration of factors is one of the most important arguments in favor of the generated approach since these stages of assessment can obtain more reliable results.

In the following section, the authors tested the formed approach to the economic assessment of the effectiveness of the development of the logistics complex of an industrial enterprise using the example of the Nivensky GOK.

3. Results

To conduct an economic assessment of the effectiveness of the development of the logistics complex of the Nivensky GOK, the authors first of all investigated the internal and external factors of the Kaliningrad region economy, which can affect the development of the logistics complex (for example, the geographical location of the Kaliningrad region, the status of the special economic zone, and so on). Also taking into account the level of infrastructure development in the Kaliningrad region, the authors have formed two alternative options for the development of the logistics complex of the Nivensky GOK.

The first option is to develop only its own local infrastructure. It is important to note that the management of the Nivensky GOK has no plans to develop regional

infrastructure for 2021–2022. The design documentation of OOO K-Potash Service focuses solely on the development of the logistics system, which is located on the territory of the mining and processing plant, as well as the adjoining railway station. The second development option is the development and use of the regional logistics system, which will make it possible to form a large logistics complex on the premises of the Nivensky GOK.

The authors conducted a comprehensive economic assessment of the effectiveness of the development of alternative options for the progress of the logistics complex of the Nivensky GOK (Table 3).

The results of the economic assessment have confirmed the expediency of the development and use of the infrastructure of the Kaliningrad region, including the seaport, railways, and motor roads. The confirmation is the greatest economic effect from the project implementation, which is equal to 298.284 million rubles.

During the economic assessment, the authors also found that OOO K-Potash Service will not be able to sell the planned 1.5 million tons of potassium sulfate per year using the first option of the logistics complex development. This situation is due to the fact that the use of local infrastructure will lead to restrictions on export supplies of up to 300–350 thousand tons of potassium sulfate, which will

Table 3
Specificity of factors affecting the development of the logistics complex of the enterprise

Indicators	Use of the local infrastructure of the Nivensky GOK	Use of the infrastructure of the Kaliningrad region
NPV, RUB million	24 247	298 284
NPV, USD million	309.3	3804.6
Rate discount, %	8.0	8.0
Dollar rate, RUB/USD	78.4	78.4
IRR, %	14.9	38.8
PI	1.4	5.3
PBP, years	11.3	8.0
DPB, years	19.0	8.0

cause a decrease in the economic effect compared to the second option of the logistics complex development to 24,247 million rubles.

Thus, the presented main results of the economic assessment of the effectiveness of the development of the logistics complex of the Nivensky GOK showed the most feasible and cost-effective option for the development of the logistics complex of the Nivensky GOK, which will allow the company to achieve the greatest economic effect with optimal indicators of time, transport costs and the cost of fixed capital.

4 Discussion

The study and testing of the formed approach to the economic assessment of the efficiency of the development of the logistics complex of the Nivensky GOK confirmed the practical significance of the results of the study. In particular, the hypothesis that it is necessary to carry out a comprehensive economic assessment at the early stages of project implementation or development of an industrial enterprise is confirmed by the economic results presented.

generated approach is the size of the sample of factors, however, for the authors it was important to disclose the issue of the need to take into account the heterogeneous specifics of regional economies in Russia, namely, internal and external factors that influence the development of the logistics complex of an industrial enterprise. For example, the implementation of the Nivensky GOK design project without additional actions on the development of the logistics complex may lead to restrictions in the distribution in the future.

The authors believe that the strength of the approach formed is the possibility of its adaptation to specific economic conditions; however, one of the main

research issues remains the construction of a basic practice-oriented and mathematical-economic model for assessing the effectiveness of the development of a logistics complex, which can be adapted to specific conditions of internal and the external environment with the full range of necessary choice of factors.

5 Conclusion

In this study, all of the research objectives have been solved. In particular, the modern theoretical base was investigated and analyzed, which revealed the lack of a unified definition of the logistics system of an industrial enterprise, as well as the lack of a scientific and practical approach to the economic assessment of the effectiveness of the development of the logistics complex of an industrial enterprise, which takes into account the heterogeneous Russian conditions.

The paper proposes the authors' definition of the concept of «logistics complex», and also formed an approach to the economic assessment of the effectiveness of the development of the logistics complex of an industrial enterprise, taking into account the internal and external factors of the Russian economy. This study was carried out on the example of a design project of an industrial enterprise for the production of potassium sulfate, namely, the Nivensky GOK. The authors managed to establish the most rational and economically justified option for the development of the logistics complex of the Nivensky GOK, which will provide an economic effect equal to 298.284 million rubles.

Thus, the formed approach to the economic assessment of the development of the logistics complex of an industrial enterprise can be used for other industrial enterprises from various industrial sectors, which have their own set of unique

factors that affect the development of political, infrastructural, economic, the distribution, including geographic, demographic and other factors.

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