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INDUSTRIAL PARKS: DEVELOPMENT FINDINGS

Psareva N.Yu., Mukhtarova T.R., Ciekanowski Z.

Abstract Integration processes are one of the most effective methods to improve performance in any sector of the economy. Integration processes are of particular importance in industry, which was the basis for developing all other types of activity. The adoption of the Federal Law on industrial policy has provided with opportunities to open industrial parks aimed at effective use of lands owned by both regional and municipal authorities and operating industrial corporations, to ensure the investments inflow into the region, by increasing employment and boosting the development of the industrial sector of the economy. To date, since 2014, according to Industrial Parks Association (AIP), there are more than 393 parks with various spaces for their activities, the composition of participants, the volume of investments, forms of private ownership, managing companies performing various functions. All these conditions in one way or another affect the final result; such influence requires creation of a methodology based on indices showing the mutual influence of factors, the dynamics of development, which is ultimately in the focus of this article. The study of statistical indicators presented by the AIP geoinformation system allowed to formulate relative indicators and their development trends based on data provided by Vorsino Industrial Park for the period of 2011 to 2020, and to conduct a comparative analysis by similar parks.

Introduction. Industry is an important basis for economic development, as evidenced by the industrialization experience for the period of 1928 to 1941 when the Soviet government implemented the first three five-year plans, which allowed to strengthen the industry of the USSR, as well as to ensure the independence of the military-industrial complex and the main elements of the economy from Western countries. The catalyst for the development after the military and modern economy is industry as well. One of the forms of industrial development at the present stage are industrial parks (IP) whose creation is envisaged by the Federal Law on industrial policy [1]. The creating industrial parks has become one of the vectors of industrial development. Along with numerous forms of business integration, IPs are intended to attract investment to the regions through placing offices and facilities on consolidated land territories which belong either to territorial formations (region, oblast, etc.), or by private or state-owned enterprises. Both from the point of view of regional formations and enterprises, the IPs creation enables to use vacant land, production and office facilities, by providing them to IP residents for lease and/or sale to develop their own business. All this enables effective use of existing resources and ensure effective production growth.

The issues of creating industrial parks and their development strategies are considered not only in the scientific community, but are legally prescribed by regulatory instruments. In 2016, AIP issued a compendium of legal texts re-

lated to IPs [2], including the National Standard of the Russian Federation GOST R 56301-2014 "Industrial Parks. Requirements" [3]. Domestic and foreign scientists also show great interest in IPs and consider various aspects starting with the issues of the need for cluster formations [4;5;6] justifying the need for their creation [7;8;9], the impact on regional policy [10;11;12] of the IP development strategy [13, 14, 15]. The importance of industrial parks for the innovative development of the region are studied by O.V. Golichenko [16], I.V. Tinyakova and T.V. Konovalova [17]. The issues of evaluating integration interaction in industry are considered in works of W. Achton [18]. The study of the boundaries of decision-making levels in regional industrial systems is presented in the work of L. Baas[19]. The technological view of industrial symbiosis is investigated in the work of F.A Bones [20]. Yu Fei's publication reveals the experience of developing countries with eco-industrial parks on the example of the Tianjin Economic and Technological Development Zone in China [21]. The experience of IP functioning in China is reflected in the work of Simon Alder [22]. The study of the ecological efficiency of industrial parks in China based on the analysis is considered in the article by Fan Y., Bai B., Qiao Q., Kang P., Zhang Y., Guo J. [23]. The Russian scientists standpoints on the issues of IP activities efficacy is reflected in the works of V.A.Kiryuchenkova and T.M. Kryukova [24]. Despite the considerable interest in the issue of creation, functioning, assessing the parks activities, the aforementioned publications and methodological recommendations on evaluating IPs activities do not contain issues of comparative effectiveness of the activities of parks with different deployment areas, management companies performing various functions, a diverse composition of participants.

The relevance of studying the assessment of the comparative effectiveness of existing IPs based on available statistical data accumulated in the unified state information system of industry is due to the need for a comparative analysis of the IPs' activities and the identification of factors affecting their performance. This is especially important for developing managerial decisions related to attracting investments, issues of quantitative and qualitative composition of residents, as well as compliance of regulations providing for the conditions and criteria for the creation and functioning of IPs with the realities of their practical implementation. It is highly important for further development of industry, the economy of regional entities, identification of problematic issues and ways of their solution.

The purpose of the study is to develop recommendations for creating a system of comparative indicators of IP activities, allowing to evaluate and conduct a comparative analysis of IP activities for the development of managerial decisions on their development.

The subject of the study is the relationship of indicators characterizing the IP activity to identify conditions and factors that determine the IP characteristics.

Methods of research are statistical data, comparing the results of the functioning of various IPs on the basis of the proposed relative indicator, establishing the trends in changes of performance indicators, expert methods and models for modeling the composition of residents.

Results of the study: proposals for evaluating the IP effectiveness based on relative indicators.

The development of IPs in Russia as a new form of integration of business participants based on joint ownership and use of land plots that provide business infrastructure, started in 2014, when the Federal Law on industrial policy was adopted, which defines IP as "a set of industrial infrastructure facilities designed to create industrial production or modernization of industrial production and administered by a managing company - a commercial or non-profit organization established in accordance with the law of the Russian Federation" [1]. The seven-year experience in creating IPs enables to analyze the parks activities from the standpoint of their effectiveness, depending on the forms of ownership, the size of investments, and other factors.

Statistical analysis of indicators characterizing the parks activities helped to establish a trend in their development. The Industrial Park Vorsino initiated by Kaluga Regional Government represented by the regional Ministry of Economic Development was considered as a basis for further comparison. The main purpose of this IP was the deployment of various industries on the territory of 2,072.2 hectares, on which 19 residents of various industries had been working by 2020: 12 - Tobacco production; 17 - Paper and paper products; 22 - Manufacture of rubber and plastic products; 24 - Metallurgical production; 26 - Manufacture of computers, electronic and optical products; 31 - Manufacture of furniture; 32 - Manufacture of other finished products. The IP is located in the north-east of the region, in the Borovsk district, on the border of the Kaluga region and New Moscow, 95 km off Kaluga. The IP status was obtained on October 16, 2006. At the moment, more than 50% of the territory intended for IP placement is involved. The type of park is state–owned. The functions of the management company are performed by Kaluga Region Development Corporation whose basic functions include: sale of land, leasing of land; leasing of ready-made industrial buildings, facilities, structures; construction of ready-made industrial buildings, engineering infrastructure facilities by order of residents (built-to-suit service), additional services - consulting, maintenance and operation of public facilities, car parking services[25].

The following statistical indicators are provided as criteria for evaluating the activities of individual entrepreneurs in regulatory documents: the industrial output of residents of the industrial park; the number of employees in the park, the wages fund of residents of the industrial park, the total area of the territory, the area occupied by residents, tax payments of residents of the park to the consolidated budget of the Russian Federation, the total amount of private, public investments in the infrastructure of the park, the total amount of investments of the park residents.

The study of the dynamics of indicators and their relative values will allow assessing the effectiveness of the IP as a basic benchmark and conducting a comparative analysis with other IP in order to identify conditions and factors affecting the park activities.

Considering that the main indicator of the activity of commercial entities is the volume of production, its absolute value may not always characterize the effectiveness in the activities of the park. The study calculated the following indicators:

- production capacity per unit area of IP (million rubles / m$^{2)}$;
- production capacity per unit area occupied by residents (million rubles / ha);
- production capacity per one IP employee (million rubles / person);

Table 1 shows the initial data for calculation and the calculated indicators.

Table 1 – Relative performance indicators of IP "Vorsino"

	Industrial output, million rubles.	Number of employees of IP (people)	Production capacity per one IP employee (million rubles / person) – growth over previous year (share).	Area(ha)		Production volume per area unit (mil. rubles/ha)
				Residents	Total	
2011	59 750,053	*2 960*	*20,185-1*	*481*	1 003	*124.220*
2012	67 540,387	*3 468*	*19,475-0,96*	*1 369*	1 875	*49.336*
2013	67 468,442	*4 757*	*14,183 -072*	*1 074*	1 917	*62.820*
2014	83 030,23	*5 916*	*14,035-0,99*	*1 477*	2 023	*56.215*
2015	98 431,4	*4 645*	*21,191- 1,51*	*1 139*	1 610,6	*86.419*
2016	117,690.7	*6 165*	*19,090-0,9-*	*1 145,9*	1 610,6	*102.705*
2017	121,932.3	*6 201*	*19,663 --1,03*	*1 145,9*	1 610,6	*106.407*
2018	162,282	*6 539*	*24,817 -1,22*	*1 162,7*	1 610,6	*139.573*
2019	183,996	*6 072*	*30,302 –1,22*	*1 162,7*	1 610,6	*158.248*
2020	218,009	6 152	35,437-1,17	*1 162,7*	1 709,5	*187.502*

The trend of changes in industrial output shows its positive growth dynamics which indicates the correct choice of strategies for IP creation (Fig.1)

Figure 1 – Industrial output trend

However, the "Industrial output per one employee" indicator, although fluctuating, at the same time has a trend of smoother growth relative to the trend of growth in industrial output (Fig.2).

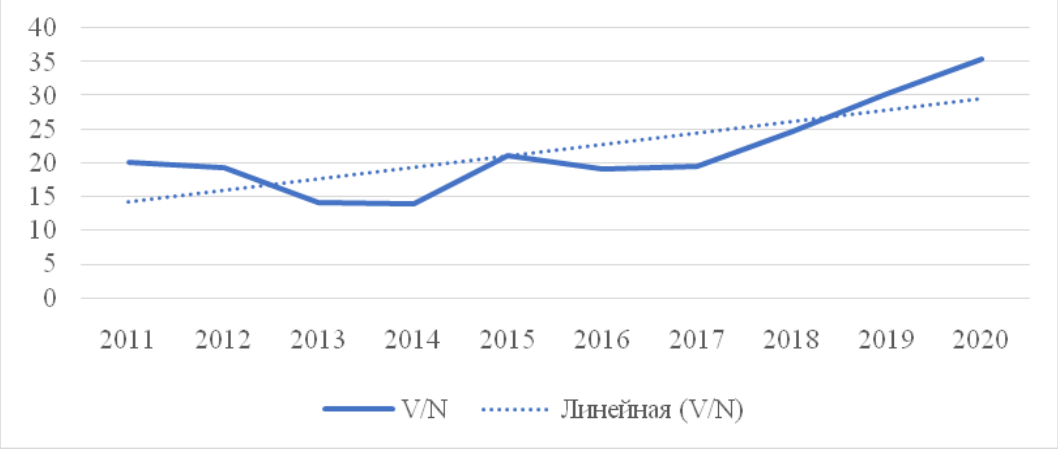

Figure 2 – Per-annum trend of industrial output per employee

The drop in per-annum industrial output per employee in 2013, 2014, 2016, is explained by a decrease in production volumes: in 2013 it was 27% compared to 2012, and down 1% in 2014 compared to 2013. At the same time, the number of IPs employees during these periods increased by 1.37 and 1.24 times, respectively. The trend of industrial output per unit area of residents which characterizes the efficiency of using areas occupied by residents, also shows deviations from the trend line in 2014 and 2017, which is also explained by a drop in industrial output. With some fluctuation in this indicator, it retains its general growth trend (Fig. 3).

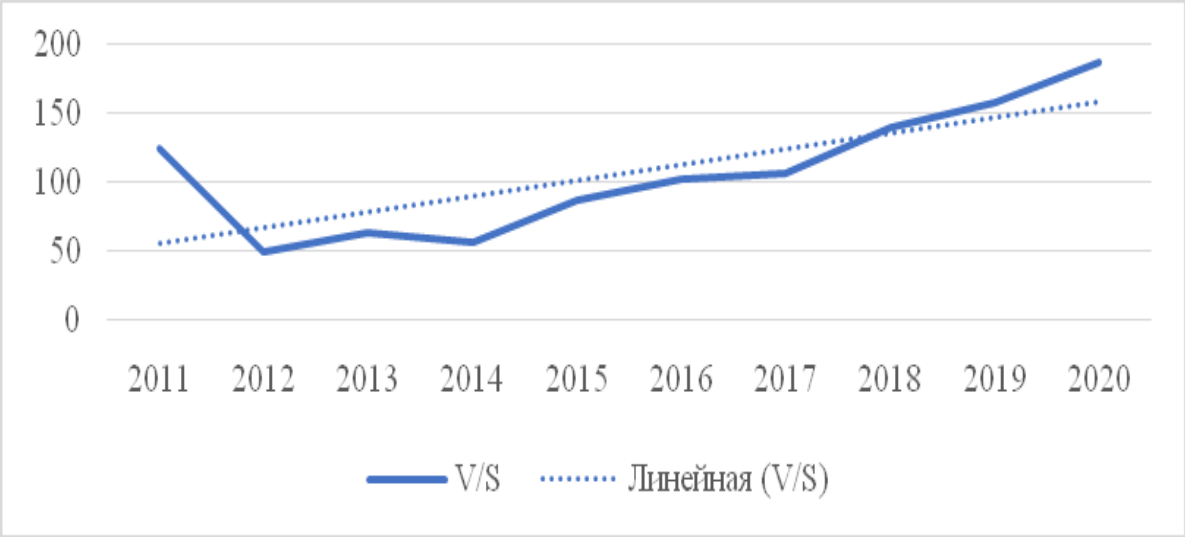

Figure 3 – Per-annum industrial output per hectare of area occupied by residents

The decrease in these values in 2012 against 2011 is primarily due to an increase in areas allocated for IPs by 1.86 times, and the areas occupied by residents, by 2.8 times. The decrease in this indicator in 2014 is explained by lower growth rates of industrial volumes (1.23) and in relation to the growth of areas (1.37).

The analysis of industrial output indicator and relative indicators characterizing the efficiency of activity proves the correct strategy of creating an industrial park. The data obtained show that the goal of increasing the volume of industrial production in this technopark has been achieved, which corresponds to the general idea of creating an industrial park.

The second most important indicator reflecting the target of IP creation is creating new jobs, which leads to a decrease in unemployment, social payments from the state for unemployment benefits in the region. Such an indicator for an IP is the wage fund. This indicator reflects, on the one hand, the amount of remuneration received by IP employees and, on the other hand, it allows to judge the levels of deductions to the budget. Consequently, the assessment of IP effectiveness is closely related to this indicator. In the study, to assess the effectiveness, it is proposed to use not only the absolute values and dynamics of the wages fund indicator, but the following relative indicators as well:

- The average annual wages of an employee and its dynamics.
- Percentage growth of the wage fund in relation to the previous year
- The share of the wage fund and the percentage of its change to the previous year
- The wage fund per unit area of the IP.

Table 2 shows the initial data for analysis and the results of calculating relative indicators.

Table 2 – Statistical indicators characterizing IP performance

	Industrial output, million rubles.	Number of employees of IP (people)	Wage fund, million rubles.	IP area (ha)	Area used by residents
2011	59 750,053	2 960	1 732,5	1 003	481
2012	67 540,387	3 468	1 996,2	1 875	1 369
2013	67 468,442	4 757	2 709,3	1 917	1 074
2014	83 030,23	5 916	2 765,2	2 023	1 477
2015	98 431,4	4 645	3 177,18	1 610,6	1 139
2016	117,690.7	6 165	3 431,4	1 610,6	1 145,9
2017	121,932.3	6 201	3 946,9	1 610,6	1 145,9
2018	162,282	6 539	4 377,3	1 610,6	1 162,7
2019	183,996	6 072	5 286	1 610,6	1 162,7
2020	218,009	6 152	5 833	1 709,5	1 162,7

Table 3 shows the results of the calculation of relative indicators characterizing the labor efficiency.

Table 3 – Indicators of labor efficiency in IPs

	The share of wages fund in industrial output (%)	Wages fund per one hectare of park area (million rubles/ha)	Wages fund per one hectare of used area (million rubles/ha)	Per employee average annual wages (million rubles)
2011	2.8	1.727	3.602	0.585
2012	2.92	1.064	1.458	0.576
2013	4.0	1.413	2.522	0.569
2014	3.3	1.367	1.872	0.467
2015	3.2	1.973	2.789	0.684
2016	2.9	2.130	2.994	0.557
2017	3.2	2.450	3.444	0.636
2018	2.7	2.718	3.765	0.688
2019	2.9	3.282	4.546	0.870
2020	2.7	3.4	5.015	0.948

"The share of the wage fund in the total industrial output" indicator characterizes the labor efficiency, which means the increasing share of other constituent elements that form the production cost. With a general increase in the number of IP employees, an increase in the average annual salary of an employee, the share of the wage fund in the total volume of industrial production by the last year of the analyzed period decreased by 0.1%.

Figure 4 is a diagram showing the trend of a decrease in the share of wages fund within industrial output.

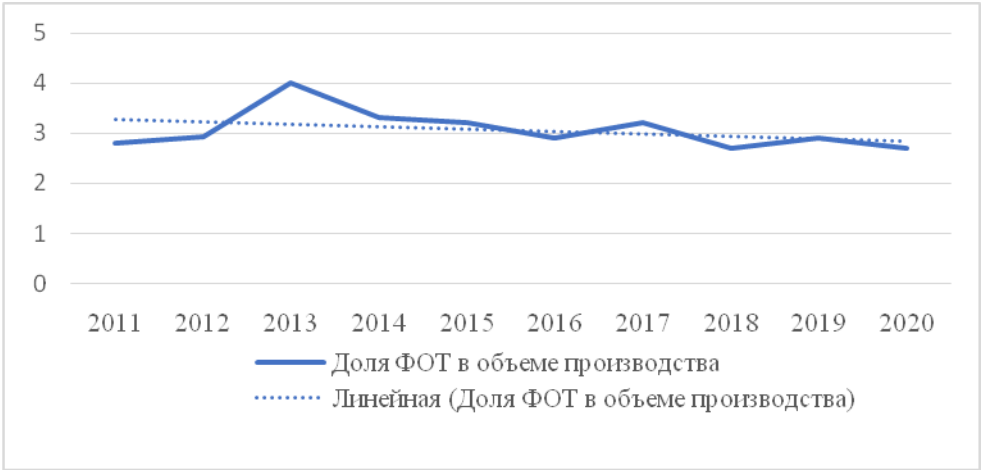

Figure 4 – Trends of wages fund share in industrial output

This trend can also be explained by the increase in the inflation of costs for material resources, which increases production volumes, and the discrepancy between the growth rate of inflation and the growth rate of wages.

The trend of the annual wages fund per employee is shown in Figure 5.

The decrease in the average annual wage in 2014 was due to a higher increase in the number of employees by 1.27 times and a small increase in the labor wages fund - 1.02 times. Similarly, the decrease in this indicator in 2016 is explained when wage index increased by 15%, and the number of employees increased by 32%.

Figure 5 – Trend of average wage of an IP employee

Figure 6 is the diagram of the growth of wages fund and industrial output in terms of growth share relative to the previous year.

Figure 6 – Diagrams of the growth of wages fund and industrial output

The diagram analysis shows that production output growth rate is higher than of the wages fund with the exception of increase in 2013, 2019, which also confirms small deviations and some stability of the indicator characterizing the share of wages fund in industrial output.

The third indicator characterizing the IP effectiveness is the indicator characterizing the taxes amount to the consolidated budget of the Russian Federation. Table 4 shows the amount of taxes to the consolidated budget of the Russian Federation, the amount of tax per hectare of area used by a resident, as well as the amount of tax to the consolidated budget per IP employee. Due to the lack of data on the volume of tax payments to the consolidated budget of the Russian Federation in 2011-2013, the analysis was implemented on the basis of 2014-2020 data.

Table 4 – Indicators characterizing IP effectiveness in terms of tax payments of residents

	Volume of tax payments (million rubles)	The volume of payments per hectare of area (million rubles/ha)	The amount of tax payments per employee (million rubles/person)
2014	6 039,371	4.089	1.021
2015	5 643,845	4.955	1.210
2016	5 553,455	4.8146	0.9
2017	9 186,067	8.016	1.481
2018	10 335,567	8.889	1.581
2019	14 824,062	12.749	2.441
2020	19 312,124	16.610	3.139

Starting from 2016, the amount of deductions to the consolidated budget per hectare of area occupied by residents has had a resilient growth trend, which positively characterizes the IP activities. Per-employee tax payments characterize the contribution to the increase in the consolidated budget of the Russian Federation, and, accordingly, the importance of the state to develop the economy. The dynamics in changes of this indicator is shown in Fig. 7

Figure 7 – Dynamics of changes in the volume of tax payments per employee, million rubles.

The study of relative indicators characterizing the of IP activity in comparison with absolute indicators confirms the trend of changes in absolute indicators, but gives a more accurate picture characterizing the IP activity. Relative indicators mainly show the efficiency of using resources (land, labor) and the IP activities in terms of tax deductions to the budget, which is an important economic criterion. In addition, these relative indicators enable a comparative analysis of the activities of various IPs, Table 5.

Table 5 – Indicators of the efficiency of land and labor use and tax payments in 2020.

Name of the industrial park	Revenue per hectare (million rubles/ha)	Revenue per employee (million rubles/person)	Volume of payments per hectare (million rubles/ha)	The amount of tax payments per employee (million rubles/person)	Average annual salary per employee (million rubles/person)	Per-hectare wages fund (million rubles/ha)
Vorsino Industrial Park	187.502	35.437	16.610	3.139	0.948	5.017
Vyatskie Polyany Kirov region [26]	178.889	2.734	22.331	0.342	0.327	21.331
"K-Agro agro-industrial park" [27]	6.33	2.215	1.221	0.427	No data	No data
Orlovka Industrial Park [28]	0.3	0.075	0.011	0.0028	0.024	0.096
SEZ Dubna [29]	94.922	2.035	14.875	0.319	0.626	29.185

Analysis of the data obtained shows that the indicator characterizing labor productivity has significant fluctuations in industrial parks, which may be explained by the different cost of products produced by residents and/or a greater proportion of manual labor used in the work process. With the highest return on revenue per hectare in IP Vorsino (35.437 million rubles) and the highest average annual salary per employee (0.948) in relation to similar indicators in other parks, the wages fund coming per hectare is the lowest, more than five (5.82) times lower than in SEZ Dubna SEZ. However, the volume of per-employee tax payments in IP Vorsino exceeds the same in the SEZ Dubna by 9.8 times, the average annual salary per employee - by 1.5 times, at the same time, the volume of tax payments per hectare of area in IP Vorsino is only 1.1 times higher than in SEZ Dubna. If we compare the parks activity in terms of per-hectare tax payments, then the Vyatskie Polyany Industrial Park is the leader being ahead of IP Vorsino by 1.34 times, and SEZ - by 1.5 times.

Conclusions

The study findings allow to draw the following conclusions:

The evaluation of the IP activity should be implemented on the basis of indicators showing the efficiency of using basic resources (labor, land). The efficiency of using land allocated for IPs is recommended to assess on the basis of the amount of revenue per hectare, which allows to assess the effect of using land allocated for IP; the amount of tax revenues to the budget from one hectare of land. To assess the effect of labor use, it is proposed to use the traditional labor productivity indicator, calculated as the ratio of revenue to the number of IP employees. However, this indicator is associated with the material intensity of the types of activities implemented in IP. Considering the importance of social problems solved in IP, it is proposed to calculate the average annual salary, defined as the ratio of the wage fund to the number of employees, which further allows to assess the growth/ decline of this indicator in relation to the average annual salary of the region where the IP is located. An indicator of labor efficiency can be the ratio of the amount of taxes received to the budget to the number of employees, which characterizes the amount of revenue per employee. The indicator characterizing the wage fund per one hectare, according to its economic content, shows what annual salary an employee receives when a resident uses one hectare of area. The analysis showed that this indicator correlates with the revenue indicator (inverse relationship) and therefore it can be an exempt from the proposed system of indicators for evaluating the effect of IP activities. The construction of dynamic series of the studied indicators showed that they can characterize the IP activity.

The analysis of indicators characterizing the efficiency of resource use for randomly selected IPs showed that there are significant deviations of the same indicators, which requires the IP grouping with approximately the same characteristics for basic activities, which will exclude a significant difference in labor productivity and will allow an adequate comparative analysis of the IP activities in order to develop solutions for their development.

A promising study will be the identification of factors influencing the change in the indicators defined in the study, which will ultimately improve the efficiency of industrial parks.

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CURRENT STATE AND PROBLEMS OF DEVELOPMENT OF ROAD CARGO TRANSPORTATION IN THE REPUBLIC OF BELARUS

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Abstract. The analysis of the current state of road freight transportation in the Republic of Belarus is carried out. The factors that have a negative impact on the development of road freight transportation are considered. The conclusion is made about the measures necessary to minimize the influence of these factors.

1 Introduction

Transport logistics occupies a leading place in the logistics system of the Republic of Belarus. This is predetermined by the geographic location of the republic as a landlocked state, as well as by the advantages of road transport, which is a fairly optimal and effective means of delivery and distribution of goods both in domestic traffic and on international routes.