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ANALYSIS OF STATE AND DEVELOPMENT OF INDUSTRIAL INFRASTRUCTURE IN ZAPORIZHZHYA REGION

Summary: The article identifies the main problems and threats of the industrial infrastructure functioning in the regions; the basic structural components of the indistrial infrastructure of the region are highlighted, the allocation of research which can become the main strategic tool for the development of the industrial sector particularly and of the region as a whole is proposed. The industrial infrastructure components of Zaporizhzhya region are analyzed. Attention is paid to the range of existing problems of industrial infrastructure development of the region and its components.

Key words: infrastructure, industrial infrastructure, components of regional industrial infrastructure, analysis, monitoring.

1. FORMULATION OF THE PROBLEM

It is common knowledge that first of all there is a direct link between the public investment level to the territorial infrastructure and the rate of return to the private sector; in the second place productivity gains can only be achieved by improving the infrastructure of the region.

The most important part of the infrastructure industry is production infrastructure which provides services of a production nature, that is, provides links in the industrial sphere of the economy. The level of development and the state of the industrial infrastructure is a strategic tool for the development of a particular region, and therefore requires a well-established analysis process (monitoring) which is currently absent.

ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS.

Foreign scientists (Managi, S., Halkos, G. 2015), (Patricia C.Melo, Daniel J.Graham, Ruben Brage-Ardao, 2013), (Holmgren, Johan, Merkel, Axel, 2017 and some others) pay considerable attention to the peculiarities and problems of infrastructure development.

The work of many domestic scientists (І. В. Валентюк, Н. О. Сич, В. Ю. Сухенко 2010), (Г. О. Власенко 2011), (С. І. Гречана 2016), (В. І. Дубницький, С. О. Федулова, О. В. Василюк 2017), (О.Г. Загній 2013), (Ю. В. Ковбасюк 2014), (Т. А. Приходченко 2018) are devoted to issues of regional and infrastructure development in Ukraine.

However firstly almost all scientific developments relate to the problems of the infrastructure industry development as a whole without highlighting or focusing on its main component – the industrial infrastructure; secondly in most researches a sectoral approach prevails that is the identification of the interdependence between the state of the industrial infrastructure and the output of the main production; at last much of the work deals with the purely theoretical issues of the infrastructure industry development as a whole and the industrial infrastructure of the region in particular.

TASKING (formulating the purpose of the article).

To identify the main problems and bottlenecks of the state and development of industrial infrastructure of Zaporizhzhya region on the basis of the analysis.

2. PRESENTING MAIN MATERIAL

Summarizing the definitions given in (О.Г. Загній 2013; С. І. Гречана 2016;; Industrial infrastructure; National economic complex), the indistrial infrastructure of a region is a collection of industries, groups of sub-sectors, enterprises, networks and communications (that is, organizationally separated objects) that ensure the normal course of social industry with providing of services for the exchange of results between enterprises of material industry and industry state for the functioning of all economic entities of the region without creating added value.

The level of infrastructure development in the region (gross value of the infrastructure, volumes of state capital investments in infrastructure projects, volumes of investments) is an indicator of the level of economic component development in the region characterized by such indicators as productivity, volume of private investments, rate of profit in the private sector and dynamics of these indicators.

In their work (І. В. Валентюк, Н. О. Сич, В. Ю. Сухенко 2010) referring to D. Aschauer's research, the authors argue that public investment in infrastructure and private investment are functionally interrelated: construction of new roads, bridges, road facilities and other infrastructural facilities accelerate the transportation of goods (promotion) from producer to consumer and modern equipped power plants reduce energy costs and consequently the overall costs of production at enterprises.

The structure of industrial infrastructure includes: utilities in terms of servicing enterprises; transport and transport infrastructure; enterprises of communication and information support; energy; other engineering structures and networks; warehousing, sales system and logistical supply; leasing, logistics companies, various service and support centers and other organizations that serve economic

entities (О. Г. Загній 2013; С. І. Гречана 2016; Industrial infrastructure; National Economic Complex).

The authors (І. В. Валентюк, Н. О. Сич, В. Ю. Сухенко 2010) include communal services in the industrial and economic infrastructure of the region in terms of servicing industrial consumers, energy management, warehousing, transport and industrial infrastructure, communication and communication enterprises, information support, various service centers and other organizations serving regional business entities.

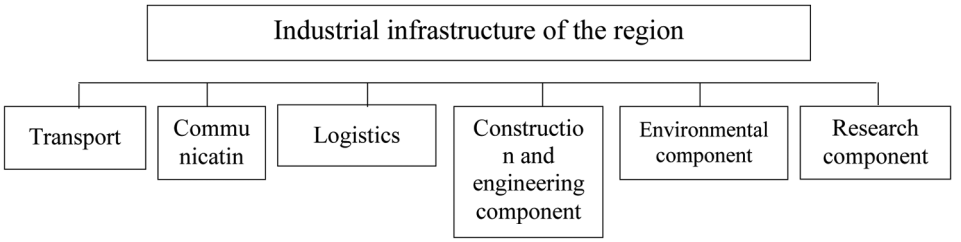
Production infrastructure is not just a collection of certain objects, it is above all a characteristic of the general initial conditions for the effective development of the main production industries, free movement and consumption. Creating such conditions in the best (optimum) way is the content of the activity of industrial infrastructure, which distinguishes it from other economy sectors of the region (В. І. Дубницький, С. О. Федулова, О. В. Василюк 2017; О. Г. Загній 2013; С. І. Гречана 2016).

In agreement with the opinion of the mentioned authors we believe that the effective development of the industries of any territorial formation including the region is impossible without adequate provision of its scientific developments, technological and product innovations, organizational ideas. Therefore in our opinion it is advisable in the industrial infrastructure system to allocate the research component which can become the main strategic tool for the development of the manufacturing sector and the region in general.

The research industrial infrastructure component of the region includes scientific institutes, educational establishments, venture firms, information and advisory firms, auditing organizations whose activity contributes to the activation of enterprise innovation of the region. information and consulting firms, auditing organizations whose activity helps to stimulate innovation enterprise activity of the region.

The industrial infrastructure components of the region are presented in fig. 1.

Figure 1. The main industrial infrastructure components of the region.



Source: own study.

In the work (С. І. Гречана 2016) the author identifies the problems and threats of the industrial infrastructure functioning of the regions on the basis of the current state analysis of development of the Ukrainian regions and the scientific sources systematization. One of the most important problems according to the author is the lack of a well-established analysis process (monitoring) of the industrial infrastructure state.

Therefore management decisions to optimize the industrial infrastructure structure of the region increase its efficiency and its individual components, etc., require constant monitoring and detailed analysis.

Zaporizhzhya region belongs to highly industrialized and highly urbanized regions (the share of industry in gross value added is over 40%). In terms of economic efficiency of regional development in 2018 Zaporizhzhya region ranks fourteenth. By the same indicator in 2017 the region occupied the twelfth position (Monitoring the socio-economic development of regions for 2018).

The region has considerable transit potential and energy generating capacities, high potential of renewable and alternative energy development, considerable potential for intensive tourist and recreational sphere development. Despite this the infrastructure of the region is slowly developing.

The analysis of the components of industrial infrastructure was carried out according to the main components (see Fig. 1).

A) The transport component of the industrial infrastructure of Zaporizhzhya region is represented by rail, road and air transport (Table 1, Table 2) (Main Department of Statistics in Zaporizhzhya region, 2018).

The volume of cargo transportation and the number of passengers carried by rail (with constant density of public tracks – 36 km per 1000 km²) are constantly decreasing. The density of paved public roads remains unchanged at 251 km. 1000 km. sq. m. territory.

Table 1. The volume of goods transported to Zaporizhzhya region, by type of transport (thousand tons).

	Railway	Marine	River	Road	Air
1995	14445,5	9,5	854,3	57170,0	0,4
2000	13337,1	4,4	125,8	40034,9	0,8
2010	13548,2	–	415,4	64914,5	0,5
2011	15375,4	–	624,8	61838,2	0,5
2012	15190,1	–	499,6	51403,4	0,6
2013	14729,3	–	419,3	35073,5	0,5
2014	14605,1	–	580,3	31427,4	0,4
2015	14340,4	–	399,9	28497,8	0,5
2016	…[1]	–	…[1]	29050,4	0,6
2017	13650,4	–	…[1]	30396,5	0,8
2018	13258,3[2]	-	…[1]	4540,9	…[1]

[1] Data are not released to ensure compliance with the requirements of the Law of Ukraine "On State Statistics" on the confidentiality of statistical information.

[2] Amount of cargo shipped.

Source: own study.

Table 2. Number of passengers carried in Zaporizhzhya region, (thousand people).

	Railway	Marine	River	Road	Air	Tram	Trolleybus
1995	25326,0	18,6	934,0	189534,0	25,2	38568,6	41159,2
2000	27342,9	20,7	518,8	142144,5	32,2	79096,4	82485,5
2010	16900,0	12,6	62,4	83009,9	15,0	56456,8	24657,2
2011	17131,0	10,2	108,3	82741,5	20,7	57124,2	22596,5
2012	17376,0	–	107,7	81206,3	29,8	46761,3	21553,3
2013	17082,0	–	63,8	71549,1	41,9	40861,0	18294,7
2014	16933,6	–	60,4	75796,1	33,0	43440,2	17648,4
2015	17456,2	–	75,4	66644,7	44,5	41571,5	19633,8
2016	…[1]	–	…[1]	62988,1	52,8	36836,5	16355,2
2017	6650,4	–	…[1]	65104,6	94,4	32150,1	15915,5
2018	7265,0[2]	79,8		67830,0	98,5	27588,8	13374,4

[1] Data are not released to ensure compliance with the requirements of the Law of Ukraine "On State Statistics" on the confidentiality of statistical information.
[2] Number of passengers carried.
Source: own study.

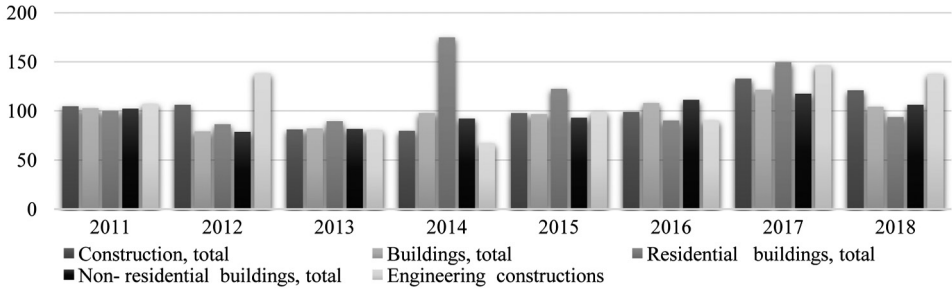
However the roads have poor technical condition, the bridge crossings are significantly congested with traffic flows which significantly affects the volume of freight and the number of passengers transported by road.According to the indicator «Density of public roads with hard surface of national importance in the region» Zaporizhzhya region ranks 19th; according to the indicator «Freight turnover of road and rail transport, thousand tons-kilometers per 1000 population» Zaporizhzhya region occupies the 20th position (Monitoring of socio-economic development of regions for 2018).

Despite the small volume of freight and the number of passengers carried by air their tendency is positive. The number of passengers carried by air transport in 2017 increased by 41.6 thousand compared to the previous year; in 2018 the number of passengers carried increased by 104.3%.

The trend of changing the number of passengers carried by tram and trolleybus transport in the region is negative (Central Statistics Office in Zaporizhzhya region. Statistical information; Transcarpathian region transport performance results in 2018).

B) The construction and engineering industrial infrastructure component of Zaporozhye region in 2017–2018 is characterized by volume increasing manufactured construction products. In particular in 2018 compared to 2017 in terms of the components: "Construction, total", the output increased by UAH 1,269,475,000; "Buildings" increased by UAH 345 085; "Engineering Structures" increased by UAH 924 390. The rate of construction products growth by type is shown in Fig. 2 (Main Directorate of Statistics in Zaporizhzhia Oblast. Statistical Information).

Figure 2. Indices of construction products by type (% to previous year).



Source: own study.

However according to such indicators as "The rate of growth (decrease) in the volume of commissioned housing, interest to the corresponding period of the previous year" and "The total area of housing stock per capita, sq. m » Zaporizhzhia region (out of 25 regions of Ukraine) took 23rd and 17th places respectively (Monitoring of socio-economic development of regions for 2018).

C) Mobile segments, fixed communications and fixed Internet access remain the main segments of the communications services market accounting for 78.9% of total revenues from the provision of communications services in 2018. (Table 3) (Head Office of Statistics in Zaporizhzhya Oblast. Statistical Information).

Table 3. Realized services volume in the field of telecommunications and postal services of Zaporizhzhia region, 2018 (at actual prices including VAT; thousand UAH).

	Volume of telecommunication and postal services implemented		It includes the volume of international services provided	
	total	habited	total	habited
Total	2036962,8	1485223,0	72477,6	52548,5
including				
postal and courier activities	162591,8	101186,2	43260,7	40646,0
telegraph communication	…[1]	…[1]	…[1]	…[1]
fixed line telephony	160243,8	109874,4	…[1]	…[1]
mobile connection	1332200,7	1022873,1	23131,9	7780,3
satellite communication	–	–	–	–
broadcasting, broadcasting of television and radio programs, maintenance and operation of equipment in broadcasting networks, radio communication	29048,2	15210,8	–	–
cable television	10882,1	10872,8	x	x
wired broadcasting	…[1]	…[1] –		–
Internet services	292771,5	214157,3	1333,3	1310,4
of these by providing fixed (wired) broadband broadcasting	257325,5	204186,7	1333,3	1310,4

[1] Data are not released to ensure compliance with the requirements of the Law of Ukraine "On State Statistics" on the confidentiality of statistical information.

Source: own study.

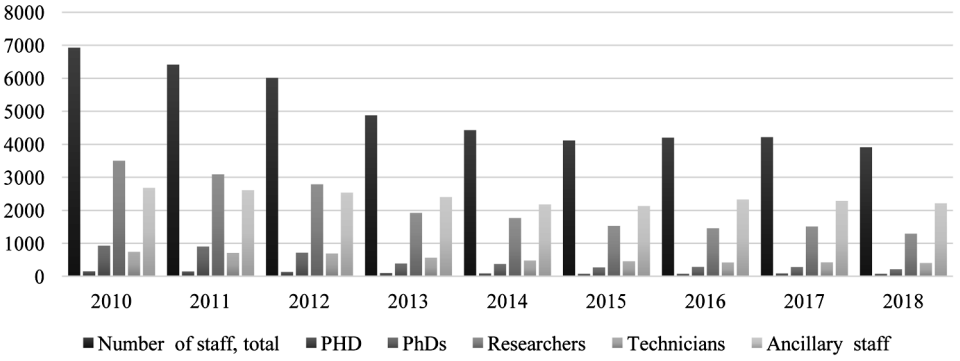
Postal shipments are projected to decline by year. The number of sent letters decreased from 12147.7 thousand in 2000 to 9704.9 thousand in 2018 (Main Department of Statistics in Zaporizhzhia region. Statistical Information).

Zaporizhzhya region has good results in terms of the urban households share with Internet access at home (8th position) and the rural households share with Internet access at home (11th place) (Monitoring the socio-economic development of regions in 2018).

D) The research component analysis of the industrial infrastructure in the Zaporozhzhya region was carried out on the following elements:

1) the number of employees involved in the research and development implementation. The exponential forecast of the total number of employees involved in the research and development implementation, with the value of the approximation reliability $R^2 = 0{,}8825$, indicates a steady tendency for their decrease (Fig. 3) (Main Department of Statistics in Zaporizhzhia Oblast. Statistical Information);

Figure 3. Number of R&D employees by category of staff (persons).

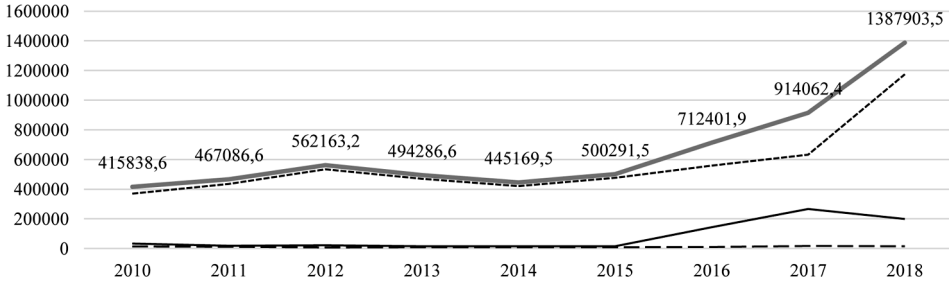


Source: own study.

2) expenditures for research and development in 2017 compared to 2010 increased by 2.2 times (from 415838.6 to 914062.4 thousand UAH). Negative is the fact that the amount of expenditures for basic scientific research (Fig. 4) (Main Department of Statistics in Zaporizhzhia region. Statistical information) has not changed much;
3) innovationenterprise activity of the region. The largest enterprise number of Zaporizhzhya region engaged in innovation activity is in 2012 (29.8% of the total number of enterprises); the maximum number of enterprises introducing innovations is characteristic for 2015 (19.2% of the total number of enterprises); in 2008 the share of sold innovative products in the volume of industrial was 8.3% (the maximum value for the studied period). The volumes of implemented innovations at industrial enterprises of Zaporizhzhya region are presented in Table. 4 (Head Office of Statistics in Zaporizhzhia Oblast. Statistical Information).

In 2018 Zaporizhzhia region became the leader in the indicator "Share of innovative products sold in total industrial output" (Monitoring of socio-economic development of regions for 2018).

Figure 4. Expenditures for the implementation research and development by enterprises of Zaporizhzhya region (by type of work), thousand UAH.



Source: own study.

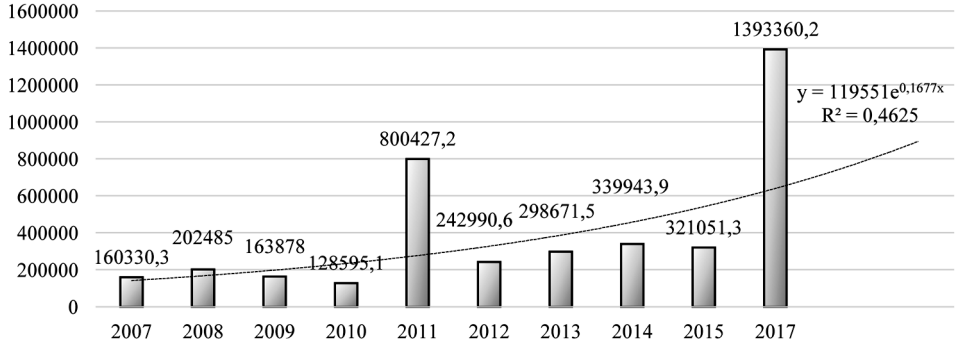
Table 4. Innovation implementation at industrial enterprises.

	Number of new technological processes implemented, units	Including low-waste, resource-saving	Number of names of introduced innovative types of products, units	Including new types of machines, equipment, appliances, apparatus
2007	234	33	109	60
2008	257	35	148	77
2009	134	33	132	69
2010	170	21	114	48
2011	509	52	619	97
2012	114	40	446	156
2013	207	48	397	193
2014	212	45	611	413
2015	114	35	397	290
2017[1]	142	35	319	227

[1] The frequency of the state statistical observation on the innovation activity of an industrial enterprise has been changed from «annual» to «once every two years», starting in 2015.
Source: own study.

The total amount of industrial enterprise expenditures of Zaporizhzhya region for innovation activities in 2017 amounted to UAH 1393360.2 thousand which is the maximum value for the period under investigation (Fig. 5, Table 5) (Head Department of Statistics in Zaporizhzhia Oblast. Statistical information).

Figure 5. Total amount of expenditures for innovative industrial enterprise activity of Zaporizhzhya region, thousand UAH.



Source: own study.

Table 5. Innovative activity of industrial enterprises, thousand UAH.

	Total cost	Including directions					
		research and development	including		acquisition of other external knowledge	purchase of machinery, equipment and software	Other costs
			internal GDRs	External GDRs			
2007	160330,3	42874,2	37301,2	5573,0	281,5	84586,4	32588,2
2008	202485,0	54720,8	24981,8	29739,0	184,0	101958,9	45621,3
2009	163878,0	55131,5	19729,6	35401,9	274,4	89469,7	19002,4
2010	128595,1	53801,9	49615,6	4186,3	666,0	69861,3	4265,9
2011	800427,2	77024,6	55376,0	21648,6	252330,0	417987,4	53085,2
2012	242990,6	66016,7	49274,3	16742,4	283,9	107914,5	68775,5
2013	298671,5	140190,1	21158,4	119031,7	393,1	129235,9	28852,4
2014	339943,9	111248,8	33771,3	77477,5	515,2	197073,7	31106,2
2015	321051,3	123797,2	61744,9	62052,3	359,2	94659,0	102235,9
2017[1]	1393360,2	252003,3	138579,4	113423,9	531,4	915464,4	225361,1

[1] The frequency of the state statistical observation on the innovation activity of an industrial enterprise has been changed from "annual" to "once every two years", starting in 2015.

Source: own study.

4) innovative activity financing sources of industrial enterprises. In the structure of industrial enterprises financing innovative activity sources of Zaporozhye region a considerable part (96,6% in 2007 and 83,4% in 2017) make up own funds; a small part – 16.6% – is occupied by other sources (Table 6) (Head department of statistics in Zaporozhye region. Statistical information);

Table 6. Sources of innovative activity financing of industrial enterprises in Zaporozhzhya region, (thousand UAH).

	Including atmospheric air protection and climate change	Total			
			atmospheric air protection and climate change		atmospheric air protection and climate change
2007	160330,3	154848,9	–	–	1265,4
2008	202485,0	199397,2	–	242,0	2845,8
2009	163878,0	160788,5	–	–	623,8
2010	128595,1	127895,1	–	–	–
2011	800427,2	648835,4	12682,5	9463,5	130331,2
2012	242990,6	235426,2	–	–	6459,4
2013	298671,5	298667,5	–	–	4,0
2014	339943,9	335729,6	–	–	4214,3
2015	321051,3	321051,3	–	–	–
2017[1]	1393360,2	1161569,9	–	–	231790,3

[1] The frequency of the state statistical observation on the innovation activity of an industrial enterprise has been changed from "annual" to "once every two years", starting in 2015.
Source: own study.

E) environmental (ecological) component. Investment in atmospheric air protection and climate change issues accounted for the largest share in the capital investment structure – 71.1% in 2006 and 53.8% in 2017; in the structure of current expenditures a considerable part is expenses for purification of return waters – 39,3% in 2006 and 34% in 2017 Table. 7, Table. 8) (Head Office of Statistics in Zaporizhzhia Oblast. Statistical Information).

Measures aimed at protecting the environment are producing positive results. Emissions of pollutants in 2018 have decreased more than 5-fold since 1990. The exceptions are carbon dioxide emissions, which have increased 1.6 times (Central Statistical Office in Zaporizhzhia region. Statistical information).

Table 7. Capital investments for environmental protection by types of environmental measures (at actual prices, thousand UAH).

	Total	Including					
		atmospheric air protection and climate change	sewage treatment	waste management	protection and rehabilitation of soil, ground- and surface water	conservation of biodiversity and its habitat	other areas of nature conservation activities
2006	121009,4	86040,5	22859,9	10636,2	735,1	50,7	687,0
2007	309625,6	168041,6	118030,2	12956,0	8945,3	1252,5	400,0
2008	418700,4	253638,1	134610,2	16208,0	12095,8	1999,2	149,1
2009	304966,5	203981,4	54264,7	26947,8	18378,5	806,5	587,6
2010	159249,0	84826,5	32234,8	12531,7	28441,6	902,1	312,3

cd. Table 7.

	Total	Including					
		atmospheric air protection and climate change	sewage treatment	waste management	protection and rehabilitation of soil, ground- and surface water	conservation of biodiversity and its habitat	other areas of nature conservation activities
2011	415639,1	278422,4	49416,3	42948,9	42542,0	1796,7	512,8
2012	453337,9	255431,3	84074,5	49804,0	54685,3	3221,7	6121,1
2013	322908,7	192584,6	59509,9	37065,7	27076,6	1307,1	5364,8
2014	881268,6	184538,0	654889,1	10333,3	30187,5	588,3	732,4
2015	591509,0	368273,5	107746,4	69097,7	43104,2	2639,3	647,9
2016	1062753,0	860964,9	101559,4	62554,3	35633,3	951,8	1089,3
2017	817114,6	439913,1	79373,7	64605,8	219139,4	3398,9	10683,7
2018	1065343,5	508454,3	226229,9	64184,6	254991,2	9798,8	1684,7

Source: own study.

Table 8. Current costs for environmental protection by types of environmental measures (at actual prices, thousand UAH).

	Total	Including					
		atmospheric air protection and climate change	sewage treatment	waste management	protection and rehabilitation of soil, ground- and surface water	conservation of biodiversity and its habitat	other areas of nature conservation activities
2006	391830,9	107369,1	154041,6	111539,0	4146,3	544,7	14190,2
2007	480914,2	148451,3	168113,0	139909,5	5079,3	1273,4	18087,7
2008	667521,1	188250,7	218552,1	226874,9	6703,5	1990,5	25149,4
2009	644202,1	180363,7	232031,8	197293,4	9280,3	2797,9	22435,0
2010	766332,0	204366,8	263293,9	119748,3	149049,3	3635,1	26238,6
2011	958423,0	249281,8	353731,2	150639,5	184171,0	5300,5	15299,0
2012	1173415,3	267364,5	488411,4	168491,5	222209,7	5916,1	21022,1
2013	1212550,9	322663,1	481006,4	166410,1	215721,8	8722,4	18027,1
2014	1274687,1	348172,4	502600,9	191664,0	207977,8	5688,3	18583,7
2015	1587096,5	445817,2	577581,7	229287,9	309008,1	6276,9	19124,7
2016	1849575,8	618505,2	644116,6	258758,3	301957,3	6053,0	20185,4
2017	2002980,7	658767,8	680705,7	322503,7	302680,1	9399,3	28924,1
2018	2496107,2	797532,7	917411,5	367066,8	369479,3	11963,1	32653,8

Source: own study.

According to the indicator „Pollutant emissions from stationary sources per 1 billion hryvnias of gross regional product" Zaporizhzhia region ranks 20th, according to „The rate of growth (reduction) of pollutants emissions from sta-

tionary sources of pollution per unit of population per year per capita, per unit of the previous year" 11th place (Monitoring of socio-economic development of regions for 2018).

The amount of waste generated increased almost 8 times; utilized – more than 57 times; burned – 82 times; removed to specially designated places or objects – 3.3 times; the total amount of waste accumulated during operation in specially designated areas or sites (waste disposal sites) – 6.5 times (Central Statistics Office in Zaporizhzhia region. Statistical information).

In 2018 the Zaporizhzhya region took 8–9 place according to the share of waste disposed of in specially designated places or objects or burned (without receiving energy) in the total amount of generated waste, percent, according to the indicator "Share of settlements, which introduced separate collection of solid household waste, in the total number of settlements in the region, percent »- 14th place.

3. CONCLUSIONS

Thus the analysis made possible to identify the main problems and threats of the industrial infrastructure functioning of the regions:

- disproportions of the current industrial infrastructure state;
- development direction imbalance of infrastructure complex branches with each other as well as with interregional development tendencies of economy;
- lack of a well-established analysis (monitoring) process of the industrial infrastructure state;
- poor organizational and institutional management quality of industrial infrastructure;
- non-systematic legislative regulation of industrial infrastructure development of the region;
- innovative component lack in the infrastructure complex transformation plans;
- insufficient financing for the industrial infrastructure development;
- inefficient use of funds for the industrial infrastructure modernization;
- high level of transaction costs in the process of industrial activities.

The industrial infrastructure of Zaporizhzhya region and its main components despite the positive changes in general have a number of problems and disadvantages:

- despite the considerable potential of the transport component the goods and passengers transportation volume by all modes of transport (except aviation) is constantly decreasing;
- construction and engineering industrial infrastructure component of Zaporizhzhya region is the only one of five analyzed components which shows positive dynamics. However in the ranking of socio-economic region development for 2018 it occupies lower positions;

- revenues from the mobile and fixed Internet access service provision have been increasing in recent years. The volume of postal items is expected to decrease (except parcels);
- the research component is characterized by a significant reduction in the number of employees involved in the research and development implementation. Despite the overall increase in the cost of doing research the cost of doing basic research has hardly changed. In 2018 Zaporizhzhya region became the leader in the Monitoring of socio-economic development of the regions in terms of the share of realized innovative products in the total volume of industrial products sold. Innovation activities are financed almost entirely by industrial enterprises at their own expense;
- investments in environmental activities are increasing; measures aimed at protecting the environment provide little but positive results.

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ANALIZA STANU I ROZWÓJ INFRASTRUKTURY PRZEMYSŁOWEJ W REGIONIE ZAPOROŻE

Streszczenie: W artykule wskazano główne problemy i zagrożenia związane z funkcjonowaniem infrastruktury przemysłowej w regionie; podkreślono podstawowe elementy strukturalne infrastruktury przemysłowej badanego regionu, zaproponowano podział badań, które mogą stać się głównym narzędziem strategicznym rozwoju szczególnie sektora przemysłowego jak i całego regionu. Analizowane są komponenty infrastruktury przemysłowej regionu Zaporoże. Zwrócono uwagę na zakres istniejących problemów rozwoju infrastruktury przemysłowej regionu i jego komponentów.

Słowa kluczowe: infrastruktura, infrastruktura przemysłowa, elementy regionalnej infrastruktury przemysłowej, analiza, monitoring.

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