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**SOCIOECONOMIC QUESTIONS  
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## **The Current Territorial Differentiation of the Industry of Irkutsk Oblast**

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**Abstract**—This article discusses recent changes in the development of industrial production in Irkutsk oblast from 2010 to 2019. Industry is the basic component in the economic complex; it provides about half of the region's gross added value and is characterized by a multi-sectoral structure formed primarily on the basis of using natural resources and cheap electricity. It is pointed out that in the last decade, a significant change in the structure of industry has led to a structural simplification of its sectoral composition with a significant shift toward the raw materials sector. Cities remain the leading centers of concentration of the manufacturing industry. The grouping of municipalities according to the level of industrial development was carried out according to the available statistical data: the calculated share of the employed in industry and the volume of shipped products of large and medium-sized organizations. On the basis of their ratio, groups of regions with intensive development of the extractive industries, primarily the oil and gas sector, as well as territories in which the industrial profile was formed in Soviet times but underwent transformations under the influence of changes in the market, were identified. A group of regions with very low industrial development has been identified, in which economic activities are mainly related to agriculture, logging, transport, and tourism. It is shown that some of the municipalities have changed their position in the groups when compared to 2010. The rest of the composition is relatively stable. It was found that in the first and fourth groups a change in priority in the development of types of economic activity occurred, whereas the second and third groups show a change in their proportions. Large business contributes to the extremely uneven distribution of investments across the oblast in the implementation of investment projects.

**Keywords:** industrial production, employed in industry, investments, leading sectors of the economy, municipalities

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### INTRODUCTION

Irkutsk oblast, one of the key industrial regions of Siberia, has great industrial and natural resource potential, which, together with its competitive advantages, make it possible to occupy a leading position among other regions of the country. Research by N.N. Klyuev [1] shows that Irkutsk oblast is one of the ten Russian regions that maximized the volume of industrial production from 1990 to 2017.

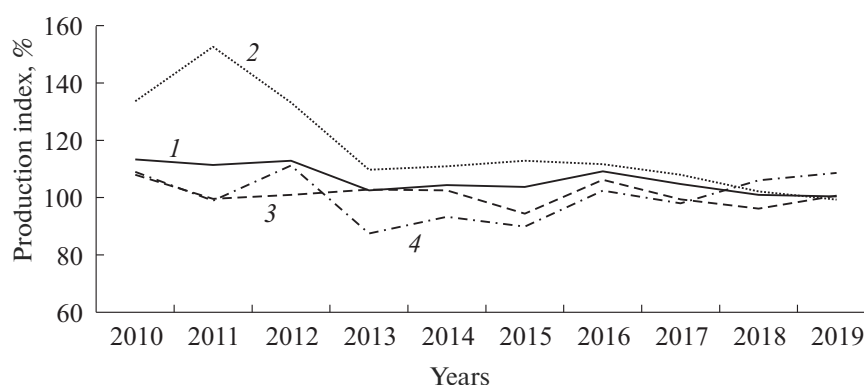
The modern industrial structure of Irkutsk oblast is made up of several basic industries, including the electric power industry, mining and timber processing complexes, nonferrous metallurgy, chemical and petrochemical industries, as well as mechanical engineering and metalworking. With the start of oil and gas production, the oil and gas industry has developed.

Currently, the spatial development of Irkutsk oblast is based on large territorial production centers located in Irkutsk, Bratsk, Shelekhov, Angarsk, Sayansk, Ust-

Ilimsk, Zheleznogorsk-Ilimsk, Taishet, Ust-Kut, and Bodaibo, where over 55% of the region's population lives. These territories account for more than 85% of the added value produced in the region, and about 60% of investments [2].

The development of industrial production and its territorial features have been widely considered by domestic geographers at different times. It is worth noting the works devoted to the period of industrialization of the eastern territories [3], economic development of certain industries [4], and issues of the location and development of certain industries [5, 6]. In recent years, the main attention has been paid to the study of industry in the sectoral context [7–11], as well as using the theory of territorial production complexes [12, 13]. The use of an integrated approach makes it possible to determine structural changes in the industry of the regions [14].

At the regional level, there are many methods and approaches to the construction of typologies and



**Fig. 1.** The production indices of Irkutsk oblast, %. Types of economic activity: 1, industrial production; 2, mining; 3, manufacturing; 4, supply of electricity, gas and steam; air conditioning.

groupings for the socioeconomic development of territories, and in particular industrial development. Consideration of the intraregional level of industrial development in the scientific literature is less common, for example [15–18], which increases the relevance of this research, which is of an applied nature.

#### MATERIALS AND METHODS

The information base of the study, which covers 2010–2019, was the materials of the Federal State Statistics Service, including databases of indicators of municipalities and official sites of local governments (analytical and forecast reports).

It is assumed in this work that at present industrial production includes the following sections of OKVED-2: Extraction of minerals (B); Manufacturing industries (C); Provision of electricity, gas and steam; air conditioning (D); Water supply; sewerage, waste collection, and disposal, and pollution elimination activities (E). According to OKVED, in 2010 industrial production consisted of the following types of activities: Extraction of minerals (C); Manufacturing (D); Production and distribution of electricity, gas, and water (E). We note that the work did not take into account the subsection Forestry and logging, which is included in the section Agriculture, forestry, hunting, fishing, and fish farming (A), although logging is a specialization of individual municipalities of the region.

The statistical data used at the municipal level (shipped goods of its own production, performed works and services on its own; the average number of employees of organizations by type of economic activity; investments in fixed assets) are given by Rosstat for large and medium-sized organizations, excluding small businesses. For example, the difference between the volume of products shipped for large and medium-sized organizations and for the full range of organizations is 5.6%, and for those employed in industrial production it is about 15%.

Due to the fact that according to the indicator called shipped goods of our own production, per-

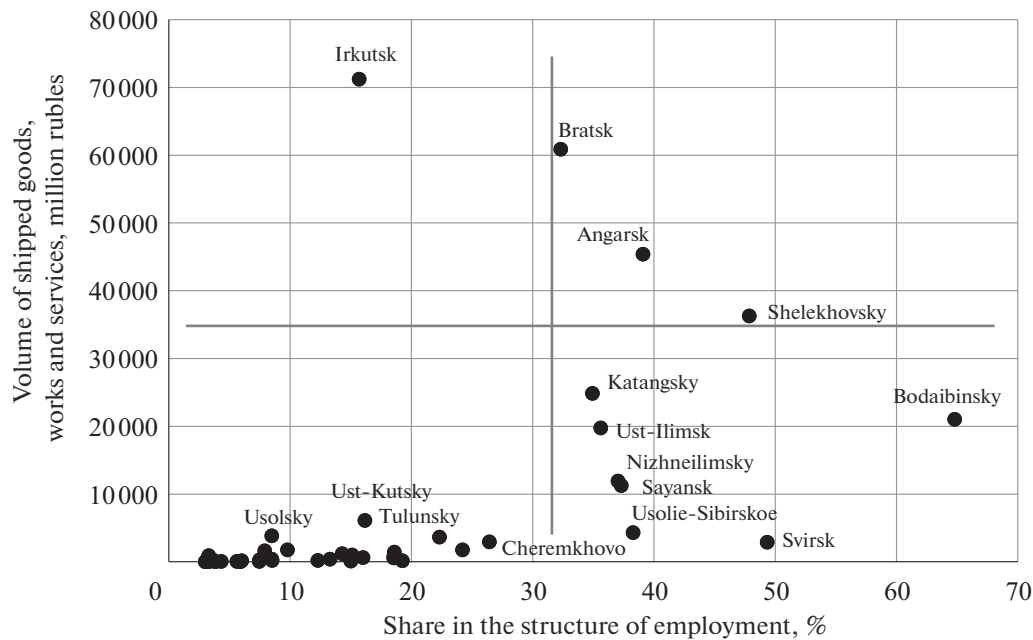
formed works and services on our own (without subjects of municipalities), information on certain types of economic activity is not published for 29 out of 42 municipalities of Irkutsk oblast in order to ensure the confidentiality of primary statistical data [19], the materials posted on the official websites of the corresponding municipalities were taken into account.

This work used comparative geographical and statistical research methods.

#### RESULTS AND DISCUSSION

In the structure of gross value added in Irkutsk oblast, industry accounted for 31.7% in 2010, and 44.8% in 2018. The specific weight of the volume of shipped products of the region in Russia increased from 1.4% in 2010 to 1.7% in 2019, due to the fact that the volume of mining operations increased nine times. The average annual number of workers employed in the industrial sector decreased by 3.6%.

In 2010–2019, the production index in Irkutsk oblast, based on the results of its retrospective recalculation by Rosstat, did not fall below 100%, reaching its maximum value in 2010, 113.3%, and the minimum value in 2019, 100.4% (Fig. 1). Growth rates of the industrial production index in 2010–2012, were due to significant volumes of mining (especially hydrocarbons). The drop in production volumes in 2019 is associated with a decrease in the production of crude oil, metal ores, and due to the current federal emergency in the region in the summer of 2019 (flooding of settlements) and coal. The trend continued in 2020 under the influence of external and internal factors (Russian participation in the agreement with the OPEC + countries and, accordingly, the restriction on oil production, as well as restrictions on the part of Russian Railways in accepting coal for export). Against the background of this situation, the manufacturing industry in 2020, in contrast, showed an increase in production (in particular, the contribution was made by Pharmasynthez, which began to produce medicines for the treatment of coronavirus infection).



**Fig. 2.** The distribution of the share of people employed in industry and the volume of industrial production of large and medium-sized organizations in Irkutsk oblast in 2010

Transformational processes, which differ in intensity and direction in different periods, have formed the modern structure of the region's industry, whose leading industries are: extraction of crude oil and natural gas, which accounts for 35.2% of the volume of shipped products; energetics, 10.3; metallurgical production, 9.1; production of paper and paper products, 4.7; wood processing, 4.5%. In 2010, the leading positions were occupied by the energy sector, 18.3%; production of machinery, equipment, vehicles, 16.3; metallurgical production, 15.3; extraction of fuel and energy minerals, 8.9; and chemical production, 7.6%.

The average number of employees of organizations (excluding small businesses) and the volume of goods, works, and services shipped by large and medium-sized organizations were used as indicators that characterize the level of development of industrial production in 42 regional municipalities in 2010 and 2019.

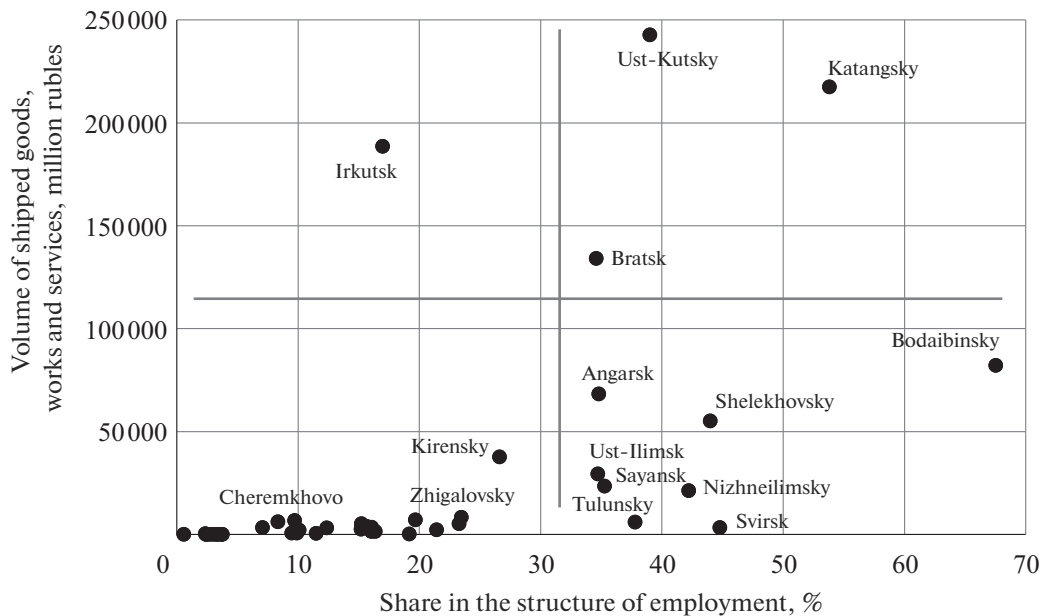
The ratio of these indicators made it possible to distinguish four groups of municipalities by the level of industrial development (high, medium, low, and very low) in 2010 and 2019. (Figs. 2, 3).

In 2019, compared to 2010, there was a transition of a number of territories of the region from one group to another. In three municipalities (Ust-Kutskiy, Katangskiy, and Alarskiy districts) there was an increase in the level of industrial development, and in the other three municipalities (Angarsk, Shelekhovskiy district, and Usolye-Sibirskoe) a decrease occurred.

*The Highly developed group* (Katangskiy, Ust-Kutskiy regions, and Bratsk) is characterized by high values of the share of people employed in industrial

production and the volume of shipped products. It accounts for 21.2% of those employed in industrial organizations of the region (rotation work is also used) and 48.4% of investments in fixed assets. The northern regions continue to increase their concentration of the volume of shipped products in the region by the type of economic activity mining (2010, 43.8%; 2019, 73.6%). Oil and gas condensate production increased by 5.4 times, from 3.3 million tons in 2010 to 17.9 million tons in 2019. Oil produced from fields in the north of the region is fed to the Eastern Siberia–Pacific Ocean (ESPO) pipeline system; it is delivered to the Far East and then exported to China and other countries of the Asia–Pacific region. The main companies represented on the territory of these municipalities are Verkhnechonskneftegaz, Dulisma, and the Irkutsk Oil Company. The latter is the largest taxpayer to the regional budget (in 2018, the share of its contributions was 12.5%). Generally, oil producing enterprises provided 46% of all income tax revenues in 2018 in the structure of tax revenues of the consolidated budget of the region.

Industrial production in Bratsk is associated with the activities of such processing enterprises as RUSAL Bratsk (in 2019 it provided 38% of the aluminum production in Russia), the Ilim Group in Bratsk, and the Bratsk Ferroalloy Plant, which form the industrial image of the city. During the period an increase in the volume of shipped products in the manufacturing sector was noted in Bratsk (2010, 22.6%; 2019, 29.9%), which allows it to remain a large industrial hub of the region.



**Fig. 3.** The distribution of the share of employed in industry and the volume of industrial production of large and medium-sized organizations in Irkutsk oblast in 2019

*Group with an average level of development* (the Angarsk, Svirsk, Sayansk, Ust-Ilimsk, Irkutsk, Bodai-binsky, Shelekhovskiy, Nizhneilimskiy, and Tulunskiy districts) is distinguished by a high share of those employed in industry and an average volume of industrial production. About half of the region's population lives in these municipalities, they produce 40.6% of industrial production, and concentrate 61.5% of those employed in the industrial sector, as well as 38.4% of investments. The group includes almost all major industrial centers in the region. Unlike the previous case, the sectoral composition of this group is more diverse and is represented by enterprises of nonferrous metallurgy, mechanical engineering, chemical and petrochemical, pulp and paper, nuclear, pharmaceutical, and food industries (Irkutsk Aluminum Plant, Irkutsk Aviation Plant, Angarsk Petrochemical Company, Angarsk Polymer Plant, Sayanskkhimplast, Ilim Group in Ust-Ilimsk, Angarsk Electrolysis Chemical Plant, Pharmasintez, etc.). The production profile of these territories was formed back in the Soviet era, but at the present stage enterprises continue to play a significant role in the socioeconomic development of the region, especially for export-oriented industries.

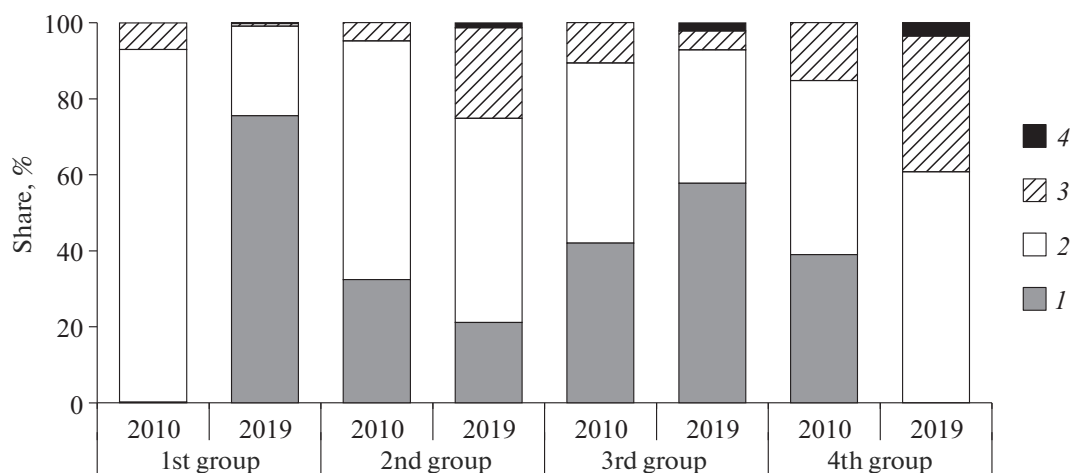
The mining sector is represented by gold mining at ore and alluvial deposits (Polyus Verninskoe, Vysochaishy, Druza, Lenzoloto, etc.), which provided more than 9% of the gold mining in Russia), iron ore (Korshunovskiy GOK), and coal (Tulunugol open pit).

A separate place in this group is occupied by Irkutsk, the administrative center of the region with a diversified industry, which is the center of the emerging agglomeration of the same name. For Irkutsk,

there is a significant increase in shipped products by the type of economic activity supply of electricity, gas, and steam, and air conditioning (in 2010, 27.9%, and in 2019, 87.4%). This increase is explained by a peculiarity of statistical accounting: most of the products produced on the territory of the region for this type of economic activity are attributed to the city. In reality, Irkutsk produces 25 times less of them. We note that almost all large energy companies, except for Vitimnergo, are registered in the regional center.

*The low development group* (Usolye-Sibirskoe, Winter, Tulun, Chermkhovo, Kirensky, Zhigalovskiy, Nizhneudinsky, Usolsky, Mamsko-Chuisky, Zalarinsky, Kazachinsko-Lensky, Taishetsky, Ust-Ilimskiy, Bratsky, Nukutsky, Alarsky, Slyudyansky, Chunsky, Chunkhovskiy, and Irkutskiy) is the most numerous and heterogeneous in its composition. It is characterized by a small share of those employed in the industrial production of the region and a low volume of goods shipped. This *group* accounts for 8.8% of the volume of shipped goods, works, and services of the region, 16.8% of those employed in industry, and 12.7% of investments. In more than half of the municipalities, the leading type of economic activity is manufacturing, which is represented by medium-sized and large companies: a branch of the Ilim Group in the Bratsk District, Knauf Gips Baikal, Rusforest Magistralny, Usolye Salt Extraction and Processing Shop (part of Russol), and others.

Mining predominates in six municipalities (Gazprom Dobycha Irkutsk, IOC, Nedra mining company (GPK), Tyretsky salt mine, Chermkhovugol open pit, etc.); in Tulunskiy district, it is power engineering,



**Fig. 4.** The change in the structure of types of economic activities by groups of municipalities of Irkutsk oblast in 2010 and 2019, %. Types of economic activity: 1, mining; 2, manufacturing industries; 3, supply of electricity, gas and steam; air conditioning; 4, water supply, sewerage, waste collection and disposal, activities to eliminate pollution.

and in Mamsko-Chuysky, it is water supply. At the end of 2022, gas is planned to be supplied from the Kovykta field (Irkutsk gas production center) to the Power of Siberia gas trunkline, which is oriented to external consumption (China).

The group includes territories both with industrial enterprises closed in the post-Soviet period and with new industrial facilities that have just begun to function. Single-industry towns (Usolye-Sibirskoye, Cheremkhovo, and Tulun) were given the status of a territory of advanced socioeconomic development to support the economy.

*The very low development group* (Osinsky, Kuytunsky, Bayandaevsky, Olkhonsky, Balagansky, Kachugsky, Bokhansky, Ekhirit-Bulagatsky, Ust-Udinsky, and Ziminsky districts). This accounts for only 0.1% of the volume of products produced in the region, 0.5% of those employed in industrial organizations of the region, 0.5% of investments in fixed assets. The industry is mainly represented by food. The districts specialize in agriculture, logging, and recreational

activities. There are no large companies; small business prevails.

In the first and fourth groups, the priorities in the development of types of economic activity changed, and in the second and third groups, their proportions changed (Fig. 4).

From 2010 to 2019, the volume of shipped products and investments increased by 3.4 and 3.8 times, respectively (on average per one municipal district) (see Table 1), with a decrease in the population and employed in the industrial sector. The greatest change in these indicators is noted in the first and second groups.

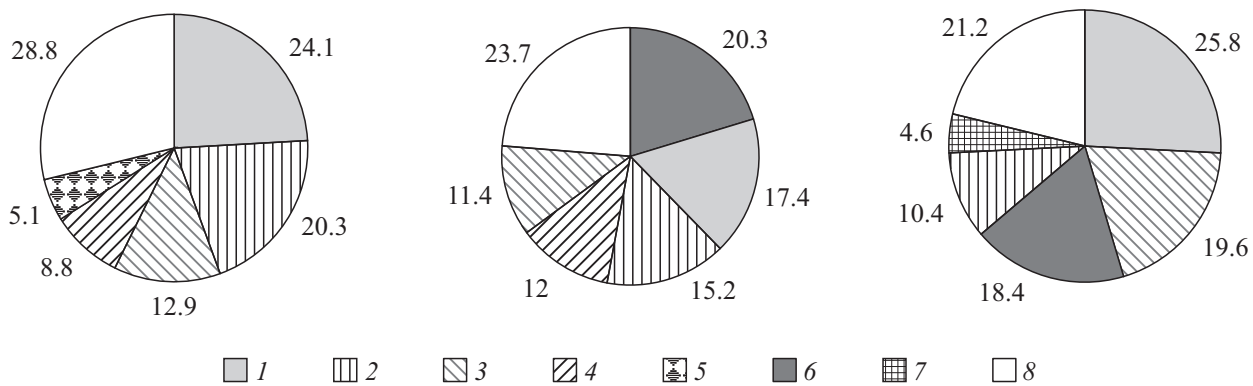
The regional industry is dominated by local organizations of various sizes, a quarter of the large and medium-sized companies are controlled by holding companies such as Gazprom, Rosneft, Polyus, Ilim Group, Rosatom, Rostekh, Mechel, Renova, En+ Group, and RUSAL.

In recent years, as a result of the active development of oil and gas resources, the process of complex

**Table 1.** Industrial development indicators by groups of municipalities of Irkutsk oblast in 2010 and 2019 (on average for one municipality)

Group of municipalities	Number of municipalities, units		Population, thousands of people		Industrial production volume, RUB bln		Average number of industrial workers, thousands of people		Fixed capital investments, RUB bln	
	2010	2019	2010	2019	2010	2019	2010	2019	2010	2019
First	3	3	184.8	92.8	47.5	198.1	17.8	9.7	6	49.4
Second	8	9	111.8	127.8	20.9	53.1	8.3	9.4	5.8	13
Third	20	20	40.7	39.5	1.6	5.2	1.4	1.2	0.8	5.9
Fourth	11	10	17.1	17.6	0.1	0.1	0.2	0.1	0.1	0.2
Oblast	42	42	57.8	57	8.1	28	3.5	3.3	1.9	7.3





**Fig. 5.** The share of investments in fixed assets of large and medium-sized organizations of Irkutsk oblast, %. Municipalities: 1, Irkutsk; 2, Katangsky district; 3, Bratsk; 4, Angarsk; 5, Usolye-Sibirskoye; 6, Ust-Kutsky district; 7, Taishetsky district; 8, others.

formation has begun<sup>1</sup>: for example, IOC is building a polymer plant in Ust-Kut (commissioning is planned in 2024) and is building the Ust-Kutsk gas processing plant for the supply of raw materials (to be launched in 2021).

RUSAL invested and attracted large investments in the construction of the Taishet aluminum plant (the launch was postponed to 2021), as well as the Taishet anode factory, which will meet the plant's needs for baked anodes. The Ilim Group will build a pulp and cardboard mill in Ust-Ilimsk by 2023, which will increase the production of unbleached packaging materials. These and other projects, which were initiated by big business and are in an active stage, attract investments to the municipalities of the region (Fig. 5).

In 2010 the share of investments of the five leading municipalities in the region was 71.2%, while by 2019 the concentration increased to 78.8%. In 2017–2019 investment growth rates increased, on average, in most municipalities (85.7%), especially in municipalities of the third group, the Tulun, Ust-Ilimsky, Kuytunsky, and Cheremkhovsky districts. Per capita investment rates are the highest for municipalities of the first and second groups, Katangsky, Ust-Kutsky, and Bodaibinsky northern regions, which is explained by the large volumes of investments made by large companies in the development of natural resources and the low population density.

## CONCLUSIONS

In the last decade, an increase in the share of the raw materials sector (by four times) with a significant decrease in the share of mechanical engineering (by four times), chemical production (by almost two times), energy, and metallurgy determines the struc-

tural shifts in the region's economy. The shift towards the extractive sector, which is more focused on the export of raw materials, structurally simplifies the sectoral composition of industry.

The existing main territories for gold and iron ore mining (Bodaibinsky, Nizhneilimsky regions), as well as peripheral northern regions (Katangsky, Ust-Kutsky), areas for the development of oil and gas resources, have increased their importance and increased concentration in industrial production. In 2019, they accounted for the largest volume of shipped products in the extraction of minerals, 89.1% (2010, 50.6%). This is also facilitated by the pipeline system, the main ESPO oil pipeline and the Power of Siberia gas pipeline (its section under construction in the region), as well as the increased demand for hydrocarbons in the markets of the Asia–Pacific region. The development of the oil and gas industry attracted labor resources from other regions of the country (Western Siberia, the Republic of Tatarstan, etc.). In 2019, the number of workers on a rotational basis exceeded 25000 people per quarter, of which more than 30% are residents of the region.

The cities, the leading industrial centers of the region (Bratsk, Irkutsk, Angarsk, Shelekhov, Ust-Ilimsk, and Sayansk), whose large enterprises were created in Soviet times, have adapted to changing conditions and still retain their stability. In 2019, they formed 87% of the shipped products of the manufacturing industry (in 2010, 90.5%). Other cities (Tulun, Zima, and Usolye-Sibirskoye) lost their importance as a result of the closure of city-forming enterprises in the post-Soviet period; in 2013, Baikalsk was added to them. As a regional center, Irkutsk is statistically attributed to a significant volume of shipped goods, works, and services in the energy sector (2019, 87.4%), which complicates the territorial analysis of this industry.

To identify intraregional differentiation of the level of industrial development in 2010 and 2019 four groups of medical organizations were identified,

<sup>1</sup> According to P.Ya. Baklanov, the processes of the initial formation and subsequent development of territorial combinations of nodal elements, various enterprises (or territorial-production complexes) are complex formation [20, p. 213].

which are different in composition depending on the distribution of quantitative criteria (the share of people employed in industrial production and the volume of shipped products of large and medium-sized organizations). Six MOs changed their position in the groups, while the rest retained their positions,

Over the past 10 years, only five municipalities (Irkutsk, Bratsk, Angarsk, Katangsky, and Ust-Kutsky districts) have concentrated more than two-thirds of their investments in fixed assets, which indicates the extreme unevenness of their distribution. Basically, the resource advantages of the region in the implementation of large investment projects in gas chemistry, nonferrous metallurgy, timber processing, pulp and paper production, and mining are used by large businesses that control significant enterprises. However, investment activity has little effect on improving socioeconomic conditions, which has been noted by other researchers [14, 21].

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