

# Assessment of the Prospects for Regional Companies to Enter Global Markets for High-Tech Products

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**Abstract**—Global challenges affecting the economic and technological development of economic sectors are identified; conditions and key trends related to world trade dynamics and the formation of new configuration with the inclusion of national economies in global value chains are highlighted. Criteria for selection of priority areas for the technological development of regional markets are determined, the corresponding technological types of economic activity are highlighted. The characteristic of the manufacturing sector is given from the point of view of its technological types of economic activity and their contribution to the economy of the region. Due to the lack of statistical information on their added value, the calculation was carried out by the authors using data from the SPARK-Interfax system for all companies included in each of the studied types of economic activity, their rating was built. An indicative approach is proposed to assess the prospects for entering the product markets of high-tech products of companies included in the ranking of technological leaders by highlighting competitiveness factors generated by the internal resources of innovative support for the organization of its production. A hypothesis has been put forward on the influence of competitiveness factors (material consumption, capital-output, payroll, labor productivity and capital intensity), integrated as an indicator of innovative competitiveness, on the value added of high-tech products at the level of manufacturing companies. The integral indicator of innovative competitiveness at subsequent stages is adjusted for external (market) conditions of commodity markets. The developed approach allows highlighting the strengths and weaknesses of the processes of innovative development of high-tech companies, making decisions about the prospects for their entry into product markets, including using integration schemes of interaction in national and global spatial development.

**Keywords:** *global markets, high-tech products, indicative approach, innovative competitiveness*

## I. INTRODUCTION

In modern conditions of economic development, the leaders of the world economy are countries that have managed to get ahead of the rest in creating the backlog of production and technological systems based on advanced technological structures, and thereby receive long-term competitive advantages of a fundamentally new type. The right choice of priorities, effective mechanisms of market self-organization and state support stimulate the foundation of a new technological structure in the economy, the expansion and growth of entrepreneurial initiative and activity.

Thus, driven by the practical significance of the study of prospects for the development of new economic sectors and their respective product markets, contributing to an increase in their competitiveness and Exit from the foreign markets.

At present, the economy of the Krasnoyarsk Territory is characterized by technological diversity and diversified specialization, the dominance of large industrial holdings, and a fragmented and inefficient system of support for innovative development.

The manufacturing sector, in the structure of which there are high-tech and high-tech industries, occupies 31.4% of the gross regional product of the region. The share of high-tech industries in the region's GRP is 13.6%, having decreased by 18.6% since 2013 (figure 1) (prepared by the authors based on EMISS, SPARK-Interfax[1,2].

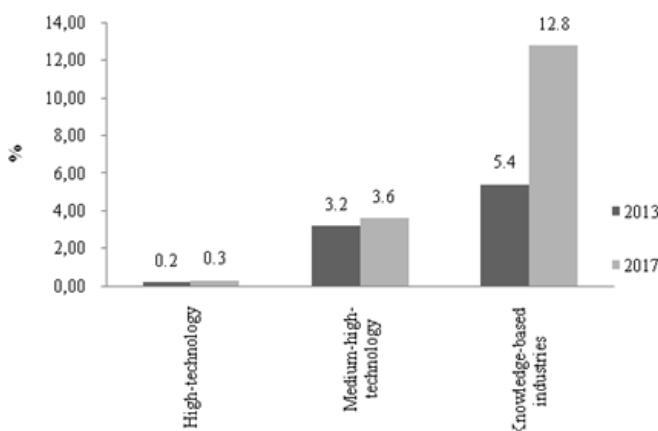


Fig. 1. The share of high-tech and knowledge-intensive industries in GRP Krasnoyarsk region

The main share in the structure of the manufacturing sector is occupied by metallurgical production (72.3%). The share of low, medium - and high-tech industries for about one third that necessitates finding ways share their capacity due to increase processability, at a relatively unstable speaker e production indices (table I).

TABLE I. PRODUCTION INDICES IN THE MANUFACTURING SECTOR OF THE KRASNOYARSK REGION BY TYPE OF ECONOMIC ACTIVITY, (IN %)

	2015	2016	2017	2018
Industrial Production Index	98.2	99.3	107.3	107.4
Manufacturing	96.7	95.7	107.0	108.6
Manufacture of chemicals and chemical products (20)	79.5	94.1	101.8	108.3
Manufacture of basic pharmaceutical products and pharmaceutical preparations (21)	88.2	118.9	94.5	134.0
Manufacture of basic metals (24)	97.5	94.3	108.5	106.8
Manufacture of fabricated metal products, except machinery and equipment (25)	112.9	83.4	106.8	100.4
Manufacture of computer, electronic and optical products (26)	93.8	137.7	92.2	103.1
Manufacture of electrical equipment (27)	99.1	2.0	105.7	120.9
Manufacture of machinery and equipment n.e.c. (28)	111.1	122.2	97.4	94.3
Manufacture of motor vehicles, trailers and semi-trailers (29)	60.6	111.9	120.1	181.8
Manufacture of other transport equipment (30) excluding Building of ships and boats (30.1) and excluding Manufacture of air and spacecraft and related machinery (30.3)	85.5	89.1	56.5	3.3.
Other manufacturing (32) excluding Manufacture of medical and dental instruments and supplies (32.5)	83.4	85.9	143.7	118.0
Repair and installation of machinery and equipment (33)	84.4	92.1	90.9	116.8

The total gross revenue of high-tech and knowledge-intensive industries in the region was steadily increasing (figure 2), which made it possible to determine the rating by

technological sectors by individual types of economic activity based on this indicator (table II).

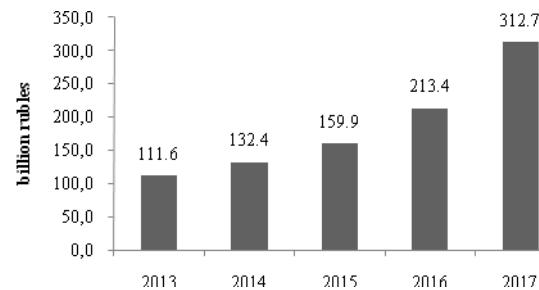


Fig. 2. Dynamics of gross revenue of high-tech and knowledge-intensive industries in the Krasnoyarsk region (SPARK Interfax)

TABLE II. RATING OF TECHNOLOGICAL AND KNOWLEDGE-INTENSIVE SECTORS OF THE ECONOMY OF THE KRASNOYARSK REGION BY SHARE IN GRP, 2017

Rank	NACE	Share in GRP 2017, %
1	Air transport services(51)	3.8
2	Repair and installation of machinery and equipment (33)	1.6
3	Water transport services(50)	0.6
4	Human health and social work activities (86)	0.5
5	Manufacture of motor vehicles, trailers and semi-trailers (29)	0.5
6	Manufacture of chemicals and chemical products (20)	0.5
7	Manufacture of electrical equipment (27)	0.4
8	Telecommunications services (61)	0.3
9	Manufacture of other transport equipment (30) excluding Building of ships and boats (30.1) and excluding Manufacture of air and spacecraft and related machinery (30.3)	0.2
10	Manufacture of machinery and equipment n.e.c. (28)	0.2
11	Manufacture of computer, electronic and optical products (26)	0.2
12	Manufacture of basic pharmaceutical products and pharmaceutical preparations (21)	0.1
13	Manufacture of medical and dental instruments and supplies (32.5)	0.003
14	Manufacture of air and spacecraft and related machinery (30.3)	0.002

Companies manufacturing sector of Krasnoyarsk region as a whole for the period 2010-2015 belonged to medium technological high level, where the ratio of R&D costs to value added is about 2.5-8%.

Indicators 2016-2017 deteriorated, in terms of the intensity of R&D expenditures, manufacturing enterprises shifted to the low-tech medium-tech group. In many ways, this situation is explained by the reduction of the costs of those x innovation by 60% over the 2015-2017 g g (figure 3).

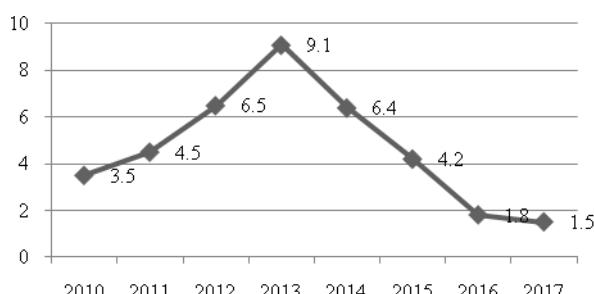


Fig. 3. The coefficient of manufacturability of enterprises in the manufacturing sector of the Krasnoyarsk region for 2010-2017

Under the current conditions, the urgent problem is the formation of new high-tech and high-tech industries in the region's economy that meet the system of "global challenges" and are focused on modern systems of innovative and spatial development of territories. The current system of scientific and technological support for the processes of innovative development is not effective enough, which is confirmed by the results of the rating of the region according to the conditions and results of innovative development, noted in the National report "High-tech business in the regions of Russia" [Zemtsova S.P., 2019]. In 2016, the region occupied 11th position "strong innovator", move vshis in 2017 in the category of medium-strong innovators.

A more detailed analysis of the situation on individual components of the innovation rating indicates a decrease in the positions of the Krasnoyarsk Territory in all its areas: level of research and development at 12 pp, the greatest decline is noted in the sub-rating "Innovative activity of organizations" - by 16 pp, innovative activity of the region decreased by 5 percentage points, the situation on the socio-economic conditions of innovation has worsened by 10 percentage points.

Qualitative characteristics of innovation activity also indicates e t a low its productivity, affecting the competitiveness of the final product and the possibility of entering new promising markets.

The object of research is the structure of the economy of the Krasnoyarsk region, its manufacturing sector and its industrial production, which determine different levels of technological development in the region.

The information base for the study was the regulatory and program documents that ensure the functioning and development of new industries in the Russian Federation and the Krasnoyarsk region, data from the federal and regional state statistics services (EMISS), information and analytical agencies ( SPARK-Interfax ), scientific publications on the problems of strategic technology development , foresights, analytical reports, forecasts [3-10].

## II. MATERIALS AND METHODS

The main elements of the analysis and assessment of the entry of high-tech sector companies in the region to promising product markets are shown in table III.

TABLE III. STAGES OF RESEARCH ON THE POSSIBILITIES OF TECHNOLOGICAL DEVELOPMENT AND THE ENTRY OF MANUFACTURING COMPANIES IN THE KRASNOYARSK REGION INTO PROMISING MARKETS

Stages	Indicators / Analysis Criteria	Results
Stage 1. Analysis of global challenges and assessment of their impact on the potential for technological development of industries in the manufacturing sector of the region's economy	Demographic factors Energy landscape Technological change Process synchronization in leading industries Causal changes in the economy	Change Trends: Materials Production of products and technologies; Control
Stage 2. Selection of technologies defining a new quality of manufacturing sector products and prospects for entering new markets	Compliance: priorities of scientific and technical development, current global technological development, targets and priorities of socio-economic development, defined by strategic documents, convergence processes, infrastructure potential of technology development and application Multi-criteria selection	Potential effects of technology development and application
Stage 3. Assessment of the prospects for the products of high-tech companies and the formation of their innovativeness ratings	Value added Labor productivity Material consumption Payroll Capital-output Capital intensity Dynamics of change depending on value added	Rating of companies and types of economic activity: by value added; in terms of innovative competitiveness; positioning by integral indicators of innovative competitiveness. Prospects for entering new markets. Problematic indicators of innovative competitiveness

The article presents a fragment of the result of the 3rd stage of the study. To form the innovation rating, its algorithm and calculated indicators are defined (table IV-V).

**TABLE IV. ALGORITHM FOR GENERATING I RATING AS MANUFACTURING FIRMS BELONGING TO THE HIGH-TECH SECTOR OF THE ECONOMY OF THE KRASNOYARSK REGION**

Stages	Set of measures at the stage
I Selection of participants	The following individuals participated in the study: 1) belonging to the region (legal registration of the enterprise in the territory of the Krasnoyarsk region); 2) belonging to the manufacturing industry, namely you are a high-tech production: High-tech industries - Production of medicines and materials used for medical purposes (21), Manufacture of computers, electronic and optical products (26), Production of aircraft, including spacecraft, and related equipment (30.3); Medium-high-tech industries - Manufacture of chemicals and chemical products (20), Manufacture of electrical equipment (27), Manufacture of machinery and equipment nec (28), Manufacture of motor vehicles, trailers and semi-trailers (29), Manufacture of other vehicles and equipment, excluding 30.3 (production of aircraft, including spacecraft, and related equipment) (30 without 30.3), Repair and installation of machinery and equipment (33); 3) valid at the time of the study.
II Data analysis and calculation of indicators	The study of companies is carried out on the basis of the data available in the SPARK-Interfax database (from the Federal Tax Service, Federal Financial Markets Service, Central Bank, etc.). The key, calculated indicators for which the comparison is made are presented in table 8
III Formation of innovation competitiveness rating	A rating is formed for each indicator, a place is assigned. Depending on the indicator, ranking is performed either in descending order or in ascending order. A list is formed, the first place is given to the company with the least value (place), that is, the most efficient company. It should be noted that at each of the stages of rating preparation, filtering is carried out - those enterprises for which there is no information necessary for calculations are excluded.

**TABLE V. SETTLEMENT N PROVIDERS, FOR COMPARING COMPANIES IN THE HIGH-TECH SECTOR AND THE ECONOMY OF THE REGION FOR INNOVATIVE COMPETITIVENESS**

Index	Calculation formula	Notes
Value added (VA)	Profit (loss) from sales (p. 2200) + Remuneration of labor (p. 4212) + (Insurance contributions to the Pension Fund + Insurance premiums to the MHIF + Insurance premiums to the FSS) + (Property tax (data of the Federal Tax Service)	The role of added value as a competitive advantage of an organization is growing by the higher the added value created in the process of production and sale of a product or service, the more efficient the activity of an economic entity. VA -> max
Labor productivity (LP)	AC / Revenue (p. 2110)	Labor productivity is an important criterion in assessing labor efficiency. The higher it is, the lower the cost of production. Having calculated the indicator, we can understand how fruitful the labor of workers per unit of time is. LP -> max
Material consumption (MC)	Inventories (p. 1210) / Revenue (p. 2110)	An increase in the coefficient of material consumption indicates an increase in the value of material costs per unit of output and a decrease in its profitability. Therefore, the management of material consumption at the enterprise is the key to lower costs and increase profitability of production. MC -> min
Payroll (P)	Salary (p. 4122) / Revenue (p. 2110)	It determines how much salary is contained in 1 ruble of manufactured products. The higher the value of the indicator, the more efficiently the organization's labor resources are used. P -> max
Capital-output (CO)	The average annual value of fixed assets ((p. 1150 prev. Year + p. 1150) / 2)) / Revenue (p. 2110)	It characterizes the level of optimization of the entire process of production and is used in assessing the effectiveness of the enterprise. There is no normative value, but you can compare the industry average Exceeding the level of capital intensity over the industry average shows a decrease in the efficiency of production in relation to similar companies in the industry, if the indicator of the level of capital intensity is lower than the industry average, this indicates an increase in the efficiency of using fixed assets. CO -> min
Capital intensity (CI)	The average value of all assets for the period ((p. 1600 previous year + p.	There is no normative value, but can be compared with industry average. Excess levels kaptaloemosti above shows the

Index	Calculation formula	Notes
	$\frac{1600}{\text{Revenue}} / \frac{2}{\text{CI}}$	average value of a Reductions competitiveness and long-term financial sustainability. if the indicator of the level of capital intensity is below the industry average, then this indicates that the business activity and profitability of the enterprise is higher than that of similar enterprises in the industry. $\text{CI} -> \min$

When choosing calculated indicators, the authors proceeded from the fact that the technological development of companies is based on innovations whose qualities "do not directly depend on their size. This successful attempt to find and turn in to in the second last piece of business that lacks to convert already existing elements: knowledge, products, consumer demand, new markets and much more productive purposes" [11].

Innovations and the technological development based on them determine the competitive advantages and position of the company in the industry. In many respects, competitive advantages are the result of activities aimed at achieving the strategic goals of the company, expressed in the organization of specific processes aimed at forming a value chain, turning it towards the market, taking into account the priorities of the end user [12]. Given the specificity of high-tech products, the factor of consumer value is the key and serves as a source of competitive advantage. The results of many studies confirm the fact that the market holds the goods on his assessment of the properties, attributes that stand out among peers. So, F. Kotler proposed the clustering of such attributes in the form of certain groups of indicators that correlate with the indicators of innovative development of industrial production [13].

Assessment of competitive advantages, as a rule, is carried out in the framework of two key components: technological and market. In the theory of technology utility assessment (OPT), the technocratic approach prevails (Antokets, Schneider), when the characteristics of technological utility are compared and the advantages of each of them are determined [14, 15]. The market utility is aimed at determining the potential and competitiveness in relation to existing or implemented alternative technologies.

An integrated approach to the analysis of technological innovations was formulated in the work of F. Jansen, who proposed the TAMO innovation model [F. Jansen, 2002]. Each of the TAMO groups contains a certain number of indicators, and their combination determines the level of product quality from the point of view of the technological solutions implemented in it and their effectiveness. The level of product quality is assessed using the qualimetric approach, when indicators are compared for goods - analogues or within a hypothetical sample. Selects the "primary metric" or integral metric.

For a quantitative assessment of the technologies used, the indicator "economic level of technologies" (EUT) [16]. EUT is a product of a person's annual productivity and quality assessment of equipment used in technology through its compensation through value added.

Important for understanding the identification of technological development on the level of competitiveness of production of high-tech sector is the introduction into circulation of M. and J. Moore about "intermittent" and "interruptible" technologies. [17,18] According to their approach, "uninterrupted" technology accompanied by a stabilization of the indicators of competitiveness and testify only to technology upgrades and products. "Chopping and camping" technologies significantly change the characteristics of the product, manifested in an abrupt increase in competitiveness indicators.

The above approaches reflecting the tons complexity of the process and evaluate the effectiveness of new technologies, they are targeted and on the production of competitive products and define the tasks of their improvement.

The innovation competitiveness indicator (IIC) proposed by the authors assesses the effectiveness of the technologies used in several directions x :

- in terms of the benefits of the technologies used;
- from the point of view of the market utility of technologies, when market potential and competitiveness with respect to alternative technologies are determined.

The effectiveness of innovative processes is recorded along the value or added value chain as a source of achieved benefits: material intensity, capital intensity, salary intensity, capital intensity, labor productivity. If their interconnection in the formation of high added value is proved, the products will be competitive.

### III. RESULTS

The study highlighted the following key aspects of the system of "global challenges" that affect the technological development of industries in the region.

*Demographic factors of economic growth.* The main problem of economic development is the aging of the population, which in the future will determine the growth rate of key economies and the direction of technological development. The main negative effect will be manifested in countries with a low birth rate, including in Russia - an increase in the number of dependents (pensioners, children, people with disabilities) with a decrease in the total number of economically active citizens.

According to the forecasts of the Nomura Research Institute (Japan), by 2020, the economic growth rate of the Russian Federation, due to the influence of demographic factors, will not exceed 0.5%, and by 2030 it will decrease to - 0.5%. This trend will cause a shift in the center of economic activity to the countries of Southeast Asia, which, led by

China, will turn into world centers of production and consumption.

The negative consequences of this trend for the national economy are: weak positions in the export of non-primary goods; significant import of finished products, equipment, tools; capital outflow abroad; reducing the state's ability to modernize and develop the economy

*Changing the global energy landscape.* Risks become dangerous for the Russian economy, associated with a fall in demand for commodity export products, primarily natural gas. The basis for solving these strategic tasks is industrial modernization and technological development of traditional sectors of the economy (resource and raw materials, manufacturing).

The key risks for the Krasnoyarsk Territory may include:

- the deterioration of the budgets (municipal, regional) due to the reduction of revenues from the production of LPG (liquefied petroleum gas);
- deterioration of the financial situation of oil producing companies and LPG, transport companies, traders;
- reduction of incomes of people employed in the fuel and energy sector and energy transportation; outflow of labor resources from this area; growth of social tension;
- reduced funding for development projects in the Northern Territories of the Krasnoyarsk Territory;
- incurring uncompensated costs for maintaining the created infrastructure.

*Climate change on the planet.* Under the influence of this factor, windows of opportunity open up for Russia and the Krasnoyarsk Territory, with access to the Arctic zone, associated with the following aspects:

- an increase in the period of navigation in the waters of the Northern Sea Route;
- the expected shift of the northern border of agriculture closer to the Arctic zone, and, consequently, the potential expansion of agricultural land.

*The development of the inconsistency of integration processes in the economy.* For the Krasnoyarsk Territory, the main threats may be:

- strengthening the position of foreign manufacturers in the domestic consumer markets of the region (food, pharmaceuticals, construction and decoration materials, etc.);
- missed opportunities for regional producers to enter international markets;
- illegal migration of labor resources.

*Strengthening the influence of new technological changes that increase the role of innovation in the development of the global economy.* According to experts, the level of competitiveness of countries will be determined by the

effectiveness of the transition from traditional models of economic organization to the knowledge economy. A special role in this process assigned to shorten the introduction of new technology (Convergent x nano-, bio- and information technology, cognitive x technologists th) in mass production:

- wide diffusion of innovations will become the basis for the formation of new markets in many traditional sectors of the economy: industry, energy, transport, etc.,
- the transition from the fifth technological mode, which is based on information and communication technologies, the production of electronic devices and computer technology to the sixth, based on achievements in the field of nanotechnology, biotechnology and other interdisciplinary fields of science and technology,
- reducing physical parameters while expanding the capacity and functionality of microelectronic components, the use of new types of materials with unique properties .

Additionally, new conditions for the development of world commodity markets were identified and analyzed to select promising areas of technological development in the Krasnoyarsk Territory [19].

The most significant, from our point of view, for regional technological development, are two. Thus, the transition to V-VI technological structures entails structural and technological shifts in the direction of the emergence of new industries and industries that *change the commodity structure of markets*.

The most significant, from our point of view, for regional technological development, are the first two. Thus, the transition to V - VI technological structures within the framework of *large economic cycles* entails structural and technological shifts in the direction of the emergence of new industries and industries that *change the commodity structure of markets*.

Among the main areas of scientific and technological progress that affect global commodity markets, those that are *formed by convergent technologies* are distinguished . The basis for such an assumption is the active mutual penetration of the results of scientific studies of various disciplines and, accordingly, methods of influencing the material world in order to obtain new goods. At the practical level, they distinguish the interaction of *nano-, bio-, information-communication and cognitive sciences*, called NBIC convergence.

The obtained analytical results, as well as the "smart specialization" model used for research purposes, made it possible to determine the directions of development of new areas of activity at the regional level, opening up technological and market opportunities for enhancing regional competitive advantages. The formation of new sectors of the economy is based on the existing potential of technological development for "stretching" the production chain in the region, providing the possibility of its structural restructuring, the use of innovative technological solutions in the production of new

types of materials, technologies, systems and management models that allow for a new quality of economic growth and livelihoods.

*The selection criteria for the technological development priorities of the Krasnoyarsk Territory were based on recommendations for global technological development, taking into account the characteristics of the regional economy.*

*The main areas of technological development of the Krasnoyarsk Territory are:*

- active use of information and communication technologies (ICT) - large-scale use of computer models, databases, information collection and processing systems;
- development and use of biotechnologies (genomic, postgenomic, cellular, tissue, etc.) in various areas of the economy (industry, agriculture, medicine, the service sector, etc.) with different goals - obtaining new products, replacing traditional processes and products with biotechnological ones, waste processing, development of biomedicine;
- rational nature management - transition to renewable energy sources; distribution of energy and resource saving, non-waste technologies; closed cycles of water use; technologies for cleaning emissions, restoring the environment; maximally deep processing of natural resources, efficient use of forests, soils, water areas; the use of environmentally friendly and non-toxic and biodegradable materials;
- the creation of new materials and the development of nanotechnology — nanostructured and composite materials, materials with special properties (resistant to environmental influences, "adaptable", with special electrical, magnetic, optical properties, etc.), nanoparticles and nanofibres, etc.;
- Smart Solution (cognitiveization of large systems) - the creation of "smart" processes, industries, cities (based on the collection and analysis of large amounts of data, optimization of processes with "flexible" behavior), which allow the distribution of network formats for managing production and society.

The introduction of these technological areas is characterized by wide industry coverage and provides maximum synergistic effects of development.

To determine the prospects for the technological sectors of the manufacturing sector of the region to enter different spatial markets (national, international), the technologies used were analyzed in terms of their impact on the competitiveness of products.

An indicative approach is used, which is based on measuring the competitiveness of products based on an assessment of its degree of its material consumption, capital intensity, salary intensity, capital intensity, labor productivity and determining the rating of companies in this sector by innovative competitiveness indicator.

We analyzed the company's high- and medium high-tech level in the amount of 1092 units, located in the Krasnoyarsk region, of different ages, organizational and legal status: from micro to large companies. For each level of manufacturability, 10 companies with the highest level of added value for the period 2016-2018 were identified. (table VI).

TABLE VI. DESCRIPTION OF COMPANIES IN THE HIGH-TECH AND MEDIUM-HIGH-TECH SECTOR OF THE KRASNOYARSK TERRITORY WITH HIGH VALUE ADDED

Name	Compan y age, years	Type of activity / industry	Primary activity code	Company size
<i>high-tech</i>				
KRASPHA RMA, JSC	26.0	Drug manufacturing	21.20.1 (the main - GMC Rosstat)	Large enterprises
TSKB GEOFIZIK A, JSC	18.5	Production of radio and television transmitting equipment	26.30.17 (main - GMC Rosstat)	Medium- sized enterprises
NPF SVYAZ- SERVIS, LLC	22.5	Production of spare parts and components for radio and television transmitting equipment and television cameras	26.30.5 (the main one is the State Statistics Service of Rosstat)	Small enterprises
PRIMA TELECOM, JSC	27.0	Production of radio and television transmitting equipment	26.30.17 (main - GMC Rosstat)	Microenterp rises
NPK FAZA, LLC	9.0	Manufacture of instruments and appliances for measuring, testing and navigation	26.51 (the main - GMC Rosstat)	Microenterp rises
EDB ART .JSC	28.0	Production of radio and television transmitting equipment	26.30.17 (main - GMC Rosstat)	Small enterprises
NPO SPUTNIK, LLC	8.0	Manufacture of computers and peripheral equipment	26.20 (main - GMC Rosstat)	Microenterp rises
ISKRA - PRIM, LLC	24.0	Production of spare parts and components for radio and television transmitting equipment and television cameras	26.30.5 (the main one is the State Statistics Service of Rosstat)	Small enterprises
KRASMED, LLC	23.0	Production of medical devices based on the use of x-ray, alpha, beta and gamma radiation	26.60.1 (the main one is the State Statistics Service of Rosstat)	Microenterp rises
OKB ALFA, LLC	18.0	Production of radio and television transmitting equipment	26.30.17 (main - GMC Rosstat)	Microenterp rises
<i>medium -high-tech</i>				

Name	Company age, years	Type of activity / industry	Primary activity code	Company size
NORILSKNIKELREMONT, LLC	13.0	Repair of machinery and equipment	33.12 (the main one is the State Statistics Service of Rosstat)	Large enterprises
KIK, LLC	20.5	Manufacture of other parts and accessories for motor vehicles	29.32 (main - State Statistics Service of Rosstat)	Large enterprises
KREVRZ, JSC	27.0	The provision of services for the restoration and equipping (completion) of railway locomotives, tram motor cars and other rolling stock	30.20.9 (the main one is the State Statistics Service of Rosstat)	Large enterprises
KZSK, JSC	26.0	The production of synthetic rubber in primary forms	20.17 (main - State Statistics Service of Rosstat)	Large enterprises
KZH BIRYUSA, OJSC	26.0	Production of household electrical appliances	27.51 (main - State Statistics Service of Rosstat)	Large enterprises
LMZ SKAD, LLC	17.0	Manufacture of other parts and accessories for motor vehicles	29.32 (main - State Statistics Service of Rosstat)	Large enterprises
KRASNOY ARSKENER GOKOMPL EKT ", LLC TPK	21.5	Production of furnaces, heat chambers and furnace burners	28.21 (main - State Statistics Service of Rosstat)	Medium-sized enterprises
IST, LLC	8.0	Repair of machinery and equipment	33.12 (the main one is the State Statistics Service of Rosstat)	Medium-sized enterprises
KhMZ, JSC	26.0	Manufacture of other inorganic basic chemicals	20.13 (main - State Statistics Service of Rosstat)	Large enterprises
ZTO BIRYUSA, LLC	12.0	Production of equipment for processing materials using processes including temperature changes not included in other groups	28.29.6 (main - State Statistics Service of Rosstat)	Large enterprises

#### IV. DISCUSSION

The analysis of companies forming the high-tech level of the region (NACE 21, 26, 30.3), by value added, leads the market "pharmaceutical production (21)" to the first place in

the ranking, then "production of radio and television transmitting equipment (26.30.17) and "the production of spare parts and components for radio and television transmitting equipment and television cameras" (26.30.5) □ figure 4-9. The resulting added value stabilizes the technological base of companies, creating the potential for subsequent "technological breakthroughs." By increasing the total mass of added value, its elemental base is being restructured in favor of the growth of labor productivity. The dynamics of changes in the indicator for companies as a whole, also indicates the absence of technological changes in the material, capital intensity, capital intensity (figure 4-9).

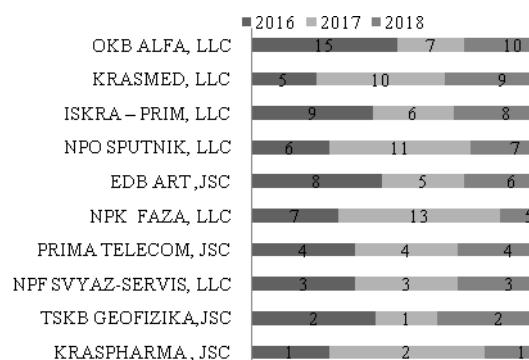


Fig. 4. Rating of companies related to the high-tech sector in terms of value added, 2016-2018

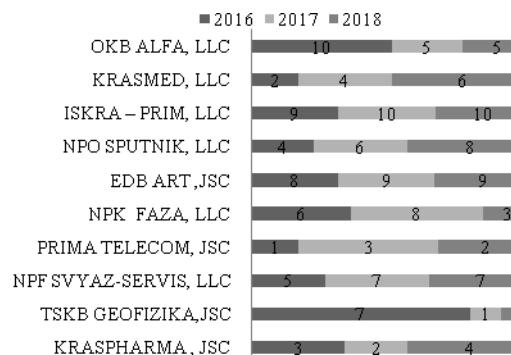


Fig. 5. Rating of companies related to the high-tech sector in terms of labor productivity, 2016-2018

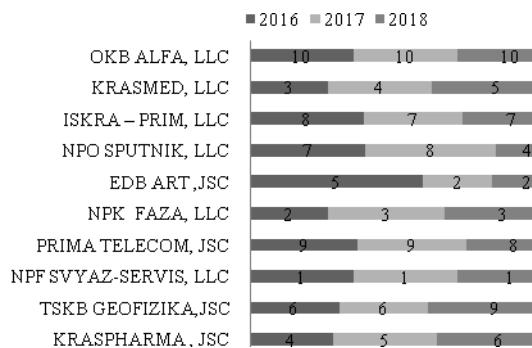


Fig. 6. Rating of companies related to the high-tech sector in terms of material consumption, 2016-2018

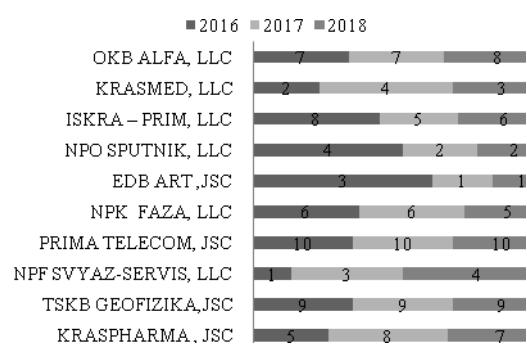


Fig. 9. Rating of companies related to the high-tech sector in terms of capital intensity, 2016-2018

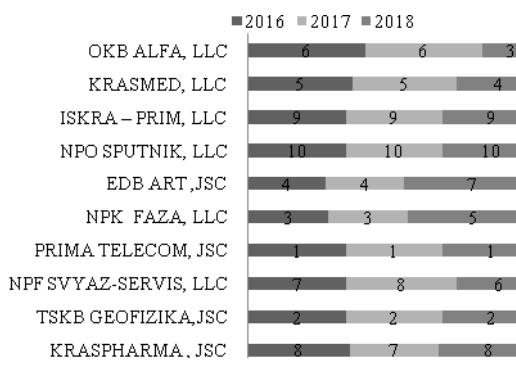


Fig. 7. Rating of companies related to the high-tech sector in terms of payroll, 2016-2018

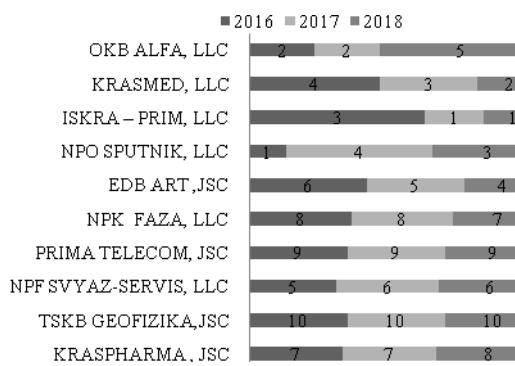


Fig. 8. Rating of companies related to the high-tech industry in terms of capital-output, 2016-2018

Among companies operating in the industrial market in the medium-high-tech sector, value added is also growing, but not at such a fast pace. Accordingly, the indicator of innovative competitiveness is gaining potential due to the increase in capital-output and capital intensity, but does not bring returns in terms of labor productivity. The result is a stable salary and material consumption. The technological level of companies is maintained at a stable level due to modernization.

There is stability in the value added of PRIMA TELECOM, JSC and NPF SVYAZ-SERVIS, LLC , the increase in KRASPHARMA , JSC, TSKB GEOFIZIKA,JSC, NPK FAZA, LLC, the reduction in the company OKB ALFA, LLC, ISKRA – PRIM, LLC, EDB ART ,JSC.

The medium-high-tech sector of the region represents different markets and is positioned differently in terms of innovative competitiveness.

Stable added value in the markets for the repair of machinery and equipment focused on both individuals and legal entities. Accordingly, the size of their added value varies hundreds of times, however, labor productivity is also stable and per employee is approximately the same.

At one level, they have material consumption and of payroll. Thus, the low added value of IST, LLC allows achieving high capital intensity with decreasing capital intensity, while NORILSKNIKELREMONT, LLC, on the contrary, is increasing it.

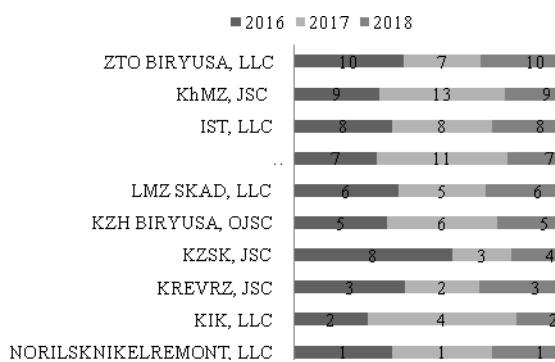


Fig. 10. Rating of companies related to the industry of medium high technological level in terms of value added, 2016-2018

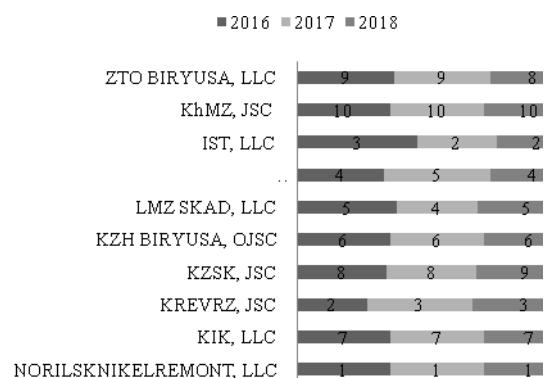


Fig. 13. Rating of companies related to the industry of medium high technological level in terms of payroll, 2016-2018

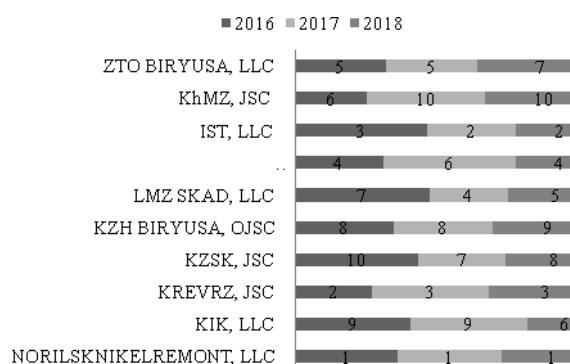


Fig. 11. Rating of companies belonging to the industry of the medium high technological level in terms of labor productivity, 2016-2018

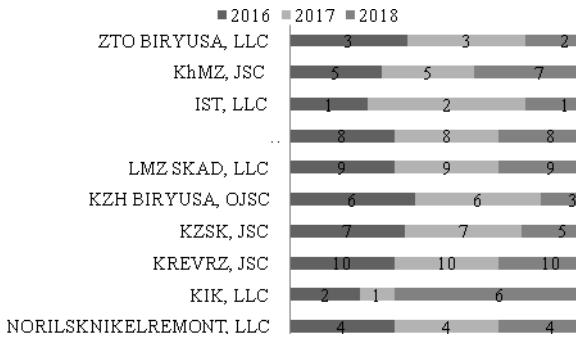


Fig. 14. Rating of companies related to the industry of medium high technological level in terms of capital-output, 2016-2018

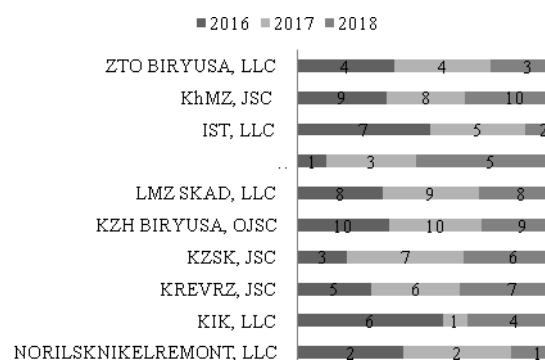


Fig. 12. Rating of companies related to the industry of medium high technological level in terms of material consumption, 2016-2018

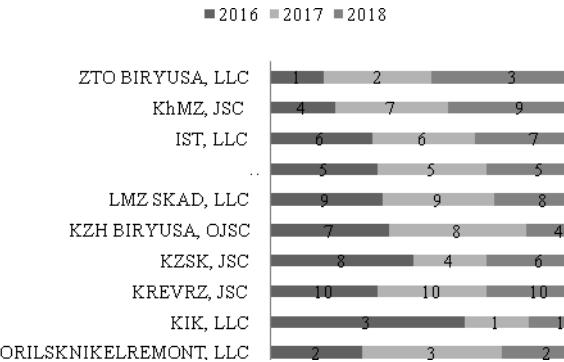


Fig. 15. Rating of companies related to the industry of medium high technological level in terms of capital intensity, 2016-2018

On the other markets the situation with value-added mixed: ramping rate of KRASNOYARSKENERGOKOMPLEKT, LLC TPK, KZH BIRYUSA, OJSC, KIK, LLC reduces – ZTO BIRYUSA, LLC, LMZ SKAD, LLC, KZSK, JSC, KREVRZ, JSC.

There is an increase and decrease in labor productivity while stabilizing, reducing and increasing payroll intensity. In almost all industries, material consumption is reduced, except for KhMZ, JSC and KREVRZ, JSC, which is evidence of innovative development.

Capital-output of production was maintained in most companies, a decrease occurred in

ZTO BIRYUSA, LLC and KZH BIRYUSA, OJSC. The relationship between capital intensity and capital-output is traced. Thus, a decrease in capital intensity at KhMZ, JSC contributed to a decrease in its capital-output, and an increase in capital intensity at KZH BIRYUSA, OJSC led to an increase in its capital-output, which indicates an increase in the technological level of production, which is accompanied by a decrease in material intensity, which together ensure the competitiveness of manufactured products.

Thus, it seems possible to use this approach to assessing innovative competitiveness at the level of a high-tech company, which forms the organizational and technological level of production and contributes to the development of the potential of comparative advantage when entering competitive markets.

In general, companies of different technological levels are focused on their market positions and market features. Their added value in the ranking is changing not only because they are working to increase it, but also due to the possibility of replenishing their resources to ensure innovative competitiveness. The behavior of companies depending on the level of manufacturability can be identified in the context of the types of economic activity and the dynamics of changes in value added (figure 16).

Innovation Competition Strategies			
Dynamics of changes in value added (VA)	Breakthrough (NEC growth in all organizational and technological indicators)	Stabilization in order to replenish the resource potential for the subsequent breakthrough	Reduction of current positions without changing innovative competitiveness
<i>High tech companies</i>			
VA growth	ISKRA - PRIM, LLC (small enterprise)		
	KRASMED, LLC (micro enterprise)		
	OKB ALFA, LLC (micro enterprise)		
VA stabilization	NPO SPUTNIK, LLC (micro-enterprise)		
	TSKB GEOFIZIKA, JSC (medium-sized enterprise)		
	PRIMA TELECOM, JSC (micro-enterprise)		
Decrease in VA	KRASPHAR MA, JSC (large enterprise)		
	NPF SVYAZ-SERVIS, LLC (small business)		
	NDK FAZA, LLC (micro enterprise)		
	EDB ART, JSC (small enterprise)		
<i>Medium-High Tech companies</i>			
VA growth	ZTO BIRYUSA, LLC (large enterprise)		
	KhMZ, JSC (large enterprise)		
	IST, LLC (medium-sized enterprise)		
VA stabilization	KRASNOYARS KENERGOKOM PLEKT, LLC TPK (medium-sized enterprise)		
	LMZ SKAD, LLC (large enterprise)		
	KZH BIRYUSA, OJSC (large enterprise)		
Decrease in VA	KZSK, JSC (large enterprise)		
	KREVRZ, JSC (large enterprise)		
	KIK, LLC (large enterprise)		
	NORILSKNIK ELREMONT, LLC (large enterprise)		

Fig. 16. Distribution of companies in the high-tech sector of the region by the possibilities of ensuring innovative competitiveness with the subsequent prospect of entering new markets

The most active innovative performance of companies in the context of growth in added value provides them with additional stability in occupied markets and the prospect of entering new markets. The stabilization strategy aimed at a qualitative change in the processes of technological renewal of production due to the growth of capital intensity and related capital intensity with a subsequent exit to reduce material consumption and increase labor productivity.

The stabilization strategy in order to maintain current positions and freeze innovative competitiveness is evidence of certain achievements in existing markets without prospects for expanding the business and entering new promising markets. More cautious strategies (stabilization, maintaining positions) are followed by medium and large companies with equity, risking their responsibility to investors. In addition, the features of the markets they discuss today do not require radical innovative solutions, unless they decide to expand the range of products and create more significant partner networks.

## V. CONCLUSIONS

The study allows us to determine the list of companies that have prospects for entering new promising markets by ensuring the innovative competitiveness of their products. Continuous technological improvement of production processes provides the products with competitive advantages in the market environment, reducing total costs and increasing added value. The position of such companies in the economic system of the region begins to determine their role and the strength of the formation of added value of the manufacturing sector, which is a priority in the conditions of the raw material region, which is the Krasnoyarsk Territory. The task of restructuring the economic system in the direction of the balance of extractive and manufacturing industries is on the agenda today. Therefore, the results obtained can be the basis for the formation of additional mechanisms to support and stimulate the innovative development of high-tech industries with the prospect of their entry into new markets.

## ACKNOWLEDGMENTS

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