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Abstract. The problems of technological development of the region's industries seem relevant in connection with the need to ensure the competitiveness of their products in both local and international markets. The high-tech sector, as well as the sector of the "knowledge economy" are, in addition, the locomotives of the technological development of basic and infrastructure sectors, therefore, special attention is paid to the improvement of scientific research processes. The technological development of industries and the region as a whole is considered in the framework of a multisectoral model, which allows reflecting all the relationships and interactions arising under the influence of "global challenges". The priority areas for the development of the high-tech sector were structured using the "smart specialization" model, which allows us to further highlight the technological and market opportunities for enhancing regional competitive advantages. Strategic positioning is presented in two sectors of the economy: basic and infrastructure; high-tech and "knowledge economy". The capabilities of the strategies are aimed at creating competitiveness in local, regional and national markets. The concept of "smart specialization" combines strategies based on the creation of both our own technologies and those borrowed and adapted to our conditions. The map of technology positioning in the sphere of strategic alternatives defines the potential circle of participants in cluster systems for joint interaction, forming the scientific and innovative potential of the region.

1. Introduction

Changes in global industrial markets in recent years indicate global technological changes, increased competition, the introduction of new information technologies, the transition to new communication models for managing intercompany relationships for generating knowledge and developing innovations.

These key aspects are determined by the strategic documents of the technological development of the Russian Federation and are focused on the search for systemic measures to reduce a whole range of risks that can transform into threats to the socio-economic development of territories.

Recent studies [1-3] show the need for the transition of Russian regions, in particular the Krasnoyarsk Territory, to a new multisectoral model of regional development, combining various sources of new knowledge for the sectors of the region's economy, aimed at creating and developing new areas of activity, mainly high-tech and high-tech industries that meet the system of "global challenges" and focused on modern systems of innovative and spatial development of territories.

The materials of the article present fragments of the formation of some conceptual provisions of the region's technological development based on a multisector model. The object of the study is the structure of the economy of the Krasnoyarsk Territory, statistics on the development of global commodity markets and global production and technological chains, priority areas for the technological development of

high-tech industries at the level of the Russian Federation and the Krasnoyarsk Territory, approved by strategic documents.

2. Description of the research

The informational basis of the study included regulatory acts of the federal and regional levels, official data of state statistics, program and information-analytical documents of federal and regional authorities, scientific publications on the strategic development of technologies and cluster systems, foresights, analytical reports, forecasts.

The main methodological approaches were as follows: systemic, strategic and network ones developed by Russian and foreign scientists.

The strategic opportunities for technological development of industries in the region were determined in the following sequence:

1. Analysis of development trends of world commodity markets and structuring of priority areas of technological development of economic sectors.

2. Identification of priority niche areas of technological development of economic sectors, taking into account the potential of the region and their competitive positions.

As part of the first task, we analyzed the main trends in the development of global commodity markets, which have been formed in recent decades under the influence of new conditions and which arose largely due to the system of "global challenges" and national trends. According to their influence on the development of technologies and global commodity markets, two types of "global challenges" are distinguished (table 1) [4].

Table 1. Types of global challenges.

Challenges of the first type - evolutionary changes	**Challenges of the second type - transformational changes**
- strengthening the negative impact of demographic factors; - changes in the global energy landscape and the depletion of strategic mineral resources; - changing of the climate; - development of the inconsistency of integration processes in the economy: geopolitical competition and economic integration; - strengthening the influence of new technological changes, the transition of the world economy to a new 6th stage of technological development, causing a change in its structure and competitiveness factors; - global synchronization in advanced industries, the convergence of various fields of science and technology (highlight the interaction of nano-, bio-, information and communication and cognitive sciences, called NBIC convergence [9]); - change of spatial development management systems of territories (network development, Smart Solution).	- transition of processes of global competition in the field of scientific and innovative activities from the sector of traditional markets to the government sector at the state level; - change in conceptual approaches to managing the processes of scientific and technological development and the formation of new demand markets as a result of the convergence processes "science - education - production"; - transformation of science as a resource of economic growth into the most significant productive force, included in global production and technological chains as the main link in creating added value; - formation of new world integration unions (political, economic, commercial, industrial, scientific) that influence the development of international scientific networks instead of local associations.

Consideration of the types of "global challenges" within the Russian Federation and the Krasnoyarsk Territory made it possible to identify potential threats and opportunities (table 2).

Table 2. Threats and opportunities for the development of the economy of the Krasnoyarsk Territory under the influence of global challenges [4, 6, 7].

Influencing factor	Threats and opportunities
Demographic factor	- Vulnerability and potential instability of the economy of the raw materials regions of Russia due to the continued dependence on the export of raw materials with the low competitiveness of the processing industries; - Weak positions in exports of non-primary goods and significant imports of finished products, equipment, tools; - The outflow of capital abroad; - Reducing the ability of the state to modernize and develop the economy. Development opportunities include the shift of the center of economic activity of the Russian Federation to the countries of Southeast Asia, which, led by China, will turn into world centers of production and consumption.
Changing the global energy landscape	- Falling demand for commodity exports - Deterioration in the budgetary (municipal, regional) budget due to the reduction of revenues from the production of liquefied petroleum gas (LPG) in the fields of Turukhansky and Yamalo-Nenets Autonomous Districts; - Deterioration of the financial situation of oil producing companies and LPG, transport companies, traders; - Reducing the income of people employed in the fuel and energy sector and transportation of energy resources; outflow of labor resources from this area; growth of social tension; - Reduction in funding for development projects of the Northern territories of the Krasnoyarsk Territory; - Occurrence of uncompensated costs for maintaining the created infrastructure. To reduce the impact of these threats, industrial modernization and technological development of traditional sectors of the economy (resource and manufacturing, manufacturing) is required.
Climate changes	- Consequences of devastating natural disasters weaken the position of business and reduce the purchasing power of the population in the affected regions. Opportunities for the development of regions close to the Arctic zone due to an increase in the period of navigation along the waters of the Northern Sea Route and the expected shift of the northern border of agriculture.
Geopolitical processes	- Factors of a geopolitical, political and / or military-political nature reduce the export and import potentials of countries involved in conflicts - Strengthening through the integration processes the positions of foreign manufacturers in the domestic consumer markets of the region (food, pharmaceuticals and others); - Lost opportunities for regional producers to enter international markets; - Illegal labor migration. - The most promising direction from the point of view of economic development is the European integration (EU) of Russia, associated with the possibilities of developing international economic relations and attracting resources. A less attractive area is the post-Soviet integration of Russia (CIS, CU, Eurasian Economic Union).

Influencing factor	Threats and opportunities
New technological changes	Opportunities for economic development are determined by the efficiency of the transition from traditional models of economic organization to the knowledge economy (in particular, by reducing the time needed to introduce new technologies into mass production).
Transition to V-VI technological structures	Such a transition entails structural and technological shifts in the direction of the emergence of new industries and industries that change the commodity structure of markets, which creates both threats and opportunities for the economic development of countries and regions.

The analysis of "global challenges" made it possible to structure the priority areas of technological development of high-tech sectors of the region's economy as part of the second research task.

For these purposes, the "smart specialization" model was used, focused on:

- identification of specialization industries in the region;
- the creation and development of new areas of activity at the regional level, the use of new technological and market opportunities to strengthen regional competitive advantages.

The concept of "smart specialization" combines strategies based on both borrowing and adapting technologies, and creating their own parent technologies and professional competencies within the region and allows us to consider [8]:

- Technological development of the sectors of the basic specialization of the region's economy (resource and raw materials, infrastructure) to ensure local niche leadership or local competitiveness. A prerequisite for this is the development of existing local markets for competitive products;
- the formation and development of high-tech sectors of the economy, the creation and development of new areas of activity at the regional level, allowing to explore and discover new technological and market opportunities, open new areas for the formation of regional competitive advantages. A prerequisite is the development and formation of new markets (local, national, international);
- development of the "knowledge economy" sector and the formation of creative industrial activity potential for diversifying the structure of the raw materials economy, ensuring international technological competitiveness and world leadership of the region in new sectors of the economy, and creating new markets. A prerequisite for the creation of "smart" environments, "smart" systems and "smart" industries is the achievement of a synergistic effect from the integration of regional centers of production, consumption and R&D.

New sectors of the economy were determined on the basis of the existing potential of technological development for "pulling" the production chain in the region and the possibility of structural adjustment of the economy, the use of innovative technological solutions in the production of new types of materials, production technologies, systems and control models. [1]

The strategic positioning of the region's industries was carried out in 2 groups of sectors:

- sectors of basic specialization (resource and raw materials sector: oil and gas, mining, metallurgy, timber, engineering, agriculture) and infrastructure (transport, energy, construction);
- new sectors of the economy: high-tech (biopharmaceutical; processing of mineral resources; high redistribution of production) and the Knowledge Economy sector (smart environments, smart systems, smart manufacturing, smart region).

The characteristics of the sectors are presented in table 3.

Table 3. Characteristics of the sectors of the region's economy in a four-sector model. [1]

Sector Development Parameters	Sector of the region's economy			
	Resource and raw	Infrastructural	High-technology	Knowledge economy
Production	Traded goods (raw materials, resources), more focused on meeting the external demand of the region	Non-tradable goods (products, services), more focused on meeting the domestic demand of the region	Traded goods (new resources, materials, technologies, innovative products, services) aimed at	Intangible products - knowledge, ICT, "smart" technologies (Smart-technologies), production, systems

			satisfying both internal and external demand	
Prices	Defined by national or global markets	Defined by local markets	Defined by world markets	Defined by local or national markets
Technological structure	3-4-th	3-4-th	5-6-th	6-th
Production factors	Produced raw materials, natural resources, labor	Investment resources and highly professional workforce	Innovative and Intelligent Resources	Innovative, intellectual, informational resources

Considering the conducted studies, it can be said that the role of the high-tech sector is to create conditions for the transition of the economy of the region and its basic and infrastructure sectors to an innovative development model.

The "knowledge economy" sector of the region develops as a result of achieving a synergistic effect from the integration activities of the centers of production, consumption and R&D and provides a transition to the sixth technological mode of development, the intensity of which determines the potential of the innovation system. [8]

The multisectoral model of the region's economy, depending on the source of new knowledge and technologies of the economy sector, made it possible to single out the strategic areas of technological development of its sectors and sectors: niche leadership, local technological competitiveness and international technological competitiveness (figure 1) [1].

Sources of new knowledge	Regional sectors of the economy: Existing sectors of the economy of traditional specialization (O; N*)	Regional sectors of the economy: New sectors of the economy (B; Z*)
Import of technologies and professional competences	**Niche leadership** (maintaining macroeconomic stability of the region's economy with low budget expenditures on science, innovation and human capital development) **Opportunities for local, regional and national markets:** - extractive industry: technologies with the use of microorganisms for mining, coal, oil refining industry; technologies of bio-extraction of useful elements of unconventional rocks; - metallurgical industry: biohydrometallurgy - microbial leaching of metals from ores, manufacture of corrosion-resistant bimetals; biological preparations for the production and transportation of oil; - power industry: production of energy from renewable raw materials of biological origin on an industrial scale; biofuels: biogas, fuel pellets, briquettes.	
Creation of own mother technologies and professional competences	**Local technological competitiveness** (global leadership, but in local traditional sectors) **Opportunities for the economy of the Krasnoyarsk region:** - machine building: disposal, recycling of machine elements and structures made of light alloys at the end of the life cycle; disposal of waste dumps and mining industry; - infrastructure sector: creation of a universal logistics and information operator on the basis of a postal operator for servicing cargo transportation between Europe and Asia; creation of spatial data infrastructure, distance education and media education.	**International technological competitiveness** (global leadership in new sectors of the economy, based on research and innovation and technological developments focused on the high-tech sector) **Opportunities for the economy of the Krasnoyarsk region:** - space hardware: development of GLONASS system; - industry of electronics: creation of infrastructure of system-oriented design centers, design centers, silicon factories, STC for Microsystems engineering.

Designation:
O – resource and raw materials sector of the economy, lagging behind in technological development;
N – infrastructure sector of the economy producing non-tradable goods;
B – actively developing high-tech sector;
Z – knowledge economy sector.

Figure 1. Technological development strategies for a four-sector economic model [1].

The considered process of forming a multisectoral model of technological development of industries allows us to determine priorities and prospects for their development, to assess the share of participation in the region's GRP.

The result of this model use is presented on a map of technology positioning for the development of a high-tech sector of the economy in the field of high production redistribution (figure 2).

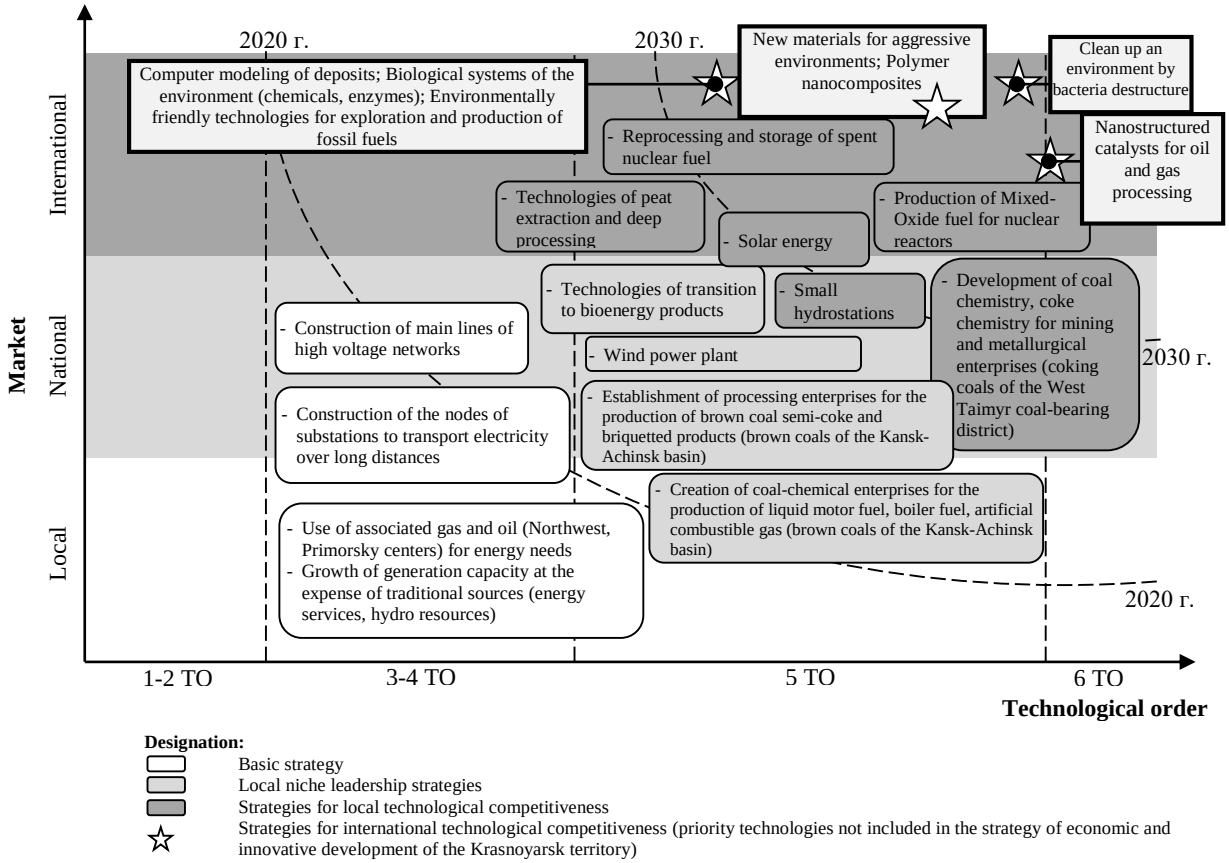

Figure 2. Positioning map for technological development of the energy and oil and gas complexes of the Krasnoyarsk Territory until 2035.

3. Conclusion

In general, an analysis of global and national trends in technological development made it possible to identify the risks of technological lag and assess the possibilities of technological development for the sectors of the region's economy. The prioritization of areas of technological development was based on the need to increase the potential of technologies with the aim of transitioning to the economy of the future and ensuring regional integration effects for the development of the national economy and achieving the status of a center for global technological development.

Acknowledgments

The project «Formation of mechanisms for selection and support of competitive high-tech businesses for structural changes in the economic system of the resource region and promotion in the world commodity markets» was funded by Krasnoyarsk Regional Fund of Science.

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