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STATE OF TECHNOLOGICAL STRUCTURES OF MACROREGION ENTITIES AND FEATURES OF ITS REINDUSTRIALIZATION

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Abstract

In an environment of permanently recurring crisis phenomena, which preserves the unevenness and delimitation of the regions of Russia according to various parameters, the low level of technical condition and the inefficiency of technological processes, it is necessary to develop and implement such a technological policy that would facilitate the transfer of the technological structure of the regional economy to a higher level. Such an approach will establish the potential that each region possesses. To implement the proposed approach, it is necessary to determine the state of the economy of a given region and identify which technological structures form this economy and which one is dominant. In the study, on the basis of the developed methodology, an analysis is made of the state of technological structures according to various indicators, an integral indicator is determined that reveals to which structure the economy of a given subject belongs. The result of this analysis is that possible ways for the macroregion to modernize technological development based on the choice of reindustrialization tools are identified. Reindustrialization is a trend in the modern development of economic sectors, it forms a new understanding of the role of industry, creates a new geography of productive forces, and ensures the transfer of all sectors of the economy to a new high-tech foundation.

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1. Introduction

The crises that triggered two unrelated factors, the pandemic and energy, had a significant impact on the individual, the country and the relationship between the countries. At the same time, these crises showed that the most important attributes of development were technology, especially digital. The world has already paid much attention to the use of technologies, they used to be the main sources of economic growth and development, and the new conditions will force us to focus more on their development and use.

The current negative situation to some extent slowed down the trend, which was the main direction of action of developing countries. It consisted of pursuing a policy of reshoring or re-transferring industrial production to the country, which was previously concentrated in other countries. Such a policy is due to two factors, firstly, the disappointment associated with post-industrial development, and secondly, in countries there is an understanding that the further development of the economy can be associated with industrial sectors or the entire industry, as the basis of the economy. Now all countries, both developed and developing, are on the path of reindustrialization. They link their further development with the use of new technologies, especially digital, in industrial sectors, increasing labor productivity and competitiveness (Reinert, 2008; Rifkin, 2013).

In this regard, it seems important to analyze the patterns and necessary conditions conducive to a change in technological patterns, which, in turn, is of significant interest for solving the problems of economic development of regions, ensuring the growth of knowledge-intensive industries on their territory and creating regional competitive advantages. An economy can be effective when a stable technological base is formed on its basis.

2. Problem Statement

The condition and characteristics of the technological structure is a fundamental factor determining the basis of the economy. It is the foundation on which all sectors of the economy stand. The study of technological structure forms the economy of a given country or region and has an important methodological, practical and prognostic value.

The existing theory of technological structures was developed with the participation of domestic and foreign researchers. Its contours were identified by Kondratiev (2002). It is impossible not to mention the work of Lvov (1990), Glazev (2012) and others who deepened and expanded understanding of this topic. Research in this direction is ongoing.

Among foreign authors, it is worth highlighting the works of Reinert (2008), Perez (2003), Freeman (1995), who studied the role of technology in the formation of technological structures. Rifkin (2013), Schwab and Davis (2018), Schwab (2016), Moazed and Johnson (2016) indicated the consequences of using modern (digital) technologies in reindustrialization.

Romanova (2014), Titov and Markova (2016), Sumin (2015) and others devoted their work to the regional aspects of the use of technology.

The technological structure is formed in the course of historical development. Scientific and technological progress and technological developments that create or shape a new type of economy with

an adequate reproduction process have an important influence on its composition and structure (Prudnikova, 2012). They are evolving systems, therefore, the study of patterns and the necessary conditions that contribute to their change are of significant scientific interest, especially for the regions.

As noted by Sergeev (2010), the relevance and practical potential of the theory of technological structures is very high. By substantively analyzing the interconnections of various technological and economic indicators, this theory, first of all, serves as a basis for studying the long-term trends of "progressive" technical and economic development. In addition, it provides convenient tools for studying the problems of the catch-up development of individual countries. From her point of view, it is permissible to "step over" the national economy through the stages of development by means of an effective modernization policy that promotes the establishment of a new technological structure without the need for the preliminary development of aging structures (Sergeev, 2010).

The technological structure is formed by a specific key factor, which forms the totality of the supporting industries, which become the foundation of the technological core. The emergence of a new structure, as a rule, is associated with the emergence of a new key factor and the formation of new industries.

According to Glazyev (2012), the technological structure is a holistic and sustainable formation, within which the reproductive cycle is carried out. Long-term technical and technological development of the economy occurs as a process of successive replacement of some structures by others. The new way is characterized by a higher level of technological content than the previous one (Glazyev, 2012).

The driving forces and the main reasons for the need for a transition to a new technological structure are changes in society and the economy associated with increased levels of competition between both market entities and between countries, the emergence of new needs in various fields, from the domestic to the military. A situation is created in which new requirements become impossible to satisfy with the tools of the existing technological structure.

Table 1. Assessment of the state of technological structure in the subjects of the North-Caucasian Federal District on the basis of an integral indicator

Subjects	2005	2015	2018
NCFD	3.379	3.700	3.758
The Republic of Dagestan	3.323	3.817	3.775
The Republic of Ingushetia	3.190	3.636	3.626
Kabardino-Balkarian Republic	3.442	3.585	3.654
Karachay-Cherkess Republic	3.485	3.766	3.652
Republic of North Ossetia-Alania	3.421	3.505	3.814
Chechen Republic	3.286	3.647	3.724
Stavropol	3.511	3.946	4.066

Source: authors' calculations

The data in table 1 show that, as a whole, the district's economy is approaching the fourth technological mode. However, not all subjects observe such a trend. Kabardino-Balkar Republic, Republic of North Ossetia-Alania, Chechen Republic, Stavropol Territory demonstrate relative stability.

The Republic of Dagestan, the Republic of Ingushetia, the Karachay-Cherkess Republic are developing with differences. Compared with the previous period (2015), they have a decrease in the integral indicator.

In general, it should be noted that compared with 2005, there were changes in all subjects that brought them closer to the fourth order. This trend was promoted by the growth of production in the metallurgical industry, the commissioning of new capacities in the manufacturing industry, oil refining, the production of machinery and equipment, education and public administration. In addition, the use of information technology in various fields of activity, especially in public administration, education, and medicine, played an important role. Currently, this is facilitated by the use of software products and digital technologies in material production. In the aggregate, such activity leads to an increase in the general level of the economy and society. However, the pace of transformation in the district remains low compared to other districts.

Three main sectors were identified to fully assess the impact of the sectoral structure on the formation of the technological structure and to make the greatest contribution to the creation of the GRP.

Of the seven subjects of the North-Caucasian Federal District, three dominate in the gross regional product (the Republic of Dagestan, the Chechen Republic, the Stavropol Territory), in two (the Republic of Ingushetia, the Republic of North Ossetia-Alania), state administration and in two (the Kabardino-Balkarian Republic, Karachay-Cherkess Republic) are rural household. In general, trade and repair of vehicles and household goods prevail in the GRP.

The structure of the GRP shows how unbalanced the architecture of the economy of the district and its subjects is. The predominant development of trade and intermediary activity is essentially a consequence of the de-industrialization of the economy. A low level of domestic production will not contribute to the development of trade, because the shortage of goods will reduce the domestic market.

Trade as an organizer of exchange in the reproduction process is an important element, but it does not create material wealth, and also leads to an outflow of investments from the sphere of material production. The constituent entities need to make significant changes to the structure of their economies. It is clear that this is a long-term process, but without it they will not be able to leave the backward zone.

Summing up, according to the presented criteria for assessing the state of technical conditions, it becomes obvious that the third technological order dominates in the district, and it remains relatively stable, although some positive changes are observed. The next task is to accelerate the processes associated with industrialization and to intensify these processes. It is possible to solve this problem on the basis of reindustrialization.

Reindustrialization is a technological policy that consists in modernizing the technological basis of industrial sectors and the entire material sphere based on new technologies. This activity helps to change the technological, industrial, economic and social conditions that impede the development of a region or country.

Reindustrialization has such properties that allow you to implement the planned activities. It can be characterized as a synchronous process of creating new high-tech sectors of the economy and effective innovative renewal of its traditional sectors (Greenberg & Bodrunov, 2015). It has a high multiplicative effect and affects not only the industries where reindustrialization is carried out, but also on related and related industries, accelerating their development. Most importantly, it provides an increasing return on industries and production areas.

The need for reindustrialization is caused by various factors, but the main reason is the low level of fixed assets and in general the means of production (Ioda & Ioda, 2016).

The issues of reindustrialization in various aspects were investigated by domestic researchers, among them Bodrunov (2015), Sukharev (2013), Greenberg and Bodrunov (2015) and others.

The reindustrialization of the economy of the subjects of the North Caucasus Federal District can be implemented using various methods. In modern conditions, the use of digital technologies and digitalization using these technologies is becoming the most important tool (Moazed & Johnson, 2016; Schwab, 2016). Digitalization in the material sphere is important, which will accelerate the transition to a more advanced technological structure (Schwab & Davis, 2018).

It is possible to implement the policy of reindustrialization on the basis of public-private partnership. It involves the interaction of the state and business on the implementation of developments that will improve the competitiveness of the business, region and country.

In order to achieve results in the process of reindustrialization, it is advisable to be guided by a specific industrial policy. For each region, it is necessary to develop an industrial policy adapted to the characteristics of the industrial sector, which should be exclusive.

For the subjects of the North-Caucasian Federal District, offshoring can contribute to reindustrialization – transfer to the regions of individual operations for the assembly or preparation of individual parts or components. In the pre-reform period, there were enterprises in the republics of the district that were part of the country's military-industrial complex. Enterprises located in large cities could be relocated here. These enterprises employ many people who migrated to these cities in search of work. Such a policy would help solve three problems. Firstly, people would stay in their regions and solve their economic issues, secondly, social infrastructure (schools, kindergartens, leisure, etc.) would develop and social tasks related to reducing unemployment would be regulated, and maybe and its liquidation, thirdly, would unload large cities.

3. Research Questions

The scientific hypothesis of the study is the assumption of whether it is possible in a regional economy where a low technological order is dominant to change its state using the methods of reindustrialization. The experience of different countries and effectively developing regions shows that the implementation of reindustrialization mechanisms can contribute to a transition to a higher level of development.

4. Purpose of the Study

The purpose of the study is to find out the state of technological structures in the subjects of the North Caucasus Federal District (North-Caucasian Federal District) and, based on its results, propose measures for the reindustrialization of the district's economy.

5. Research Methods

The study is based on the use of the methodology of a systems approach, the application of methods of economic and statistical analysis, scientific abstraction, analogies and scientific generalizations. During the development of the proposed topics, classical and modern works of domestic and foreign scientists, statistical and empirical material prepared in the process of field research were used.

The object of the study is the North Caucasus Federal District. Currently, the district is showing low rates of development.

6. Findings

To determine the state of technological structures (TU) in the economy of the subjects of the North Caucasus Federal District, the authors used the methodology (Batov et al., 2017) and the methods of other researchers (Moskvina, 2010). The main difference between the proposed methodology from others is that the integral indicator of the technological structure is calculated, which corresponds to the number of the structure (for example, 2, 3, 4, etc.). And the second, as a rule, to determine what kind of structure corresponds or which way dominates, one indicator is used – gross domestic product (GDP) – for the country's economy and regional domestic product (GRP) – for the region.

In the methodology used, other indicators are calculated, in addition to GDP and GRP. This is the structure of investment in fixed assets by type of economic activity; structure of fixed assets and putting them into action; the structure of the number of employees by industry. In the course of the study, the technological structure was calculated according to the proposed indicators and the integral indicator for each of them was determined. Then, a consolidated or general integral indicator was determined, which is the main indicator showing the state of technological structures and which of them dominates.

7. Conclusion

The relevance and practical potential of the theory of technological structures are very high. By substantively analyzing the interconnections of various technological and economic indicators, this theory, first of all, serves as a basis for studying the long-term trends of “progressive” technical and economic development.

Technological structure is the foundation of the economy, but this foundation is not a frozen structure, it is in a dynamic movement. In form, it can remain constant, but the content should change with a constant increase in efficiency and productivity. It is possible to change the technological structure based on reindustrialization.

Reindustrialization is an important element in the restructuring of the regional economy. It has a set of different methods and tools, which allows you to choose for each region adapted to it the methods of reindustrialization.

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References

- Batov, G. K., Krotova, M. V., & Shardan, S. K. (2017). *Methodological approaches to measuring the results of technological modernization of the oil and gas complex. Theory and practice of institutional transformations in Russia*. Collection of scientific papers. TsEMI RAS.
- Bodrunov, S. D. (2015). *Formation of the strategy of reindustrialization of Russia*. Ed. 2nd, rev. and add. In two parts. Part one. INIR.
- Freeman, C. (1995). The National System of Innovation in Historical Perspective. *Cambridge J. of Econ.*, 19(1), 5–24. <https://doi.org/10.1093/oxfordjournals.cje.a035309>
- Glazyev, S. Y. (2012). *Strategy for the rapid development of Russia in the context of the global crisis*. Economics.
- Greenberg, R. S., & Bodrunov, S. D. (2015). *Re-industrialization of the Russian economy: imperatives, potential, risks*. St. Petersburg.
- Ioda, Y. V., & Ioda, L. R-K. (2016). The influence of technological structures on the innovative development of territories. *Socio-econ. phenomena and processes*, 10(6), 44–50.
- Kondratiev, N. D. (2002). *Large cycles of conjuncture and foresight theory: selected works*. Economics.
- Lvov, D. S. (1990). *Efficiency of management of technical development*. Economics.
- Moazed, A., & Johnson, K. (2016). *Monopolies: What It Takes to Dominate the 21st Century Economy*. St. Martin's Press. <https://www.goodreads.com/book/show/26114480-modern-monopolies>
- Moskvina, O. S. (2010). Determining the level of technological structure in the regional economy. *Bull. of the Chelyabinsk State Univer.*, 2(183), Econ. 23, 52–58.
- Perez, C. (2003). *Technological revolutions and financial capital: The dynamics of bubbles and golden ages*. Edward Elgar Publ.
- Prudnikova, L. V. (2012). Evaluation of innovative processes and the structure of technological fit for industry. *Bull. of Vitebsk State Technol. Univer.*, 22, 151–162.
- Reinert, E. S. (2008). *How rich countries got rich... and why poor countries stay poor*. Public Affairs Publ.
- Rifkin, J. (2013). *The third industrial revolution: How lateral power is transforming energy, the economy, and the world*. St. Martin's Griffin Publ.
- Romanova, O. A. (2014). The strategic vector of economic dynamics of the industrial region. *Econ. of the reg.*, 1, 43–56.
- Schwab, K. (2016). *The fourth industrial revolution*. Crown Business Publ.
- Schwab, K., & Davis, N. (2018). *Shaping the Fourth Industrial Revolution*. Published January 15th by World Economic Forum. Kindle Edition. <https://www.goodreads.com/book/show/38040556-shaping-the-fourth-industrial-revolution>
- Sergeev, A. M. (2010). Change of technological structures and institutional innovations: a regional aspect. *Econ. of the reg.*, 3, 111–117.
- Sukharev, O. S. (2013). The economic policy of the reindustrialization of Russia: opportunities and limitations. *National interests: priorities and security*, 24(213), 2–24.
- Sumin, E. V. (2015). Innovative advantages of the region in the context of reindustrialization. *Actual probl. of econ. and law*, 2, 109–117.
- Titov, V. V., & Markova, V. D. (2016). Support system for the innovative development of industry in the region. *World of Econ. and Manag.*, 16(2), 89–99.