

opción

Revista de Antropología, Ciencias de la Comunicación y de la Información, Filosofía,
Linguística y Semiótica, Problemas del Desarrollo, la Ciencia y la Tecnología

Año 35, diciembre 2019 N°

24

Revista de Ciencias Humanas y Sociales
ISSN 1012.1587/ ISSNe: 2477-9385
Depósito Legal pp 198402ZU45



Universidad del Zulia
Facultad Experimental de Ciencias
Departamento de Ciencias Humanas
Maracaibo - Venezuela

Technological development as a driver of economic growth in a macro-region

Gumar Kh. Batov¹

¹Institute for Computer Science and Problems of Regional Management – the filial branch of Federal State Budgetary Scientific Establishment Federal Scientific Center Kabardin-Balkar Scientific Center of Russian Academy of Sciences

e-mail: gumarbatov@mail.ru

Saida K. Shardan²

²Federal State Budget Educational Institution of Higher Education North Caucasus State Humanitarian-Technological Academy

e-mail: Shardansaida@mail.ru

Zarema U. Temirova³

³Federal State Budget Educational Institution of Higher Education North Caucasus State Humanitarian-Technological Academy

e-mail: z.temirova@mail.ru

Abstract

The research objective is to show the state of technology and technological development of the North Caucasian Federal District (NCFD) and to identify the factors impeding it. The study is based on the systemic approach and the methods of economic and statistical analysis, scientific abstraction, analogies and scientific generalizations. As a result, the economic efficiency of a macro-region can be increased by using new technologies. In conclusion, it is necessary to intensify research activities in the entities and to establish closer cooperation between scientific institutions, educational organizations and manufacturing enterprises.

Keywords: Demand, Limitations, Innovation, North, Caucasian Federal.

El desarrollo tecnológico como motor del crecimiento económico en una macro-región

Resumen

El objetivo de la investigación es mostrar el estado de la tecnología y el desarrollo tecnológico del Distrito Federal del Norte del Cáucaso (NCFD) e identificar los factores que lo impiden. El estudio se basa en el enfoque sistémico y los métodos de análisis económico y estadístico, abstracción científica, analogías y generalizaciones científicas. Como resultado, la eficiencia económica de una macro-región se puede aumentar mediante el uso de nuevas tecnologías. En conclusión, es necesario intensificar las actividades de investigación en las entidades y establecer una cooperación más estrecha entre las instituciones científicas, las organizaciones educativas y las empresas manufactureras.

Palabras clave: Demanda, Limitaciones, Innovación, Norte, Cáucaso Federal.

1. INTRODUCTION

At present, only such a country can pretend to be a world or regional leader in economic development, which combines the use of innovative resources and reserves with intellectual, scientific and technical potential. In developed countries, the bulk of the increase in gross production is created by new knowledge embodied in technologies, new forms of production organization, education processes and personnel training. For the subjects of production activity, advanced technological developments and innovative products (the results of the knowledge economy) are becoming, or

rather have already become, the main factors for ensuring competitive superiority, obtaining excess profit, which in its turn is used to acquire intellectual rent and monopoly use (for a period of time) of new products and technology. As a result of highly innovative activity, the reproduction process of economic activity is carried out on an expanded basis, which allows obtaining sufficient profit for the subsequent investment in new developments.

The development of advanced technologies and the emergence of new production schemes radically change the existing economic structures, in addition, the emergence of completely new industries. They radically and more rapidly change the economy and society, even more rapidly than before. This process is at different stages in different countries, but the general trend is that the industry's main driver of development is industry 4.0. New technologies and related processes disrupt the uniformity of technological development, which leads to a change of the techno-economic paradigm, as it was called by KONDRATIEV (2002), or the emergence of new technological structures (KONDRATIEV, 2002; LVOV, 1990).

The problem can be solved through the joint use of the technological base and the scientific and technological potential that the entities of the region possess. In this, the authors of the present paper agree with and support R. Zeynalov who argues that in order to achieve these goals, it is necessary that in the structure of industrial production in the region, and accordingly in the country as a whole, the number and proportion of high-tech enterprises and organizations are not symbolic, but could provide extended reproduction,

improvement of quality of life and high competitiveness of products on the world market.

2. METHODOLOGY

In the course of the study, classical and modern works of Russian and foreign scientists on the topics studied were used. The methodological basis of the research comprises general scientific methods: analysis, generalization, conceptualization, system-structural analysis. Specific methods were also used, in particular, expert assessment.

3. RESULTS

The North Caucasian Federal District (NCFD) was established in 2010, by allocating a part of the entities from the Southern Federal District. The North Caucasian Federal District includes seven federal entities with an area of 170.4 km² and a population of 9,823 thousand people.

The economy of the district is dominated by the third technological order. With the dominance of the third technological order, there are also basic signs of the fourth-order in the economy of the district often combined with the features of the third. The ratio between the structures is roughly in the range of 55% to 45% in favor of the third order. The structure of the third and fourth technological orders comprises various types of economic activities that form the

industrial basis of the economy (KRYLOVA, 2011).

The main goal of the NCFD administrative entities is to eliminate the discrepancy between the existing model of development and the need to move to a new development paradigm. The achievement of this goal is possible only within the framework of technological development based on innovations. This is confirmed by KOMKOV (2013), who notes that in the program documents on the economic recovery of the country, technological modernization is declared as a strategic direction of development, innovations being its main and only factor (KOMKOV, 2014).

Achievement of these goals depends on the level and rate of scientific and technological development, which are determined by the socio-economic capabilities of the district to carry out the activity aimed at ensuring the functioning of science and technology as a single system closely related to production. The main results of such activity are the creation of new scientific knowledge and its subsequent implementation in new technologies or in new products produced with the help of these technologies (Table 1).

Table 1: Indicators of scientific and technical development of the NCFD administrative entities

Administrati ve entities	The number of staff engaged in	The number of postgradua te students	Internal costs of research and	Number of organizatio ns that have	Number of patent application s per 100
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	research and development, per 10,000 population employed in the economy		per 10,000 population		development, per 1000 of GRP, roubles		completed research and development projects		personnel involved in research and development	
	2010	2016	2010	2016	2010	2015	2010	2016	2010	2016
Russian Federation	55	51	11	6	14.0	14.0	3492	4032	6	5
North Caucasian Federal District	18	14	6	3	2.9	2.5	92	160	33	9
Republic of Dagestan	17	13	4	3	2.3	1.7	29	45	88	10
Republic of Ingushetia	13	14	2	2	0.8	1.4	4	7	1	1
Kabardino-Balkarian Republic	22	21	7	4	5.7	3.9	14	18	12	6
Karachay-	28	16	5	3	6.1	6.0	6	11	2	3

Cherkess Republic										
Republic of North Ossetia-Alania	21	12	11	6	3.0	3.0	15	22	9	18
Chechen Republic	14	7	1	3	1.5	1.7	8	8	17	9
Stavropol territory	16	13	9	4	2.8	2.4	16	49	19	9

An important aspect of scientific and technological development is the number of personnel engaged in research and development per 10,000 employed in the economy. According to this indicator, the NCFD subjects fall far behind the Russian Federation. While the average for Russia in 2016 for 10 thousand workers accounted for 51 people engaged in research and development, in the North Caucasian Federal District this figure was 14 people, which is 3.6 times lower.

The number of postgraduate students in the district per 10 thousand of the population is also less than the average in the Russian Federation.

The most unfavorable and constraining factor is the low level of research and development funding. In the gross regional product of the administrative entities of the North Caucasian Federal District per 1000 rubles GRP, the internal costs for research and development in

2015 amounted to 2.5 rubles. The situation in the three entities is slightly better: The Kabardino-Balkarian Republic – 3.9 rubles, the Karachay-Cherkess Republic – 6.0 rubles, the Republic of North Ossetia-Alania – 3.0 rubles. In 2015, the indicator for the Russian Federation was 14 rubles, which also cannot be considered high. In the NCFD, very little money is invested in science, which is a source of knowledge.

A general analysis of the most important indicators of scientific and technical development of the North Caucasian Federal District entities indicates a significant lag in NCFD regions from the average level of development in Russia. According to the calculations by GRINBERG (2015), the population of the North Caucasian Federal District is about 7%, and the number of registered enterprises and organizations is about 3% of the average indicators in Russia. The number of personnel engaged in research and development is 0.2%; internal research and development costs – 0.5%; technological innovation costs – 0.3%; the number of organizations that have taken part in research and development projects – 2.8%; the costs for information and communication technologies – 1.4%; the number of advanced production technologies used – 1.0%; the volume of innovative goods – 0.9%.

According to development programs, numerous publications, and also according to experts, the main development potential of the NCFD is concentrated in the energy, tourism-recreational and agro-industrial sectors of the economy (GLAZYEV, 2010).

4. DISCUSSION

In 2016I in the NCFD, 15 advanced production technologies were developed, which is 10 more than in 2010. They were developed in five entities: The Republic of Dagestan – 6, the Kabardino-Balkarian Republic – 2, the Republic of North Ossetia-Alania – 2, the Chechen Republic – 2, Stavropol Territory – 3. During the studied period, the remaining entities could not provide new production technologies. In the same year, 2710 advanced production technologies were used, which is 572 technologies less than in 2010. Table 2 shows the status of the use of new technologies by the North Caucasian Federal District administrative entities.

Table 2: The share of enterprises of NCFD using new technologies, %

	Number of production points, units			Number of technologies used, units			Share of enterprises using new technologies, %		
	2010	2015	2016	2010	2015	2016	2010	2015	2016
Russian Federation	1,350,609	1,462,025	1,401,601	203,330	218,018	232,388	15.0	14.9	16.5

North Caucasian Federal District	54,042	54,449	48,141	3282	2338	2710	6.0	4.3	5.6
Republic of Dagestan	11,684	13,595	14,032	1793	424	578	15.3	3.1	4.1
Republic of Ingusheti a	1922	2793	2528	-	-	16	-	-	0.6
Kabardin o- Balkarian Republic	4771	4798	4779	192	262	270	4.0	5.5	5.6
Karachay - Cherkess Republic	2321	2409	2350	70	90	93	3.0	3.7	3.9
Republic of North Ossetia- Alania	4045	3883	3668	18	30	151	0.4	0.7	4.1
Chechen Republic	5247	3996	4070	298	356	317	5.6	8.9	7.7

Stavropol territory	24,044	22,975	16,714	911	1176	1285	3.7	5.1	7.6
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In 2016, the share of the production technologies used in the NCFD was 5.6%, in Dagestan -4.1%, the Kabardino-Balkarian Republic – 5.6%, the Karachay-Cherkess Republic – 3.9%, the Republic of North Ossetia-Alania 4.1 %, Chechnya – 7.7%, Stavropol Territory – 7.6%. The average value of the indicator in Russia was 18.6%. The entities of the NCFD are thoroughly behind the average indicators for this component in the Russian Federation.

In general, it should be noted that the situation associated with the use of new technologies remains ambiguous. At the same time, it is worth highlighting that in the entities of the district, certain work is being done to find a way out of the existing situation.

Table 3: The impact of new technologies on the economic growth of the NCFD

Administrative entities	GRP, billion roubles		Volume of industry production, billion roubles			The value of fixed assets, billion roubles			Investments in fixed assets, billion roubles			The number of employees in the economy, thousand people.		
	2010	2015	2010	2015	2016	2010	2015	2016	2010	2015	2016	2010	2015	2016
	0	5	0	5	6	10	5	6	0	5	16	0	5	6

Cherkes Republic														
Republic of North Ossetia-Alania	127.					17	232	247	14.		27.	299.	294.	287.
	74.8	5	20.4	28.1	25.8	1.3	.1	.8	0	25.4	4	3	7	2
Chechen Republic	160.					23	425	468	39.		61.	281.	488.	490.
	69.5	5	8.9	28.8	28.9	1.1	.9	.1	3	58.8	9	0	7	0
Stavropol territory	316.	609.	200.	337.	355.	98	150	167	89.	126.	11	123	121	124
	8	5	2	0	2	1.0	0.4	5.2	1	2	0.7	6.5	5.5	2.0

In the district, there is an increase in GRP, volumes of industrial output, the value of fixed assets and investments in fixed assets in monetary terms. The economic growth, cleared of the inflation component and calculated on the basis of the Solow model, has shown that it is based on technological changes. Based on the analysis of the data in Table 3, it can be noted that the growth that was provided by new technologies and the modernization of industrial sectors in the

NCFD entities did not lead to the transition to the fourth technological order, but reduced the distance between the third and fourth orders in favor of the latter. However, the district still does not pay due attention to the large-scale introduction of innovation.

One of the reasons for the low demand for the existing regional innovative developments on the part of business entities is that research areas in universities, academic and industrial research institutes do not cover, and consequently, do not solve the urgent problems of the district enterprises. This indicates the absence or low level of the issues of mutually beneficial cooperation between science and production. On the other hand, universities and research institutes do not receive orders from enterprises and business structures for the development of innovations, the organization of technology transfer, etc., which makes the development of innovative activity undemanded.

Currently, businesses in the NCFD show low susceptibility to innovation, as well as low motivation to innovate. The share of innovative and active organizations in the NCFD in various types of economic activity is at a low level. The indicator for the NCFD is 2.9%, while the average for the Russian Federation is 8.4%. With the indicator of the share of innovational active organizations defines the level of innovation in the economy, which is 5.9% in the Russian Federation, and 2.4% in the NCFD. The indicators are at an unacceptably low level.

Most enterprises of the district are characterized by the focus on short-term efficiency, which does not contribute to long-term development based on innovation. There are few enterprises in the

district that carry out joint innovative projects. Connections that are established between enterprises are of a production nature, partnership often occurs with suppliers of raw materials and components, which in principle does not contribute to the creation of new products. Leonard argues that from the point of view of a long-term effect on the development of the innovative activity, the density of the formed networks may prove to be a more important factor than the initial budget stimulation (LEONARD, 2016).

To sum up, it should be noted that to ensure economic growth in the district on the basis of new technologies, it is necessary to establish innovative activity. Such work is important and relevant for other districts and the country as a whole.

Production factors that impede the introduction of technologies in most industrial enterprises of the district should be highlighted separately. These include the low technological potential of organizations, lack of qualified personnel, lack of information on new technologies, lack of information about the market, immunity of the organization to innovations, lack of opportunities for cooperation with other organizations and scientific enterprises, insufficient financial support from the state.

The conditions preventing the introduction of technologies in production include the high cost of innovation, high economic risk and a long payback period of technology. Other factors are the low demand from consumers for innovative products, the inadequacy of legislative acts that regulate and stimulate innovation, the underdevelopment of the technology market. The impeding factor is the underdevelopment

of the regional infrastructure and the education system. As the research results show, the NCFD is not fully ready to introduce promising innovative technologies.

5. CONCLUSION

Studies of a different kind show that the North Caucasian Federal District is at a low level of development for a number of indicators, is a weak link in the country's economy, and this must be acknowledged. When creating the district, the federal center meant to send here certain investment flows to be used to bring the district out of its depressive state and ensure the average Russian level of development. It was taken into account that the district did not have rich natural resources, and the main direction of development would be the search and use of new technological solutions based on innovations. However, this process is going on at a slow pace, which is due to the lack of resources, and, which is the worst, to the absence of a clear strategic policy for the transition to an innovative economy. In this regard, the authors of the paper agree with a number of researchers who believe that the problems existing not only in the district and in the region but also in the whole country can be solved by changing the strategic vector of domestic economy development, its orientation towards the new industrialization (GUBANOV, 2012).

Modern Russian reality shows the high lack of demand and immunity to research results on the part of the real sector of the

economy. The main reason is existing demand limitations, which are due to the fact that the economy lacks real conditions for competition, the basic market laws do not work, and most importantly, the strength of competition among market participants is such that allows them all to co-exist, although they supply the market with mediocre and low-quality products. In such conditions, market players do not have to compete and improve their products or search for new technologies. At the same time, there are new technologies in the regions that can be used, but they do not find application. Out of the total number of issued patents only a minimal number is used.

It is necessary to change the existing practices and policies, each region needs to develop its own mechanism and approach to the transfer of technology depending on its characteristics. First of all, this refers to the NCFD, because only using new technologies and technological developments, it will be able to fit into the new technological structure and ensure economic growth.

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DEL ZULIA

opción

Revista de Ciencias Humanas y Sociales
Año 35, N° 24, (2019)

Esta revista fue editada en formato digital por el personal de la Oficina de Publicaciones Científicas de la Facultad Experimental de Ciencias, Universidad del Zulia.

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