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STRATEGY INNOVATIVE TECHNOLOGICAL DEVELOPMENT AND SPECIALIZATION REGION RESOURCE ECONOMICS

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Abstract

The issue of strategic management of regions with a resource-based economy, which is relevant for the Russian economy, is revealed in the article. The article analyses the structure of the gross regional product of a number of Russian regions, identifies the prevailing industrial sectors in accordance with the priorities of technological development by a resource-type economy. In the process of preparing the article, the following methods of scientific research were used: methods of systemic and formal logical, scientific analysis and synthesis, comparative analysis, economic and statistical methods, and more. The purpose of this study is to determine the features of innovative technological development of regions with a resource-based economy, and to study the priorities of their technological development. The role and features of developing strategic alternatives and priorities for the technological development of regions with an economic resource type are determined. The factors determining the effectiveness and efficiency of the technological development of the economy of a region of a resource type are disclosed. The advantage of this work is the formulated conceptual basis for the development of a strategy for scientific and technological innovative development of a region with a resource-type economy. The factors that determine the effectiveness and efficiency of technological development of a region-wide economy of a resource type are found out.

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1. Introduction

The strategy of innovative technological development, the role of new technologies in a crisis and new growth, is reflected in the works of many famous scientists. According to the theory of innovation cycles (Schumpeter, 1982) and the theory of technical and economic development (Glazyev, 1993), (Freeman & Soete, 1999), the world economic system is entering the sixth economic order, is on the verge of new technological breakthroughs. A change in basic technologies leads to a chain of changes in industries, radical transformations in the economy. The successor of the theory of innovative development (Mensch, 1979) presented the time of economic recession as a period of concentration of innovations that determine and find their development in a new phase of economic growth. Technological development and the formation of the global digital economic space, the activation of Russia in it - strengthens social and economic differentiation in the context of the conservation of raw material specialization. The Russian economy remains dependent on natural and political development factors: from 1997 to 2011, oil and gas exports in the country's trade balance increased to almost 70%. The trend in foreign trade determined by the prevalence of the primary sector of the economy continued until 2014. In 2015, the share of certain types of high value-added products increased in the structure of Russian exports, but the share of fuel and energy products decreased. Export of the most significant group, fuel and energy products, decreased by 37.6%. In 2019, mineral products and fuel and energy products prevail in the export structure. The negative dynamics is caused not only by an increase in the share of manufacturing with high added value in the sectoral context of the Russian economy, but by a strong decrease in average contract prices in external resource markets, primarily for oil. The economic development of the country is also built on the dominance of the raw material sectors of the economy. It is highly dependent on the available natural reserves and the dynamics of foreign trade prices in the quintessence with geopolitical factors of influence.

Revealing the specifics of the innovative development of regions with a raw material economy, the fundamental principles of the implementation of innovative activities should be taken into account. An innovation activity manifests itself in diverse forms and types of innovation, not only in production innovations, in the appearance of new products or production processes, but also in the form of managerial, magnetite and production innovations. It should be agreed with Porter (2010), who argues that there are no innovative industries, but there are no innovative companies. It is important to promote the continuous improvement of firms in all types of activities, and not focus on the use of the most advanced; you need to focus on the needs of the market. Otherwise, there is a risk of so-called technological myopia (Gokhberg & Kuznetsova, 2011).

The specialization of the region should be guided by scientific and technological priorities, but the multistructure in the regional context of the Russian economy (Glazyev, 1993) forms different innovative potential, the level of innovative susceptibility of the regional economy. These conditions must be taken into account in the strategic planning of the technological development of the Russian regions (Sumina, 2015). The European strategy of "smart specialization" (Foray et al., 2009) as a smart regional specialization is a regional or state economy development strategy based on identifying and choosing a limited number of priority areas for investment in research and innovation, which represent the strengths and comparative advantages of the region.

Innovative processes ensure the competitive advantages of the region and the implementation of the strategy of technological development of the economy (Dynkin & Kurenkov, 2003; Porter, 2010; Tatarkin, 2003). In the economy of the region Edquist (2005) identifies interfirm, regional, national, or global innovation systems. A number of researchers interpret innovation as the following process: public - technical - economic, social (Santo, 1990). The innovation process is the process of implementing innovation, introducing innovation into practice; it is a process of transforming scientific knowledge into innovation, which can be represented as a sequential chain of events during which new knowledge is generated as an idea of a new product, technology or service, and is disseminated through practical use and commercialization. Innovation process is a set of activities aimed at creating and commercializing new knowledge in the form of scientific and technical products, improving production technology, translating new knowledge into a product, in organizing innovative business - from seed stage to IPO (Initial Public Offering). The innovation process is the reproduction of new knowledge. Any innovation process has certain phases, duration, goal, and is implemented taking into account limited resources. From the position of the required competencies and the content of each phase, the innovation process can be divided into stages of generation, conceptualization, optimization and execution. The mechanism for developing an innovative project at any level involves the sequential passage of a number of stages: analytical stage (problem-oriented analysis of the situation); conceptualization stage (building a hierarchy of goals and objectives); instrumentalism stage (selection of effective tools for carrying out activities within the project); concretization of the action plan (to the level of measures and the order (schedule) of their implementation); project budgeting; highlighting the criteria for the effectiveness of the project, expected indicators and methods for their evaluation. Innovation process is a set of activities aimed at creating and commercializing new knowledge in the form of scientific and technical products. It can consist of several interconnected stages, such as basic and applied research, experimental development (development work), bringing products to the market (implementation), production and marketing.

Unlike STP, the innovation process does not end with implementation, i.e. the first appearance on the market of a new product, service or bringing to design capacity of a new technology. This process is not interrupted even after implementation, because with the spread (diffusion), the innovation improves. The methodological principles of managing innovative processes in the region should be based on determining the factors that allow achieving a leading innovative position in the region in terms of innovative performance and effectiveness. The conceptual provisions of the innovative development of the region, the disclosure of the features of managing innovative processes based on the identification of factors of innovative leadership in the region are the subject of the work of many researchers: Foray et al. (2009), Gokhberg and Kuznetsova (2011), Gokhberg (2015), Hall (2009), Zack (1999), Hamel and Prahalad (2002), Pavitt (2003, 2006), Sveiby (2001), Tees et al. (2003), Twiss (1989), Valentei (2015).

Territorial differentiation in the management of innovative processes in the regional economy. The regional aspect is becoming more relevant, the role of regional clusters and innovation systems as points of economic growth and innovative development of the economy is growing. In this regard, the question and the objective need to identify territories that can become key territories with the highest development potential, cumulative effectiveness of territorial interaction, stimulate regional development and reduce the level of economic imbalances, taking into account the peculiarities of regions with raw materials oriented

economies arise. On the instructions of the President of the Russian Federation, at the end of 2013, the creation of territories of priority development (ASEZ) was initiated, which should be called a fundamentally important initiative for the country's social and economic development, taking into account the differentiation of regions and creating infrastructural conditions for innovative development due to the possibility of implementing a mechanism for attracting the business sector of the economy. The law provides for the formation of special territories, the so-called economic “locomotives”. The territorial development of the country as a multidimensional concept, including geopolitical transformation and geographic, economic, administrative division and development should include a certain set of systemic actions aimed at ensuring sustainable and balanced socio-economic and natural-resource reproduction. The implementation of these systemic actions should be carried out in the interconnection of the local (municipal), regional and federal levels, the system of public administration and development. New legislative initiatives and the uneven socio-economic development of regions, individual territories, the presence of imbalances in regional development, being a natural tendency and the fundamental heterogeneity of innovative development, require a process approach with the identification of priorities, stages and components of the innovation process. Differentiation of natural climatic potential, geographical remoteness of a number of constituent entities of the Russian Federation, their territories from federal and regional centers, from the nearest motorways and highways, railway stations, airports; problems of a shortage of human resources and a number of other factors, in turn, require new infrastructural and institutional elements of regional systems.

The choice of priority development areas is based on a combination of certain criteria that allow achieving the highest economic results. Thus, new mechanisms for innovative development of the region and methodological approaches in government bodies are needed to achieve indicators of social and economic development, basic indicators of regional development that are superior to other regions. On the one hand, ASEZs are formed in order to solve social and economic problems, including those related to raw materials specifics; on the other hand, determine the best conditions for the innovative development of the region and the introduction of high-tech industries. ASEZs should become territories with the highest development potential, and new technologies are needed to operate and achieve the required level of effectiveness.

It was initially established that the first three years of the law, until 2018, ASEZs can only be created in the Far Eastern Federal District and in the territories of single-industry towns (a settlement with one city-forming enterprise) with the most difficult socio-economic situation, the Russian Government approves the corresponding list). But relevant legislative initiatives were introduced and ASEZs formed in other federal districts. Since January 1, 2016, it has become possible to create ASEZs in closed administrative-territorial entities (CATUs). For example, CATU Zheleznogorsk has become a territory of priority development; Novouralsk, Sarov are the territories of priority development in the closed cities, which are not single-industry towns, associated with special priorities in the technological development of the region.

The raw material specialization of the region determines the dependent position and certain trends of the Russian regions in conjunction with the performance indicators of innovation processes and economic growth rates demonstrate this. Raw material specialization reduces the rate of economic growth, increases imbalances in various directions and indicators of the level of social and economic development

of the country and each region, taking into account the geographical extent of the Russian Federation and other factors that strengthen the influence of the raw material dominant in the sectoral structure of the economy. There is a situation of inter-regional inequality in terms of socio-economic development. In this regard, it should be noted that the uneven innovative development of the regions is not directly dependent on these imbalances. The influence of the social and economic situation of the region on the innovative activity and performance of the constituent entities of the Russian Federation was considered in domestic and foreign studies of factors of innovative development (Gokhberg, 2015; Gokhberg & Kuznetsova, 2011). In most cases, relatively favorable social and economic conditions and scientific and technological potential are not a determining factor in the high level of innovative development of the region. Its achievement, with some exceptions, largely depends on the focused efforts of regional authorities, the quality of innovation policy.

A number of Russian researchers call the region's raw material specialization a factor of its competitiveness, and include extractive industries in assessing the region's production efficiency. According to the criteria for classifying a region as "raw", different methods are used. For example, the share of mining in the structure of GRP, the ratio of gross value added of mining and manufacturing in the constituent entities of the Russian Federation. The most commonly used share of gross value added from mining in the structure of GRP. An analysis of the structure of gross value added by federal districts indicates that the prevalence of extractive industries can be noted by the contributions of the Ural Federal District, Volga Federal District, the Far Eastern Federal District and the Siberian Federal District. The overall dynamics of the share of each subject in GRP is considered in Figure 01. The presented diagram illustrates GRP growth trends, a significant contribution of the Central Federal District, mainly due to wholesale and retail trade. Extractive industries in the Central Federal District make up 0.7% of the total GRP in this subject for the period from 2011 to 2018.

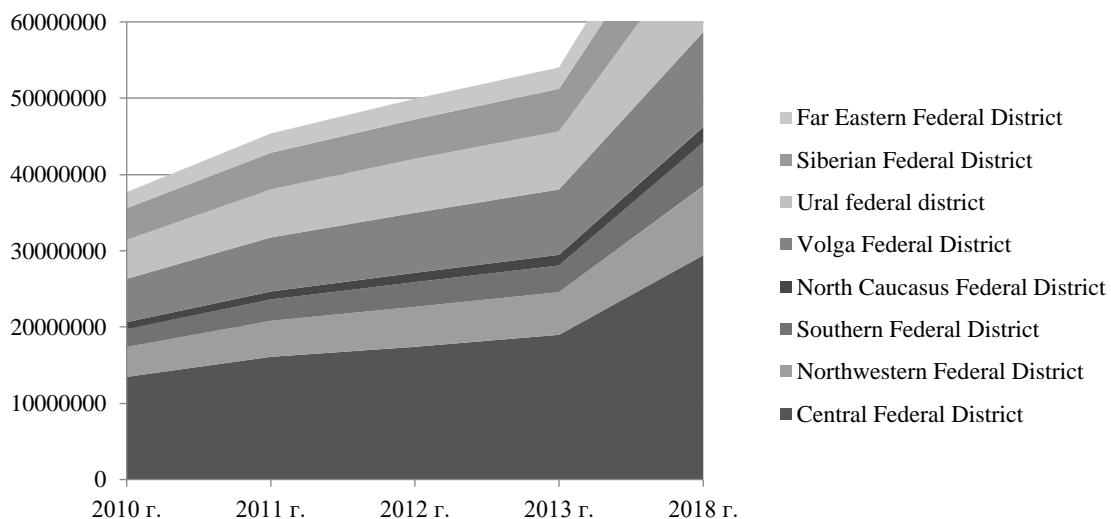


Figure 01. The structure of GRP by constituent entities of the Russian Federation, million rubles

In the federal districts, in which the share of extractive industries is high, regions with a raw material orientation of the economy and the prevalence of the extractive sector (more than 15% in the structure of

GRP) are selected. Selected regions with a specified share of raw materials industries are presented in Figure 2.

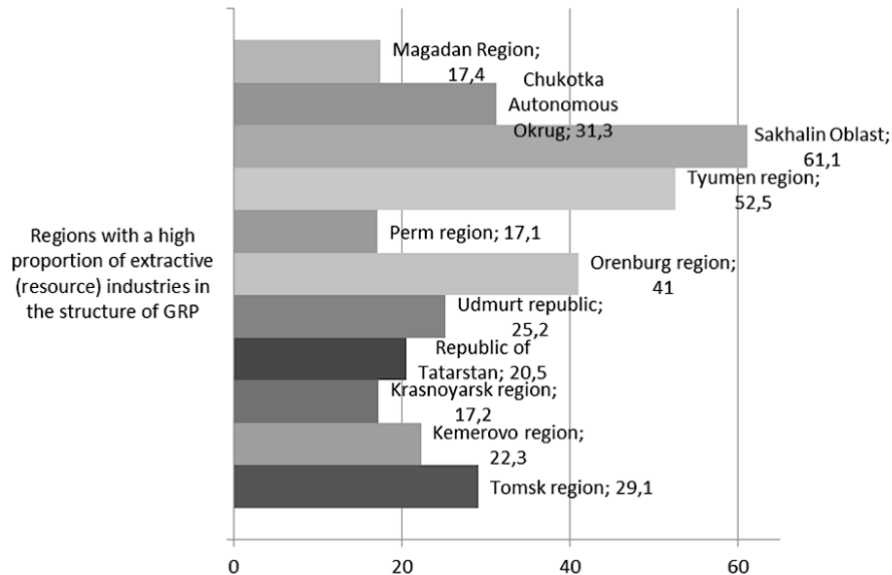


Figure 02. Regions with a raw material economy with an indication of the share of extractive industries, %

In the presented illustration of the regions, Sakhalin Oblast, Tyumen Oblast, Orenburg Oblast lead the way in raw materials specialization of the economy by more than 50% of GRP structure. It is also worth noting the North-West Federal District, which was not allocated for the total contribution to GRP structure for extractive industries, namely the Nenets Autonomous Okrug, in which the share of raw materials orientation industries is 76% according to 2013 data. In selected leading regions according to the share of raw materials industries, hydrocarbon, natural gas and oil production (Orenburg region), diamond mining, fishing, electricity (Sakhalin), fuel, oil and gas industry (Tyumen region) are developed; The Nenets Autonomous Okrug also has huge open reserves of hydrocarbons. Krasnoyarsk Territory also has an extremely rich natural resource potential, which determines the development of the fuel and energy complex, metallurgy, the woodworking industry, the oil industry, mechanical engineering and metalworking. The main natural wealth of the Republic of Tatarstan is oil. In the sectoral structure of the region, oil production and refining, chemistry and petrochemistry are of particular importance. Considering the position of the selected regions in the ratings of innovative development, the Tyumen region was one of the ten most innovative regions in 2010 according to studies of the Higher School of Economics (HSE), the Orenburg region ranked 56th in 2010, in 2013 they were 47th; Sakhalin Oblast lowered its position from 31 to 58; The Nenets Autonomous Okrug rose from 79 to 51 places in the rating. Krasnoyarsk Territory occupied the 12th position in the ranking in 2010 and retained it according to the latest published data in 2013. It is certainly indicative, in this regard, the example of the Republic of Tatarstan, which also has a significant share (20.5%) of extractive industries in GRP structure. Tatarstan rose from the 6th place in 2010 to the 2nd place in the ranking of 2013, and according to the latest data in 2015 it was ahead of Moscow and Moscow region and headed the rating of innovative development of the constituent entities of the Russian Federation. Other studies of the level of innovative development of the constituent entities of

the Russian Federation, conducted by the Association of Innovative Regions of Russia (AIRR), confirm a number of presented positions by region, but there are also special differences. Sakhalin Oblast is on the 50th place, Krasnoyarsk Territory is on the 19th place; Nenets Autonomous Okrug is on the 81th place; Orenburg region is on the 62th place; Sakhalin Oblast is on the 58th place; according to the ranking of 2015 Krasnoyarsk Territory is on the 22nd place, Tyumen region without AO is on the 21st place. The innovative development of the region depends on many resource factors, which include natural and climatic factors affecting the specialization of the region, that is, the choice of priorities for innovative scientific and technological development. The above comparisons of the achieved level of innovative development of the region with its industry orientation (for selected regions with a significant share of extractive resource sectors in the structure of GRP) showed that the raw material orientation of the economy can be traced both in the regions of innovation leaders (Republic of Tatarstan) and in the regions that occupy medium (Krasnoyarsk Territory, Tyumen Oblast) and the lowest positions in the ratings of innovative development of constituent entities of the Russian Federation (Orenburg Oblast, Sakhalin Oblast, Nenets Autonomous Okrug).

These results are also synchronized with a number of Russian studies of regional competitiveness. The Republic of Tatarstan is among 7 leaders in the competitiveness rating, occupies the third position, and Krasnoyarsk Territory is the 10th in the ranking, Tyumen Oblast (without AO) is the 14th, Orenburg Oblast is the 31st, Sakhalin Oblast is the 38th, and Nenets Autonomous Okrug is the 69th. The competitiveness of the region as a complex integrated indicator includes various aspects like natural resource potential (Krasnoyarsk Territory took the leading positions in the ranking in 2013 and 2014). In order to determine the impact of the raw material orientation on the innovative development of the region, it is possible to consider the cost indicators for technological innovations in the context of industries and sources. An analysis of financing by sources (forms of ownership) is also indicative; if we consider the structure of GRP by regions of the Russian Federation in the Siberian Federal District, then we can see that the largest share of processing (more than 36% of GRP) industries is concentrated in Omsk Region and Krasnoyarsk Territory. In Omsk region, such industries as oil refining and petrochemicals are most developed, and in Krasnoyarsk Territory, metallurgy is most developed. The highest share of mining in GRP structure (more than 22%) is in Kemerovo region (the main coal-mining region of Russia) and in the Tomsk region, where oil and gas are extracted.

Electricity makes the largest contribution to GRP in the Republic of Khakassia (more than 10%), where the Sayano-Shushenskaya hydroelectric power station is located. A rather high share of agriculture in GRP structure in the Siberian Federal District as a whole is mainly provided by the Altai Territory and the Altai Republic, where it is 18%. Another feature of the Siberian Federal District is a rather high share of transport and communication in the structure of GRP (almost 13%), due to the geographical county position. The main transit flows of Russia (freight and passenger traffic) from the European part of the country to the Asian pass through the Siberian Federal District.

The largest share of transport and communications in GRP structure (more than 23%) is in the Republic of Buryatia, in the Trans-Baikal Territory and in the Irkutsk Region. An analysis by industry makes it possible to identify areas of activity predominant in the structure of GRP, and the volumes of sales of innovative products in comparison with the general dynamics of GRP by region illustrate general trends

and make it possible to make an assumption of the presence of key competencies in regions and territories. Comparison of GRP dynamics, its structure with the indicators of innovative activity in the region makes it possible to judge the general level of innovative activity and the level of “innovativeness” of industries and regions.

The data presented make it possible to judge the sectoral focus of technological innovation costs and sources of financing in a regional context. The main investment sectors are raw materials industries (mining (except fuel and energy), mining of fuel and energy minerals, production of coke and oil products, metallurgy and manufacturing of finished metal products and other industries). According to the sources of financing, the Central and Volga Federal District are leaders in the sectoral context, with the extractive industry and raw materials sectors of the economy being more concentrated in the Urals, Volga, Far Eastern and Siberian Federal Districts. Thus, the raw material orientation of the region’s economy is not projected onto the level of innovation activity and the effectiveness of the entire region’s economy. Imbalances in economic development also negatively affect the innovative development of the region; it is necessary to determine innovative priorities for the development of the region and regional specialization, which, according to modern approaches, should not focus only on the primacy of technological and knowledge-intensive industries, the most advanced technologies, which is taken into account in the mandatory stage of technological forecasting.

The specialization of the region, including the region of the raw material orientation of the economy, should become its key competency (Hamel & Prahalad, 2002), which determines the maximum efficiency of the use of natural resources factors for the development of the region and the observance of the necessary harmonious sectoral structure, which will be supplemented by accompanying industries and activities. The necessary competencies of the participants in innovative activities provide the maximum level of creating economic added value, which, by natural market mechanisms and organizational conditions in the form of cluster structures, expands and complements the area of influence of competence in related and interrelated areas of services and production.

Based on the above and presented analysis, it is possible to draw the following conclusions: non-resource specialization is a “curse” and the primary basis for reducing the effectiveness of innovative processes in the regional economy; regional “abilities” and mechanisms for identifying and implementing sectoral and scientific and technological priorities for the innovative development of the region’s economy are needed, which may also be related to resource-based, based on natural factors, sectors, but excluding dependence on the region’s mono-production industrial policy; mechanisms are needed to engage the business sector in innovative processes in the regional economy. The necessity to engage the business sector in innovation processes is evidenced by the trend of changes in the costs of technological innovation, taking into account the structure of funding sources.

Cost analysis of technological innovations of the constituent entities of the Russian Federation, taking into account the share of each source of financing, indicates a decrease in the share of the organization’s own funds. As noted above, the main mechanism for determining the priorities of innovative development of the regional economy should be entrepreneurial initiative and choice, which is considered as the most important conceptual basis in the new European innovation development strategy Smart Specialization, which was proposed in 2009 by economists Foray et al. (2009). According to statistics in

the Russian regions, in comparison with the EU, Japan and the United States, the functioning of this mechanism is confirmed by the high share of the entrepreneurial sector of the economy in R&D investment (up to 80% is the entrepreneurial sector).

The concept of “smart specialization” presented in the EU countries is limited when it is introduced into the existing organizational, institutional environment and the specifics of Russian regions with a high share of extractive industries in the structure of GRP, which activities are largely interconnected with social infrastructure and by its nature cannot function without an active role government bodies. Innovation policy should become a flexible tool for managing regions with such a feature in the selection and implementation of innovative priorities, achieving high rates of innovative development of the region with high socio-economic landmarks.

2. Problem Statement

The article is devoted to the problem of innovative development of regions with a resource-type economy, in which the leading sectors of the economy are resource mining and processing industries. There is a need to determine sectoral and technological priorities of the needs of these regions for new technologies, features of the technological development of the region with natural and climatic advantages.

3. Research Questions

The object of the research in the article is the strategy of technological innovative development of regions with a resource-oriented economy, features of the implementation of innovative processes, the formation of industry priorities in regions of this type. The traditional sectors of the economy of the commodity regions are mining and processing resources, which can be seen in the structure of the gross regional product (GRP). Research tasks are primarily associated with determining the specialization of regions with a resource-type economy, the possibility of maintaining the region's industrial priorities.

4. Purpose of the Study

The purpose of this study is to determine the features of innovative technological development of regions with a resource-based economy, and to study the priorities of their technological development.

5. Research Methods

The methodological basis of this work includes fundamental research by Russian and foreign scientists in the field of scientific and technological development, strategic management, and regional economics. In the process of preparing the article, the following methods of scientific research were used: methods of systemic and formal logical, scientific analysis and synthesis, comparative analysis, economic and statistical methods.

6. Findings

The role and features of determining strategic alternatives and priorities for the technological development of regions with an economic resource type are determined. The factors determining the effectiveness and efficiency of the technological development of the economy of a region of a resource type are disclosed. The results of the study can be in demand in the management of processes of technological transformation of regions with a resource-type economy.

7. Conclusion

Scientific and technological progress and a change in the technological structures of the economy and society certainly affect the specialization of the region, including the region of the raw material orientation of the economy. The predominance of the mining and processing industries is determined by many factors. Innovative technological development and the selection of priorities for the region should become its key competency, which determines the maximum efficiency of using the natural resources of the region and the observance of the necessary harmonious sectoral structure, which will be complemented by related supporting industries and activities. The development of an infrastructure to support the business sector and free entrepreneurial choice in the field of information technology is the basis for the maximum level of creating economic added value, implementing natural market mechanisms and organizational conditions in the form of cluster structures, which expands and complements the potential for using a digital platform in the interconnected spheres of services and production.

Based on the foregoing and the presented analysis, it is possible to draw the following conclusions: non-raw material specialization is a “curse” and the primary basis for reducing the effectiveness of innovative and information processes in the regional economy; regional mechanisms for the identification and implementation of the strategy of scientific and technological development, the formation of an innovative environment in regions with a raw material economy, the formation of industry and scientific and technological priorities for the scientific and technological development of the region’s economy, which may also be related to resource based on natural factors, are needed, but excluding dependence on the mono-industrial industrial policy of the region; mechanisms are necessary to engage the business sector in innovative processes in the regional economy.

The innovative environment and innovative infrastructure are a prerequisite for the effective use of the resource advantages of the region.

An innovative technological process as an object of investment is not always financially attractive for a private business in the short term. Thus, the need for government participation in innovation processes is due to objective reasons and is associated with the peculiarity of innovation as an object for private investment. Due to the fact that innovation in regional development is a complex and multidirectional process, including participants in innovation and representatives of contact audiences (researchers, innovators, entrepreneurs, the general public, government officials and other participants), it is necessary to take into account the possible result for each interested party in implementation of innovative initiatives, compliance with the principle of participatory principles. Management of regional development in modern

conditions cannot be carried out by a separately existing system, a unit in various structures, departments and organizations.

Implementation of innovative projects and programs, achieving the best result and obtaining high added value (from the perspective of a consumer of a product of high consumer value), ensuring the economic efficiency of highly risky investments and investments in R&D, in other spheres of the regional economy, and obtaining all these effects is impossible without collective interactions and effort. Thus, the features of regions with a raw material orientation of the economy require taking into account possible social and economic effects, the difficulties of implementing the innovation process, the formation of network organizational forms with the participation of the state and business structures, which becomes a prerequisite for the implementation of the innovation process, it is necessary to search for missing objects and organizational conditions; proactive approach and ideological "leadership as the ability of the system to provide organizational changes in the priority direction of the industry and technological specialization of the region; selective approach and determination of priorities in the selection of areas of scientific, technological and sectoral development of the region; priority areas of innovative development of the region can be not only high-tech and knowledge-intensive sectors of the economy; the most advanced and high-tech technologies act as possible priorities for the region's innovative development, but not as the main criterion for their choice, taking into account social efficiency, the region's competitiveness in the international market and the formation of the region's industry specialization.

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