

New industrialization: spatial factors of regional economic rise

Timacheva E.V.

Department of Economics and Finance
Volgograd Institute of Management RANEPA
Volgograd, Russia
borisova_e@mail.ru

Ivanova T.B.

Department of Corporate Governance
Volgograd Institute of Management RANEPA
Volgograd, Russia
nika20021960@bk.ru

Tabakov A.N.

Department of Accounting, Analysis and Audit
Volgograd Institute of Management RANEPA
Volgograd, Russia
ale-tabakov@yandex.ru

Abstract— Taking into account the factors of the regional economic rise the authors highlighted the need for the new industrialization as the basis for the third industrial revolution. Firstly, new enterprises generate technologies belonging to modern technological wave. Secondly, there is a necessity to invest large national and international capitals. Thirdly, the new industries diversify sources of raw materials. Fourthly, the main part of the sources of raw materials is located within the region. Fifthly, new enterprises are export-oriented. Sixthly, intraregional production of goods, works and services is becoming part of the global value chains. Moreover, for regional economic rise, it is important to have a large number of enterprises based on similar or vertically diversified innovative technologies. Seventhly, several large productions form innovative clusters. The authors used the historical and statistical approach to the study. All results of the study presented in the article are verified. The proposed factors of economic rise justified the decision of the Volgograd region to be involved in the new industrialization process.

Keywords—*spatial factors of regional economic rise; economic take-off, new industrialization; investment projects of the Volgograd region*

I. INTRODUCTION

Recently in Russia much attention has been paid to the new industrialization as the basis of the third industrial revolution. The problems of correlation between industrial and post-industrial society, the role of large and small businesses in them, the factors determining these processes, the priority directions of innovative activities development are subject to research. The study of these issues allows us to identify effective tools for Russia's GDP growth, to overcome commodity dependence, to improve competitiveness in the world market. This article presents the results of the study of one of the aspects of these processes, i.e. the spatial specifics of the new industrialization providing a sustainable regional economic rise.

II. REVIEW OF LITERATURE

The need for a new industrialization is debatable. In 1973, D. Bell [1] introduced the term post-industrial society, justified the descending role of industry and the increasing share of services production. Now there are opposing points of view. The works [2, 3] indicate that this trend in developed countries was associated with the transfer of industrial enterprises to developing countries with low labor prices. Now there is a reverse process - the return of industrial production to the national economy. This is being accomplished on a new technical basis: robots, drones and other devices are used. They provide GDP growth, but erode the middle class and increase unemployment.

The specifics of the current state of society is described in theories of "super industrial society" by A. Toffler [4], "the fourth jump" of scientific and technical progress by A. J. Toynbee [5], "the third industrial revolution" by J. Rifkin [6], change of technological ways by S.Yu. Glazyev [7] and etc. These authors prove that modern economy is based on industrial production. It can be characterized by such specific terms as reindustrialization, super industrialization, neo industrialization, new industrialization.

In Russian literature new industrialization is examined in works of scientists of the Ural State Economic University [8] which define it as "a set of the long-term technical and technological processes enabling quantitative and qualitative update of the industrial sphere including material and technical base, research and development (R&D), management, training" [9, p.16]. They proved the need for "the advancing development of the real sector, and first of all domestic hi-tech industry and agricultural and industrial complex, production infrastructure and social sector in a whole, civilized space arrangement of Russia (production, infrastructure, social facilities)" [10, p.11].

In order to create a methodological basis for activating industrial production two interdependent industrial sectors of different importance were analyzed, namely traditional (mass demand) and modern (innovation) ones. This approach is introduced by J.Schumpeter in the theory of new combinations [11]. Scientists of the Ural scientific school managed to identify factors of new industrialization including creation of new resources, the use of existing standard technologies enabling technological level improvement, activation of scientific researches, increasing regional economic self-development and financial independence [8], the development of megaprojects [12].

In recent decades, foreign studies have considered the following issues. Lewis [13], Goodfriend and McDermott [14], Rostow [15], Rosenstein-Rodan [16], Tsiang [17] studied the stages of economic development. Hansen and Prescott [18] justified the need for faster growth of the modern economy. Fei and Ranis [19] investigated the rate of capital accumulation and the sectoral redistribution of the labor force as the basis for the dynamic development of society. Tung and Wan [20] studied the barriers to modernization, for example, in the form of the rapid disappearance of innovation profits due to the actions of competitors. U. R. Sumaila, C. Walters [21] analyzed the distribution of costs and benefits between generations.

Ming-Jen Chang, Ping Wang, Danyang Xie [22] wrote an article synthesizing all these topics. They used the works of Madison [23]. This is the most common information base for such studies. They built a two-sector dynamic General equilibrium model with disjoint generations. The model enabled to study the most important determinants of economic rise. Among them there are the following: the initial level of modern technologies, initial financing, the subjective discounting factor between generations, the barriers of capital overflow.

Scientists and experts are actively engaged in the examining problems of new industrialization. They investigate factors of economic rise referring to the materials of different countries. The results are verified with the help of long-term series analysis. Such research is still ongoing. This is due to the development of the industrial production technical base and global institutional changes in its use. The study of the spatial aspects of sustainable economic rise is one of the subjects to analysis.

III. RESEARCH METHODOLOGY

Authors applied historical and statistical approaches. They collected and processed statistics on industrialization of Volgograd region over 100 years. These materials are located in the State archive of Volgograd region.

IV. PRACTICAL VALUE, OFFERS AND OF INTRODUCTION, RESULT OF PILOT STUDIES

A. Practical value

Accounting of the revealed spatial factors of economic rise enables to select perspective investment

projects. The construction of a mining and processing plant, a plant for deep processing of corn and some other plants in Volgograd region was the result of the introduction of these provisions.

B. Recommendation and result of implementation.

Recommendation. When making investment decisions it is necessary to take into account the following factors of economic rise:

- 1) technology of new enterprises belongs to the modern technological wave;
- 2) investments are made with the involvement of large national and international capital;
- 3) supply sources are diversified. Some sources ought to be intraregional;
- 4) new enterprises are export-oriented;
- 5) intra-regional production of products, works and services is integrated into global value chains.

Result of implementation.

The above-mentioned factors served the basis for making decision on the construction of "EuroChem-Volgakaliy" (Kotelnikovskiy district of Volgograd region):

- 1) "EuroChem-Volgakaliy" is a large business. The funds of the Federal, regional budgets and Russia's largest producer of mineral fertilizers Swiss chemical company "EuroChem" (EuroChem group AG), whose assets are located in Russia, Lithuania and Belgium, were used,
- 2) A local source of raw materials – Gremyachinskoye Deposit of potassium salts – is used,
- 3) "EuroChem-Volgakaliy" is expected to become the largest on the Eurasian continent, the first in Russia and the fourth in the world,
- 4) The volume of production according to the plan is 2.3 million tons of fertilizers per year. It will enable us to meet the domestic needs for fertilizers as well as to export them,
- 5) This project has a complete production cycle - from mining to pelletizing,
- 6) Modern technologies ensuring global competitiveness of products are used.

While making a decision on the construction of the NewBio corn deep processing plant in Alexeyevskiy district of Volgograd region) the following factors were taken into account:

- 1) Extra-regional sources of financing are raised for the plant construction. The plant is built by the Kvartal group of companies. This diversified holding consists of eight enterprises. They are engaged in building residential, commercial and industrial real estate, producing agricultural goods, sound recording and scientific researching. Five of them are located in Moscow, three - in Volgograd region.

2) The plant uses local sources of raw materials. 20% of raw materials will be delivered by own local enterprises of the holding. 80% will be delivered by other farms of Volgograd region. The plant will process only 50% of corn from fields of Volgograd region.

3) Production capacity of the enterprise is 135 thousand tons of the processed raw materials. It is equal to 54% of the capacity of the largest competitor. The enterprise is export-oriented. It has a competitive price performance ratio.

4) The market of the enterprise has the essential potential for growth. Various investors are interested in it. Rostov "Aston Food and Food Ingredients" sold 50% of its starch business to the American Archer Daniels Midland Company. In Ryazan region two firms specializing in deep processing of corn (LLC Aston Krakhmalo-produkty) and Vladimir (LLC Krakhmalopatochny Plant Novlyansky) have mutual development plans.

LLC "Cargill Novoanninsky" (Novoanninsk Volgograd region) - oil-extracting plant. It is one of the largest in the industry. It can process 640 thousand tons of sunflower per year. Production capacities of the company up to 70% will be loaded with raw materials from Volgograd region, the remaining 30% will be provided by agricultural producers of the Southern and Central Federal Districts. The plant will use the best technologies of the oil industry and know-how of Cargill company. The investor is company "Cargill". It is one of the world leaders in the production, processing and trade of agricultural, food and industrial goods. The company has offices in 70 countries. It has been operating in Russia since 1991. The company opened its first representative office in Moscow. Today Cargill comprises over 10 Russian enterprises and offices: in Novorossiysk, Krasnodar, Rostov-on-don, St. Petersburg, Novoanninsky, as well as Efremov and other Russian cities. LLC "Kargill Novoanninsky" is the most modern, effective and safest oil extraction production. LLC "Cargill Novoanninsky" exports and provides domestic market with meat and oil. They provide raw materials for the company's own production in the city of Efremov, Tula region. These raw materials are subject to further processing in Tula region.

Investments in LLC "EuroChem – Volgakaliy" and LLC "Newbie", LLC "Cargill Novoanninsky" are made due to the factors obtained in the experimental studies.

C. Result of pilot studies

The results of the experimental study have shown (in the course of the study of archival materials in Volgograd (formerly Tsaritsyn) region) that by the time of intensive industrial development of Russia (from 20-30-ies of XX century) in the region top two places in terms of the volume of production were filled by metallurgy and woodworking industries. These industries produced over 90% of the regional product exported and consumed domestically. Later on, metallurgy and metalworking were predominantly developed and the volume of products of the woodworking industry decreased significantly.

Analysis of the reasons for such changes showed differences in the following areas.

1) Differences in funding sources. Woodworking industry was financed by the national capital, mostly local one. Heavy industry was financed by foreign, state and large national capital. The British firm Vickers and the military-industrial group of St. Petersburg International Accounting and Loan Banks formed The Russian joint-stock company of artillery plants. It decided to build the largest gun factory in Russia and Europe located in Tsaritsyn. Many cities claimed for its construction. Tsaritsyn plant received an order for the production of new 14-inch guns.

2) The raw materials processing rate. Heavy industry used the finished production cycle. It began with the processing of minerals. It ended in the manufacturing of finished products. The woodworking industry produced an intermediate product. Tree trunks were sawn into planks sold to other regions.

3) The level of diversification of raw materials sources. The metallurgical industry used the iron of the Urals, Baku oil, Donbas coal, local materials. Wood processing used the wood from the upper Volga. The wood was floated by the river. The industry did not have its own raw materials. The metallurgical industry worked on more diversified sources of raw materials. This gave it an advantage in interregional competition.

4) Different product innovation rate. In the 20-30s, heavy industry products were more significant, progressive and innovative for that time compared to wooden goods. Technologies of the wood-processing industry of Tsaritsyn for processing of the fused wood were considered progressive by world standards. One of the woodworking industries (Maximov sawmill) had its own power plant, mechanized unloading of logs, Swedish machine equipment. The novelty of the product was more important than the technologies used.

The industry with modern technology ensured the development of new industries in the region. Stalingrad tractor plant could receive metal from the local plant "Red October". The plant "Barricades" was not fully loaded with the production of guns, but had all the necessary personnel and equipment for the production of tractors. Actually, it led to forming a metallurgical and metal-processing cluster, which brought together three largest plants "Red October", "Barricades" and the Stalingrad tractor.

The industry involved in predominant development had the following characteristics: diversified sources of raw materials, large share of local resources, innovative products combined with innovative technologies, creating most of the value added within the region, raising funds from national and foreign markets. For regional economic rise, it is important to have a large number of enterprises based on similar or vertically diversified innovative technologies. Several large productions form innovative clusters.

V. SUMMARY

Factors of new industrialization provide economic rise in regional development. Among them we can highlight the following: innovative technologies, diversified sources of raw materials, availability of local raw materials, availability of national and international financial sources, deep processing of raw materials, forming a considerable part of added value of a chain in the territory of the region, export potential of the enterprise, large volumes of production. The specified factors provide sustainable regional development. They reflect spatial specifics of implementing new industrialization.

VI. DISCUSSION OF RESULTS

The following arguments confirm the validity of the experimentally obtained spatial factors of sustainable regional economic rise due to the new industrialization. Firstly, the sample includes a significant number of regional enterprises. The analysis frames cover about 100 years.

Secondly, the results obtained by the authors of this article correspond to the provisions of the above-mentioned works. For instance, the provisions of the work [21] enable us to specify the significance of quantitative changes in the initial level modern technologies and supply of fund as well as in a subjective discounting factor between generations, barriers to capital flow which influence the speed of economic rise. We also noted similar factors. We accentuated that the preference for consumption growth for the present generation over the future is a macroeconomic factor, depending on the savings preferences and strategies adopted in the society. For specific types of production at a particular time, it does not change being an exception from the conclusions we have presented.

In [12], scientists of the Ural State Economic University highlighted the role of megaprojects in the implementation of new industrialization in the regions, pointing out that "at the end of XX – beginning of XXI century ... they became a kind of hallmark of the world's fast-growing economies" [12, p.132]. This also corresponds to the results of the study carried out by the authors.

On the basis of our research we made up a table of economic take-off of a number of countries depending on the rates of the determining factors.

The table enables us to get the following sequence of indices calculated by the rate of growth for Taiwan compared to the U.K.:

- initial supply of fund (growth by 65%),
- initial level of modern technology (growth by 54%),
- subjective intergenerational discounting factor (growth by 22%),
- modern sector capital barriers (reduction by 21%).

New industrialization is impossible in case the indicators take on the following rates:

- initial supply of fund – 0,5,

- initial level of modern technology – 0,4,
- subjective intergenerational discounting factor – 0,45,
- modern sector capital barriers – 1,5.

Initial level of the modern technology decreased by 42%. Considerable amounts of financing enable to apply the most modern technologies and provide decreasing barriers to capital flow since executive power is interested in the results of investments. These are the factors that we noted above. Modern technologies existing in the region attract the large extra-regional capital. As a result, it provides development of innovative economy and regional economic take-off.

The factors of regional economic rise received through production function and a historical and statistical method are close to each other. Results of both researches are reasonable.

TABLE I. THE TIME OF ECONOMIC RISE FOR A NUMBER OF COUNTRIES IN THE WORLD, DEPENDING ON THE RATE OF ITS DETERMINING FACTORS

Indicator	State			
	U.K.	Canada	Korea	Taiwan
Rise time, years	55	32	15	10
Initial level of modern technology	0,69	0,715	0,75	0,77
Initial supply of fund	0,59	0,61	0,65	0,66
Subjective intergenerational discounting factor	0,53	0,55	0,55	0,55
Modern sector capital barriers	1,23	1,19	1,19	1,19

Acknowledgment

The authors thank the Russian Humanitarian Science Foundation for the grant "Problems of Economic Zoning and Placement of Productive Forces in the Works of Scientists of the South of Russia in 1920-1930" (project № 16-12-34003). Its materials are largely determined by this study.

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