Evolvement of Eastern Siberia's heavy industry: formation experience and modern development trends

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Abstract. The article discusses the experience of Eastern Siberia’s heavy industry evolvement starting from the Soviet times. Based on the analysis of a large number of archival documents, the process of almost all industries’ evolvement in the controlled economy is shown. That allowed the region to develop dynamically. Reconstruction and technical upload, production modernization, encouraging the initiative of workers, moral and financial incentives, improving working and living conditions were the means of enterprises’ growth and development. The idea of integrated development of territories in the form of territorial-industrial complexes (TIC) started to be implemented. Under the conditions of the changed economic paradigm, such new trends as private-public partnership in the development of deposits, increased attention to eastern neighbors, large cross-border and interstate initiatives, and increased attention to ecology began to emerge. In the context of globalization, the One Belt One Road initiative and the development of the Arctic increases the steadiness of the development of Russia and China. Much attention is paid to transport infrastructure. In general, the experience of previous generations is very useful and can serve as a source of dynamic modern development of Siberia.

Introduction

The formation of heavy industry in Siberia (in the modern sense of the word) was evolved by the construction of the Trans-Siberian Railway. Some enterprises were built before the war, in the first decades of Soviet power. A shift to a new technological structure in the second half of the 20th century made one fully understand a statement attributed to Mikhail Lomonosov – “Russia’s power will grow with Siberia”. Since the 1960s, Eastern Siberia has become a dynamically developing territory. That time, the richest proven resources started to be included in the production. The country, having the planned economy as a type of economic system, adopted policies aimed at developing of the productive forces of Eastern Siberia: the enterprises of metallurgical and mining, timber, pulp and paper, mechanical engineering, metalworking and chemistry industries were built. After 20-30 years, many of them survived reconstruction, technical re-equipment, and production modernization. An awareness of the prospects for the integrated region development gradually came. As the result, territorial-industrial complexes (TICs) started to be formed. The growing economic problems of that time did not allow people to fully engage in the automatization and computerization of production. During Perestroika, when the country completely changed its economic system and even its name, many enterprises went into oblivion. However, the scientific and technological progress (STP) and the
resources accumulated marked new development trajectories in the 21st century. These were modern production, infrastructure solutions, and large intercountry integration projects.

**Problem Statement**

Nowadays, industry takes up about a third of production and determines our way of life despite the shift to a post-industrial and information society. The possession of resources and their leveraging are turning into an additional bonus for the country in the context of globalization. To some extent, we continue to use some production factors our ancestors left us: factories and enterprises built, material resources, personnel, historical experience and ways forward. Today, it is obvious that even in a rapidly changing world, the production and intellectual experience of previous generations can and should be adhered to. It’s studying and updating can become an additional motivation in the search for Russia’s development prospects. This is precisely the way that determines the research relevance of the issue.

**Research Questions**

Eastern Siberia’s main features of the modern economy were formed by the active industrial construction processes of the 1960s. For instance, the Production Association Krasnoyarskugol was formed in the Krasnoyarsk region. The association included the Nazarovsky and the Irsha-Borodinsky open-pit mines, the largest in the country, where mining was carried out using the open method. The Chernogorsky and the Izykhsy open-pit mines in Khakassia can also be named as examples as well as dozens of other coal mines. The structure of the Yeniseyzoloto plant consisted of five mines. MMC Norilsk, Gorevsky GOK, the Sorsk molybdenum plant, and aluminum smelters represented the non-ferrous metallurgy. Petrochemistry and mechanical engineering developed in Krasnoyarsk. The planned economy ensured the location of enterprises to have a solid scientific basis and be tied to raw materials and labor resources. That gave a serious economic effect. The industry growth rates were high. In 1980, compared to 1970, total industry production of the Krasnoyarsk Region increased by 90%, including electricity – by 68%, ferrous metallurgy – by 173%, non-ferrous metallurgy – by 99%, chemical and petrochemical industries – by 66%, machinery – by 172% [1]. In the Tenth Five-Year-Plan Period, more than 450 large facilities started to operate. More than 21 billion rubles of capital investments were absorbed. The achievements of science and technology, mechanization and automation (about 55 thousand interventions in total) made it possible to increase labor productivity 1.6 times [2]. In 1976, advanced labor collectives of the Krasnoyarsk Region launched the Krasnoyarsk billion initiative aimed at issuing additional products for the Tenth Five-Year-Plan Period for 1 billion rubles. This sum was significantly exceeded amount up to 1980.

A large number of mining enterprises has been a feature of the heavy industry of the Chita region since the 18th century. A significant part of rare and non-ferrous metals was mined there. Over two hundred years, many deposits were depleted. Therefore in 1980, compared to 1970, lead production decreased by 5%, zinc – by 30%, molybdenum – by 25%, fluor spar – by 20%. In the Ninth Five-Year-Plan Period, industrial production in the region fell by 13% [3]. However, it grew by 20% due to the reconstruction of a number of old enterprises and the launching of new ones in the Tenth Five-Year-Plan Period. 3 billion rubles of the investments were approximately spent on the development, over 600 units of equipment were modernized, and about 800 types of new products were absorbed [4]. Nevertheless, it was not possible to overcome the lag in the mining industry. None of the planned enterprises was launched because of underfunding, lack of necessary personnel, and leaders’ passivity.

Uranium mining is a distinctive feature of the industry in Zabaikalye. Priargunsky Industrial Mining and Chemical Union has been operating since 1968. Nowadays, it serves as the only source of
domestic raw materials for the atomic industry of Russia. With the collapse of the USSR, two thirds of raw materials are mined in Kazakhstan, Canada, and Australia. Therefore, the urgent issue is the early development of proven deposits in Siberia, including the Elkon, the Vitim, the Aldan, the Istochnoye and the Zherlovoye deposits. Their development will ensure the self-sufficiency of the nuclear industry in Russia.

The study of archival documents in the region suggests that there were still examples of successful development in equal economic conditions. For instance, the workers of the Kharanor coal mine [5], the Bukachacha mine [6], Sherlovogorsky GOK [7], the Nerchinsk polymetallic combine [8], the Baleyzoloto combine [9], the Chita machine-building plant [10], the Ulan-Ude aviation plant [11] and others resolutely implemented the work plan, modernized production, introduced innovations. In addition, the workers built roads, housing, clubs, shops, consumer service enterprises. The human factor can be called the main reason: not indifferent and initiative managers served as the model to follow for their workers, they skillfully combined moral and financial incentive, created decent working and living conditions as far as it was possible.

Five largest hydropower plants (HPP) of Russia are located in Eastern Siberia. Three of them were built in the 1970s: Bratskaya, Krasnoyarskaya, Ust-Ilimskaya HPPs. Territorial-industrial complexes (TICs) began to naturally appear near the HPPs. Wood processing plants (in Bratsk and Ust-Ilimsk) and many hydrolysis plants were built. Krasnoyarsk and Bratsk aluminum plants were constructed. The Sayano-Shushenskaya hydropower plant is the largest in Russia. Its construction was painstakingly long, since 1963, due to some errors in its design. The first units started to operate in 1985. Negative features of the country's economy and Perestroika slowed down its final commissioning for a long time. Its last units started to operate in 2014. In 2014, after a long break in construction, the Boguchanskaya HPP became operational. The excess of electricity allowed modernizing old and building new energy-intensive industries at a faster pace.

TICs of the Krasnoyarsk Region began to be actively constructed. The Central Krasnoyarsk TIC was located along the Trans-Siberian Railway and drew on the Kansk-Achinsk coal mines, the Krasnoyarsk HPP and the aluminum and alumina plants. The Norilsk TIC operated from the development of copper and nickel deposits. The basin of the Middle Yenisei and the Lower Angara became the basis of the Priangarsky (Boguchansk) TIC. In the south of the region, the Sayansky TIC combined the Chernogorsky open-pit mine, the Sayano-Shushenskaya HPP as well as enterprises for iron, gold, molybdenum extraction, and a number of machine-building plants.

Modernization and formation of new transport infrastructure centres in Eastern Siberia intensified the development of the northern territories. The interests of new owners and investors coincided with the ones of the state. Modernization of the Baikal-Amur Mainline (BAM) in the 21st century provides access to enormous resources, creates conditions for the development of the mineral resource base of the northern regions of the Irkutsk Region, Buryatia, and Zabaikalse. Formation of the Mamsko-Chuysky, the Verkholensky, the SeveroBaikalsky TICs and others are under consideration. JSC Siberian Anthracite is ready to participate in the construction of the second Severomuysky tunnel.

In the 1990s, there was a serious shift in all spheres of life, including economy. Many enterprises became private or public-private. The latter are mainly common for enterprises of heavy industry as they have strategic and defense significance for the country. Almost all the enterprises, where the reconstruction and technical upgrade of production were successfully carried out, remained and reached a new level of development [12]. Nowadays, the country has sufficient resources to build new enterprises and implement new initiatives. The development of the Kovyktka and the Chayanda hydrocarbon deposits, the Sukholozhskoye gold deposit, the Ogodzhinsky coal mine, several non-ferrous and rare metal deposits has already begun and will begin in the short term with usage of the most advanced technology.

New spirits, however, gradually began to form. Integrated development of the territory was strongly believed to bring a synergistic effect. Therefore, in addition to TICs formation (which were primarily understood as a set of industrial enterprises), the country started to pay great attention to the transport infrastructure. In the beginning of the 21st century, Russia started its turn to the East due to
both political motives and economic reasons. Today, Asia is developing dynamically, and Russia can avail of the opportunities opened. Prospects for such cooperation were noted by V. B. Bazarov [13], V. A. Koksharov [14]. They discussed the options for the development and the formation of powerful growth centres in the border area.

China is particularly interested in the development of economic relations [15]. Promoting its One Belt One Road initiative [16], the country is actually trying to accelerate the growth of its economy with the help of Russian raw materials. However, Russia also has advantages of such cooperation [17]. Russian-Chinese cooperation has spilled over to the Arctic. Developing its most northern territories, Russia gains the superiority in the Northern Sea Route advancing and mineral resources extraction. The participation of such serious players as China [18] stimulates the introduction of modern and advanced methods and techniques for the construction of enterprises and the development of deposits. Despite some possible disagreements between the countries [19], Russia has the right to pursue its own interests. Environmental issues have become a trend in resource development today [20]. That especially applies to the mining industry. In the Soviet times, environmental issues attracted some attention too, although emission standards for pollutants were regularly exceeded. In general, heavy industry turned out to be a fairly persistent component of the economy in the changed conditions, which managed to adapt to new shifts and acquire new development trends.

**Purpose of the Study**

The article is aimed at summarizing the historical experience of Eastern Siberia’s modern heavy industry construction. An attempt has been made to identify a number of factors affecting the formation of modern configuration of its enterprises and to identify trends in modern development. The article is based on the extensive involvement of sources from the state archives, many of which are introduced into scientific circulation for the first time. The study should close certain gaps in covering the history of the region.

**Research Methods**

The article deals with both general scientific methods (comparison, description, generalization, deduction, induction, etc.) and methods of historical research (chronological, historical genetic, periodization). The use of statistical, historical and sociological methods is justified for the analysis of a large array of concrete facts. The typological method has allowed us to identify groups of similar phenomena and processes. The whole set of possibilities, as well as the system method, has made it possible to recreate an objective scientific picture of the issue studied.

**Conclusions**

The author can summarize all the foregoing as follows:

1. Eastern Siberia’s heavy industry formation represents unique development experience. 14 of 15 industry groups uniting about 90 industries out of 120 are presented in this region of the country. The share of heavy industry in the economy far exceeds the rest of the regions and is very high – 70-75% [21].

2. Construction of enterprises in the Soviet times was partly politically motivated (defense and development of sparsely populated territories), but it was always based on scientific methodology.
Modern technologies as well as the initiative of workers were used. Investments were only public. Social sphere and ecology were rather underdeveloped.

3. Most of the enterprises were regularly reconstructed and modernized. A lot of (but not all) the enterprises paid much attention to training and retraining of their staff. The most modern enterprises survived and seriously changed in the course of Perestroika.

4. Integrated development of territories is replacing the construction of separate enterprises. Nowadays, much attention is paid to infrastructure and interstate integration processes.

Thus, the experience of the past is involved today in determining the strategy and tactics of industrial development in Siberia. It can serve as a useful adjunct in solving modern economic problems.

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