Specifics of construction in Eastern Siberia in 2015-2019

N V Kaigorodova and L G Rudykh
1 Irkutsk National Research Technical University, 83 Lermontov str., Irkutsk, 664074, Russia
E-mail: kaygorodova@mail.ru

Abstract. The article is devoted to the specifics of Eastern Siberia construction industry development in 2015-2019. Questions about a place of a building branch in structure of economy of region are actualized, data on priority directions of building in the investigated period are resulted, influence of bank sphere, mortgage crediting is specified, reasons of recession of the market of working trades are described, a degree of development of building in region is revealed. The article describes the current state and trends in the construction industry of Eastern Siberia for the last five years. The comparison of large-panel and reinforced concrete house-building is given, the advantages and disadvantages of each type of residential building construction are analyzed. The specificity of resource base of construction materials is noted, the reason of high cost of construction objects in the region, starting from complicated climatic conditions and finishing with economically expensive transport logistics is specified. The prospects for the development of other construction directions than civil construction are presented. The conclusions of the article reflect the specific character of the construction complex in Eastern Siberia in 2015-2019, which is expressed by the high demand of the population for the purchase of housing, the availability of a sufficient number of enterprises on the housing construction market, a wide mineral base for the production of construction materials.

1. Introduction
The construction industry has always played a leading role in the development of economic development in any region, as it creates conditions for the development of other sectors of the economy. The construction industry in Eastern Siberia takes one of the first places. According to statistics, the industry employs 6% of the region's workforce and 26% of the region's workforce. In recent years, there has been a high construction activity in the construction industry, and the region is ahead of the market average in terms of the actual volume of work index and ranks sixth in Russia.

In 1970-1980 the Irkutsk region had one of the most powerful construction complexes in the country. Such organizations as Glavvostoksbstroy, Angarsk Construction Department, Bratskgesstroy were able to erect the largest objects of power engineering, machine building, non-ferrous and ferrous metallurgy, timber industry, chemistry and whole cities in a few years. The construction industry supplied its structures to Surgut, Buryatia, Chita, Mongolia, Sakhalin, etc.

However, public funding for industrial and housing construction began to decline in the 1990s and then stopped. The advantages of the construction complex in Eastern Siberia - industriality, assembly, large-panel house-building, automated control systems - turned out to be its disadvantages [1]. There
were no funds for modernization of heavy technological lines and transition to another type of products, and only a part of enterprises managed to adapt to new market requirements, to master new types of materials, structures and new technologies [2]. Since the 2010s, there has been a certain growth in housing construction.

The modern construction industry of Eastern Siberia is represented by organizations performing design and expert works, general construction works, specialized types of work, electrical installation works, road works, production of basic building materials, structures, products. Eastern Siberia construction is characterized by the following sectors: 1) industrial construction objects, 2) civil construction objects, 3) agricultural construction objects, 4) transport construction objects, 5) military objects, 6) hydraulic engineering objects, 8) hydromeliorative objects.

2. Research questions
The development of the Eastern Siberia construction industry in 2015-2019 has a number of specific characteristics [3]. The construction of residential real estate has the largest specific weight in our region. It accounts for 7% of the gross regional product of the region and ranks fifth among all other industries. On the first place on introduction of habitation among cities of the region the regional centre takes the first place - in Irkutsk 332 thousand sq. m. of inhabited premises have been introduced (according to statistics for 2018), on the second place Angarsk - 26 thousand sq. m., on the third Bratsk - 16 thousand sq. m.

In Eastern Siberia there are more than 7000 large and medium construction organizations of various forms of ownership engaged in industrial and civil construction. The large organizations are based in the industrial centers of the region. Today in the territory of the region the following largest construction organizations work in various branches of construction: MUE "UKS of Irkutsk", "FSK Novy Gorod", GC "Vostok Center", GC "VostSibStroy", CJSC "Stroykompleks", "FSK DomStroy", "Holding SERS", "SK Maxstroy", JSC "SiberiaEnergoTrade", LLC "Vysota", etc. [4].

The development of the construction industry is supported by investment banking activities. Since 2018, the Russian Federation has introduced escrow accounts, which represent a deposit of funds for construction financing [5]. This makes it possible to impose more stringent requirements on the developer. So far, this practice is just beginning in Eastern Siberia.

Mortgage lending plays an important role in the development of the construction industry. The mortgage on sale of residential premises makes up 50%, and on some objects of residential development reaches 75-80%. Credit interest on mortgages in the region is 11-12% [6].

The development of the construction industry in Eastern Siberia is constrained by a limited market for workers - masons, welders and fitters. In 2019, the modal salary was 35-60 thousand rubles. However, the social prestige of the working professions in Russia is low, and construction organizations need to make efforts to raise the prestige of the working professions in construction.

Growth in housing construction is one of the top priorities of the construction complex, the most important task of social development in Eastern Siberia. At the same time, there are a number of negative factors affecting the rise in construction costs and volumes in the region, such as: 1) unfavorable climatic conditions (presence of permafrost); 2) high seismic activity; 3) remoteness from the main producers of construction materials; 4) high transportation costs; 5) inclusion of a part of the Irkutsk region territory into the Baikal natural area, where it is necessary to pass the state ecological expertise of project documentation.

The state of the construction industry and systemic problems in it in recent years have become one of the most powerful constraints for the development of the entire construction complex. Insufficient development of the given segment of the market in the region became the reason that we use a lot of imported materials that reduces economy and increases term of construction, complicates industrial logistics, puts builders in dependence on transport systems [7, 8]. At the same time, many materials produced in our company are inferior to our imported analogues.

Eastern Siberia is provided with certain capacities for the production of non-metallic materials, wall blocks including autoclave hardening, wood products, gypsum board, metal structures, reinforced
concrete structures, bricks, insulators, paintwork materials, thermal insulation, there is a stock of capacity for cement production. It is necessary to deliver finishing materials, fiberglass fittings, carbon fabric, composite and other materials.

In the Irkutsk region there are 6 main enterprises producing bricks. Available capacities of brick producers are not fully loaded. The decrease in production is caused by several factors: 1) the quality of the products does not meet modern requirements (size, color, strength, etc.), 2) consumption is seasonal, and 3) the use of wall blocks in enclosing structures is increasing [9, 10].

Large-panel house-building (hereinafter - KPI) was widely used in Soviet times in the construction of buildings for various purposes, up to 60% of residential and social buildings were erected in the Irkutsk region from KPI mass series 1-335. In spite of the fact that buildings of efficiency have a number of advantages such as: all-season construction, controlled quality, shorter construction time, high factory availability. At present the buildings are mainly designed on a monolithic frame with wall fillings: from blocks, bricks with insulation, curtain facade systems, which does not always ensure energy efficiency of wall fillings, construction time is increased, the proper quality of work is not provided [11]. Wider application of prefabricated reinforced concrete products will allow to provide construction sites with quality products, to carry out installation works at any time of the year, to reduce the terms of construction of facilities, while carrying out modernization of existing facilities, it is possible to reduce costs (electricity, steam, etc.) for the production of reinforced concrete products, which will reduce the cost of the final product.

The main supplier of cement to the East Siberian market is Angarskcement. According to the data for 2015 this enterprise met 86% of cement needs in the region, being in fact a monopolist on the market. The current production of JSC "Angarskcement" produces cement grades 400, 500 without additives grade 400, which does not always meet the requirements for the production of responsible structures [12]. Some consumers import cement from "Achinsk Cement Plant", which has better quality characteristics and lower price.

Thermal insulating products are widely used for thermal insulation of enclosing structures, basement and attic floors, foundations of buildings and structures, pipelines. The projects mainly provide for insulation: such as mineral wool slabs and mats, basalt-based minplits, foamed polystyrene boards, foamed plastic, foamed polyurethane shells.

One of the most acute issues for the construction industry in the region is the issue of providing with thermal insulating materials (TIM). Delivery of qualitative building thermal protection from glass fibre (companies Ursa, Isover, Knauf, etc.) and mineral wool (Rockwool, Parok, etc.) is made mainly from the European part of Russia, in this connection its sharp increase in price at the expense of transportation costs occurs. Mineral wool insulation is mainly 60% imported from outside the region from the Khabarovsky and Krasnoyarsk Territories, and UPSA and Isover type insulation from the Novosibirsk Region and other regions of the country [13]. The available capacity in the Irkutsk Region is insufficient and the products are not always of a certain quality level.

The strategy for the development of the construction materials industry in the Irkutsk region in the future until 2030 offers: 1) modernization and technological development of production base; 2) creation of long-term conditions for sustainable development of building materials enterprises and increase of their competitiveness; 3) overcoming the technological gap of regional enterprises of building materials from the leading domestic and foreign companies; 4) reduction of energy consumption at the enterprises of building materials; 5) maximum use of household and industrial waste in the production of building materials [14].

3. Materials and methods
There are more than 30 producers of marketable concrete and reinforced concrete structures in the region, the production of marketable concrete is developed in almost all municipalities, but not everywhere is proper control over the quality of products. On available capacities it is possible to produce most types of reinforced concrete such as blocks, floor slabs, beams, trusses, supports, wall panels, stairs, rings, etc. Annually, the production of reinforced concrete slabs is reduced by 5-8% due
to their mass application in monolithic projects. The equipment of most manufacturers of reinforced concrete structures was launched during the Soviet period of mass construction and has a wear and tear of up to 40%, is energy-intensive and requires a lot of labor during the production of structures. In this connection, the cost of produced structures is often higher than that of monolithic designs.

The article uses general scientific methods: induction, deduction, rise from the abstract to the concrete, analysis, synthesis, explanation, analogy, comparison.

4. Results
It should be noted that construction in Eastern Siberia has its own characteristics associated with the harsh Siberian climate, which implies an increased level of thermal insulation that allows you to save on heating.

The specific nature of the resource base has a number of issues that need to be addressed, including the high cost of construction and cost-effective transport logistics.

5. Discussion
Activation of building branch in other directions (building of objects of industrial, transport, hydraulic engineering appointment) can be connected with the project of formation of the North Siberian industrial belt developed recently.

The Irkutsk Region is one of the five most industrially developed regions in the Siberian Federal District and belongs to the group of regions where the role of the mining complex is lower than that of the processing complex. This is due to the presence of two large fuel and industrial complexes (hereinafter referred to as the Fuel and Processing Complex), established as early as 1940-1970: the Irkutsk-Cheremkhovsky and Sredneangarsky. These complexes specialized in chemistry, petrochemistry, non-ferrous metallurgy, power engineering and timber processing, and to a lesser extent in defense engineering [15]. The base for the project of the North-Siberian industrial belt is the Sredneangarsk TIC (MO of Bratsk city, Ust-Ilimsk city, MO of Bodaibo city and district, Bratsk district, Kazachinsk-Lensky district, Katanga district, Kirensky district, Mamsk-Chui district, Nizhneilimsky district, Nizhneudinsky district, Taishetsky district, Ust-Ilimsky district, Ust-Kutsky district, Chunksky district).

The project of forming the North-Siberian industrial belt is based on the following factors:

1. Significant natural and resource potential of the Irkutsk region in the northern regions of the region. The zone of concentration of productive forces and infrastructure in the north is the highway territory of the Baikal-Amur Mainline (BAM) zone, which covers the cities of Irkutsk and Kursk, Bratsk, Taishet, Ust-Ilimsk, Chuna, Bratsk, Kirensky, Kazachinsk-Lensky, Nizhneilimsky, Ust-Kutsky, Ust-Ilimsky districts. The BAM zone also includes Katanga, Mamsko-Chui and Bodaiba districts.

2. The Baikal-Amur Mainline is the 1st category road with the design carrying capacity of 18 million tons of cargo per year on the western section, 9 million tons on the eastern section, electrified on alternating current, double-track from Taishet to Lena (704 km) and single-track from Lena to Taximo (725 km) [16].

Implementation of such a project in the region will allow the construction industry to increase its capacity practically in all construction directions.

6. Conclusion
The specifics of the construction industry in Eastern Siberia in 2015-2019 is the high potential for the development of the construction industry with: 1) high demand of the population associated with rural-urban migration of the population, 2) availability of a sufficient number of enterprises in the housing construction market, 3) a wide mineral base for the production of construction materials. Nevertheless, the technological backwardness of a number of industries related to the construction industry, high mortgage rates for the population, and the low prestige of working professions in construction reduce the opportunities for the construction industry. Also specific to the construction industry in Eastern
Siberia in 2015-2019 is the prevalence of civil (primarily residential) construction in the general spectrum of the industry.

References
[1] Timoshenko A I 2018 Economic Development of Siberia as the Result of State Strategies Aimed at Industrial Modernization of the USSR Historical-economic studies 19 pp 91–118
[2] Tulokhonov A K, Batomunkuev V S and Boldanov T A 2018 The Role of the Transport and Communication Infrastructure in the Strategy for Spatial Development of Asian Russia: History, Problems, Risks and Prospects New Economic Issues 3 pp 4–13
[3] Rudykh L and Shilova O 2018 Analysis of the socio-economic indicators of the Irkutsk region, Buryatia, and the Far East in 2016-2017: investments and prospects International Scientific Conference “Investment, Construction, Real Estate: New Technologies and Special-Purpose Development Priorities” (ICRE 2018) 212 DOI: https://doi.org/10.1051/matecconf/201821208014
[4] The amount of work performed by type of "Activity" in 2019 in the Irkutsk region 2019 Statistics Federal state statistics service Statistics for the Irkutsk region URL: http://irkutskstat.old.gks.ru/wps/wcm/connect/rosstat_ts/irkutskstat/ru (28.01.2020)
[5] Construction in Priangarie: results and prospects 2019 Sibdom.ru URL: https://irk.sibdom.ru/journal/1849/ (28.01.2020)
[6] Shelomenceva N N 2018 To the problem of project financing in housing construction Building economic 6 pp 22–31
[7] Berliseva A E 2017 Construction industry analysis in the Irkutsk region Science and education 6 pp 73–77
[8] Ignatova O A 2018 Demographics of the construction industry in Irkutsk region Current trends in spatial development and priorities of public geography. Barnaul, 12-19 September
[9] Ryazantseva A A 2019 Analysis of development of the construction industry of the Irkutsk region in the current economic conditions Informatization and virtualization of economic and social life Irkutsk, May 14
[10] Saneev B G, Korneev A G and Agafonov G V 2016 Assessment of regional demand for electricity in the areas of the construction of new hydroelectric power plant in eastern siberia and the far east Energy policy 1 pp 37-49.
[11] Zubareva G I 2017 Perspectives of Straw-bale building as environmentally safe construction Ecology and Industry of Russia 21(6) pp 10–14.
[12] Investment and construction in the Irkutsk region: statistical Bulletin, 2019.
[13] Fokin S 2018 Import substitution in the construction industry as an example from the Irkutsk region Contract construction 11 pp 66-76
[14] The draft Strategy for the development of the construction materials industry in the Irkutsk region was approved at a meeting of the regional government Regional socio-political newspaper URL: http://www.ogirk.ru/2017/02/20/proekt-strategii-razvitija-promyshlennosti-stroitelnvyh-materialov-irkutskoj-oblasti-odobrili-na-zasedanii-pravitelstva-regiona/ (28.01.2020)
[15] Zatsepin A 2019 Change proposal in the development strategy of electric power of the South of Siberia National priorities of Russia 4 pp 75-78