

**SCTMG 2021**  
**International Scientific Conference «Social and Cultural Transformations in the Context of  
Modern Globalism»**

**IMPACT OF CONSTRUCTION CLUSTERS ON THE  
COMPETITIVENESS OF THE CONSTRUCTION INDUSTRY**

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**Abstract**

The paper considers the issues of formation and development of cluster approach in construction on the territory of one of the constituent entities of the Russian Federation. The dynamics of construction is one of the key indicators in the Chechen Republic justifying economic and social development of the region. Both throughout the country and its regions the construction complex is defined as a set of contracting and installation organizations, enterprises of the construction industry and the industry of building materials, as well as design institutes, research and design bureaus, the results of which depend on the functioning of other sectors of the national economy and the living conditions of the population. The authors identified the priorities for the development of the construction industry of the republic in the near future that are outlined in the *Strategy for the Socio-Economic Development of the Chechen Republic until 2025*: ensuring the development of the construction complex based on the effective use of internal mineral resources and the introduction of advanced technologies. The paper also analyzed the cluster concept and defined the cluster approach. The situation of the construction industry is currently studied and the need to use clustering of construction enterprises. The authors noted that the modern construction complex is currently quite fragmented, not managed from a single center and consists of many independently owned entities, each of which has its individual features. The authors of the paper proposed an algorithm for the implementation of a cluster approach in construction.

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*Keywords:* Construction cluster, construction complex, construction industry



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## 1. Introduction

For a century, the construction materials industry played a crucial role in the economy of the Chechen Republic (Kerimov et al., 2013). In the Soviet period Chechen-Ingushetia had one of the most powerful construction complexes in the North Caucasus. The development priorities of the construction industry of the republic for the near future are outlined in the *Strategy for the socio-economic development of the Chechen Republic until 2025*: ensuring the development of the construction complex based on the effective use of internal mineral resources and the introduction of advanced technologies; developing a clear strategy for rational subsoil use and study, development of promising deposits of non-solid minerals in accordance with it; developing the production of innovative energy-efficient building materials for the construction of structures of various levels of complexity and purpose; creating a cluster of enterprises of the construction industry (Betilgiriev, 2016).

The Chechen Republic has the richest deposits of raw materials for the development of the construction industry. Huge reserves of cement marls, limestone, dolomite, gypsum are concentrated in the mountainous regions of the republic. The largest include Shatoyskoye, Yarysh-Mordinskoye, Chanakhoyskoye deposits. They are located on the left bank of the Chanty-Argun mountain river. The useful thickness of dense light gray limestones of the Upper Cretaceous age of the Shatoyskoye deposit is about 20 meters. The total thickness of limestones of the Yarysh-Mordinskoye deposit is 700 meters. Due to the huge reserves of these deposits, a large cement plant was built near the Chiri-Yurt village. The proven useful thickness of gypsum and limestone of the Chanakhoyskoye deposit is 200 meters (Datsaeva and Betilgiriev, 2012).

The Chechen Plain is characterized by numerous deposits of brick-tile and pottery clays, gravel. The Tersko-Sunzhenskaya Upland has large deposits of construction and glass sands, sandstones, shell limestone, brick-tile and bleaching clays. Brick and tile raw materials are extracted from 19 deposits: Naurskoye, Kalinovskoye, Shelkovskoye, Nadterechnoye, Sunzhenskoye, Goryacheistochenskoye, Terskoye, Andreevskoye, Groznenskoye, Groznenskoye 1, Groznenskoye 2, Gudermesskoye, Gudermesskoye 2, Oysungurskoye, Samashkinskoye, Urus-Martanovskoye, Avturinskoye, Shalinskoye, Nozhai-Yurtovskoye. These deposits contain high-melting clays, construction sands. Four deposits contain raw materials for the production of keramzit concrete: Volchye-Vorotinskoye (Pervomaiskoye), Gudermesskoye, Duba-Yurtovskoye, Shalinskoye (Idigova et al., 2017).

Concrete sands are extracted from 4 deposits of the republic: Ischerskoye, Chervlenskoye, Goryacheistochenskoye, Argunskoye 2. Glass sands and sandstones are extracted from 2 deposits: Eldarovskoye and Argunskoye. Silicate sands and sandstones are extracted from Pionerskoye and Samashkinskoye deposits. The largest sandstone deposits (Sernovodskoye, Samashkinskoye, Chishkinskoye) may be used to obtain wall and quarry stone. Pure quartz sands suitable for glass production are also found here. Throughout the republic there are large reserves of sand-gravels. It is extracted from 14 deposits: Naurskoye, Argunskoye, Goryacheistochenskoye, Khankalskoye, Kolkhoznoye, Pionerskoye, Chechen-Aulskoye, Aksayskoye, Novoselskoye, Argunskoye, Khankal-Belgatoevskoye, Ataginskoye, Shalinskoye, Vedenskoye. Precast concrete, reinforced concrete products

and structures were produced in the Soviet period at a number of large enterprises: Grozny Plant of Reinforced Concrete Structures No. 1, Grozny Plant of Reinforced Concrete Structures No. 2, Argun Plant of Building Materials and Construction Industry, Argun Plant of Reinforced Concrete Products, etc. In 1955, the factories of the republic produced 16.2 thousand cubic meters of precast reinforced concrete structures and parts, in 1958 – 50.6 thousand cubic meters. The total capacity of enterprises producing reinforced concrete products in 1985 was at least 400.0 thousand cubic meters/year (Idigova et. al., 2019). Besides, the enterprises of the construction industry of the Checheno-Ingosh Autonomous Soviet Socialist Republic produced significant volumes of metal structures, commercial concrete and mortar, keramzit concrete, lime, construction gypsum, carbide, wall materials of carpentry.

## 2. Problem Statement

At the present stage of development, in terms of production volumes the enterprises of the construction industry of the republic are significantly inferior to the enterprises of the Soviet period. Thus, the production of sand and gravel materials at the Berdykelskoye, Khankalsko-Belgatoevsky and Chechen-Aulskoye deposits in 1992 amounted to 1 million 85 thousand cubic meters, while in 2010 – 367 thousand cubic meters, or 33.8 % compared to 1992. In 2008, the production of limestone for the production of lime, alabaster at a field near the Yarash-Mardy village amounted to 164 thousand tons, or 23 % compared to 1992 (Table 01).

**Table 1.** Production of certain types of other non-metal mineral products in the Chechen Republic in 2008–2019

	2016	2017	2018	2019
Production of bricks, tiles and other construction products from burnt clay				
Construction brick, mln of relative bricks	21.1	21.58	25.4	29.1
Production of concrete, gypsum and cement products	-	-	-	-
Asphalt, thousand tons	5.3	23.53	42854.0	43.6
Concrete M-200, thousand m <sup>3</sup>	3.2	5.12	2.2	1.5
Precast reinforced concrete, thousand m <sup>3</sup>	-	3.33	0.66	1.1
Mortar, thousand m <sup>3</sup>	-	0.34	-	-
Non-reinforced concrete products, thousand m <sup>3</sup>	-	2.18	35.4	44.2
Construction sand, thousand m <sup>3</sup>	215.6	292.32	264.6	246.4
Crushed stone and gravel, thousand m <sup>3</sup>	-	82.89	102.4	149.9

Source: Socio-economic situation of the Chechen Republic in 2019. The territorial body of the Federal State Statistics Service for the Chechen Republic.

The efficiency of construction materials plants may be confirmed by a number of examples. Information is obtained from the reports of the Ministry of Construction and Housing and Communal Services of the Czech Republic (Table 02).

**Table 2.** Indicators of economic activity of enterprises subordinate to the Ministry of Construction and Housing and Communal Services of the Chechen Republic for 2020. Report of the Ministry of Natural Resources and Environmental Protection of the Chechen Republic (2020)

Organization	Number of employees, people	Volume of shipped products, works, services, thousand rubles	Accounts receivable as of 01.11.2020, thousand rubles	Accounts payable as of 01.11.2020, thousand rubles	Profit (loss), thousand rubles
Grozny Plant of Reinforced Concrete Structures	75	42 124.0	10 766.0	14 577.0	99.0
Argun Plant of Reinforced Concrete Products	15	0.0	0.0	4 539.0	0.0
Chehencement	715	1 575 540.0	190 822.1	1 028 501.3	н/д
Chechenkarieroupravlenie	43	46 900.0	78 764.0	21 530.0	0.0
Chechengrazhdanproekt	29	466.0	6 048.0	5 496.0	0.0
Grozny Brick Factory	286	59 107.9	31 247.1	67 045.5	436.8
Total	1 163.0	1 724 137.9	317 647.1	1 141 688.6	535.0

Source: Report of the Ministry of Construction and Housing and Communal Services of the Chechen Republic for 2020. <http://mgkhs.ru>

### 3. Research Questions

The subject of the study is management relations aimed at implementing a cluster approach to stimulating innovation in the construction materials industry.

### 4. Purpose of the Study

The purpose of this study is to develop theoretical and methodological foundations and practical proposals for improving the efficiency of functioning and development of the cluster approach in construction industry on the territory of one of the constituent entities of the Russian Federation.

### 5. Research Methods

The methods of structural-functional analysis – statistical, traditional methods of economic analysis – grouping, comparison, generalization – were used in the work to achieve the purpose and substantiate the hypothesis.

### 6. Findings

A cluster is a group of geographically adjacent and interconnected companies, as well as related organizations complementing each other and operating in a certain economic sphere. The cluster approach is especially suitable for the construction industry of the Chechen Republic not only because of the dispersion of mineral deposits throughout the territory of the republic, but also due to extremely uneven economic development of the territory. This is one of the unresolved socio-economic problems of the Soviet period.

What is the advantage of a “bundle, clot” interconnected by the bonds of economic cooperation of enterprises? It is the effect of synergy, which is achieved by combining the efforts of business, science and power. The community of enterprises concentrated in a limited area, forming a cluster, mutually contributes to the growth of each other’s competitiveness. Cluster development makes it possible to reduce the cost of retraining personnel, consulting and engineering services, develop new technologies and products, solve social and infrastructure problems, etc.

Construction clusters in Europe operate in almost all countries, for example, the Bornholm Construction Cluster (Denmark), the Eastern Construction Cluster (Poland) and the Slovenian Construction Cluster (Slovenia). Most European construction clusters focus on the use of environmentally friendly, energy-efficient materials and production technologies.

In this regard, for the successful development of construction clusters in the Chechen Republic, the following algorithm of actions is proposed. First of all, the republican and municipal authorities shall not interfere with the natural process of grouping partners around large enterprises producing construction products; second, shall help all cluster members to their best.

It is logical to form the first construction cluster in the Chechen Republic – the Chiri-Yurtovsky construction cluster – in the densely populated Shalinsky region. The core of the cluster will be Chechencement JSC and the KAZBEK Innovative Construction Technopark located at a distance of 500 meters from it. Both enterprises are located in the foothill zone of the republic, behind the Chiri-Yurt village, in the immediate vicinity of the largest deposits of high-quality mineral raw materials. From January 13, 2017, Chechencement, on the basis of the Order of the Government of the Chechen Republic No. 183-r of 12.07.2016, was reorganized into JSC Chechencement. The owner of the company is the Chechen Republic. To support the Company’s activities, a charter capital of 1,238,828 million was formed, divided into 1,238,828 ordinary registered shares. According to the Forecast Privatization Plan for 2018, in 2018, the government put up for sale 100 % of shares of Chechencement JSC (Idigova, 2019).

The design capacity of the plant is 3.3 million tons of cement per year. The development of Chechencement JSC as a core of the construction cluster may give it additional competitive advantages. The sale of a significant part of produced cement as a raw material to construction enterprises in close proximity (IST Kazbek and eight future residents of its innovative construction park) will allow the plant competing on price, confidently planning sales volumes, easily communicating with consumers, saving on product packaging. Such advantages are especially relevant due to the high concentration of cement production in Russia, monopoly pressure on the market. More than three quarters of cement production is provided by five holdings: EUROCEMENT Group JSC, HeidelbergCement Group, Gazmetallproekt LLC, LafargeHolcim, Siberian Cement Holding Company JSC. The leader is EUROCEMENT Group JSC. The holding includes 16 plants with a total annual cement production capacity of 40 million tons, located in almost all regions of the European part of the country. The deposits of cement raw materials of the Chechen Republic are not unique. The reserves of raw materials are explored throughout Russia. More than two thirds of them are concentrated in the European part of the country.

It would be advisable to organize a second construction cluster in the Chechen Republic at Argun, which was the second most important industrial center of the republic during the Soviet period. The predominant specialization of the Argun construction cluster is the production of modern types of concrete, iron-concrete products, composite materials. The Argun Plant of Building Materials and Construction Industry, Argun Plant of Reinforced Concrete Products, Argun Plant of Reinforced Concrete Products and Structures, Argun Plant of Large-Panel House Building (with a capacity of 120.0 thousand cubic meters), and Argun Plant of Large-Panel House Construction may become the leaders of the cluster.

The third construction cluster may be formed in the area of Andreevskaya Valley located in the Zavodsky district of Grozny at a distance of 7 km from the city center and in the immediate vicinity of the primary source of electricity – Grozny TPP, the construction of which is being completed at a rapid pace. The core of the Grozny construction cluster may be the new GrozStroyKeram LLC plant, which produces competitive products: facade face brick, building blocks. Finally, it is advisable to organize the Terek construction cluster near the village of Chervennyaya, Shelkovsky district, Chechen Republic. The largest quarry *Chechenkarierupravlenie* of the republic is located here, which began to work in 1959, as well as the *Stimul* Sand Quarry. There are many developed deposits for brick and tile production, production of glass and glass composites, keramzit concrete, rubble stone, paving, concrete, and other materials in the Priterechnaya zone.

## 7. Conclusion

Due to the formation of construction clusters one of the main tasks of the Government of the Chechen Republic is the creation of infrastructure necessary for cluster members. There is a need for convenient and safe highways equipped with high-quality fuel points, car services, cargo storage, rest and food for drivers. It is necessary to organize freight transportation to the republic and through its territory by rail as a cheaper way compared to the automobile type of cargo delivery. All clusters should be provided with cheap and stable electricity. If the Chechen Republic wants to develop industry, electricity tariffs should be reduced. This is only possible with personal energy generation stations of the republic. Internet and mobile telephone networks should be expanded beyond the borders of large settlements of the republic. Industrial zones should have stable, inexpensive communication.

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