

# Development of integration processes in the mining and metals sector in Russia and Kazakhstan under business transformation

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**Abstract.** The article presents the study of the main integration processes in the metallurgical industry in Russia and Kazakhstan in the context of business transformation, as well as demonstrates the key risks under current conditions and the main problems. Promising areas in the development of integration between the two countries have been formed in the course of the research.

## 1 Introduction

Metallurgy is considered to be the basis for the industrial development, providing structural materials for industries such as mechanical engineering, automotive industry, machine tool engineering, construction, shipbuilding. Basic industries form the core of manufacturing industries and make a significant contribution to the country's GDP. The metallurgical industry includes mining and beneficiation of ferrous metal ores, mining and beneficiation of raw materials for ferrous metallurgy, fabrication of ferrous metals, as well as non-ferrous metals, steel, chemical-recovery coal carbonization and secondary processing of ferrous metals.

Ferrous metallurgy considerably contributes to the development of the national economy of Russia and Kazakhstan. Thus, the share of the GDP of ferrous metallurgy constitutes 1.9 % in the country's GDP and 16 % in the manufacturing industry. In Russia, ferrous metallurgy is a system-forming industry and is considered to be a key consumer of electricity and transportation services. The share of the metallurgical industry in general in Russia's GDP is about 5 %. The level of development of iron and steel industry affects the basic sectors of the economy, namely, manufacturing, fuel and energy complex, construction, which in aggregate account for 58% of GDP.

At the present time, as in other industries, under the conditions of spread of the new coronavirus disease, there is a decrease in the metallurgical industry. Thus, in the first quarter of 2020, the spread of coronavirus disease caused a decrease in prices in the global

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ferrous and non-ferrous metallurgy markets. COVID-19 hurt Chinese enterprises, disrupting the infrastructure and supply networks around the world. Empty cargo containers began to accumulate in Chinese ports, while conversely in other parts of the world there was a shortage. As a result, the epidemiological situation, coupled with the extension of the "holiday", affected the industrial production, automobile manufacture and the construction sector, that are the main consumers of metals.

In modern conditions, entrepreneurship is on the verge of transformation, which leads to changes in a business model, as well as to the use of new technologies, reorientation of business towards new markets and the search for new niches. According to the studies in the field of urbanization, [1] the population is expected to reach 9 billion people in 2050. The growth of the population would contribute to continuous urbanization, which would increase the demand for electrical energy and products of iron and steel enterprises. Despite the development of energy alternatives, the demand for coal is not decreasing, therefore, the demand in the energy market remains stable. In addition, the development of green energy will contribute to the development of electric cars and high-capacity batteries and will increase the demand for foundry production. Thus, in the near future, transformation processes in business will affect many industries, which leads to the study of new development prospects.

## 2 Materials and Methods

As a basic industry, metallurgical industry significantly contributes to the economy of Kazakhstan. On the one hand, the success in the development of the industry is explained by overall political stability, as well as structural and institutional reforms, and, on the other hand, by an exceptionally favorable external economic conditions. In recent years, high prices for metal products and the potential for increasing their exports have led to a considerable contribution of metallurgical industry to the growth of GDP and other macroeconomic indicators.

Thus, in Kazakhstan, in January-December 2019, metallurgical industry accounted for 7.6% of GDP, the production increased by 11.5% and amounted to 6.8 trillion tenge, including the increase in mining of metal ores by 29.3% and metallurgical industry - by 5.9% [3].

In iron and steel industry of Russia there is a growth trend owing to non-ferrous metallurgy, while there is a downward trend in the ferrous metallurgy due to a decrease in exports. However, domestic consumption in Russia increased by 3-5% [4]. In non-ferrous metallurgy, production increased in all sectors except the zinc one. The increase in the exports of precious metals, the improving domestic demand for steel products and the depreciation of yearly average exchange rate of the rouble contributed to the improvement in the financial position of the industry in 2019. And, the balanced result in the metallurgical sector increased by 32.6% in 2019 [5].

The established diplomatic relationship, good neighborly relations, and mutually beneficial cooperation between Russia and Kazakhstan determine close economic ties. Thus, integration processes in metallurgical industry of Russia and Kazakhstan demonstrate a profitable alliance.

There is a historical cooperation between iron and steel companies of the two countries. Thus, SSGPO supplies iron ore and pellets for manufacturing of steel products to Magnitogorsk Iron and Steel Works. Aktyubinsk Copper Company supplies zinc concentrate to Chelyabinsk Zinc Plant and copper concentrate to Russian Copper Company. Aluminium of Kazakhstan supplies alumina to United Company RUSAL. Donskoy GOK supplies chrome ore for ferrochrome production to Serov Ferro-alloy Plant[6-8].

At the present moment, there is a decrease in exports to Russia by 39%, mainly due to a decrease in the shipping of a number of goods (copper cathodes, ferrochrome and zinc).

In addition, the development of import substitution industrialization affects integration. For instance, United Company RUSAL implements a number of investment projects for modernization and increase of production, including increase of the production of alumina by its own divisions, which might have a negative effect on the Kazakhstan alumina export to Russia.

Currently, United Company RUSAL produces approximately 3.7 million tons of aluminum per year. For the current production, approximately 7.5 million tons of alumina is needed. Russian raw material assets of the company provide only a third of alumina, which is 2.5 million tons. UC RUSAL receives most of the raw materials (about 3 million tons) needed for its metallurgical plants from abroad, that is from the subsidiaries specializing in the production of bauxite in Guyana, Guinea and Jamaica, and from alumina refineries in Ireland, Jamaica, Ukraine and Australia (joint venture with Anglo-Australian Rio Tinto). [9-11]. The remaining volume, which is approximately 2 million tons of alumina, is purchased by UC Rusal in the market, including 1 million tons of alumina of Kazakhstan.

In recent years, the policy of departure from foreign alumina of UC RUSAL has come into focus in the form of various programs and events. Thus, before 2023, UC RUSAL will begin the pilot production of alumina from kaolinite ore at Achinsk Alumina Refinery (Krasnoyarsk krai). In 2018, the company has already produced 1.1 million tons of alumina from nepheline ore at this plant.

In addition, there is a risk in other areas. SSGPO JSC has been a historical supplier of iron ore raw materials to Magnitogorsk Iron and Steel Works (hereinafter MMK PJSC) for over 60 years. Annually, SSGPO exports 7-8 million tons of raw materials and semi-processed materials, which corresponds to 65% of the materials needed for the plant. The amount of annual exports is estimated at up to \$400 million.

It is important to note that, in 2015, there was a precedent between SSGPO and MMK, which resulted in the termination of the agreement between the companies. However, later on, the contract for the supply of iron ore raw materials produced by SSGPO JSC to MMK PJSC was extended until the end of 2020.

Currently, the historical supply of SSGPO to MMK has not been restored, and MMK plans to further diversify raw material suppliers in favor of local producers, which is essentially an import substitution industrialization. The Russian competitors, such as Lebedinsky, Mikhailovsky or Stoilensky GOK, could completely replace imports from Kazakhstan in 1.5-2 years.

When modeling the influence of the spread of coronavirus on the integration processes of the two countries, special attention should be paid to the development of China's dynamics, namely how the demand for steel in China has changed during the quarantine. According to Chinese statistics, steel consumption in January-February increased by 5.5%. However, this does not reflect the real situation. Plants did not halt production completely, building up stocks, and production in China increased by 3.1% in two months. According to Kallanish Commodities, warehouse stock of rebar and hot-rolled coil increased by 2.5 times in February against December last year. Considering a growth in warehouse stock, the real steel consumption in China in January-February fell by 19%.

Without regard to the epidemic, the sector encounters identical crises every five to seven years. Definitely, a drop in demand by over 50% is expected in the next two quarters. If a second wave of the epidemic is prevented, the economic activity will quickly restore markets. However, one must be ready for an 18-month stagnation [12,13].

The problem of demand should be considered in two aspects: the first one is the quarantine shock, and the second is a fall in demand as a result of the economic crash on a

medium-term horizon. According to The Ministry of Commerce of the People's Republic of China, this year, more than 90% of Chinese exporters of all industries have faced problems with shipping or delayed payments. There is a 56.9% year-over-year increase in March in export credit insurance claims made by Chinese companies.

There have already been many examples of how buyers of Chinese goods cancelled contracts or delayed payments. Most of these cases occurred in South America, Indonesia and Pakistan.

In this regard, CISA recommends that metallurgical companies, that is members of the association, focus on domestic supplies. Moreover, demand for steel products in China is recovering, and it is expected to exceed the pre-crisis level in the second half of the year.

In addition, the share of the construction sector in consumption, which amounted to approximately 55% in 2019, is expected to increase due to a decrease in demand for flat steel, primarily owing to export-oriented industries. According to Fastmarkets, certain Chinese companies are halting hot and cold rolling mills and are reorienting to the primary production of rolled steel.

### **3 Results**

In the development of integration processes in the metallurgical industry of Russia and Kazakhstan under transformation, promising areas are the use of new production technologies, cutting steel production costs, and digitalization of business processes. Despite the policy of import substitution industrialization in Russia, the existing historical relationship can be transformed in modern conditions by combined efforts through digitalization.

The first area is the development of powder metallurgy. Powder metallurgy is a rapidly developing field that has a huge number of distinctive features. At the present time, powder metallurgy is actively applied in a variety of industries. In addition, the work is in progress that is aimed at improving the quality of the products.

Powder metallurgy is applied in aviation, electrical engineering, radio frequency engineering and many other industries. This is explained by the fact that the applied production technology allows to produce complex parts.

A variety of technologies can be applied to produce the powder, however, they share common features that are:

1. Cost-effectiveness. Waste from the metallurgical industry can be used as raw materials.
2. High precision shapes. The products manufactured by applying the considered powder metallurgy practice have precise geometric shapes, and further machine processing is not required. This point determines a relatively small amount of waste.
3. High-wearing feature of the surface. Owing to the fine-grained structure, the products have increased hardness and strength.
4. Low complexity of powder metallurgy technologies.

In the development of powder metallurgy, the combined efforts of the two countries will contribute to the development of integration. As a form of the implementation of this area, the cluster model, which involves the integration of industrial enterprises, the scientific community, and government bodies, should be considered.

The second area should be regarded as a transition to renewable energy sources. One of the priority areas of energy development is the widespread use of renewable energy sources. Furthermore, the increasing use of renewable energy leads to an increase in the need for batteries for electric vehicles and electricity storage. Phones, solar panels, wind turbines, and batteries that are used to store energy, several basic metals are applied. In addition to lithium, the batteries use cobalt, manganese and nickel. Solar panels are made of

tellurium, gallium, silver and indium. Other renewable devices also use copper and aluminium. Which will also contribute to growth of demand for metal products.

The development of mining and metals sector of the two countries depends on many factors that are formed both under the influence of economic phenomena within the country and, due to the high export orientation, of the economic and political situation within the countries of the main trading partners. Moreover, the spread of coronavirus is currently having a serious negative effect.

However, the industry is exposed to production risks associated with a high degree of depreciation of key assets of metallurgical enterprises both in Russia and Kazakhstan. Solving these issues requires a large amount of investments.

## 4 Conclusions

The spread of coronavirus has a serious negative impact on the global economy. Thus, the impact of the epidemic was manifested in a decrease in China's consumption, which caused a sharp decrease in prices for basic metals, which influenced the development of the metallurgical industry in Russia and Kazakhstan. The quarantine measures introduced in the People's Republic of China due to the coronavirus outbreak had a strong impact on the consumption of metal products in the studied countries. Plants that produce electrical equipment, components, consumer goods and other products were halted. All this leads to a review of approaches to the implementation of integration processes, as well as to the search for new business models and the digitalization of basic industries.

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