

Review

Issues of market monopolization in the mining of non-metallic minerals in transition economies

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Abstract

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This paper considers the issue of mining non-metallic (rock) products in the context of transition economies. Our studies have shown that interest in non-metallic products is growing every year, as evidenced by the growing volumes of production both around the world and in the group of countries considered in the article. The market analysis for non-metallic minerals has revealed the market development dynamics; however, its high monopolization may lead to some restrictions on free competition in subsoil use. In order to assess such monopolization, we have calculated the Herfindahl-Hirschman index for each non-metallic mineral mined in countries with economies in transition. We have found that the entire product range under consideration is part of a highly concentrated market dominated by the Russian Federation. We have presented some options for designing and introducing various kinds of arrangements to develop the mining potential of non-metallic minerals in order to reduce the dominant component of individual countries or companies and to balance the market. It is proposed to consider a partial transition from the possibility of developing deposits to an underground one — as an alternative option that harms the environmental load on the situation in the mining area. The results of this study will be used to conduct a detailed analysis in each country under review, which will provide the most complete picture of the mining industry in countries with economies in transition.

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Introduction

Non-metallic minerals are the basis for the growth and well-being of each individual state (Pedro et al., 2017; Church and Crawford, 2020). According to the annual analytical digest, which summarizes and statistically evaluates the production indicators of 65 types of mineral raw materials from 168 countries (Reichl and Schatz, 2020), the non-metallic mineral production around the world has a strong tendency to increase, and since the beginning of 2000, this indicator has gone up one-and-a-half times (Figure 1). Interest in the non-metallic minerals market is constantly growing, which

indicates favorable conditions for the exploration, evaluation and development of new deposits. The most popular non-metallic minerals currently include those that are mostly used in the construction industry, such as anhydrite, gypsum or limestone (Kurchin et al., 2013a; Miatto et al., 2017).

It is also worth noting that the significant share of both non-metallic and almost any raw material production is opencast mining. This fact entails corresponding technological and environmental problems (Ekmekci, 1990; Fedorko, 1998; Burcev et al., 2003; Chang and Koetter, 2004; Hashimoto et al.,

2006; Jarockij, 2007; Krjukov et al., 2011; Trubeckoj et al., 2011; Kurchin et al., 2013b; Priester et al., 2019).

Non-metallic minerals are mined in 145 countries, which in turn, according to the international standards, namely the classifications developed by the International Institute for Applied Systems Analysis (IIASA, Austria) and United Nations Conference on Trade and Development (UNCTAD), for statistical convenience, are classified in the advanced economies, countries in transition, emerging economies and

countries with the least developed economies (Reichl and Schatz, 2020; UNCTAD, 2020). To systematize and classify all countries according to the level of socio-economic development, the indicators of economic development and the type of their growth, the level and nature of foreign economic relations, as well as the size of economic potential are used.

The geographical location of countries with different economic development statuses is shown in Figure 2.

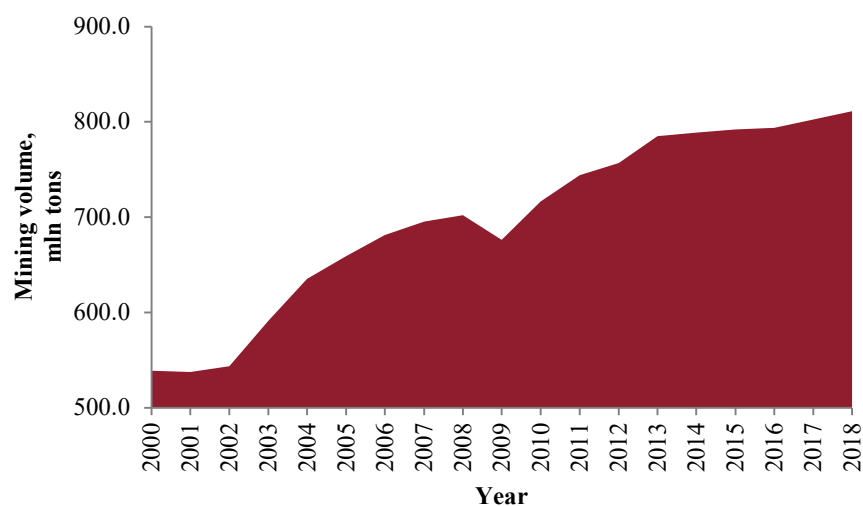


Figure 1. Indicators of world non-metallic mineral production in the period from 2000 to 2018.

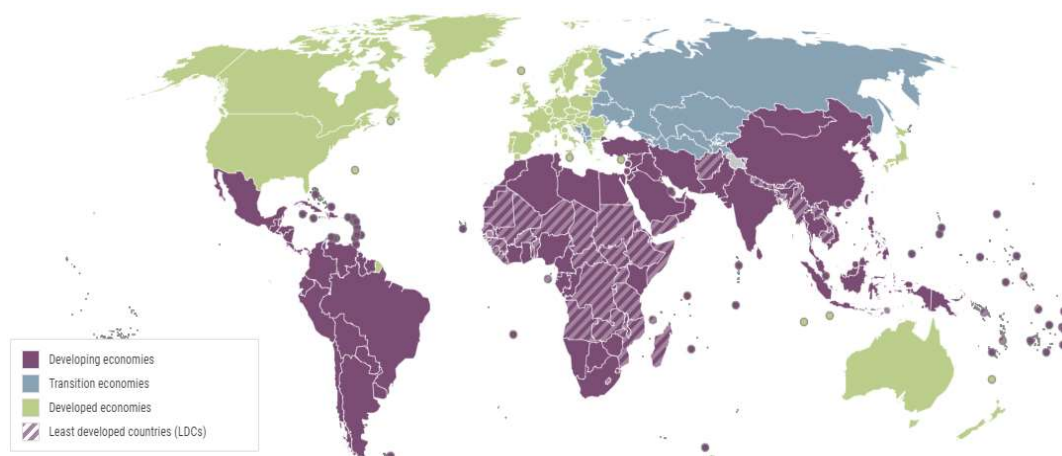


Figure 2. World map by development status (UNCTAD, 2020).

Based on the analysis, it was revealed that the share distribution of all minerals production in the world for 2018 is as follows: countries with developed economies mined 27.42% of all minerals, countries with economies in transition – 12.88%, countries with developing economies – 58.57%, and countries with the least developed economies in total mined 1.12%.

This balance of power is greatly influenced by China, which has the status of a country with a developing economy and is the world leader in mining of 32 different minerals (China produces 41.33% of all minerals in developing countries). In relation to the share distribution of non-metallic minerals production, these values do not change much and are 33.76%,

7.82%, 57.39%, and 1.03%, respectively. Since the developed economies include such mining giants as the United States and Australia, which together produce 20% of all minerals in the world, and the developing economies, as mentioned above, are led by China with 23% of the total world production, the two remaining economic groups are of interest for study. However, due to the fact that the countries with the least developed economies are mostly located in unstable regions of Africa, where wars, political upheavals, etc. often take place on various scales, it is difficult to analyze and predict the further development of the mining industry in any direction (Church and Crawford, 2020).

This paper provides an overview of the market for non-metallic minerals produced in countries with economies in transition.

It should be noted that the non-metallic minerals in this paper include Asbestos, Baryte, Bentonite, Boron, Diamonds (Gem/Industrial), Diatomite, Feldspar, Fluorspar, Graphite, Gypsum and Anhydrite, Kaolin, Magnesite, Perlite, Phosphates (incl. Guano), Potash, Salt, Sulfur, Talc (incl. Steatite and Pyrophyllite), Vermiculite, Zircon. According to the UN Secretary-General's Report, the characteristic problems for countries in transition are associated with the need to provide the highest socio-economic benefits of mineral production, such as diversification of the relationships between the minerals sector and the local economy, the development of mechanisms for a more equitable distribution of revenues from the extraction of mineral resources of national, regional and local government, expanding public participation in decision-making in relation to the development of mineral resources and the need to work in conditions of limited public funds for social needs (UN Secretary-General, 1998). However, many resource-oriented

countries have failed to achieve economic diversification and sustainable development based on the export of natural resources. In many instances, the development of the natural resource base may fail to provide the conditions necessary for anticipated economic stability, diversification or increased social opportunity (Gelb, 1988; Auty, 1993; Sachs and Warner, 1995; Oganessian and Mirlin, 2019; Rastyannikova, 2020).

Contrary to the expectations raised by the export-based model, therefore, a consistent underperformance of mineral economies relative to non-mineral economies has been observed.

Analysis of Countries with Economies in Transition

The development of non-metallic mineral mining technologies is becoming one of the priorities in modern mining since this type of raw material can be widely used in various fields, such as construction, mining or metallurgy. The minerals in question are used by humankind both as various types of raw materials for the production of binders (for example, for cement), and for the direct production of some construction or medical materials.

As for the world situation in the non-metallic minerals market, starting from 1984, the production performance increased by 76.3%, but at the same time, almost half of the total extracted raw materials (49.0%) are in 5 leading countries: China, USA, India, Turkey and the Russian Federation, whose proceeds from the sale also significantly exceeds that of other countries (Figure 3). According to (UNCTAD, 2020), the countries with economies in transition currently include 9 European and 8 Asian states, whose structure of all minerals production is presented in Table 1.

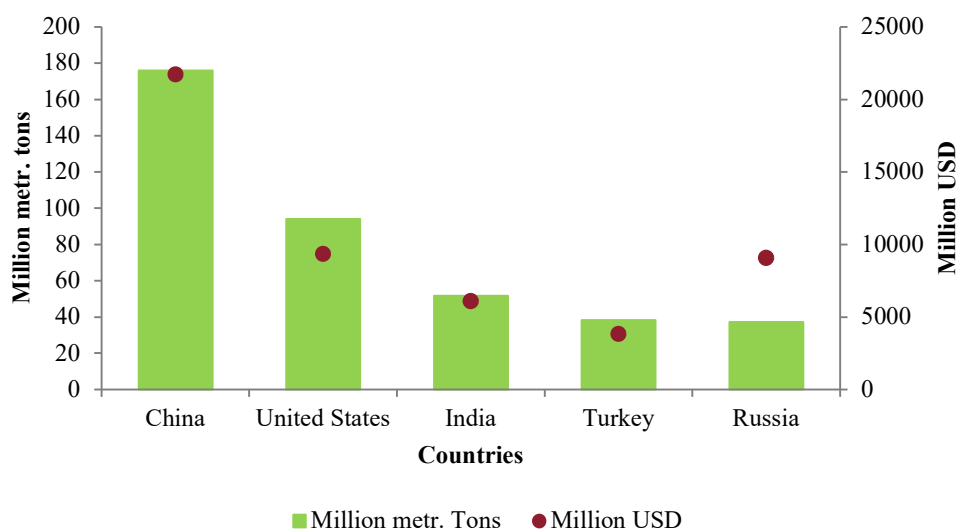


Figure 3. Total industrial minerals production by leading countries and their value in million USD in 2018.

Table 1. Mineral output in transition economies.

Country	Type of extracted mineral, thousand tons				
	Iron, Ferro-Alloys	Non-Ferrous Metals	Precious Metals	Industrial Minerals	Mineral-Fuels
Azerbaijan	0.00	47.04	0.01	288.14	54,179.90
Albania	501.15	3.78	0.00	133.52	1,272.07
Armenia	5.42	75.87	0.02	237.50	0.00
Belarus	0.00	0.00	0.00	10,250.19	1,838.80
Bosnia and Herzegovina	704.05	147.93	0.00	1 582.81	14,378.77
Georgia	95.00	15.25	0.003	0.00	176.10
Kazakhstan	15,700.36	1,283.02	1.07	5,562.47	237,947.60
Kyrgyzstan	0.00	8.64	0.04	146.00	2,528.00
Moldova	0.00	0.00	0.00	352.50	0.00
Russian Federation	59,027.13	4,900.91	1.75	37,204.31	1,557,531.52
North Macedonia	0.00	79.74	0.02	264.35	4,946.49
Serbia	0.00	69.76	0.01	127.81	38,923.23
Tajikistan	0.00	288.13	0.02	46.60	1,931.79
Turkmenistan	0.00	0.00	0.00	575.20	66,603.00
Uzbekistan	0.85	99.29	0.25	554.11	54,944.10
Ukraine	39,952.95	0.007	0.00	6,156.56	45,193.89
Montenegro	0.00	52.61	0.00	0.00	1,595.90
Total	115,986.90	7,071.98	3.19	63,482.08	2,083,991.16

In the group of transition economies, the Russian Federation occupies a leading position by production output of various minerals. The structure of the mineral resource base of the Russian Federation is dominated by the extraction of fuel and energy resources (93.9%), followed by the extraction of ferrous and non-ferrous metals (3.86%), then the non-metallic minerals considered in this article (2.24%), and a small share of 0.0001% is accounted for by precious metals.

In the context of the annual increase in the rate of construction in the Russian Federation, where a huge amount of non-metallic minerals is needed, it can be predicted that consumption will grow, mining enterprises will switch to developing deposits with a poorer raw material base, which will inevitably lead to an increase in production costs (U.S. Geological Survey, U.S. Department of the Interior, 2019c).

The overall picture of non-metallic mineral mining in transition economies is presented in Table 2.

From the materials presented above, it can be seen that only 5 countries produce more than 1 million tons of non-metallic minerals annually. This is due not to the weak development of mining production but to the banal absence of deposits with this type of mineral resource. For example, asbestos is mined in only 4 countries of the world (Russia, Kazakhstan, China and Brazil), where the countries with economies in transition we study are in the leading positions by output.

The Russian Federation produces the most non-metallic minerals from countries with economies in

transition, namely, it is the leader in the extraction of asbestos, bentonite, boron, diamonds (for precious stones and industrial products), feldspar, fluorspar, graphite, gypsum and anhydrite, magnesite, phosphates, salt, sulfur, talc and vermiculite (58.6% of all extracted non-metallic minerals). This is due to a large number of different deposits in this area. There have also been some interesting trends in recent years: firstly, the government tried to streamline and simplify licensing of exploration and mining, and also to encourage them; secondly, Western economic sanctions have increased the emphasis on the exploration development and national self-sufficiency; and thirdly, the Russian mining industry began a new trend of strengthening partnerships with the countries of Asia and the Pacific region (U.S. Geological Survey and U.S. Department of the Interior, 2019b; Reichl and Schatz, 2020).

In the Asian region (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan), 11.7% of all non-metallic minerals of countries with economies in transition in total are extracted. However, these shares are not evenly distributed. For example, Kazakhstan, whose mining industry accounts for a significant share of gross domestic product, is one of the leaders in the extraction of many non-metallic minerals and provides 75% of the production of the entire Asian group of countries with economies in transition. The number of exploration projects in this country indicates a huge potential for future increases in mineral production, but it will depend on many factors, including raw

material prices and the development of government programs that promote the growth of the industry (U.S. Geological Survey and U.S. Department of the Interior, 2021b). Uzbekistan has more than 1,700 deposits of various mineral raw materials. Since 2014, the country has been implementing a program of structural modifications, modernization and diversification of production, designed for 2015-2019. According to this program, a systematic increase in

cement production by 3.5% per year was planned. Also, since July 2015, the country has a presidential decree on granting preferences to companies and organizations involved in the construction of facilities for the production of ammonia and urea. In the last few years, Uzbekistan has intensified its efforts to develop the country's industry, whose share in the country's gross domestic product is more than 50% (Raduzhnaya, 2015; Azizov, 2016).

Table 2. Indicators of production and proceeds from the sale of non-metallic minerals for 2018.

Country	Non-metallic mineral output, thousand tons	Share of the total output of non-metallic minerals mined by countries with economies in transition, %	Revenue from the sale of non-metallic minerals (not included Diamonds), mln US dollars
Azerbaijan	288	0.5	29
Albania	134	0.2	5
Armenia	238	0.4	23
Belarus	10,250	16.1	5,858
Bosnia and Herzegovina	1,583	2.5	185
Georgia	0	0.0	0
Kazakhstan	5,562	8.8	832
Kyrgyzstan	146	0.2	8
Moldova	353	0.6	3
Russian Federation	37,204	58.6	9,069
North Macedonia	264	0.4	5
Serbia	128	0.2	20
Tajikistan	47	0.1	5
Turkmenistan	575	0.9	56
Uzbekistan	554	0.9	130
Ukraine	6,157	9.7	684
Montenegro	0	0.0	0
Total	63,482	100.0	16,912

The current and future economy of Turkmenistan is very dependent on the export of crude oil and natural gas, so the priority for the country is to find new routes for their implementation. However, some signs of a focus on the non-hydrocarbon sector are Turkmenistan's investments in plants for the production of chemicals and building materials, modernization of existing bromine and iodine plants, construction of potassium refinery plants, etc. The investment is likely to lead to an increase in the production of these minerals over the next few years (International Monetary Fund 2017; U.S. Geological Survey and U.S. Department of the Interior, 2019d).

Armenia and Azerbaijan produce a narrow range of non-metallic minerals – bentonite, gypsum and anhydrite, perlite, salt and sulfur. In 2015, the production of bentonite clay in Armenia increased by 100% (U.S. Geological Survey and U.S. Department of the Interior 2019a; 2020a).

Since 2016, the Government of Kyrgyzstan has continued to further strengthen efforts to increase the production of minerals – mining tenders are held and

foreign investors are attracted. The country is trying to improve its mining industry by increasing transparency of issuing licenses for natural resources exploration and development (U.S. Geological Survey and U.S. Department of the Interior, 2021a).

In the most unproductive (by non-metallic mineral extraction) country in the region — Tajikistan, high hopes are placed in foreign investment and development of mine-site infrastructure (U.S. Geological Survey and U.S. Department of the Interior, 2020h).

European countries (Albania, Belarus, Bosnia and Herzegovina, Moldova, Serbia, North Macedonia, Ukraine and Montenegro), together mine 29.7% of all non-metallic minerals of countries with economies in transition. Here, as in the case of the Asian region, there are leading countries by output.

Belarus's mineral production enterprises include a potash mining company, three metallurgical steel plants, a nitrogen production enterprise, and two crude petroleum refineries. In 2018, Belarus ranked second among all countries (and first among countries

with economies in transition), among the world's potash producers. The only mining company in the country that plays an important role in the world markets is the potash company JSC "Belaruskali", which accounts for a fifth of the total world production of potash fertilizers. Belarus is expected to remain a major supplier of potash fertilizers to the world markets in the near future, and after the commissioning of the Petrikov and Nezhin mining and processing plants, the production of potash fertilizers will increase (Martynyuk, 2016; Sidorchik, 2016; Levinsky and Abakumova, 2017; U.S. Geological Survey and U.S. Department of the Interior, 2020b).

Ukraine has more than 2 thousand deposits of non-metallic minerals, the total reserves of which occupy a leading position in the world. This also results in the high production output – 6.1 MnTPA (Reichl and Schatz 2020; U.S. Geological Survey and U.S. Department of the Interior, 2019e).

The mining sector makes up a small part of the economy of Albania, Bosnia and Herzegovina, North Macedonia and Serbia, however, it should be noted that some non-metallic minerals are mined there in increasing quantities from year to year (kaolin, salt, gypsum and anhydrite), which indicates the infrastructure and economy recovery of these countries (Montenegro Statistical Office, 2018; National Agency of Natural Resources, 2019; Republic of North Macedonia State Statistical Office, 2019; U.S. Geological Survey and U.S. Department of the Interior, 2019g, 2020d, 2020e, 2020f).

Moldova is a country where, according to (Reichl and Schatz, 2020; U.S. Geological Survey and U.S. Department of the Interior 2019f), the main mineral resources are non-metallic minerals. The extracted raw materials are used for building materials, as well as for the chemical, cement, glass and food industries. Georgia and Montenegro mine these non-metallic minerals, if at all, in small amounts, which are not sufficient for statistical processing (U.S. Geological Survey and U.S. Department of the Interior, 2020c, 2020g).

Analysis of Non-Metallic Minerals Market Monopolization in the World

As world experience shows, the mechanism of competition does not function in monopolized markets. New entry with a strong, dominant position raises the concentration level in the industry, monopolizes it and, as a result, reduces the quality of industry performance as a whole (Viscusi et al., 2005; Brown 2018).

The Herfindahl-Hirschman index (HHI) is widely used for a thorough analysis of the market monopolization in the world. This index is named after the economists Orris Herfindahl and Albert Hirschman, who developed it. For the correct reading of this index, the following generally accepted ranking

of the obtained values is used, and three types of market are globally distinguished:

Type 1 – Highly concentrated (markets with a high level of monopolization) – HHI from 1800 to 10000.

Type 2 – Medium-concentrated (markets with a strong level of monopolization) – HHI from 1000 to 1800.

Type 3 – Weakly concentrated (markets with a low level of monopolization) – HHI up to 1000.

In Europe, the threshold for medium-concentrated markets is 2000.

Thus, we can conclude that the lower the value of HHI, the higher the competition, and the weaker the market power of the companies present in this market, and vice versa – the higher the HHI, the greater the concentration, and, accordingly, monopolization.

It normally involves a high concentration in the industry, if the market is divided by several large producers with a high market share. A company that is a leader in the industry or a company that organizes the market may have significant market power. On the other hand, new entry may be the result of a merger of several companies united by a common strategy and goal, such as market monopolization, reduction of marginal costs, and expansion of a product line.

Reichl and Schatz (2020) show that non-metallic minerals are globally divided into all 3 types of monopolization, namely:

- The highly concentrated market includes: magnesite (4505), asbestos (4299), graphite (3868), boron (3620), fluorspar (3515), perlite (2807), diatomite (2297), zircon (2208), diamonds (gem) (2171), phosphates (2063), diamonds (industrial) (2025).
- The medium-concentrated market includes: vermiculite (1990), barite (1832), potash (1771), bentonite (1495), feldspar (1450), talc (1309).
- The weakly concentrated market includes: kaolin (909), salt (873), sulfur (783), gypsum and anhydrite (713).

The output of these non-metallic minerals in the world for 2018 is shown in Figure 4. Table 3 shows the share of production and the degree of monopolization index (HHI) for each type of non-metallic mineral by the leading countries for 2018.

Analyzing the submitted data, it can be observed that the share of production of some non-metallic minerals by a single country (leading by this mineral output) reaches 50 percent or more (asbestos, boron, fluorspar, graphite, magnesite), on average, this indicator is 36.5%. However, it should be noted that this table shows data only from those countries that occupy the first place by output. If we add the top 3 countries for each extracted raw material to this table, the overall picture will change significantly, and the average share of resources extracted by them will be from 66% and higher, with an average share of HHI equal to 2071, which indicates a high monopolization

of the non-metallic minerals market worldwide. Thus follows, the monopoly degree of non-metallic minerals mining is mostly quite high, which causes some restrictions (barriers) on free competition in subsoil use. Natural resources scarcity can be one of these barriers for potential competitors entering the non-metallic minerals market. Despite a large amount of

reserves, exploration and development of new fields require large start-up investments, which increases the risks of investment. There are also administrative restrictions associated with obtaining licenses for the development of a particular field; it takes several years to issue permits. Moreover, there is no viable mechanism for competitive licensing (Dolgi, 2009).

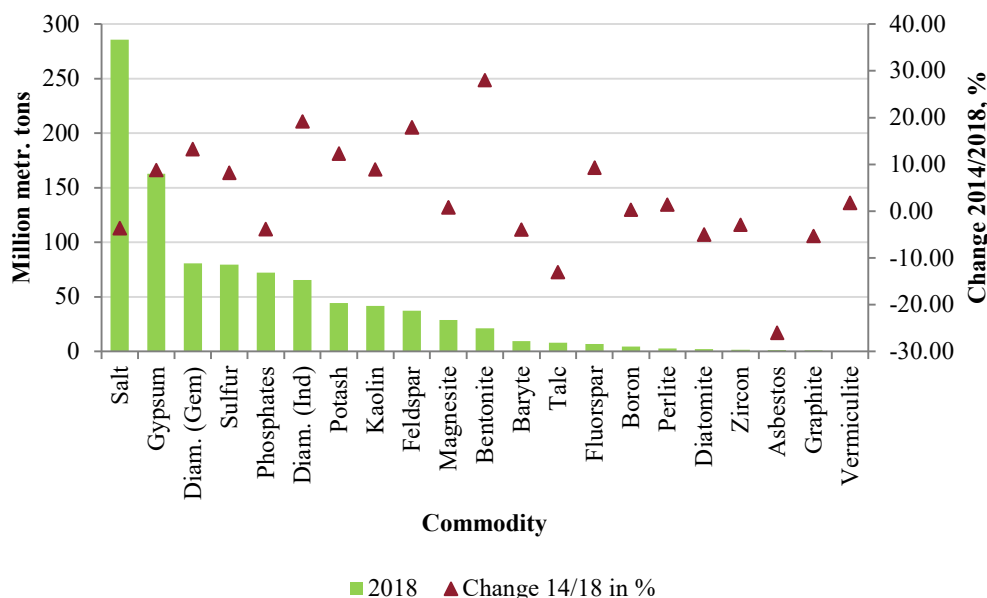


Figure 4. Output of each non-metallic mineral in the world for 2018.

Table 3. Share of world industrial minerals production 2018, by leading countries.

Industrial minerals	Leading country in terms of production	Production in 2018, metric tons	Share, %	Share HHI
Asbestos	Russia	752,500	61.36	3,764.86
Baryte	China	3,100,000	33.67	1,133.66
Bentonite	China	5,600,000	26.33	693.50
Boron	Turkey	2,432,000	54.14	2,930.66
Diamonds (Gem)	Russia	22,973,133*	28.41	806.95
Diamonds (Ind)	Russia	20,187,926*	30.81	949.21
Diatomite	United States	957,000	43.39	1,882.57
Feldspar	Turkey	11,474,040	30.93	956.93
Fluorspar	China	3,500,000	51.04	2,605.05
Graphite	China	630,000	60.17	3,620.33
Gypsum and Anhydrite	China	25,000,000	15.34	235.28
Kaolin	China	7,500,000	18.03	324.97
Magnesite	China	19,000,000	65.97	4,351.89
Perlite	Turkey	1,088,983	39.95	1,595.97
Phosphates (P ₂ O ₅ -Content)	China	28,897,800	40.07	1,605.91
Potash (K ₂ O-Content)	Canada	14,024,000	31.60	998.83
Salt	China	58,361,700	20.42	417.17
Sulfur	China	13,762,700	17.27	298.18
Talc	China	2,000,000	25.37	643.53
Vermiculite	South Africa	141,346	32.69	1,068.55
Zircon	Australia	618,000	40.00	1,600.11

* production output is indicated in carats.

Discussion

The main consumers of non-metallic minerals are the construction industry, the construction materials industry, the road industry, the railway track facilities, the housing and public services, the oil and gas industry. In addition, products of the construction materials industry are used in automotive and transport engineering, agriculture, furniture production and for the needs of the population (Miatto et al., 2017).

In the context of the materials presented above, we will consider the monopoly degree of non-metallic minerals mining in countries with economies in transition. The analysis of the submitted materials revealed that countries with economies in transition mine 7.82% of all non-metallic minerals. This list does not include only Diatomite, which is not mined in the territory of the countries under consideration. Figure 5 shows the HHI index for each non-metallic mineral produced in transition economies.

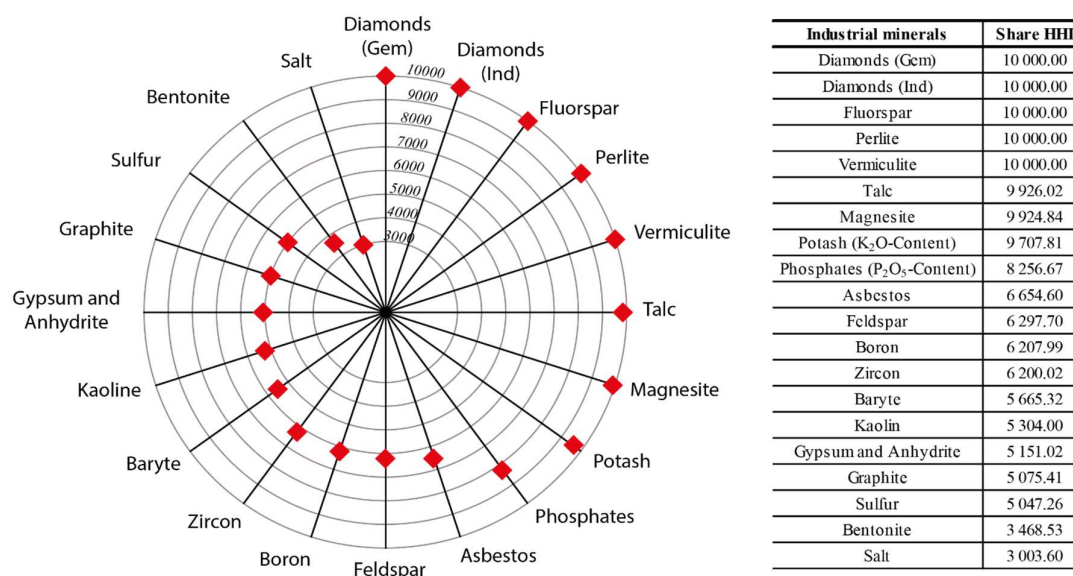


Figure 5. HHI index for each non-metallic mineral produced in transition economies.

For such non-metallic minerals as Diamonds (Gem/Industrial), Fluorspar, Perlite and Vermiculite, the maximum degree of monopolization is 10,000 since these types of raw materials are extracted only in the territory of the Russian Federation.

In production sharing of Talc, Magnesite, Potash and Phosphates, the Russian Federation is also a stable leader with more than 90 per cent of the total extracted raw materials. Thus, given an enormous lead in production output, the HHI index here varies from 8,256 to 9,926 (it is 8,205 to 9,925 for the Russian Federation).

Bentonite and Salt mining is the most competitive niche in the structure of all non-metallic minerals with the HHI index in the range from 3,003 to 3,468, where, as in almost all other niches, the Russian Federation dominates, but with a smaller advantage by production output.

All other types of non-metallic raw materials are extracted with the HHI index of 5,047 to 6,654. A detailed description of the output of raw materials extracted and the HHI index of each transition country for 2018 is given in Table 4.

The sustained growth of the global mining complex (Figure 1) has been going on for more than a

decade; however, this progress has not been uniform in all countries, and the prospects for its development are still questionable.

The feasibility of establishing specific mechanisms to promote capacity development varies across countries and even across extractive resources. In this regard, when developing and implementing innovative approaches in countries with economies in transition to increase their potential and maximize economic and social benefits, special attention should be paid to their structural differences.

Innovative policy approaches are needed to enhance the capacity of countries with economies in transition to maximize the economic and social benefits of mining. For example, many of the countries under review have adopted laws that encourage foreign investment in the mining sector. This fact gives investors a sense of confidence in the country's legal regime, and in return, the countries get an additional niche to replenish their budget.

The degree of concentration of transition countries producing non-metallic minerals shows a significant spread, which creates a highly competitive environment in this group of countries (the minimum HHI index is 3003), where the Russian Federation with

an average HHI index of 6470 plays a dominant role. This fact is due to the huge territory on which there is

a large number of both already developed fields and those referred to the reserve.

Table 4. Indicators of non-metallic mineral production and the Herfindahl-Hirschman index by countries with economies in transition

Industrial minerals	Leading country in terms of production	Production in 2018, metric tons	Share, %	Share HHI
Asbestos	Russia	752,500	78.76	6,203.58
	Kazakhstan	202,900	21.24	451.02
Baryte	Kazakhstan	570,000	68.24	4,656.56
	Russia	265,300	31.76	1,008.76
Bentonite	Russia	714,000	53.89	2,904.65
	Azerbaijan	212,300	16.03	256.80
	Ukraine	178,200	13.45	180.93
	Kazakhstan	120,000	9.06	82.05
	Bosnia-Herzegovina	87,358	6.59	43.48
	Turkmenistan	10,000	0.75	0.57
Boron	North Macedonia	2,945	0.22	0.05
	Russia	88,000	74.58	5,561.62
Diamonds (Gem)	Kazakhstan	30,000	25.42	646.37
	Russia	22,973,133*	100.00	10,000.00
Diamonds (Ind)	Russia	20,187,926*	100.00	10,000.00
	Russia	281,300	77.68	6,034.64
Feldspar	Ukraine	50,000	13.81	190.66
	North Macedonia	30,813	8.51	72.41
Fluorspar	Russia	6,000	100.00	10,000.00
Graphite	Russia	19,200	56.14	3,151.74
	Ukraine	15,000	43.86	1,923.67
Gypsum and Anhydrite	Russia	5,453,400	69.31	4,803.83
	Ukraine	1,386,400	17.62	310.48
	Moldova	352,500	4.48	20.07
	North Macedonia	230,029	2.92	8.55
	Bosnia-Herzegovina	122,421	1.56	2.42
	Kazakhstan	121,400	1.54	2.38
Kaolin	Albania	102,016	1.30	1.68
	Kyrgyzstan	100,000	1.27	1.62
	Russia	1,485,900	70.05	4,906.35
	Bosnia-Herzegovina	303,626	14.31	204.86
	Uzbekistan	291,814	13.76	189.23
	Kyrgyzstan	40,000	1.89	3.56
Magnesite	Russia	1,571,400	99.62	9,924.70
	Bosnia-Herzegovina	5,950	0.38	0.14
Perlite	Russia	45,000	100.00	10,000.00
Phosphates (P ₂ O ₅ -Content)	Russia	5,304,000	90.59	8,205.85
	Kazakhstan	381,200	6.51	42.39
	Uzbekistan	170,000	2.90	8.43
Potash (K ₂ O-Content)	Russia	7,155,000	98.52	9,706.15
	Uzbekistan	92,300	1.27	1.62
	Turkmenistan	15,200	0.21	0.04
Salt	Russia	6,710,000	47.39	2,245.76
	Belarus	2,904,097	20.51	420.67
	Ukraine	2,191,619	15.48	239.58
	Bosnia-Herzegovina	1,063,458	7.51	56.41
	Kazakhstan	885,717	6.26	39.13
	Armenia	155,393	1.10	1.20
	Turkmenistan	100,000	0.71	0.50
	Azerbaijan	66,699	0.47	0.22
Tajikistan	36,964	0.26	0.07	

Industrial minerals	Leading country in terms of production	Production in 2018, metric tons	Share, %	Share HHI
Sulfur	Albania	31,500	0.22	0.05
	Serbia	7,811	0.06	0.00
	Kyrgyzstan	6,000	0.04	0.00
	Russia	7,170,000	64.57	4,169.49
	Kazakhstan	3,251,250	29.28	857.33
	Turkmenistan	450,000	4.05	16.42
Talc	Ukraine	222,200	2.00	4.00
	Armenia	10,500	0.09	0.01
	Russia	150,000	99.63	9,925.88
Vermiculite	North Macedonia	559	0.37	0.14
	Russia	25,904	100.00	10,000.00
Zircon	Ukraine	21,614	74.50	5,549.52
	Russia	7,400	25.50	650.50

* production output is indicated in carats.

Since non-metallic minerals are the main components in the creation of various types of building materials, it can be assumed that the leading position by their output will allow the Russian Federation to export not only the extracted raw materials, but also finished products, which will significantly increase the state budget revenue and enhance the chances of transition to the group of countries with developing economy.

Conclusions

After analyzing the concentration of countries with economies in transition, as well as the world market of non-metallic minerals mining, we can draw several conclusions.

Firstly, the unevenness of non-metallic minerals mining in the world is extremely strong – in 2018, five countries produced almost half (49.0%) of all non-metallic minerals in the world. These countries were China (21.7%), the United States (11.6%), India (6.4%), Turkey (4.7%) and the Russian Federation (4.6%). The only country representing transition economies in this group of five is the Russian Federation, which occupies a leading position in its economic group with a 58.6% share of non-metallic mineral extraction.

Secondly, it was found that the degree of monopolization of non-metallic minerals mining around the world is quite high (the HHI index is 2071), which causes some barriers to free competition in subsoil use.

With regard to non-metallic minerals mining, a compromise may be the separation of minerals, if possible, by more environmentally friendly technologies and the definition of underground mining as prevailing. When making a decision on the development of a particular mineral deposit, new technologies and opportunities that meet the geoeconomic requirements in the region and the mining area should be taken into account.

Thirdly, it is shown that in the countries with economies in transition, as well as in the whole world,

monopolization of non-metallic minerals mining has very high values. Excluding the production of Diamonds (Gem/Ind), Fluorspar, Perlite and Vermiculite, which are mined only in the Russian Federation, the average HHI index of the remaining non-metallic minerals is 6392.

This fact necessitates the development and introduction of various mechanisms for capacity building of non-metallic minerals mining in order to reduce the dominant component of individual enterprises and to balance the market. We should pay attention to and be guided by the general elements of successful approaches to the creation of such mechanisms, for example: facilitating opportunities for foreign investment; promoting education and training for working in the mining sector; expanding cooperation of subsoil users with state authorities and local communities; developing special business incentive programs for small-scale mining, etc.

Fourth, the analysis of the unevenness of the mining industry in transition countries should take into account the long-term nature of the technological and economic changes that may occur in it. This is due to the high investment in the modernization of this industry, the payback of which takes a very long period. As a result, the HHI index of countries producing non-metallic raw materials has been very stable for many years.

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