

The shifts in the spatial structure of the world bauxite industry and Guinea's position in the industry

El cambio en la estructura territorial de la industria mundial de bauxita y la posición de Guinea en la industria

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Abstract

The article is devoted to the analyses of the development of the bauxite mining industry of the world and Guinea for the period 1950-2018. Information base there is an international statistical database of Mineral Yearbook (Metals and Minerals); International Aluminium Institute; International Council on Mining and Metals; World Mineral Production; Mineral commodity summaries. The research methodology is based on a systematic approach. Statistical, comparative and analytical research methods have been used. Shifts in the spatial organization of the bauxite mining industry were analyzed at the level of all countries and of 7 major regions in 1950-2018. The analysis showed that, the composition of the Top 10 countries in bauxite mining has completely changed. Australia, China and Guinea are the world's biggest bauxite producer (2018). The share of these three countries is more than 65% of global bauxite production. Top 10 countries account for 95% of bauxite mining in the world. The positions of Guinea have always been consistently high (since 1990, 2-3 place). Shifts in the spatial organization of this extractive industry sector at the regional and global levels are identified. It is proved that the positions of large regions in the world mining of bauxite have changed. The leading regions were Central and South America, Europe and North America in 1950. In 2018, the leaders are Asia, Oceania (Australia) and Africa.

Key words: Bauxite mining industry, aluminum, spatial structure, regional shifts, world, regions and Guinea

Resumen

El artículo está dedicado a los análisis del desarrollo de la industria minera de bauxita del mundo y Guinea para el período 1950-2018. Base de información hay una base de datos estadística internacional de Mineral Yearbook (Metales y Minerales); Instituto Internacional del Aluminio; Consejo Internacional de Minería en Minería y Metales; Producción mundial de minerales; Resúmenes de productos minerales. La metodología de investigación se basa en un enfoque sistemático. Se han utilizado métodos de investigación estadística, comparativa y analítica. Los cambios en la organización espacial de la industria minera de bauxita se analizaron a nivel de todos los países y de 7 regiones principales en 1950-2018. El análisis mostró que la composición de los 10 principales países en la extracción de bauxita ha

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cambiado por completo. Australia, China y Guinea son el mayor productor de bauxita del mundo (2018). La participación de estos tres países es más del 65% de la producción mundial de bauxita. Los 10 principales países representan el 95% de la minería de bauxita en el mundo. Las posiciones de Guinea siempre han sido consistentemente altas (desde 1990, 2-3 lugares). Se caracterizan los cambios en la organización espacial de este sector de la industria extractiva a nivel regional y mundial. Está comprobado que las posiciones de las grandes regiones en el mundo minero de bauxita han cambiado. Las principales regiones fueron América Central y del Sur, Europa y América del Norte en 1950. En 2018, los líderes son Asia, Oceanía (Australia) y África.

Palabras clave: Bauxita, industria minera, aluminio, industria, región, estructura espacial, cambios regionales, mundo, regiones y Guinea

1. Introduction

Mining of bauxite in the world is growing every year. Bauxite is the main raw material used in the commercial production of alumina and aluminum metal globally. More than 85% of the bauxite mined globally is converted to alumina for the production of aluminium metal. An additional 10% goes to non-metal uses in various forms of specialty alumina, while the remainder is used for non-metallurgical bauxite applications (Sustainable Bauxite Mining., 2018).

All stages of the aluminum industry: bauxite mining, alumina production and aluminum smelting - in fact, formed as separate industries (Rodionova, 2003; Rodionova, 019).

The volume of world aluminum smelting exceeded 60 million tons in 2018 (Mineral commodity summaries, 2019). At the beginning of the twentieth century aluminum was produced in only 6 countries. At present this metal is smelted in more than 50 states (Rodionova, 2014). However, the level of concentration of raw materials, production volumes of all stages of the production cycle, and even the consumption of this metal is still quite high. So, in total, only three states produce more than 65% of the global bauxite production. These are Australia (26%), China (24%) and Guinea. Three countries account for 75% of global alumina production. These are China (55%), Australia and Brazil. In the world smelting of primary aluminum, the leaders are China (55%), Russia and India. In total, these three countries produce over 65% of the global aluminum production (Mineral commodity summaries, 2019; Rodionova, 2019)).

Technological changes and structural changes in the global mining and manufacturing industry will be able to significantly change the industrial landscape of the world economy in the near future (Rodionova, 2003; Draper, 2013; Rodionova, 2014; Rodionova et al., 2017; Industrial Development., 2018; Industrial Development in Least Developed Countries, 2018; Industrial Landscape..., 2019).

The acuteness and unresolved many problems are the main obstacle to the socio-economic progress of African countries and a potential source of social tension in society (Deutsch & Boguslavsky, 2013; Lileev, 2015; Knierzinger, 2018). The influence of the last global financial and economic crisis on the role of Africa in modern international economic relations is characterized in numerous scientific publications (Tomberg, 2012; Roshchin, 2012; Industrial Development in Least Developed Countries, 2018)]. It is emphasized that the traditionally dependent position of African countries on the former metropolises predetermined the degree of their vulnerability to the impact of external forces and their position in the global economy. This situation persists today (Roshchin, 2013; Lileev, 2015; Khalitova, 2016; Urnov, 2019).

The conclusion about the need to attract foreign direct investment for the development and modernization of the economies of countries in Africa and their integration into the global economy is confirmed by many scientific studies (Roshchin, 2012; Roshchin, 2013; Aleshin, 2018; Khalitova, 2017). It is emphasized that since the beginning of the 1990s, foreign investors have been granted almost the same rights as to national capital

(Roshchin, 2015; Tkachenko, 2018). At the same time, a set of incentive measures are being implemented that are designed to help attract foreign investment. China has recently been very interested in developing cooperation with African countries in various sectors of the economy (Deutsch, 2010; Tomberg, 2012; Deutsch & Boguslavsky, 2013; Deutsch, 2014; Life on Mars., 2018; Tkachenko, 2018); .

Many articles are also devoted to the study of the specifics of the development of the extractive industries in African countries and of the positions of African states in the modern world economy (Afrikanskiye zapasy boksitov Roshchin, 2015; Khalitova, 2016; Industrial Development in Least Developed Countries, 2018). The issues of stability in African countries, the wealth of their resource base (diamonds, gold, bauxite, iron ore, etc.) are discussed (Afrikanskiye zapasy Boksitov., 2008; Knierzinger, 2014, Mamadou Diouma Bah, 2014). It is noted that the mining industry is significantly important to the Gross domestic product (GDP) of countries. It is this sector of the economy that is the engine of economic growth for many African countries. It is noted that performance management and higher levels of remuneration for work are two main aspects of successful management in natural resource extraction companies in Africa (Roshchin, 2013; Deutsch, 2014; Kalinina, 2019). The combination of abundant natural resources and extreme poverty in these countries is indicated as a significant factor in civil conflicts (Aleshin, 2018; Urnov, 2019). In Guinea it was possible to avoid such phenomena and processes. But it was concluded that, despite the wealth of the resource base of the country, the majority of Guineans still exists in extreme poverty (Mamadou Diouma Bah, 2014; Khalitova, 2017).

The author once of the articles (Knierzinger J.) argues that the country's economy for many decades is determined by the decisions of several transnational companies (TNCs) with a specialization in non-ferrous metallurgy (aluminum industry). For Guinea, which has reserves of bauxite of world importance, this sector of the economy is the most important (Knierzinger, 2014). The paper "Bauxite Mining in Africa" also describes the policy options faced by decision makers in Guinea. In particular, it is emphasized that the rapid development of the extractive industry in the 2000s led to the spread of social movements and forced the governments of many African countries to reform and increase the taxation of transnational corporations. Later some of these reforms were canceled (Knierzinger, 2018).

Guinea has not only bauxite reserves (Johnston et al., 2015). Thus, this country also has one of the largest iron ore deposits of the highest quality in the world. It is noted that the enormous resources of iron ore will help develop an industrialization program. This trend can create more favorable prospects for the exploitation of various mineral deposits and the economic development of Guinea (Mamadou Diouma Bah, 2014; Johnston et al., 2015; Khalitova, 2016; Cindy Wilhelm, 2020).

The purpose of this article is to analyses regional shifts in the allocation of production capacities in the world's bauxite mining industry in 1950-2018, is to characterise of the level of concentration of bauxite mining in the world , and to show the change in Guinea's position in the group of leading countries in this industry.

2. Historical view of bauxite mining industry

The bauxite mining was originated in the first third of the XIX century (in the south-east of France). This industry initially developed slowly. Gradually, aluminum found more and more use (Sustainable Bauxite Mining., 2018). World production of bauxite began to grow quite rapidly. In 1913, the production reached the 540 thousand tons, already in 1938 - more than 4 million tons, in 1960 - almost 25 million tons, in 1980 - 95 million tons, in 2006 - more than 175 million tons, and in 2018 - 300 million tons (Mineral Yearbook, 1940-1999; World Mineral Production 2013-17; Mineral commodity summaries, 2019). The number of countries, which mining bauxite, is growing. Bauxite is the main raw material for smelting primary aluminum. Although in recent years, alumina can already be considered as a raw material for smelting aluminum. Many countries now began to produce alumina for the purpose of exporting it to other countries (Rodionova, 2003; Rodionova, 2019).

The industry as a whole has undergone great changes. And at the beginning of the twenty-first century, leading countries and even regions were replaced in the list of leaders. However, still more than 90% of the world's bauxite reserves are concentrated in tropical and subtropical countries. According to estimates of the US Geological Survey, Guinea, Australia, Vietnam, Brazil, and Jamaica have the largest total reserves of bauxite. In the depths of these five countries almost 70% of the world's bauxite reserves are located. The largest confirmed reserves are held by Guinea (25% of the world total) and Australia (20%). Global resources of bauxite are estimated to be between 55 billion to 75 billion tons, which are located in Africa (about 32%), Oceania (23%) and South America (18%) (Sustainable Bauxite Mining., 2018; Mineral commodity summaries, 2019).

3. The changes of the space structure of the world bauxite mining industry

To assess structural changes of the bauxite mining industry, it is necessary to take into account indicators of a sufficiently large time interval. Therefore, the period 1950-2018 was chosen for the study. The statistics on bauxite production by countries were compared for the “key” decades: 1950, 1960, 1970, 1980, 1990 and 2000. They are the most convenient for analysis. Changes in the global bauxite mining industry were characterized in a spatial aspect (Rodionova, 2003; Rodionova, 2019). The analyses of structural changes in the bauxite mining industry of the world was carried out at the level of seven large regions. These are the integration macro-regions: 1) North America (USA, Canada, Mexico); 2) Central and South America; 3) Europe (Western and Central-Eastern Europe); 4) USSR / CIS (until 1990 - these were all the republics of the former Soviet Union - the USSR, in 1990-2018 - these were all the republics of the Commonwealth of Independent States - the CIS); 5) Asia; 6) Africa; 7) Oceania. The choice of macrogeographic regions as special objects of research is explained by the fact that states are now not the only, as before, subjects of the global economy. The information on bauxite mining by product weight was analyzed. Bauxite mining in the world corresponded to 100%. The share of individual countries in the production of bauxite was calculated from the global indicator. Data for large regions were obtained by summing up indicators for countries belonging to a particular region.

Analysis of statistics shows that at the beginning of the XX century the main extraction of raw materials for the aluminum industry was concentrated in Europe and North America (Mineral Yearbook, 1940-1999; Rodionova, 2003; Rodionova, 2019; Mineral commodity, 2019). These regions were the main producers and consumers of aluminum. In 1913, it was these two regions that accounted for 98% of the total world bauxite mining. Most of the bauxite was mined in Europe (1913 - 60%, 1938 - 32%), although by 1950 the share of the region was already less than 30%. At the same time, by 1980 France moved in terms of bauxite mining from the first place (at the beginning of the XX century) to the 4th in 1950, to the 5th in 1960, to the 6th in 1970 and to the 11th place in 1980. And in 1991 mining was completely stopped in France due to the exhaustion of resource. And the aluminum industry was reoriented to imported of bauxite (3/4 from Guinea) (Rodionova, 2019).

In the 1950s-1970s, Central and South America came in first place in terms of world bauxite mining (over 40%) thanks to mining in Jamaica, Suriname and Guyana. But the situation began to change again. In the 1970s, the share of Africa in the world bauxite mining industry began to grow (primarily due to Guinea). Australia's share also grew rapidly (especially in the 1980-1990s). But at the same time, the region of Central and South America remained of great importance up to the present (Rodionova, 2003; Rodionova, 2014; World Mineral Production 2013-17). The changes in the spatial structure of the industry are continued. The industry developed rapidly in Asia (especially since the beginning of the 2000s, primarily due to the very rapid growth of mining bauxite in China and India). Only in China, mining since 2000 to 2018 has increased by more than 8 times (from 9 to 79 million tons) (World Mineral Production 2013-17; Mineral commodity summaries, 2019 et al.). In 2018, two regions are leaders: Asia and Oceania (Australia). (Table 1: Mineral Yearbook, 1940-1999; World Mineral Production 2013-17; Mineral commodity summaries 2019; Rodionova, 2019).

Table 1
Bauxite production, by region, %, 1950-2018

Countries / Regions	1950	1960	1970	1980	1990	2000	2018
Europe	25,5	19,5	17,4	12,7	7,8	4,6	1,2
USSR / CIS*	6,4	14,8	9,0	6,9	4,7	5,7	3,4
North America**	15,8	7,2	4,3	2,0	0,5	0,1	0,1
Central and South America	43,6	46,2	41,0	26,6	24,7	25,7	15,6
Asia	7,1	6,4	7,1	6,7	10,2	13,5	34,5
Africa	1,6	5,6	5,6	16,0	15,5	11,2	16,3
Oceania	0,0	0,2	15,6	29,2	36,6	39,2	29,0
WORLD	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: (Mineral Yearbook, 1940-1999; Mineral commodity summaries, 2019; World Mineral Production 2013-17; Rodionova, 2019)

* USSR = Union of Soviet Socialist Republics; CIS = Commonwealth of Independent States.

** North America (USA, Canada, Mexico)

The analysis of the table data showed that the Central and South Asia region in the period 1950-1970 was the leader in world bauxite mining. (43.6%, 1950 and 41%, 1970). Europe occupied the second position, but its share was reduced (from 25.5 to 17.4%, respectively). And the North America region (USA, Canada and Mexico) already moved to the 7th position by 1960, and the share of this region decreased (from 15.8 to 4.3%) (Table 1).

It should be noted that bauxite production in all seven regions increased during the period 1950-1970. World production increased from 8.6 to 60 million tons (Mineral Yearbook, 1940-1999; World Mineral Production, 2019). The growth rate of production in this industry in different regions varied significantly. Thus, bauxite production in Europe increased from 2.2 to 10.5 million tons (the growth was almost 5 times); in the former USSR, it increased from 0.5 to 5.4 million tons (10 times); in North America - increased from 1.4 to 2.6 million tons (only 1.5 times); in Central and South America - increased from 3.8 to 24.6 million tons (7 times); in Asia - from 0.6 to 4.4 million tons (7 times). And in Oceania (Australia), bauxite production increased to 9.4 million tons in 1970 (i.e. 30 times) (Mineral Yearbook, 1940-1999; World Mineral Production, 2019; Rodionova, 2019).

The growth of bauxite production in most regions (excluding North America and Europe) and in the world continued in 1980-2018. But Australia was already the leader in the world (29%, 1980). The second position was occupied by Central and South America (27%). And Africa moved to the third position (16%) (Table 1). After 1990, production in Europe fell sharply (from 8.8 to 3.6 million tons). But at the same time, production of this type of raw material for the aluminum industry in Australia (from 4 to 86 million tons) and Asia (growth from 11.5 to 107 million tons) continued to increase (World Mineral Production 2013-17; Mineral commodity summaries, 2019). Significant changes in the spatial structure of the bauxite mining industry in the world are being recorded. And we see the following situation by 2018. Asia came in first place (34.5%). The second position is occupied by Oceania (Australia) - 29%. The third place is occupied by the Central and South America region (16.6%) (Table 1).

Mining of bauxite in the world has grown to 300 million tons (Mineral commodity summaries, 2019). As already noted, the leading countries have changed several times during the existence of the bauxite-mining industry (Rodionova, 2014; Rodionova, 2019). Bauxite mining volumes grew in many countries. By 1950, France was ahead of Suriname, Guyana and the United States. Since the early 1950s, the mining industry in Jamaica began to actively develop when the Canadian company Alcan completed exploration and development of the bauxite deposit and built the first alumina plant in this country (Rodionova, 2003; Kalinina, 2019). Due to the

development of the industry in the 1960s and 1970s, Jamaica became the world leader in the extraction of raw materials for the aluminum industry. Even up to 2008, Jamaica occupied the 3rd or 4th position in the world bauxite mining. After the global financial and economic crisis in 2009, the level of production and supply of Jamaican bauxite to the world market decreased significantly. Since the 1970s, leadership in this industry has passed to Australia. China was rapidly increasing its production volumes (especially since the 1990s). Nowadays, China occupies the 2nd place in the world, already catching up with Australia. (Table 2: Mineral Yearbook, 1940-1999; World Mineral Production 2013-17; Mineral commodity summaries 2019; Rodionova, 2019).

Table 2
Bauxite: world production, by Top-10 countries, by dry weight, thousand tons

Country	1950	Country	1970	Country	1990	Country	2018
Suriname	2 081	Jamaica	12 012	Australia	41 391	Australia	86 400
Guyana	1 668	Australia	9 384	Guinea	15 772	China	79 000
USA	1 369	Suriname	6 022	Jamaica	12 571	Guinea	57 000
France	806	the USSR	5 400	Brazil	9 678	Brazil	29 000
Hungary	615	Guyana	4 309	India	4 852	India	23 000
the USSR	550	France	3 051	Russia	4 320	Indonesia	11 000
Indonesia	531	USA	2 562	China	4 200	Jamaica	10 100
Yugoslavia	526	Guinea	2 540	Suriname	3 267	Russia	5 650
Italy	153	Greece	2 283	Yugoslavia	2 952	Kazakhstan	5 000
Ghana	117	Yugoslavia	2 098	Hungary	2 559	Saud Arabia	4 125
Total TOP-10 (% of the world)	97.3		82.7		89.7		94.9
World total:	8652		60027		113244		327000

Source: (World Mineral Production 2013-17; Mineral commodity summaries, 2019)

The concentration level of bauxite mining in the 10 leading countries is still very high (97%, 1950; 95%, 2018) The share of three countries is more than 65% of global bauxite production (Tabl 2). Very unstable mining is in Indonesia (bauxite production volumes either decrease or increase again, 6th position, 2018). In 2014, Indonesia, a large producer, stopped exports because of the damage that mining causes—it requires stripping vast amounts of topsoil and battering the ground beneath. Two years later, Malaysia ended bauxite mining for the same reason (Life on Mars..., 2018). Strongly reduced mining in Venezuela, Suriname, and Tanzania (World Mineral Production 2013-17; Sustainable Bauxite Mining..., 2018;). At the same time, production in Saudi Arabia arose from scratch (10th position, 2018). The quality of bauxite deposit of Ez-Zabira in Saudi Arabia is similar to the bauxite of the largest Australian field Weipa deposit. Bauxite mining in Viet Nam is growing at a very fast pace (Rodionova, 2019).

Australia, China and Guinea are the world's biggest bauxite producer. The industry in Australia is geared to serve world demand for alumina and aluminum with more than 80% of production exported (Rodionova, 2019; Mineral commodity summaries 2019).

According to estimates by the US Geological Survey, China, Brazil, India, and Venezuela are promising for the near future in the bauxite industry. The extraction of bauxite in Jamaica and Guinea is still very significant (production increased in this country from 17 to 57 million tons from 2007 to 2018) (Kalinina, 2019; Mineral commodity summaries, 2019).

The African continent is extremely rich in aluminum raw materials (bauxite). At the same time, almost 85% is in West Africa. In addition to Guinea, bauxite deposits are in Cameroon, Ghana, Sierra Leone, Malawi, Democratic Republic of Congo Mozambique, and others (but they are much inferior to Guinea). Large reserves of aluminum raw materials, the availability of cheap sources of electricity, favorable conditions for the occurrence of ore layers, the presence of nearby seaports make Africa the most promising raw material base for the aluminum industry in the world (Kalinina, 2019). The possibility of organizing large-scale mining is facilitated by the high profitability of production when using cheap labor force and low environmental requirements (low environmental standards).

Leading corporations in the world are increasing aluminum exports from Africa. Almost half of the bauxite that is mined on the continent is exported to other regions, mainly to the United States and the European Union. In recent years, exports to China have been growing (Deutsch, 2014; Johnston et al., 2015; Kalinina, 2019). But if earlier foreign TNCs had to export bauxite for processing into alumina, now it is possible to produce alumina even in African countries (Afrikanskiye zapasy boksitov..., 2008; Knierzinger, 2018). It is then exported to other countries. TNCs are trying to create a full cycle of aluminum production on the African continent (from the extraction of raw materials to the smelting of primary aluminum) (Kalinina, 2019).

4. The features of the development of bauxite mining industry in Guinea

Guinea has the largest bauxite reserves in the world. This corresponds to almost 30% of the proven global reserves (33-45% of the forecasted), as well as 73% of the forecasted and 58% of proven reserves in Africa (Kalinina, 2019). According to the estimate, the volume of world proven bauxite reserves is of 30 billion tons (2018). Guinea had reserves estimated at 7.4 billion tons (Mineral commodity summaries, 2019).

The quality of the Guinean bauxites is very high. It lies on the surface, and require minor work in their extraction by the open method. The Bokeh deposit is one of the richest bauxite deposits in the world. Produced raw materials are mainly exported (Kalinina, 2019). Bauxite mining in the country began in 1952 at Kass, but these deposits were exhausted by 1962. In 1960, the Fria International Co. (an international consortium of several Western aluminum producers, later renamed Friguia) began developing the large Fria deposit. The Guinean bauxite company (Compagnie des Bauxite de Guinée, or CBG) was formed in 1966. It is the largest bauxite producer, 49% of which is owned by the government and 51% by the international consortium for the development of reserves in Sangaridi (fr. Sangarédi - a city in the north-west of Guinea, in the province of Boke). The company began exporting bauxite in 1973 (African bauxite reserves..., 2008; Kalinina, 2019).

Guinea is in the group of leaders in world production of bauxite. From the 8th position in 1970, the country rose to the 2nd position and occupied it in the period 1980-2000. But by 2010, the country moved to the 5th position, since Australia, China, Brazil and India were ahead of Guinea (Table 2).

Most of the production capacity in Guinea is owned by transnational companies: UC Rusal, Alcoa and Alcan. These companies have such enterprises as the alumina complex "Friguia", the mining complex "Compagnie de

Bauxite de Kindia" ("CBK") (Kalinina, 2019). A typical example is the activities of the company "CBG". 51% of whose shares are jointly owned by "Alcoa" and "Alcan" (Kalinina, 2019).

There is only one aluminum producer in Russia - UC Rusal. Russia is a leading exporter of aluminum and its alloys in the world. In recent years, the country exports up to 85% of all smelted aluminum and plays an important role in world trade in non-ferrous metals. UC Rusal exported sold 3.9 million tons of metal. At present, Russia accounts for about 20% of the world exports of aluminum (Popavshiy pod sanktsii., 2018; Rodionova, 2019).

African bauxite reserves are attracting the attention of Russian aluminum producers. In Guinea, UC Rusal is represented by three operating enterprises - an alumina refinery in the city of Fria (privatized by UC Rusal in April 2006), a bauxite mining mine (operated by the UC Rusal since 2001), and the construction "Company Guyenne de Genie" ("CGG"). In 2018, UC Rusal commissioned a mine with a capacity of 3 million tons of bauxite per year at the Dian-Dian deposit in the Republic of Guinea. The Dian-Dian deposit is estimated to have proven reserves of 564 million tons. The license for its development has been owned by UC Rusal since 2001 (Popavshiy pod sanktsii, 2018). Dian-Dian is a long-term project, a long-planned investment by a Russian corporation.

In order to invest in the development of the aluminum industry in Africa, UC Rusal acquired the Alcon plant in Nigeria for the production of primary aluminum. In 2006, UC Rusal acquired a 77.5% stake in the Nigerian company Aluminum Smelter Company of Nigeria ("ALSCON"). Now, raw materials and alumina from Guinea can be imported directly. In this country aluminum will be produced for subsequent export. This is an important step in the development of a developing African market. It is also interesting to note the fact that aluminum plants in Mozambique and South Africa prefer to purchase the necessary raw materials from producers in Australia and Brazil, despite the presence of bauxite and alumina production facilities in Guinea (Kalinina, 2019)

The USA was the driver of the global aluminum market in the early 2000s. This country was reoriented from the purchase of alumina to the import of bauxite as the main raw material for the smelting of primary aluminum. Somewhat later, China made the same turn. For many years Guinea has been the largest exporter of aluminum ores. Indonesia is almost completely focused on the Chinese market and exports low-grade raw materials. Guinea remains the key supplier of bauxite to the world market (Knierzinger, 2018).

The impacts of bauxite mining may be positive and negative. That is, while bauxite mining may contribute to development, it may also create or intensify local socio-environmental problems, requiring specific mitigating actions. Guinea could in theory industrialise if it moved to processing bauxite instead of exporting it raw (Cindy Wilhelm, 2020)

5. Conclusions

The geography of the aluminum industry of the world is becoming more complex every year. In recent years there have been significant organizational and territorial changes in all stages of the production cycle of this non-ferrous metallurgy industry (in the bauxite mining industry, alumina production and aluminum smelting).

A high level of concentration of production at all stages of the production cycle in the aluminum industry remains. In the mining of bauxite, only three countries of the leaders account for over 65% of the world total. The TOP-10 account for 95% of the world total bauxine production. Compared to 1950, the composition of the countries leading in the extraction of bauxite has changed completely. At present the leaders are: Australia, China and Guinea. Guinea's positions in the world bauxite industry have always been consistently high (from 1990s, 2-3 position in the world, with a share of about 15% of world production).

There also have been significant regional changes in space structure of the bauxite industry. Asia took the first place, gradually pushing aside even the recognized leader Australia.

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