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Article

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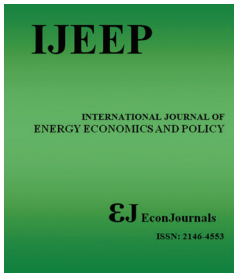

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BRICS on the African Energy Market: Current Situation and Prospects for Mutual Cooperation

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ABSTRACT

The African energy market is one of the developing markets in search of foreign investments. The traditional investors, the EU and the USA, follow a policy inconsistent with the current situation – the emergence of new competitors, the BRICS countries. The purpose of the article is to assess the influence of the BRICS countries on the African energy market and to identify the extent of this influence. To this end, the authors have developed the presence index composed of the main indicators of the country's participation in the African energy market. The results are then interpreted, in order to reveal the most effective strategy of the BRICS energy cooperation on African issues. The authors have identified the main specific features of the energy market in Africa and the main characteristics of the energy strategies proposed to African countries by the main players on the energy market (including the EU and the USA). This allows to develop a strategy for African countries regarding the development of their national markets. The main hypothesis of the article is that the African economies should diversify their portfolio of energy sector investments, but introducing only those strategies that contribute to the growth of their economy.

Keywords: Africa, Energy, BRICS, Strategy, Green Energy, Development
JEL Classifications: O55, Q40

1. INTRODUCTION

Africa is a significant and growing market of goods and services. Several regions (e.g., North Africa and South Africa) are developing at high pace. The integration processes in Africa are also changing rapidly – the latest changes in the African Union lead to the better economic and financial conditions for cooperation on the continent. As a result, the African economies tend to develop faster and require new approaches to the economy and energy supply.

The traditional situation on the African energy market is dubious. The energy resources are significant, both developed and potential, when the energy supply is far from enough for the needs of the population of most African countries, especially in the central part of the continent (Powanga and Giner-Reichl, 2019). The most developed countries in the northern and southern parts of Africa face economic development problems due to the energy shortage.

In this context, the development of energy infrastructure at all its stages (extraction of resources, generation of energy, distribution between corporate and private consumers) is one of the key goals for African countries in general. This is one of the regional problems that unites all of them. Today, the development of energy infrastructure is an expensive task, therefore, most of African countries need financial support to implement projects in this area. The key directions of energy development determine the fact that most of the new energy infrastructure, which construction is financed by foreign investors, relates to the new generation energy: green energy and nuclear energy, including wind, solar, geothermal and tidal energy generation and biofuels.

Our research is dedicated to identifying the economic efficiency of these energy sources in Africa and evaluating possible financial sources to attract investments in energy development projects in Africa. The authors focus on the cooperation with integration institutions, such as BRICS and the belt and road initiative (BRI) and its affiliate structures (e.g., Asian Infrastructure Investment Bank). Traditional players in the African energy market are also studied.

2. LITERATURE REVIEW

The cooperation of BRICS with the African economies in energy sector is covered in a number of articles, they focus on the cooperation from the perspective of one country.

Hinga et al. (2013) give a general analysis of the Chinese energy initiatives in African countries and prove that the cooperation in energy sector with non-African countries is mutually beneficial for both sides. Powanga and Giner-Reichl (2019) present data on the foreign multinational companies (MNCs) on the African energy market and propose the approach for analyzing the situation on energy market through the access to energy data. The general tracks of China – Africa cooperation are described in (Looy, 2006).

Olivier and Suchkov (2015) focus on the political interests of Russia in Africa and address to the Russian economic and, consequently, energetic presence on the continent. We have transformed the hypothesis put forward in (Olivier and Suchkov, 2015; Fidan and Aras, 2010) into a new dimension of Africa–BRICS energy cooperation.

Afionis et al. (2016) specify the main areas of energy cooperation between Brazil and Africa and emphasize the Brazilian strategy of conquering the African markets. Furthermore, they state that the energy exports of a country depend on its energy specialization, and allow us to make conclusions on the specialization of the BRICS countries in energy sector.

Our research, including analysis of the African energy market key players, is based on data from (The African Development Bank Group, 2011; Alozious, 2014; Schneidman and Wiegert, 2018) and statistics from the World Bank (2019a, 2019b) and Energydata.info (The World Bank Group: Arderne, 2017).

3. METHODOLOGY

Our research questions are focused on three main themes:

1. What is the current situation on the energy market in Africa?
2. How can we assess the presence of a non-African country on the African energy market?
3. What should BRICS and African countries do to achieve the most effective cooperation?

In order to answer these questions, we have statistically assessed the supply and demand of energy with respect to the alternative energy share in Africa and identified the main specific factors affecting the development of the African energy market.

Next, we have conducted statistical analysis of the two main factors:

- The extent of influence of a country on the African market (the number of African countries where this country is present);
- The volume of foreign direct investment (FDI) of this country in the African energy sector.

This was done with the use of frequency analysis of the projects in Africa for China and by the data from the FDI reports for Russia and Brazil. The correlation between the BRI and the Chinese FDI is to be assessed based on the frequency data analysis of the Chinese-financed projects in Africa and the countries participating in the BRI.

The further analysis is based on the presence index (II), developed by the authors for the assessment of the influence of a country on the African energy market (1).

$$II = \frac{FDIr}{CT} + \frac{FDI_{Af}}{FDI_T} + Q_{MNC} \quad (1)$$

where *FDIr* is the number of countries receiving *FDI* from the studied country, *CT* is the total number of African countries – 54 (UN, 2019), FDI_{AF} is a volume of the country's investments in Africa, FDI_T is the total volume of *FDI* outflow from the country, and the Q_{MNC} is the number of the MNCs, which originate from the studied country and operate on the African energy market. We propose the following approach for estimating the results:

1. II <5 – the presence of a country on the African energy market is low (no specific instruments of proliferating the country's presence, no energy cooperation with the majority of African countries)
2. 5 <II <15 – moderate presence
3. 15 <II <40 – high presence. Even if the index is mainly comprised of the MNCs, and the FDI share and volume in Africa are low, the country has the opportunity to develop its cooperation with Africa due to the high influence of its corporate sector and, as a result, the influence of its financial institutions on African countries
4. 40 <II – extremely high presence. The country considers Africa as one of the main partners in energy cooperation and trade and develops trade with Africa not only in energy sector, but also in other goods and services. This leads to the institutional exchange and the establishment of strong ties between the country and African countries.

Finally, we have studied the formation of the energy market based on the identified specific factors, the influence of other countries and the identified pros and cons of the strategies they proposed for African economies.

4. RESULTS

4.1. The Current Situation on the African Energy Market

The current situation on the African energy market remains difficult. The distribution of key industries and wealth in Africa

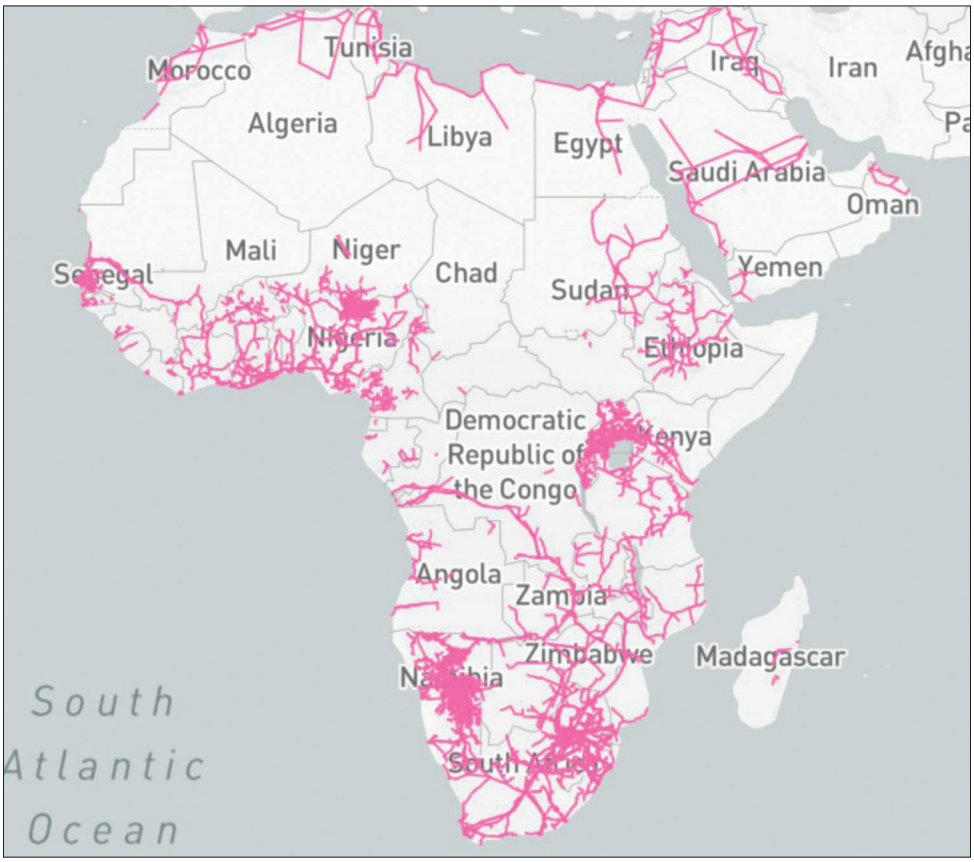
is unequal; due to this, sub-Saharan Africa is one of the poorest regions in the world. In addition, the prospects of the development of the region in question are rather murky without receiving help from other countries, since the risks of international cooperation with the region are extremely high (EXX Africa, 2019), and the infrastructure is not developed. All in all, this leads to the low development of energy market, which is undersupplied, causing the cycle of poverty – without energy, no industry can develop in the region.

The similar situation is met in Central Asia, however, there are several significant differences. In Central Asia there are several powers fighting for dominance, such as China, India and Russia, which have a rich heritage of previous partnership and exploit existing electric grids (built by the USSR and its allies in the region) as the basis for the future development of the energy infrastructure. The most developed African countries, such as South Africa, Namibia, Egypt, Morocco, Tunisia, Libya and Kenya are mainly concentrated on their internal problems and do not tend to provide massive help (financial and material) to their neighbors. As a result, there is no interconnected energy grid in Africa (Figure 1).

This leads to a low share of the population with access to electricity (it equally refers to the share of enterprises). The worst situation, as we can conclude from Figure 1, is in Central Africa (the region also known as sub-Saharan Africa) (Figure 2).

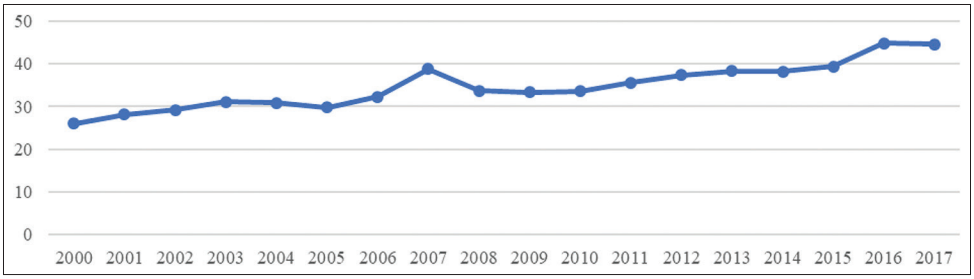
The microenergy facilities, which are mainly represented by alternative energy generators in Europe (Agora Energiewende, and Sandbag, 2019; SETIS, 2013), may provide a significant change in the situation in Africa, allowing its countries rich in solar and

Figure 1: Africa – electricity grids map



Source: (The World Bank Group: Arderne, 2017)

Figure 2: Share of population with access to electricity (%)



Source: Created by the authors, based on (World Bank, 2019a)

wind resources (Global Wind Atlas, 2019; Global Solar Atlas, 2019) and generally possessing significant land resources enough to dislocate the named facilities, to become self-sufficient in energy resources. However, due to the poverty in the region, the share of alternative energy in energy generation in Africa is low (Figure 3).

Hence, the situation around the development of energy infrastructure in Africa allows to identify several important factors, which form a general view of the future of the industry on the continent:

1. The price of energy and its generation should be extremely low to satisfy the needs of the population, the majority of which live below the poverty line (85% of Africans live on less than US$5.5 per day (World Bank, 2019b), while the needs of business, which is primarily aimed at foreign demand (Rocha and Freund, 2010), are less severely constrained in terms of price
2. The energy distribution infrastructure should be bidirectional, both to and from consumers
3. The electric grid should be developed in such a way that it connects the existing infrastructure of the more developed economies of the region with the less developed, creating a single African electric grid; this will lead to a closer integration of African countries and stimulate the mutual investment process
4. The supply must be stable, so national markets completely switched to green energy cannot exist
5. Financial resources for the construction and maintenance of energy infrastructure should come from abroad, both from corporate and institutional investors.

These factors lead to the necessity to estimate institutional and corporate investments in Africa's energy sector.

4.2. The New Paradigm of Energy Strategy of the BRICS Countries in Africa

The data from (Brautigam et al., 2017) clearly demonstrate the high share of Chinese investment in financing development of the energy sector in Africa. It is crucially important to understand the interconnection between Chinese FDI, development of African countries' economies and the integration initiatives promoted by China (Figure 4).

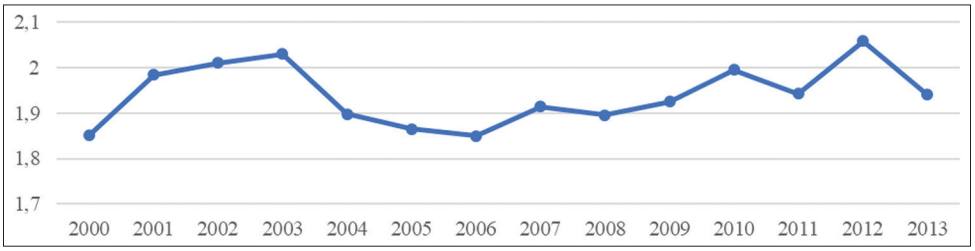
It is important to notice that Chinese investment in the African energy system does not correlate with the countries involved in the BRI (highlighted in red in Figure 4), which would support the hypothesis put forward in (van de Walle, 2018), as it seems that African countries have other points of interest to China, rather than logistic. At the same time, it should be noted that China develops both green energy and conventional energy in Africa (namely coal), since there is a clear view of higher costs of alternative energy.

In addition, China has a positive dynamic of FDI in Africa (Figure 5).

However, Africa is not one of the key recipients of Chinese investment. Despite the stable growth, the share of the FDI in Africa in the Chinese global FDI does not exceed 4% (3% in 2015 (China Africa Research Initiative, 2017).

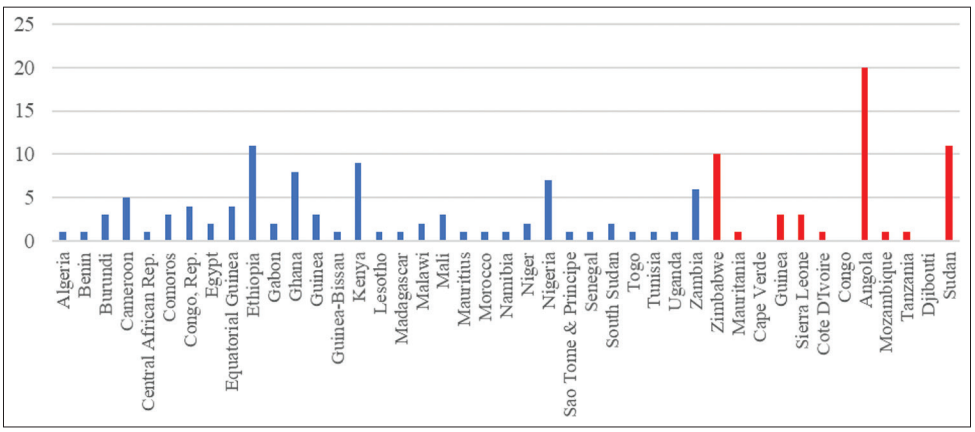
The second important actor seeking to maximize its presence in Africa is Russia. The main reason for this is that the European

Figure 3: Share of alternative energy (% of total energy generation)



Source: Created by the authors, based on (World Bank, 2019a)

Figure 4: Number of China-financed energy projects in Africa by country



Source: (Chimbelu, 2019; AIDDATA, 2016)

and American dominance in the studied countries is falling. The reason for such decrease lies in the low efficiency of traditional development institutions of the current financial system. These factors contribute to expanding opportunities for new investors to penetrate the African energy market.

In this context, Russia offers another energy product – nuclear energy. The only project being implemented is in Egypt (Burke, 2019), and it should be noted that the overall investment opportunities and areas of interest for Russia in the African energy sector are much narrower than for China (Figure 6 presents the seasonal structure of Russian investments with annual peaks in IV quarter, which means the dominance of bonds and financial instruments, but not FDI). In this regard, there is no need to indicate whether investments are related to cooperation in energy or other area, since they are scarce and produced mainly by a small number of companies.

The depth of the Russian presence in Africa is small, the only 4 countries represented in the Russian Central Bank's balance of FDI are shown in Figure 7.

Brazil is also interested in Africa's energy sector, but concentrates on the biofuels as it specializes in them (Afionis et al., 2016). The future of biofuels in Africa is uncertain because of the lower density of forest resources than in Brazil, although mobility remains the focus, biofuels are one of the best ways to pursue an innovative energy trade policy and development in Africa. However, Africa remains outside the main focus of Brazil in investments (Figure 8).

Due to the scarce data on Brazil's energy cooperation with Africa, we have to rely on the data by African Development Bank and state that Brazilian energy companies are present in at least five African countries (The African Development Bank Group, 2011) – Mozambique, Angola, Congo, Nigeria and Ghana.

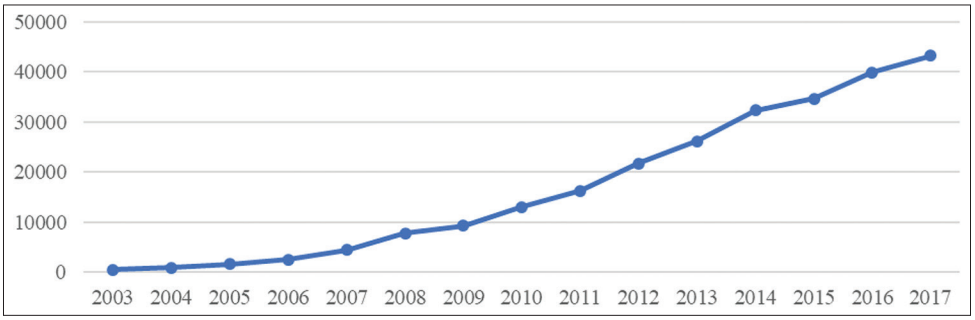
India does not participate in an active race for Africa's energy sector, though it is one of the major consumers in the BRICS energy market, so it should not be put aside.

Another important participant in the energy dialogue between Africa and BRICS is South Africa. It faces several serious problems with energy supply, so it receives extensive financing from its BRICS partners and from the BRICS New Development Bank. In addition, according to data on energy projects, South Africa cannot be considered as an energy partner for Africa, as it is the main recipient of investments.

4.3. The Presence Index Data and the Comparison of Energy Strategies

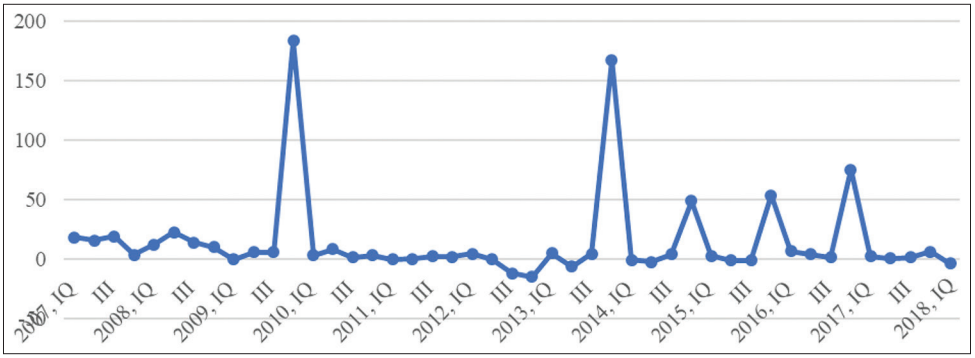
The African continent is a significant developing market and is the focus of developed economies as one of the drivers for their development. Despite the fact that the article addresses the BRICS role on the African energy market, we cannot but compare the BRICS countries involvement in the energy cooperation and the role of traditionally strong players in Africa. These players are the USA and the EU, their interactions with China in Africa are described in (Alozious, 2014), allowing to identify key external players on the continent, still nearly no energy cooperation aspects were covered.

Figure 5: The volume of Chinese investment in Africa (total US$, mln)



Source: Created by the authors, based on (China Africa Research Initiative, 2017)

Figure 6: The dynamic of Russian investments in Africa

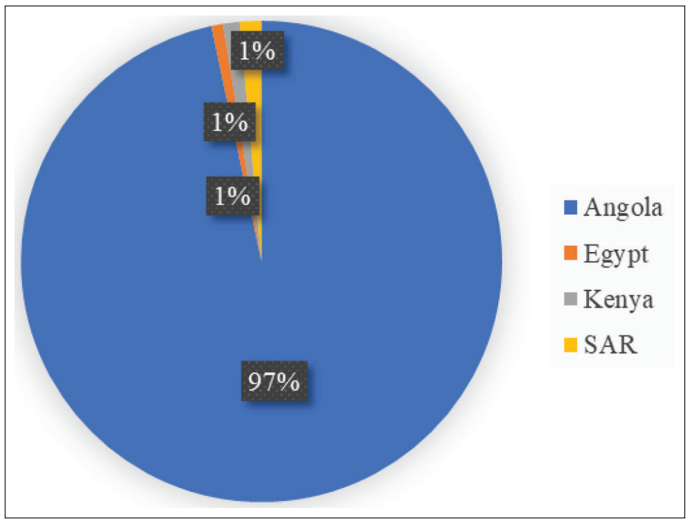


Source: Created by the authors, based on (Central Bank of the Russian Federation, 2019)

In order to determine the extent of penetration of the named countries in the African energy sector, we have calculated the presence index of the BRICS countries and compared it with the EU and the USA presence index (Table 1).

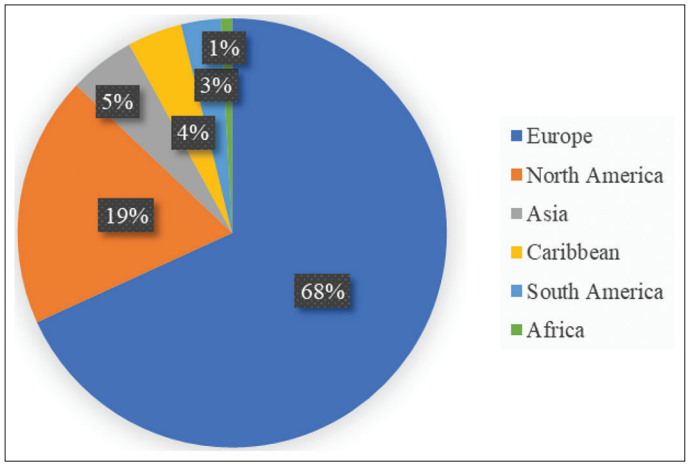
Table 1 clearly illustrates the current state of the African energy market by its main foreign players. The index values show that the Chinese influence in Africa has overgrown the American, while the EU's position is still very firm. For Russia and Brazil, the scenario is rather negative. Their presence index value is low, so they cannot afford to withstand the significant competition from other parties in the region.

Figure 7: The distribution of Russian investments in Africa by country in 2017, %



Source: Created by the authors, based on (Central Bank of the Russian Federation, 2019)

Figure 8: Brazilian FDI by region in 2017



Source: Created by the authors, based on (Banco Central do Brasil, 2018)

The African economies are searching the most beneficial strategy, which will best influence their institutions. The strategy for African countries should include their main goal – economic development. Nevertheless, in order to develop a better strategy for African countries, it is necessary to determine the specifics of energy cooperation strategies (Table 2).

These specific aspects of energy cooperation determine the choice of a strategy adopted by African countries. The choice is highly dependent of the economy development of a country; however, African economies cannot be clearly divided, especially taking into account the fact that the majority of the countries discussed, as it is shown in Figures 4 and 6 and in (Powanga and Giner-Reichl, 2019), develop combined strategies.

5. DISCUSSION

The results of the study demonstrate that despite the high efforts to gain dominance in African energy sector, China is far from this. Its main competitor is the EU, whose overall presence index almost double that of China.

The BRICS countries overall index equals to 42, which is close enough to the EU's indicator, and nearly doubles that of the United States. The data show a trend of rapid growth, which makes the EU countries' position in Africa weaker (not to mention the position the US, which for now is the largest sole investor in Africa – the largest national economy investor). These trends lead to the creation of a number of opportunities for the BRICS countries, which are described below. The BRICS countries possess front-end technologies for energy production, so their main opportunities in Africa are related to the previously revealed specifics of the energy sector of the continent, so the energy generation in Africa must meet the criteria: (a) cheap, (b) mobile, (c) contributing to the development of the least developed countries (LDCs), (d) externally financed.

The first opportunity is the division of labor and deepening the specialization of the BRICS countries. We have already mentioned that the three BRICS countries divided the African energy market: China has a dominant position in the green energy and coal sectors, Russia in nuclear energy, Brazil in biofuels. It may seem that these countries have a covert deal strategy to conquer the African energy market, however, it is much more likely that, due to the specialization of their domestic energy sector, they provide more competitive products in these areas. Hence, it is necessary to

Table 1: The presence index results

Country	Number of FDI recipients	Share of FDI in Africa	Number of multinational energy companies in Africa	Index value
China	22	4	4	30
Russia	4	1	1	6
Brazil	5	1	0	6
USA	20	1	3	23
EU (28)	18	29	8	55

Source: Authors' calculations, based on (BEA, 2018; Powanga and Giner-Reichl, 2019; Seabra, 2014)

Table 2: The comparison of the energy strategies in Africa

Aspect	Green energy	Nuclear energy	Biofuels development	Conventional energy sources development
Price and financing	High, external	High, external	Medium, both external and internal for the most developed African economies	Medium, external due to high return rate – no competition will be allowed by the multinational companies
Allowed risks	Moderate risks	Extremely low risks	Moderate risks	Low risks
Main partner	China	Russia	Brazil	BRICS, the EU, the USA
Economic effect	Highly positive	Moderately positive	Moderately to insignificantly positive	Insignificantly positive to insignificantly negative
Cooperation strategy	Tight cooperation, BRI integration	Fragmented cooperation, potentially free-trade zones with EAEU	Fragmented cooperation, potentially FTZs with Brazil and Mercosur	Tight cooperation with a powerful political element

Source: Created by the authors

stimulate this specialization for the BRICS countries in order to gain more positive effects from international energy cooperation.

The second opportunity for BRICS in Africa is developing a cooperative strategy based on the financial resources of Chinese multinational banks that actively operate in African countries (Executive Research Associates, 2009) within the framework of the BRI. In addition to these resources, it is reasonable to implement special development projects of Asian development banks for the LDCs in Africa, for instance, the Asian Infrastructure Investment Bank may create a fund to support energy initiatives in Africa.

The third opportunity for BRICS in Africa is the consolidation of LDCs in Southern Africa around South Africa and their interconnection by power grids centralized in South Africa. Thus, the BRICS countries will support the development of the region and, in addition, pursue their economic and political interests on the continent. This will additionally allow to deter the influence of the USA and the EU in southern Africa even more.

Another important issue is whether cooperation with the BRICS countries is mutually beneficial for African countries. Table 2 demonstrates several disadvantages and barriers to cooperation, such as dependence on external financial resources and political components of cooperation. Today, the African economies do not enjoy stable and fast growth, the social institutions in most of them (except for the North Africa economies, Tanzania, Kenya and South Africa) are extremely weak and undeveloped. Hence, the only way to figure out a sustainable growth path for African countries is to accept foreign aid. The energy sector is one of the most conducive to stimulating economic development; therefore, it is a development priority for African countries. In this regard, the only way for the African economies is to accept one of the energy cooperation strategies proposed above. At the same time, in order to minimize the negative impact of the risk factors, African countries should consider the following measures:

1. At this stage of economic development of African countries and economic integration on the continent, the cheaper the resource, the better. The pursuit of the green energy should be economically better for the African economy, if adopted. Otherwise, it is better to choose the conventional energy sources, despite their negative impact on environment. This will allow better stimulation of economic growth, and, as a result, alternative energy will be adopted by the country after a while, but will not harm its development
2. Countries with high tourism income and relatively low energy demand from industry, such as Kenya, Tanzania, Morocco, etc., should stick to green energy, as this allows them to preserve their natural potential and resources
3. Countries with a high share of industry in the economy, such as Egypt or South Africa, have better prospects for developing nuclear energy cooperation, as this allows them to gain access to stable (compared to green energy) and powerful energy sources without massive investments in green energy infrastructure
4. LDCs in sub-Saharan Africa and in the central regions of the continent should primarily focus on creating energy infrastructure and grids, when the countries neighboring countries with developed energy grids should focus on energy generation, as they will be interconnected with their neighbors by energy trade, in such way modernizing and constructing their energy grids
5. The integration opportunities provided by the BRI and the free trade zones are the best way to start the development process in the energy sector – the majority of Chinese investment in Africa under the BRI are made in ports (Chimbelu, 2019), which in turn require energy supply, therefore, FDI in energy sector is inevitable. In order to stimulate them, it is necessary to create a secure basis for the future cooperation with Chinese entities and avoid creating new risks for Chinese companies.

Nevertheless, these recommendations are only the first step towards the development of the energy market on the African continent, and it is inevitable that after a while it will be fragmented and its main centers will be located in regions with the highest density of energy infrastructure (Figure 1). In addition, competition for the African energy market will continue to grow, creating new risks associated with promoting the interests of leading players in the African market and the division of the spheres of influence between them.

6. CONCLUSION

The current situation on the African energy market is uncertain. The continent is not monolithic – the more developed countries

lack the energy, but are able to develop their energy infrastructure, while the LDCs in Africa (which are the majority of African countries) are not able to develop their economies due to the lack of financial resources for the energy sector development.

The unevenness of energy grids and production distribution in Africa lead to negative consequences for all countries of the continent, forming specific limits for the development of the energy sector. These limits can be overcome only with introducing systematic external financing.

The traditional players of Africa's energy market are giving way to new players entering the African energy market and using a fast penetration strategy. These players are the BRICS countries, which offer mutual cooperation to African economies in the energy sector. They offer financial resources and new opportunities for economic development. Nevertheless, the strategies pursued by these countries carry a number of risks for the economies of African countries, for instance, the wrong choice of development strategy may lead to the negative long-run effects for the economy.

The Chinese presence in Africa has been growing recently and is the most widespread among the BRICS countries; still the EU has much stronger ties with African economies and the energy sector. However, the overall presence of the BRICS countries in Africa is significantly higher than only the Chinese one. To achieve the best results in the energy cooperation with Africa, the BRICS countries should follow a common strategy for the African market development, which will benefit both the investor and the recipient country. This strategy should be based on the division of labor, based on the most competitive areas of the energy sector of the BRICS countries in Africa (green energy for China, nuclear energy for Russia and biofuels for Brazil).

African economies should also pursue the general strategy of the development aimed at the choice of the most economically effective energy development strategy. The ongoing competition between the major powers on the region's energy market will contribute to better conditions for the African economies in this area.

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