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The railway transport development in the new BRICS countries

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ABSTRACT With effect from January 1, 2024, Egypt, Ethiopia, Iran, Saudi Arabia and the United Arab Emirates have become new members of the BRICS. Today, BRICS is an association of 10 countries that account for about 42 % of the world's total population (2.8 billion people) and 27 % of the global GDP.

According to experts, a major focus is made on the association's prospective economic potential and its expected share of the world's economy. What seems interesting in the context of the continued economic growth is the research in the field of development of the transport industry in the BRICS countries.

Earlier, the BRICS Transport journal (Issue No. 2 (4), 2023) presented an overview of the state and progress of high-speed railway transport in the five BRICS founding countries (Brazil, Russia, India, China, and the Republic of South Africa). In connection with the expansion of the transnational association, it is proposed that the research should be extended. The authors used both findings of scholarly works in the field of railway transport development, and BRICS summit reports and presentations available on Russian and foreign information platforms.

The paper analyses the development of railway transport in the countries that have joined BRICS recently (Egypt, Iran, the United Arab Emirates, Ethiopia, and Saudi Arabia), in particular, the prospects of development of express and high-speed rail services.

KEYWORDS: BRICS countries; Brazil; Russia; India; China; South Africa; Egypt; Iran; the United Arab Emirates; Ethiopia; railways; network; routes; length; speed; rolling stock; express and high-speed railways

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Обзорная статья

Развитие железнодорожного транспорта в новых странах БРИКС

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АННОТАЦИЯ С 1 января 2024 г. к межгосударственному объединению БРИКС присоединились новые страны: Египет, Эфиопия, Иран, Саудовская Аравия и Объединенные Арабские Эмираты. Сегодня организация насчитывает 10 стран, на долю которых приходится порядка 42 % населения планеты (2,8 млрд человек) и 27 % мирового ВВП.

По мнению экспертов, перспективы экономического потенциала объединения и прогноз его доли в мировой экономике — объект повышенного внимания. В условиях дальнейшего экономического роста интересными представляются исследования в области развития транспортной отрасли в странах БРИКС.

Ранее в журнале «Транспорт БРИКС», 2023, № 2 (4) был приведен обзор состояния и развития высокоскоростного железнодорожного транспорта в пяти странах-основателях БРИКС (Бразилии, России, Индии, Китае и Южно-Африканской Республике). В связи с расширением межгосударственного объединения предлагается дополнить исследования. Использованы результаты научных трудов в сфере развития железнодорожного транспорта, отчеты и доклады по итогам проведения саммитов БРИКС, опубликованных на российских и зарубежных информационных платформах.

Выполнен анализ развития железнодорожного транспорта в присоединившихся к БРИКС странах: Египте, Иране, Объединенных Арабских Эмиратах, Эфиопии, Саудовской Аравии, в том числе рассмотрены перспективы развития скоростного и высокоскоростного железнодорожного сообщения.

КЛЮЧЕВЫЕ СЛОВА: страны БРИКС; Бразилия; Россия; Индия; Китай; Южно-Африканская Республика; Египет; Иран; Объединенные Арабские Эмираты; Эфиопия; железные дороги; сеть; маршруты; протяженность; скорость; подвижной состав; скоростные и высокоскоростные железнодорожные магистрали

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INTRODUCTION

On August 2023, the 15th BRICS Summit took place in Johannesburg, South Africa. The heads of the member countries agreed to admit new members to the union[1] (*Fig. 1*).

The President of Russia Vladimir Putin put forward an initiative to create logistics and transport corridors between the member countries[3]. The key role, as noted by the President, is played by the development of railway transport as the most environmentally friendly, safe and reliable mode of transport. This demon-

Fig. 1. BRICS countries (after the 15th BRICS Summit, August 22–24, 2023, Johannesburg, South Africa)[2]

[1] The Russian National Committee on BRICS Research, Russia. URL: https://www.nkibrics.ru/pages/summit-docs
[2] BRICS. URL: https://infobrics.org
[3] BRICS geography grows in scale// 1520 International. URL: https://1520international.com/content/2023/sentyabr-2023/geografiya-briks-rastyet-v-masshtabakh-/

strates the relevance of the topic chosen by the authors and the need for further research on the development of the railway industry in the modern economic and political contexts.

MATERIALS AND METHODS

The authors have reviewed the findings of research by Russian scholars in the field of railway transport development and used reports and presentations published on foreign platforms, as well as web resources that cover the outcomes of BRICS summits.

FINDINGS

This paper presents an analysis of the development of railway services in the new BRICS member states: Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates.

Egypt

According to the International Union of Railways (UIC), as at the end of 2023, the total length of 1,435 mm railway track in use was 6,679 km, of which just a little more than 3,000 km had two or more tracks; the railways had no electrified sections [1, 2]. In recent years, the land of pyramids has led the region in terms of railway construction (*Fig. 2*), outrunning the United Arab Emirates (in the context of the new BRICS members in question).

According to the Global Data Report, in the 2010s, investment in railway projects amounted to USD 50 billion, with 45 % of that being accounted for by financing of projects under construction [3, 4].

In May 2022, the National Authority for Tunnels of Egypt signed a contract with Siemens Mobility, Orascom Construction and Arab Contractors to build three new high-speed railways with a total length of 1,985 km [3, 5]. The design of Siemens Mobility trains intended for Egypt is shown on *Fig. 3*.

The Suez Canal on Rails project is the first high-speed railway line to operate three main routes with trains running at a speed of up to 250 km/h. The 660 km network will connect cities between the Mediterranean and Red Seas extending to the border with the Republic of Sudan. Specifically, the high-speed line will con-

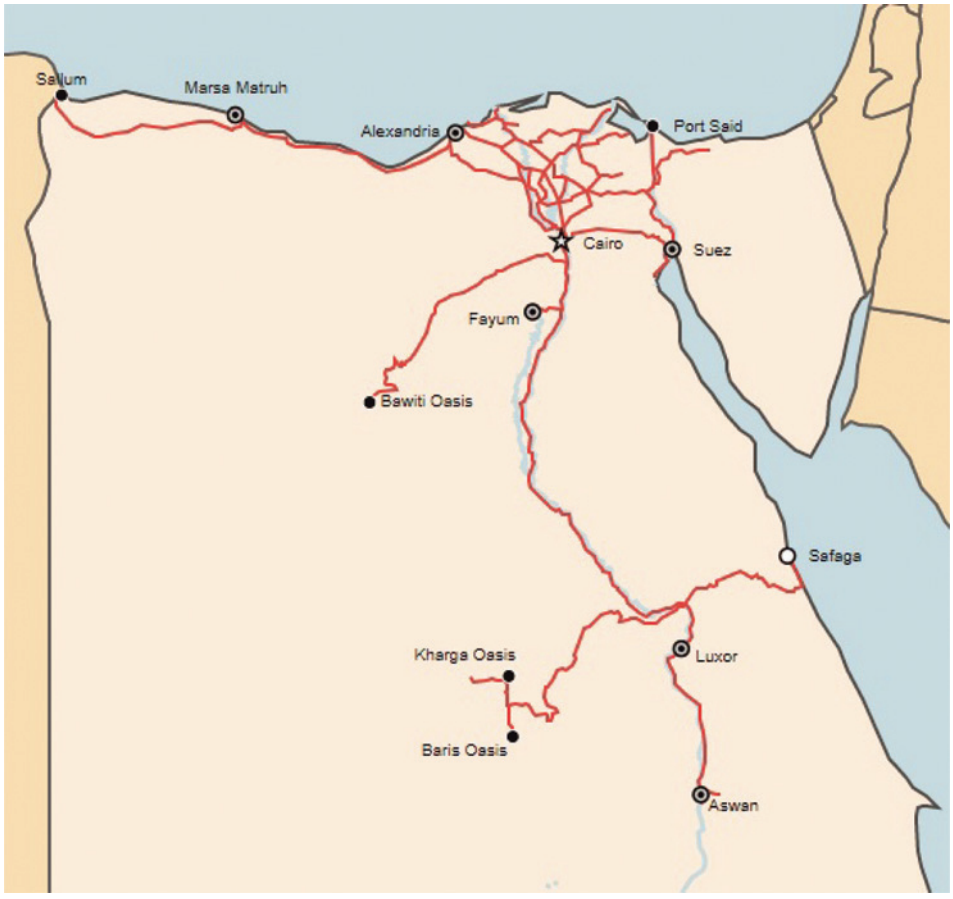

Fig. 2. Railway network in Egypt[4]

[4] Egyptian National Railways. URL: https://ru.abcdef.wiki/wiki/Egyptian_National_Railways

Fig. 3. Design of Siemens Mobility trains for Egypt [5]

nect Mersa Matruh on the Mediterranean coast with Ain Sokha on the Gulf of Suez of the Red Sea. It is expected that the future line will operate three types of trains: those running with few stops (express trains); traveling at an average speed of 230 km/h; regional passenger trains (up to 160 km/h); and goods trains (up to 120 km/h). The contract to build the Suez Canal on Rails will continue for 15 years (design, construction and maintenance of rolling stock). As predicted by experts, the first high-speed railway will carry about 30 million passengers per year and travel times will be reduced by two times [3].

The second high-speed line of 1,100 km will connect large cities and industrial centres along the Nile River in the south of Egypt [3]. The high-speed line will connect Cairo with Qena, Luxor, Aswan and Abu Simbel near the border with Sudan. The third high-speed railway of 225 km will connect Qena with the resort of Hurghada and the port of Safaga on the Red Sea.

The construction of the high-speed railway network in Egypt will require more than 40,000 new jobs [4]. It is expected that when all the three high-speed lines are commissioned, 90 % of the population in Egypt will be able to use the new, modern and safe mode of transport. The transition to railway transport with a fully electrified network will considerably reduce carbon dioxide emissions, contributing to overcoming the country's overall air pollution problem.

Ethiopia

The development of transport in African countries is a priority for economic growth. Ethiopia is one of the most rapidly growing economies in the region [6]. According to the International Union of Railways (UIC), as at the end of 2023, the total length of railway lines in use was 754 + 790 = 1,544 km, of which 146 km had two or more tracks, and 754 + 778 = 1,532 km of railways have been electrified [2].

In 2010, the Government of Ethiopia decided to create a new National Railway Network of Ethiopia (*Fig. 4*).

The Addis Ababa – Djibouti railway line in Ethiopia is owned by its Government via a state-owned company, Ethiopian Railway Corporation (ERC). Until 2023, the railway line was operated by Chinese companies, China Railway Group Ltd. and China Civil Engineering Construction Corp. From the beginning of 2024 onwards, the operation of the railway will be taken over by Ethio – Djibouti Standard Gauge Rail Transport S.C. The first new 392 km long line will connect Awash and Woldia. The second new 216 km long line will connect Woldia and Mekelle.

On September 21, 2023, the One Belt – One Way project marked its fifth anniversary. Africa's first electrified railway line connected the capitals of Ethiopia and

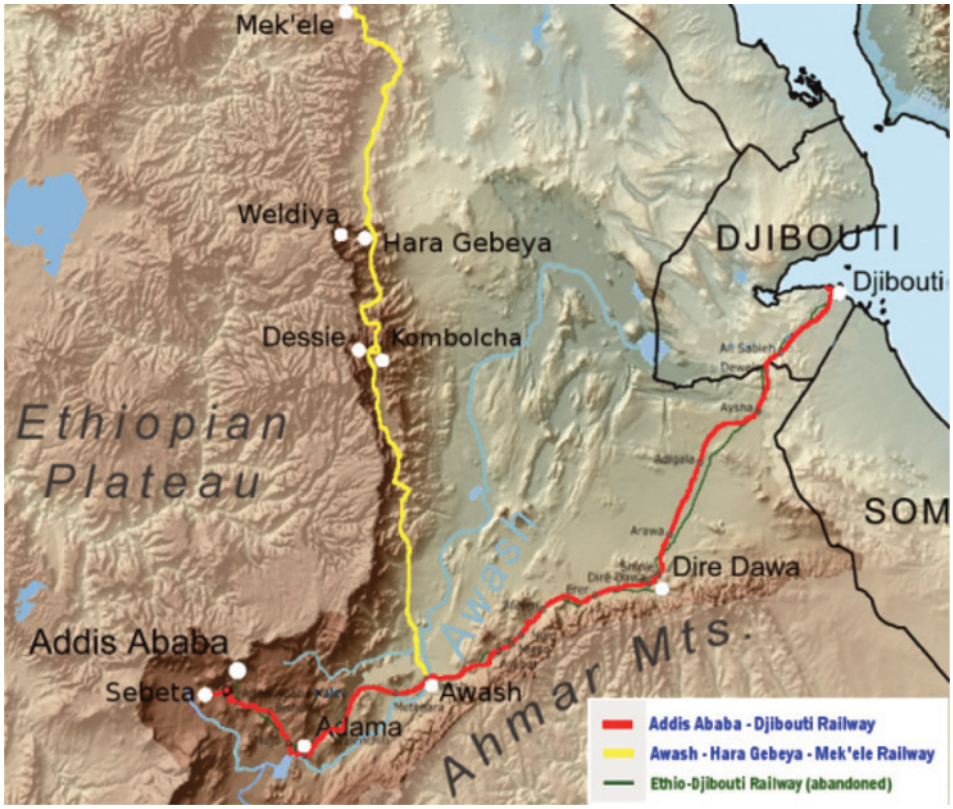

Fig. 4. Railway transport in Ethiopia[5]

Djibouti. More than 2,000 passenger trains and almost 8,000 goods trains have travelled on the line over the five years [7, 8].

Iran

The leadership of Iran places a significant emphasis on the development of railway transport as an essential component of the modern infrastructure with the view to strengthen their country financially and economically. During the sanctions period, Iran's transport projects were frozen. Railway transport was affected most of all (*Fig. 5*), as its modernization required much finance [9, 10].

According to the International Union of Railways (UIC), as at the end of 2023, the total length of railways in use was 9,556 km, of which 181 km were electrified lines [2].

On May 17, 2023, President of Russia Vladimir Putin and Iranian President Ebrahim Raisi signed an agreement to build a 162 km railway line between Rasht and Astara in Iran [11].

Vladimir Putin noted that the line to be built will contribute to establishing railway services across the North – South route with an access to the water way to India. On this section, goods are currently carried by road and need to be trans-shipped twice between modes of transport. Thanks to this, delivering goods from St. Petersburg to Mumbai will take 10 days rather than 1–1.5 months on other routes. The project has been pending for a long time. In 2011, Russian Railway JSC, Iranian Railways and Azerbaijani Railways CJSC signed a Memorandum of Understanding. The companies have agreed to cooperate in the implementation of a project to build the Rasht (Iran) – Astara (Iran) – Astara (Azerbaijan) railway line.

The construction of the Rasht–Astara line is planned to be completed by 2028, as was announced by the head of the Russian Ministry of Transport Vitaly Saveliev at the government hour in the State Duma [11]. It is expected that the Rasht – Astara line will be built by Russia and Iran and the construction of the Astara (Iran) – Astara (Azerbaijan) line will be contributed to by Russia, Iran and Azerbaijan. The North – South transport corridor will significantly change logistics and the economy on the continent (*Fig. 6*).

In 2018, Russian Railways Holding started work to electrify the Garmsar – Inche Burun line in Iran. According to experts, electrification of the line will have substantial economic effects. The two-fold growth of speed will lead to increasing the carrying capacity

[5] Transport in Ethiopia. URL: https://mungfali.com/post/55D47619C7D067054BAE7CDC93741EB35B53AD32/

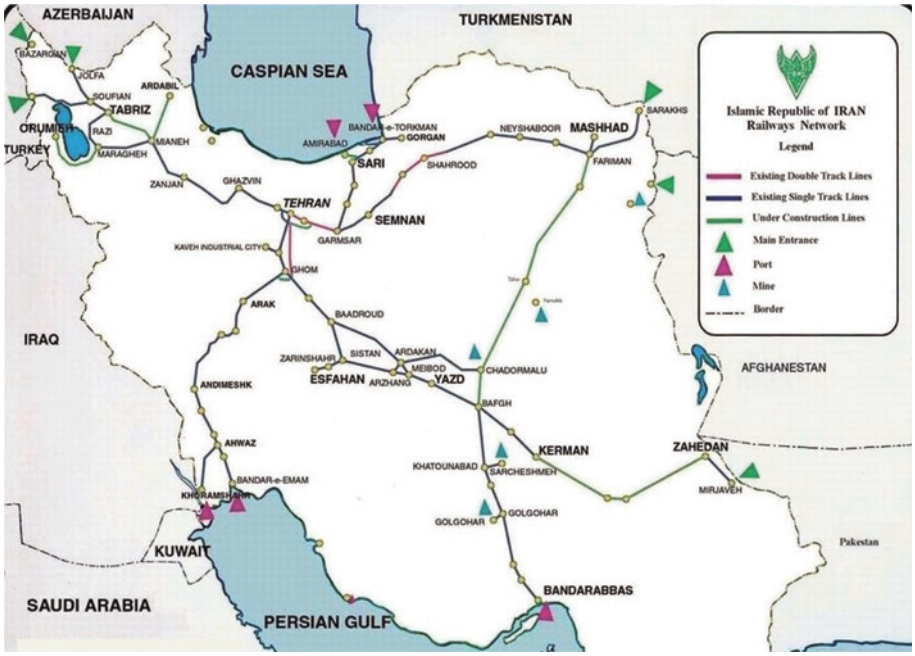

Fig. 5. Railway network in Iran[6]

Fig. 6. North – South international transport corridor[7]

four times to up to 10 million tons per year. An effect regarded particularly positive is lower air emissions, which will help improve the environmental status of the areas adjacent to the line. As highlighted at the ceremony in Teheran, the project will last four years and four months and will provide the electrification of a 495 km long line. The contractor is RZD International LLC (a subsidiary of RZD JSC).

During a conference on October 3, 2023, the Managing Director of Railways of the Islamic Republic of Iran (RAI) [12, 13] said that the railway is essential for the development of the transport sector which is vital

[6] Russia and Iran: A new dimension of a strategic partnership // Cezarium. URL: https://cezarium.com/intervyu-s-igorem-morozovym/
[7] The North – South International Transport Corridor — the Indian Ocean: Complementary routes are in demand. URL: https://dzen.ru/a/ZNCrT77DPzySEbmG

for the economic growth of the country. He also announced that passenger rail traffic had hit its record high in the 1401 Iranian calendar year and added that in the previous year the national railways had carried 29.67 million passengers, which also suggests growth of 43 % on a year-to-year basis. 346 new wagons were added to the railway fleet, including 339 freight wagons, 5 passenger coaches, and 2 locomotives. The wagons were manufactured by Iranian companies Mapna Group, Pars Wagon, Kowsar Wagon Complex, and Green Polour Industrial Group.

Saudi Arabia

The need for the development of railways in Saudi Arabia is driven by a large population, which generates demand for logistics and more extensive use of the country's territory.

According to the International Union of Railways (UIC), as at the end of 2023, the total length of railways in use was 4,309 km, of which 2,883 km had two or more tracks, and 3,390 km of railways have been electrified [2].

The country's railways are run by two state-owned companies: the Saudi Railways Organization and the Saudi Railway Company.

The Haramain high-speed railway between Mecca and Medina is 450 km long (*Fig. 7*). With high-speed trains, the travel time between Mecca and Jeddah has become two times shorter. The speed of the Talgo T350 train running on the line reaches 310 km/h. According to the contract, 35 trains, with each capable of carrying more than 400 passengers, were supplied by Talgo to the Saudi Railways Organization.

Currently, the country's largest project is a section of the North – South corridor (the NSR project). The project provides a network of 2,400 km for freight and passenger traffic. The maximum running speed on the line will be 250 km/h for passenger trains and 120 km/h for goods trains. The larger part of the network is located in a desert with high temperatures and air dryness. Solar radiation has a strong effect on track components. Therefore, electronic components of track transponders in the automatic train traffic control system are protected by additional sun shields that do not affect the functionality of the devices [14]. The railway network will be equipped with a European control system and a radio network. CEOs of RZD JSC and the Saudi Railway Company signed an agreement to implement the Saudi Vision 2030 programme for the development of the railway network. It involves the renovation and retrofitting of the existing railway infrastructure and construction of 2,000 km of new lines and more than 20 passenger stations.

Fig. 7. Railway network in Saudi Arabia[8]

[8] URL: https://upload.wikimedia.org/wikipedia/commons/a/a7/Rail_transport_map_of_Saudi_Arabia.pn

The United Arab Emirates

The first railways appeared here as early as the 19th century, but there was no development in this area until the middle of the last century [15]. According to the International Union of Railways (UIC), as at the end of 2023, the length of railways in use was 279 km, of which 119 km had two or more tracks. The line has not been electrified [2]. In 2023, Etihad Rail basically completed the creation of the UAE national railway network (*Fig. 8*) which is 1,200 km long.

The national railway network in the UAE (*Fig. 9*) is compliant with the global Sustainable Development Goals and the UAE Net Zero by 2050 strategic initia-

Fig. 8. Map of the UAE national railway network[9]

Fig. 9. A goods train on a railway section in the desert of the UAE[10]

[9] Etihad Rail is the first railway in the UAE // Railways of the World. URL: http://1430mm.ru/etihad-rail-pervaya-zheleznaya-doroga-oae
[10] URL: http://1430mm.ru/etihad-rail-pervaya-zheleznaya-doroga-oae

Fig. 10. Palm – Jumeirah Monorail, UAE[11]

tive[12] [16, 17]. By 2050, it is planned to reduce carbon emissions and road transport emissions by 21 % and 40 %, respectively.

In 2009, a 5.5 km long Palm – Jumeirah monorail system was built by Hitachi using the ALWEG straddle-beam technology. The line is capable of carrying up to 40,000 passengers at a speed of up to 70 km/h (*Fig. 10*).

CONCLUSION

Based on our analysis, it should be noted that the new BRICS members are both building new ordinary railway lines and developing routes for express and high-speed railway systems.

In Egypt, the length of railways is about 10,500 km, with 5,500 km of lines being under construction. It is planned to build about 900 km of high-speed lines for trains running at 320 km/h and 660 km of high-speed lines with train speeds of up to 250 km/h. In Iran, the length of railways is about 15,040 km, and 3,726 km of railway lines are being built or designed. It is planned to commission more than 1,400 km of new express (200 km/h) and high-speed lines. In the UAE, the total length of the railway network is 1,200 km; 150 km of lines are being designed, and about 900 km of lines are under construction. In Ethiopia, the length of the railway network is 750 km.

Railway transport is very important for the development of the economy of any country, creating a competitive environment in the transport industry, providing reliable and secure transport connections both on the passenger and freight segments of the transport market, and contributing to the creation of new jobs. High-speed lines are, in turn, the drivers of the progress, offering passengers a new, modern and comfortable mode of transport [18–20]. The implementation of high-speed railway projects provides an environment for continuous growth of the country's science and technology potential and, most importantly, for solving the global environmental problem of pollution.

Based on the study of the new transport and logistics corridors and increased train speeds in various countries, we find it reasonable to continue monitoring the development of the railway industry in the BRICS countries, especially in the context of the current economic and political landscapes.

[11] URL: https://happylove.top/52848-dubaj-palma-monorels.html

[12] Net Zero is a term frequently used in the environmental industry. The purpose of Net Zero to combat climate change by reducing emissions and balancing them with carbon sinks, such as woods, oceans and other various environmental resources that absorb carbon dioxide from the atmosphere. URL: https://www.iea.org/reports/net-zero-by-2050

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