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## Transformation of BRICS logistics networks under the influence of Chinese port expansion

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**Abstract.** In the context of global transformation of trade and economic relations and the restructuring of international logistics chains, the study of China's role as a key driver of integration processes within BRICS becomes particularly relevant. This research is dedicated to a comprehensive analysis of the impact of Chinese economic expansion on the development of transport and logistics infrastructure in the member countries, which presents significant scientific and practical interest in the context of forming a new architecture of international economic relations. The study conducts a detailed analysis of China's investment activities in the infrastructure projects of BRICS countries, with a particular focus on the "Belt and Road" initiative as a systemic element of the modern logistics system in Eurasia. The methodological framework of the study includes: a comparative analysis of the economic strategies of the participating countries, an assessment of the effectiveness of logistics systems through the lens of the LPI index, statistical analysis of commodity flows, and expert evaluations of the implementation of major infrastructure projects. The results of the study indicate the ambiguous nature of Chinese influence. On one hand, a significant positive effect from Chinese investments has been identified, manifested in the modernization of transport infrastructure, an increase in trade turnover, and enhanced interconnectedness of economies. On the other hand, substantial risks have been discovered, associated with the formation of asymmetric dependence, exacerbation of debt problems, and geopolitical competition. Special attention in this study is given to differentiated strategies for BRICS countries to adapt to Chinese economic expansion. It is shown that while Russia and South Africa demonstrate a high degree of involvement in Chinese infrastructure projects, Brazil and India pursue a more balanced policy, combining cooperation with measures to protect national economic interests. In conclusion, the necessity for developing a coordinated strategy among BRICS countries aimed at diversifying transport routes, developing alternative logistics corridors, and strengthening institutional interaction is justified. Promising areas for further research include issues related to the digitalization of logistics systems and the creation of mechanisms for balanced economic partnership within the union.

**Keywords:** China, transport corridors, logistics infrastructure, Belt and Road initiative, economic integration, geopolitical risks, international economic relations

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## Трансформация логистических сетей БРИКС под влиянием китайской портовой экспансии

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**Аннотация.** В условиях глобальной трансформации торгово-экономических связей и перестройки международных логистических цепочек особую актуальность приобретает изучение роли Китая как ключевого драйвера интеграционных процессов в рамках БРИКС. Исследование посвящено комплексному анализу влияния китайской экономической экспансии на развитие транспортно-логистической инфраструктуры стран объединения, что представляет значительный научный и практический интерес в контексте формирования новой архитектуры международных экономических отношений. Проведен детальный анализ инвестиционной деятельности КНР в инфраструктурные проекты стран БРИКС с особым акцентом на инициативу «Пояса и пути» как системообразующего элемента современной логистической системы Евразии. Методологическая база исследования включает: сравнительный анализ экономических стратегий стран-участниц, оценку эффективности логистических систем через призму индекса LPI, статистический анализ товарных потоков, а также экспертные оценки реализации крупных инфраструктурных проектов. Результаты исследования свидетельствуют о неоднозначном характере китайского влияния. С одной стороны, выявлен значительный положительный эффект от китайских инвестиций, выражающийся в модернизации транспортной инфраструктуры, увеличении товарооборота и усилении взаимосвязанности экономик. С другой стороны, обнаружены существенные риски от формирования асимметричной зависимости, обострения долговых проблем и геополитической конкуренции. Особое внимание уделено дифференцированным стратегиям адаптации стран БРИКС к китайской экономической экспансии. Показано, что если Россия и ЮАР демонстрируют высокую степень вовлеченности в китайские инфраструктурные проекты, то Бразилия и Индия проводят более сбалансированную политику, сочетая сотрудничество с мерами по защите национальных экономических интересов. В заключении обоснована необходимость выработки скоординированной стратегии стран БРИКС, направленной на диверсификацию транспортных маршрутов, развитие альтернативных логистических коридоров и укрепление институционального взаимодействия. Перспективными направлениями дальнейших исследований определены вопросы цифровизации логистических систем и создания механизмов сбалансированного экономического партнерства в рамках объединения.

**Ключевые слова:** Китай, транспортные коридоры, логистическая инфраструктура, инициатива «Пояса и пути», экономическая интеграция, геополитические риски, международные экономические отношения

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## Introduction

In the era of globalization and digitalization, the transformation of international trade has made global supply chains (GSCs) a key element of the world economy. They integrate raw material suppliers, manufacturers, and distributors, ensuring seamless movement of goods across continents. The People's Republic of China (PRC) serves as a crucial link in GSCs due to its status as the largest exporter and its developed port infrastructure. The ports of Shanghai, Ningbo-Zhoushan, and Shenzhen rank among the top global hubs in terms of cargo throughput, connecting Asia with Europe, Africa, and the Americas. China's investments in logistics, including overseas projects, enhance its influence on international markets.

The expansion of BRICS (Brazil, Russia, India, China, South Africa, UAE, Iran, Ethiopia, Egypt, Indonesia) reflects a shift in the global economy. These countries, comprising 40% of the world's population and possessing significant resources, are increasing trade and investment, thereby strengthening their collective positions. China, as the leader of the group, plays a pivotal role in integration through its logistical capabilities.

*Relevance.* Considering geopolitical changes and de-globalization trends, the resilience of GSCs has become critically important. China and BRICS offer alternative models of cooperation that reduce dependence on traditional centers and shape a new architecture for global trade.

**The aim of this study** is to identify the key mechanisms through which China influences the logistics networks of BRICS through the lens of port investments, trade strategies, and Logistics Performance Index (LPI) indicators. Specific objectives include determining the degree of correlation between Chinese infrastructure projects and LPI growth in BRICS countries; analyzing structural imbalances arising from technological and logistical dependence on China; and assessing how differences in the economic models of BRICS countries affect their susceptibility to Chinese expansion.

### *Research Hypotheses:*

- The expansion of China's port infrastructure positively impacts the creation and optimization of logistics chains in BRICS countries, leading to a reduced dependence on traditional logistics hubs.
- Chinese investments in the transport infrastructure of BRICS countries contribute to the diversification of trade routes and increase their resilience to external economic and political shocks.

- The asymmetric nature of investment interactions between the PRC and BRICS countries leads to the formation of new dependency patterns, making BRICS countries more vulnerable to economic and political decisions made by China.
- Geopolitical changes and de-globalization trends affect the resilience of global supply chains, necessitating a reevaluation by BRICS countries of their cooperation and integration strategies with China.

## Materials and methods

*Degree of Scientific Development of the Problem.* The topic of the transformation of logistics networks within BRICS under the influence of Chinese port expansion is actively discussed in academic and expert publications in Russian, English, and Chinese languages. These discussions encompass infrastructure projects, changes in routes, and economic and geopolitical consequences. The issues of port expansion, the development of new corridors, and the integration of digital solutions in logistics have been studied most comprehensively. However, there is still a lack of comprehensive interdisciplinary works that cover the entirety of changes in BRICS logistics networks due to China's influence, especially as the topic requires rethinking in the context of increasing sanctions pressure from the collective West, thus gaining renewed relevance.

In Russian-language publications, the focus is on the formation of new transport and logistics corridors involving BRICS countries, including projects supported by China, such as Eurasian and Arctic routes, and the development of multimodal transport through Russian and Chinese hubs (Strelnikova, Mayorov, Popov, 2024), as well as port projects in Brazil and Africa (Vinogradov, 2023; Obura, 2024). It is emphasized that Chinese port expansion contributes to the diversification of routes (Salamatov et al., 2024), reduces dependence on traditional logistics nodes (Baldova, Trunin, 2024), and creates conditions for establishing independent logistics chains within BRICS (Lavrov, 2024). The asymmetrical nature of investment interactions between China and the economies of BRICS partner countries is noted (Seniuk, 2024; Kurmanova, 2024). Many experts conclude that China, addressing its long-term national development goals, seeks to activate a new phase of globalization, within which the economic potential of Global South countries should be unlocked through their involvement in sustainable supply chains oriented towards China (Stoletov, 2024).

In English-language scientific literature, the impact of China's Belt and Road Initiative (BRI) on the development of global and regional logistics networks is examined in detail (Oropeza Garcia, 2014; Semenova, 2022)<sup>1</sup>, including

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<sup>1</sup> Smotrytska, M. (2021). IFIMES Analysis of China's "Belt and Road" Initiative: Genesis and Development. Czech & Slovak Leaders. August 3. Retrieved May 21, 2025, from <https://www.czechleaders.com/posts/ifimes-analysis-of-chinas-belt-and-road-initiative-genesis-and-development/>

BRICS countries. Special attention is given to China's large-scale investments in ports and infrastructure<sup>2</sup>, which lead to changes in trade routes, reduced delivery times, and the formation of new logistics hubs (Mokhammad, 2023). The economic and geopolitical consequences of the transformation of trade routes are analyzed, including increased dependence on Chinese logistics nodes and the growing influence of China in global supply chains (Sholokhova, 2020; Xin, Khan, Ling, 2024).

Chinese academic thought demonstrates a high degree of elaboration on infrastructure and geostrategic aspects. Research predominantly analyzes these issues through the lens of institutional interaction and geoeconomic strategies (Guo et al., 2024; Chen, 2021). For instance, studies related to the Belt and Road Initiative view it as an extension of the BRICS model, where Chinese port projects serve as a tool for integrating transport corridors (Wang, Zhu, 2017; Guo, He, Hou, 2018; Wang, Tian, Zhao, 2019; Yang, Cai, 2020; Guo, Liang, 2022).

A critical analysis of the literature shows that most works focus either on the economic effects of Chinese investments or on geopolitical consequences but do not provide a systematic model linking these aspects with LPI dynamics. This study fills this gap by integrating comparative analysis methods, LPI assessment, and SWOT analysis into a unified framework.

## Results of the Study

The modern economic architecture of the BRICS association is characterized by pronounced structural heterogeneity, combining various development models. This study identifies three key groups of countries:

- Resource-oriented economies (Russia, Brazil), where the share of raw material exports accounts for 60–75% of trade turnover, predominantly consisting of energy resources and agricultural products;
- Technologically service-oriented economies (India), with 55% of GDP derived from the services sector, including IT outsourcing and pharmaceuticals;
- Industrial-logistics centers (China, UAE), which provide manufacturing and transit functions.

China plays a foundational role, accounting for 42% of intra-bloc trade turnover. Its interactions with partners exhibit distinct specialization: 68% of Russian oil and gas exports; 45% of Brazilian agricultural products; 30% of Indian IT services; and 60% of re-export operations through the UAE (Guo, Liang, 2022).

The analysis reveals three key challenges: asymmetry in economic interaction (a disparity ratio of 1:95 between China and Ethiopia); a technological gap between production models; and logistical dependence on Chinese infrastructure (Table 1).

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<sup>2</sup> Runde, D.F., Hardman A., & Bonin C. (2024). Responding to China's Growing Influence in Ports of the Global South. Center for Strategic & International Studies. October 20. Retrieved May 21, 2025, [https://csis-website-prod.s3.amazonaws.com/s3fs-public/2024-10/241030\\_Runde\\_China\\_Ports.pdf?VersionId=lqLIQU7hTxc0R5wR5lTuG70Kfsm2Clcn](https://csis-website-prod.s3.amazonaws.com/s3fs-public/2024-10/241030_Runde_China_Ports.pdf?VersionId=lqLIQU7hTxc0R5wR5lTuG70Kfsm2Clcn)

**Trade and economic indicators of the BRICS countries, including foreign trade with China, billion dollars, 2023<sup>3</sup>**

The BRICS country	GDP, \$B	GDP per capita, \$	Export, \$B	Import, \$B	Total commodity turnover, \$B	Commodity turnover with BRICS, \$B	Share in BRICS commodity turnover, %	Export to China, \$B	Import from China, \$B	China in the BRICS trade rating
Brazil	2191	10378	339.696	252.71	592.406	198.3	10	122.42	59.110	1
Russia	2008	13809	424.483	302.866	727.349	337.11	17	129.14	110.970	1
India	3576	2487	431.559	673.929	1105.488	297.45	15	18.55	117.670	1
China	17795	12509	3379.044	2556.941	5935.985	852.69	42	*	*	*
South Africa	378	5976	110.855	130.747	241.602	59.49	3	12.482	21.000	1
Egypt	332	2895	42.081	83.2	125.281	39.66	2	0.91	14.900	*
Iran	402	4432	97.357	66.058	163.415	39.66	2	21276.00	10.080	2
UAE	514	48311	570.245	470.536	1040.781	158.64	8	**39.29	55.680	2
Ethiopia	160	1241	3.468	17.063	20.531	8.725	0	0.44	2.590	4

Note. Symbols: \* — no data available; \*\* — excluding oil.

Source: compiled by N.K. Semenova on UNISTAT (2023). Retrieved June 05, 2025, <https://unctadstat.unctad.org/>

The simplification of trade procedures is crucial for expanding imports and exports between China and BRICS countries. Recent studies (Xin, Khan, Ling, 2024) indicate that the overall level of trade facilitation in BRICS countries remains relatively low, with significant opportunities for improvement. The United Arab Emirates demonstrates the highest level of trade facilitation (index 0.87), while Ethiopia has the lowest (index 0.32), with the average index across the association not exceeding 0.61. The correlation between logistics quality and trade volume is 0.78; 62% of the variance is explained by the development of customs procedures; technological endowment adds +0.15 to efficiency. Factors such as economic status, business environment, and technological advancements positively impact trade efficiency, while inadequate infrastructure hampers it.

There is a noticeable discrepancy in the average efficiency of agricultural import and export trade between China and BRICS countries, with Russia demonstrating the highest efficiency and Iran the lowest. Brazil shows significant trade potential, while trade demand between Iran and China is comparatively minimal. This indicates that the development of Chinese ports has varying quantitative impacts on the economies of BRICS countries based on existing infrastructure and additional economic factors (Table 2).

<sup>3</sup> Excluding Indonesia, BRICS membership in 2025 (*author's note*).

Table 2

**Assessment of China's trade potential and expanding trade space with the BRICS countries<sup>4</sup>**

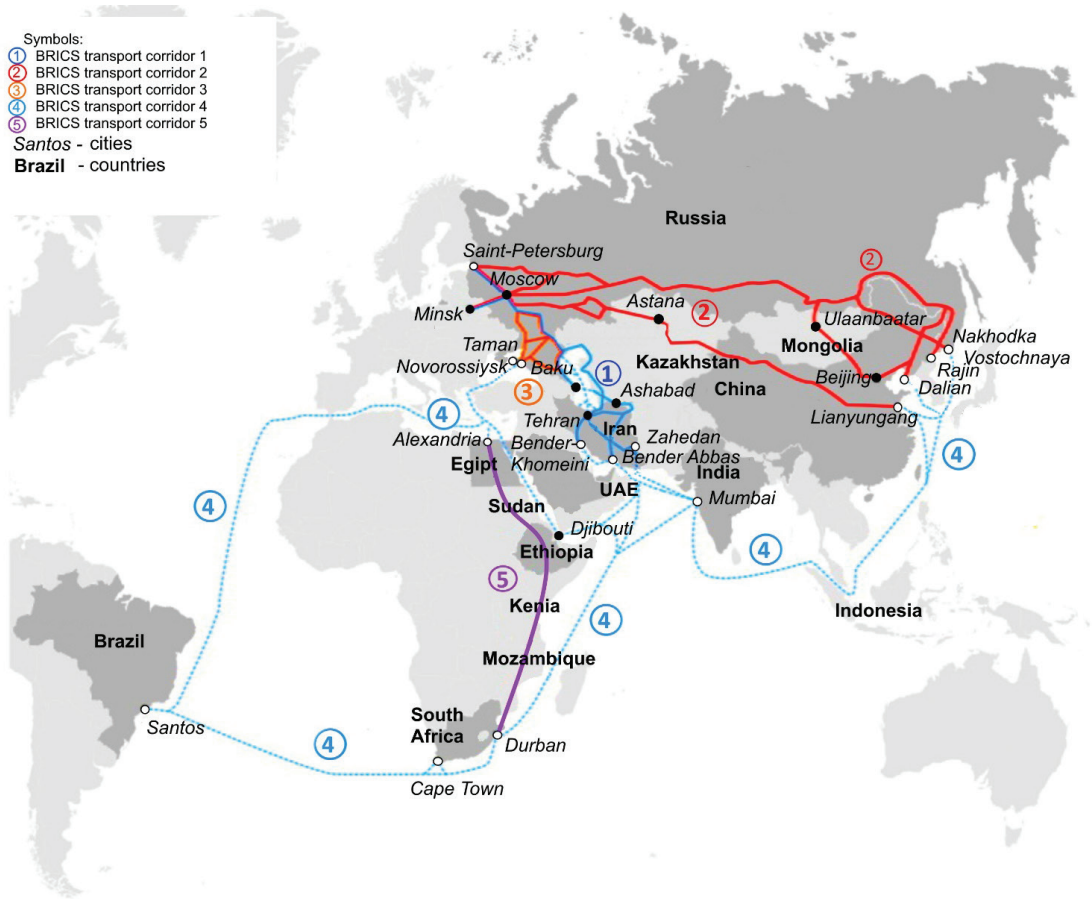
State	Trade efficiency	Trade volume, billion dollars	Trade potential, billion dollars	Expandable retail space, billion dollars
Brazil	0.707	51.309	72.535	0.041
Russia	0.503	8.298	16.501	0.099
India	0.222	4.086	18.403	0.350
South Africa	0.056	1.122	20.052	1.688
UAE	0.366	1.401	3.823	0.173
Egypt	0.069	0.487	7.087	1.354
Iran	0.057	0.387	6.810	1.661
Ethiopia	0.116	0.396	3.397	0.759

Source: (Xin, Khan, Ling, 2024).

The BRICS countries, forming one of the key economic alliances of modern times, view transport infrastructure as a crucial element for deepening mutual cooperation. The development of maritime, railway, and air corridors not only promotes trade growth but also strengthens the strategic positions of the members of the alliance on a global scale. In this structure, China, possessing a developed port infrastructure, serves as a key hub for maritime communication, ensuring connectivity among the BRICS economies. The integration of the Belt and Road Initiative with the alliance's transport system creates new opportunities for transcontinental transportation, including the railway routes of the Economic Belt of the Silk Road. Concurrently, air communication is being developed between the capitals of the participating countries, which is particularly important for high-tech sectors of the economy.

For Russia, new international logistics represent a strategic necessity. In this regard, the Business Council of BRICS has proposed a prospective scheme for transport interaction among the alliance countries (Figure), which includes five transport corridors: BRICS Corridor 1 — International Transport Corridor (ITC) North-South + countries of the Arabian Peninsula and Africa; BRICS Corridor 2 — East-West corridor and routes developed within the framework of the global strategy One Belt, One Road (OBOR); BRICS Corridor 3 — routes towards the ports of the Azov-Black Sea basin and further to Egypt, other African countries, and Latin America; BRICS Corridor 4 — international maritime routes: China — Southeast Asia — India — South Africa — Brazil; Russia — Egypt — Saudi Arabia — South Africa; Russia — Egypt — Brazil; BRICS Corridor 5 — a prospective system of trans-African transport routes, contingent upon the initiation of practical development of such projects (Fig.).

<sup>4</sup> Excluding Indonesia, BRICS membership in 2025 (*author's note*).



**Transport corridors of the BRICS space**

Source: compiled by N.K. Semenova based on (Salamatov et al., 2024).

The formation of a unified logistics system within BRICS faces several challenges, stemming from both differences in the economic models of member countries (Mokhammad, 2023) and the need to coordinate infrastructure projects. Nevertheless, the dynamic economic development of the alliance, which has surpassed the G7 countries in terms of total production volume, creates a stable foundation for long-term transport integration. The successful implementation of joint projects in the transport sector can become an important factor for sustainable development within BRICS, providing the alliance with competitive advantages amid the transformation of global logistics chains (Salamatov et al., 2024).

The current dynamics of logistics network development within BRICS are characterized by pronounced asymmetry, driven by differences in the levels of economic development and infrastructural endowment among member countries. As indicated by the Logistics Performance Index (LPI), there is a significant variation in efficiency indicators. Leaders ( $LPI \geq 3.7$ ): China (4.0 for the infrastructure component), South Africa (3.7 with uniform development across all components). Countries with an average level ( $3.4 \leq LPI < 3.7$ ): India (3.4, with infrastructure as the weak link at 3.2), Brazil (3.6). Underperformers ( $LPI < 3.0$ ): Russia (2.6).

Key determinants of such differentiation include the level of digitization of customs procedures ( $r = 0.82$ ), quality of transport infrastructure ( $r = 0.79$ ), and development of logistics competencies ( $r = 0.75$ ) (Table 3).

Table 3

**Logistics Efficiency Index (LPI) for BRICS member and Candidate countries, 2023<sup>5</sup>**

Country	Ranking LPI	LPI	Customs	Infrastructure	International transportation	Logistics competence	Tracking	Timeliness
Brazil	51	3.2	2.9	3.2	2.9	3.3	3.2	3.5
Russia	88	2.6	2.4	2.7	2.3	2.6	2.5	2.9
India	38	3.4	3.0	3.2	3.5	3.5	3.4	3.6
China	19	3.7	3.3	4.0	3.6	3.8	3.8	3.7
South Africa	19	3.7	3.3	3.6	3.6	3.8	3.8	3.8
UAE	7	4.0	3.7	4.1	3.8	4.0	4.1	4.2
Egypt	57	3.1	2.8	3.0	3.2	2.9	2.9	3.6
Indonesia	61	3.0	2.8	2.9	3.0	2.9	3.0	3.3
Iran	123	2.3	2.2	2.4	2.4	2.1	2.4	2.7

Source: compiled by N.K. Semenova on International LPI Index. *The World Bank*, 2025. Retrieved May 27, 2025, <https://lpi.worldbank.org/international/global>

Port infrastructure is a critically important factor for enhancing trade efficiency between China and the BRICS countries (Bawaskar, 2024). Contemporary port infrastructure projects initiated by China in BRICS nations (Table 4) represent a complex symbiosis of economic opportunities and geopolitical challenges. Three key aspects of this interaction can be highlighted.

*Economic Effects:* In Brazil, Chinese investments have increased port capacity by 40%, contributing to a 25% growth in agricultural exports from 2018 to 2023. Russian oil and gas exports through Chinese terminals reached 68 million tons in 2023. The Indian IT sector has reduced logistics costs by 18% due to the utilization of Chinese port infrastructure.

*Structural Risks:* Debt burden (the debt-to-GDP ratio in infrastructure projects exceeds 15%); technological dependence (85% of port equipment is of Chinese manufacture); market asymmetry (China's share in BRICS trade turnover is 42%).

*Geopolitical Tensions:* Competition with India in the Indian Ocean (tension index increased by +35% since 2020); concerns regarding “debt diplomacy” (case

study of Sri Lanka); discrepancies in digitalization standards (system compatibility at 62%) (Mokhammad, 2023).

Particular attention should be paid to the paradoxical nature of the situation — on one hand, the Logistics Performance Index (LPI) of recipient countries has increased on average by 0.5 points; on the other hand, dependence on Chinese technologies has reached 75% in critical infrastructure.

Table 4

#### China's port projects in the BRICS countries

State / Project	Year	Investment, million USD	Form of participation	Investor/acquirer enterprise
Russia / Zarubino Universal Harbor	2014–2018	1000.00	IC	China Merchants Group Ltd. (CMG)
Brazil / 90% stake in the Port of Paranagua (TCP)	2018	872.00	P	China Merchants Port Holdings
Brazil / Port of St. Louis Project	2018–2021	700.00	IC	China Communications Construction Company (CCCC)
Egypt / 20% equity stake in Damietta Terminal	2007–2011	200.00	IC	China Shipping (Group) Company
Egypt / Port Said East Port Container Terminal	2008–2011	*	CS	China Communications Construction Group (CCCC)
Egypt / Sokhna Terminal, 25%	2023	380.00	P	China COSCO Shipping
India / Vizhinjam Port Automation	2017–2023	180.60	CS	Shanghai Zhenhua Heavy Industries (ZPMC)
Indonesia / Tanjung Priok Port Expansion	2019	590.00	IC	Ningbo Zhoushan Port Group
Indonesia / Wilmar Industrial Park (WIIP), Port, Phase 1	2019–2022	*	CS	China's Tsingshan Group
UAE / Abu Dhabi Khalifa Port Container Terminal Phase II Project	2017–2018	170.00	CS	CCCC, ZPMC, COSCO Shipping
UAE / Abu Dhabi Khalifa Port Station Phase I Project	2019–2020	57.46	CS	China Harbour Middle East Regional Management Center
UAE / Kanai Island Pier and Breakwater, Abu Dhabi	2009–2010	30.42	CS	CCCC, First Navigation Engineering Bureau

Note. Symbols: IS — investment in construction; CS — contract construction; P-acquisition; \* — information not disclosed.

Source: compiled by N.K. Semenova based on open sources.

Correlation analysis reveals a direct relationship between the volume of Chinese investments in ports and the growth of the LPI infrastructure sub-index ( $r = 0.73$ ). For instance, the UAE (with \$257 million invested in the Khalifa terminal) achieved an LPI of 4.1 for infrastructure; Egypt (\$380 million in the Sokhna terminal) improved its LPI to 3.0 but lags behind in logistics competence (2.9). However, in Ethiopia, despite an increase in LPI by 0.5, the debt burden remains high ( $> 20\%$  of GDP), limiting the sustainability of improvements

The relationship between trade potential (see Table 2), investments (see Table 4), and current indicators (see Table 1) shows that countries with high trade potential (Brazil — \$72.5 billion, Russia — \$16.5 billion) attract more Chinese investments (\$1.5 billion and \$1 billion, respectively). However, realizing this potential faces challenges: Brazil utilizes its potential at 70% due to port modernization; South Africa has a potential of \$20 billion but minimal investments (\$0), which can be attributed to low trade efficiency (0.056, see Table 2). This reveals a key imbalance: China predominantly invests in resource-specialized countries (Russia, Brazil), reinforcing their dependency while neglecting diversified economies (India).

Under China's influence, a "centrifugal model" is forming with three levels: core — China (hub with an LPI of 3.7) and the UAE (LPI 4.0); semi-periphery — Brazil, India (LPI 3.2–3.6), dependent on Chinese technologies; periphery — Russia, Ethiopia (LPI  $< 3.0$ ) with resource specialization and minimal diversification.

The logistics networks of BRICS, under China's influence, serve as a subject for conducting a SWOT analysis (Table 5). After systematizing data: macroeconomic indicators (see Table 1), LPI indices (see Table 3), investment projects (see Table 4), and trade potential (see Table 2), key variables were identified: economic specialization of countries, logistics efficiency indicators, volumes of Chinese investments, and geopolitical factors (further routine operations are omitted due to space limitations).

The SWOT analysis revealed several key patterns in China's influence on the logistics networks of the BRICS countries. Strengths vs. Opportunities: It can be noted that Chinese port expansion and a high Logistics Performance Index (LPI) create a foundation for trade growth, but they necessitate the unification of standards (especially digital ones). Investments in infrastructure (see Table 4) can reduce logistics costs but do not address the issue of technological dependence.

*Weaknesses vs. Threats:* The raw material specialization of Russia and Brazil increases their vulnerability to Chinese influence, while the UAE and India demonstrate resilience. A low LPI correlates with a lag in digitalization (for example, Russia scored 2.4 in customs, see Table 3), which limits integration.

*Paradox of LPI Growth:* Improvements in logistics indicators (e.g., +0.5 in Ethiopia) do not guarantee economic sustainability due to debt burdens and dependence on Chinese technologies.

**SWOT Analysis Matrix of China's Influence on BRICS Logistics Networks**

	<b>Strengths</b>	<b>Weaknesses</b>
<b>Internal environment</b>	• China's dominance in BRICS trade volume (42% share) enables centralized logistics flow management (see Table 1).	• Economic model asymmetry: Commodity dependence of Russia/Brazil (60–75% exports) vs. UAE/India's diversification.
	• High LPI scores of China and UAE (4.0 and 4.1 infrastructure ratings) establish modernization benchmarks (see Table 3).	• Technological dependence (85% of port equipment Chinese-made).
	• Large-scale port investments (+40% throughput capacity in Brazil, 25% export growth, see Table 4).	• Suboptimal LPI performance among key members (Russia — 2.6, Iran — 2.3, see Table 3).
	• Belt and Road Initiative integration with BRICS transport corridors (see Fig.).	• Debt burden concerns (debt-to-GDP > 15% in Egypt and Ethiopia).
<b>External environment</b>	<b>Opportunities</b>	<b>Threats</b>
	• Untapped trade potential (Brazil +\$72.5bn, Russia +\$16.5bn, see Table 2).	• Geopolitical competition (India-China tensions in Indian Ocean, +35% conflict index).
	• Logistics digitalization (LOGINK platform, 0.82 digitalization-LPI correlation).	• Debt-trap diplomacy risks (Sri Lanka case precedent).
	• Multimodal corridor development (BRI rail routes + air transport integration (see Fig.)).	• Standardization gaps (62% digital system compatibility).
	• BRICS Business Council coordination (5 priority directions including NSITC (see Fig.)).	• Sanction vulnerabilities (Russia's LPI decline to 2.6 under isolation, see Table 3).

Source: compiled by N.K. Semenova.

The SWOT analysis confirmed the ambivalent nature of China's impact on the logistics systems of BRICS. On one hand, there is positive dynamics in key performance indicators, an increase in freight turnover, and deepening transport integration. On the other hand, there are rising risks of technological and debt dependence that could undermine sustainable development. The key insight of the study is that in the absence of a coordinated strategy among participating countries, the ongoing transformation will lead not to genuine partnership but to the formation of a centripetal model dominated by China.

The conducted SWOT analysis allows for the formulation of a comprehensive set of measures aimed at optimizing logistical interaction within BRICS. In the context of minimizing risks, relevant actions include diversification of equipment suppliers; creation of compensatory mechanisms for countries with low LPI (e.g., joint infrastructure modernization funds). To capitalize on opportunities: development of alternative hubs (the UAE as a logistics center for Africa and the Middle

East); harmonization of digital platforms (a unified standard based on LOGINK) (Drozdova, 2023). To balance China's influence: coordination of investments through the BRICS Business Council with a priority on projects that reduce asymmetry (e.g., trans-African routes).

## Conclusion

Port infrastructure plays a crucial role in deepening trade and economic cooperation between China and the BRICS countries. The study confirms that investments in port modernization, the development of multimodal corridors, and the digitalization of logistics can significantly increase trade turnover, reduce costs, and strengthen the economic resilience of alliance participants. However, the effectiveness of interaction varies depending on the level of infrastructure development and institutional conditions in each country.

The research identified three key patterns of transformation in the BRICS logistics networks under China's influence: asymmetric integration — Chinese investments enhance the Logistics Performance Index (LPI) but exacerbate structural imbalances (In Brazil, a 25% increase in freight turnover is accompanied by dependence on Chinese equipment); divergence of strategies — countries with raw material specialization (such as Russia) are more vulnerable to logistical dependence than diversified economies (like the UAE); paradox of resilience — improvements in LPI do not always correlate with economic stability (as evidenced by Ethiopia).

China, possessing the largest ports in the world and advanced logistics technologies, remains a central link in the BRICS supply chains. It transforms BRICS logistics networks through mechanisms of “soft power” (investments, infrastructure), but without coordination from the alliance, this leads to fragmentation rather than genuine integration and creates risks of debt dependency and geopolitical competition. To minimize these risks, BRICS countries need to:

- Diversify transport routes by developing their own port hubs and alternative corridors (for example, the North-South Transport Corridor).
- Strengthen coordination in the standardization of customs procedures and the implementation of digital platforms.
- Balance investment policies to avoid excessive dependence on Chinese capital through joint projects with third countries.

The prospects for cooperation within BRICS depend on the participants' ability to combine economic integration with the protection of national interests.

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