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## Assessment of logistics efficiency and value of supply chains on the way of the New Silk Road countries in the context of the "Belt - Road" megaproject

**Abstract.** *The relevance of this article is determined by the significance of the strategic initiative "Belt - Road (BR)" both for the world economy as a whole and for the development of the countries directly included in this project. This article explores the impact of the BR Initiative on strengthening investment relations between Central Asia and China. The authors revealed that the implementation of the initiative is provided by the financial structures (European Bank for Reconstruction and Development, Asian Development Bank, Silk Road Fund, foreign direct investment of China), as well as bilateral agreements in the economic, investment and cooperation. The BR initiative was established by the PRC and supported in the Republic of Kazakhstan by Elbasy N.A. Nazarbayev in 2013. Nowadays BR initiative continuing in Kazakhstan as a political course by the President of the Republic of Kazakhstan K. Tokayev.*

*It has been proved for implementation as essential project for development of transport and logistics infrastructure, has a positive impact for diversification of logistics routes for the supply of Chinese goods to the European market, and aimed at increasing the volume of trade and economic cooperation of all countries of Central Asia and China.*

**Keywords:** *New Silk Road, Belt-Road, transport and logistics infrastructure, logistics efficiency index.*

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### Introduction

Few could imagine that the idea of reviving the Silk Road would become a necessity in the face of modern global challenges. The history of the Great Silk Road, which started in the II century BC, connected the trade routes of China

through the countries of Central Asia with access to the Mediterranean and made a significant contribution to the mutual knowledge of the West and the East, while the countries standing on its way received development because of trade [1].

As it is known, international trade determines the level of development of society and state.

In this regard, the Great Silk Road became the basis for the exchange of not only goods, but also technologies, culture, and etc. Thus, the Great Silk Road made Central Asia the epicenter of the development of the first waves of globalization. [2]

In historical science there is a theoretical concept of the historical cycle, proposed by the Italian philosopher Giambattista Vico ("The Founding of a New Science about General Nature of Nations" (1725), which asserts that the development of society (or communities, "civilizations") goes "in a circle", regularly and consistently passing through phases of (re)birth, rise and decline. These kinds of representations took place in the ancient, ancient Chinese and Arab world.

In economics, there is also a concept of cyclicity, which was studied by Karl Marx as a "classical" industrial cycle. Another great important concept is called as "long waves" by N.D. Kondratyev, who offered the world an understanding of the economic cycles of recession and recovery [3].

So, the possible resumption of the New Silk Road is a natural event that will give a new impetus and potential to the economies of Central Asia in the context of new realities in the global world.

The purpose of the article is to find effective approach to realize the capacity of the New Silk Road in the context of the One Belt - One Road initiative, and to approve ways of investment development of the transportation and logistics sector for countries-members.

### **Methodology**

During this research the general scientific methods such as historical - chronological, analytical methods were used. The historical and chronological methods referred to the emergence, development and restoration of the Great Silk Road. The analytical method was used to clarify the communication resources of the Silk Road revival and its degree when influencing the economic, political, scientific cooperation of countries along this path.

The study used different methodological approaches, such as: the analytical approach was used in the evaluation of the Logistics Performance Index (LPI) in Asia and Europe. The synthetic approach revealed the impact of the New Silk Road on the transport and logistics system of the countries of Central Asia. The heuristic approach was used to predict the prospects for the development of logistics efficiency and increasing the value of supply chains on the path of the New Silk Road countries in the context of the One Belt and One Road mega project.

### **Discussion and results**

The Belt and Road Initiative (BRI), mentioned by Chinese President Xi Jinping, who announced this initiative in Astana in 2013, is slowly but surely moving forward. The governments of the 65 countries currently participating in this initiative have recognized the importance and opportunities for developing trade and attracting investment in infrastructure. Networks connecting Asia, Europe and Africa foreshadow the integration of 4.4 billion people into the sphere of global interaction and the exchange of goods and ideas. [4]

The BRI project includes the New Silk Road (Economic Belt), a transcontinental passage that links China to Southeast Asia, South Asia, Central Asia, Russia and Europe by land and the 21st Century Maritime Silk Road, a sea route linking coastal regions China with south-east and southern Asia, the South Pacific, the Middle East and East Africa, up to Europe [5].

In the context of the BRI megaproject, the role of logistics and supply chain management becomes an important component on which the quality of provision of global flow processes will depend.

The implementation of the project involves the construction of transport and logistics infrastructure (railways and highways, pipelines, sea and land ports); it should provide a significant impetus to the growth of trade in the Eurasian space and the intensification of the development of Eurasian countries, as well as the countries of South and Southeast Asia, the Middle East and

Africa, where the "New Silk Road" have to reach (at least in its maritime component).

Today, Central Asian countries are economically isolated from each other with intraregional trade accounting for only 6.2% of all cross-border trade. They also depend heavily on Russia, particularly on remittances, which account for a third of the gross domestic product (GDP) of Kyrgyzstan and Tajikistan. By 2018, remittances fell to the level of 2013 due to the economic problems of Russia, the current situation with the COVID-19 pandemic will cause irreparable damage to these countries, from which the economy will recover at least in 3-5 years, and this is an optimistic forecast [4].

Despite the intentions and plans for the development of the BRI project tasks, it is necessary to understand that the imbalances of countries on the way of the New Silk Road in the development of transport and logistics infrastructure will be a significant obstacle for this project.

The program is expected to leverage over \$ 1 trillion in investments, mainly in infrastructure development for ports, highways, railways and airports, as well as power plants and telecommunications networks. [6]

In the project, a huge role is assigned to the countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) as a transit corridor of the New Silk Road with further access to the Middle East, Africa, Russia, and Europe. Thus, the BRI project brings together the interests of developed and developing countries. However, it remains to be investigated how efficiently the transport and logistics system works along the entire supply chain. The key problems in transportation are differences in measurement standards (different track gauges), in educational systems (training), the cost of transport and logistics services, the level of development of transport and logistics infrastructure, which can be combined into a system of logistics performance indicators, and etc.

The most popular and well-known method for assessing the efficiency of logistics is a World Bank Logistics Performance Index (LPI) [7].

Since logistics has many criteria to measure, it is quite difficult to summarize efficiency across all countries. Investigation of the time and costs associated with logistics processes, such as handling cargo in ports, customs clearance, transport, and other information, in many cases, are easily available. However, even though this information can be complete, it is not easy to aggregate it into a single and consistent database across countries due to structural differences in countries' supply chains [7].

In addition to many criteria for good logistics, even more important is the transparency of processes and quality of service, predictability and reliability, since it is impossible to assess the efficiency of logistics using only information of time and cost. Therefore, to determine the Logistics Performance Index, the World Bank uses such indicators as:

- 1) Efficiency of customs and border procedures;
- 2) Quality (development) of trade and transport infrastructure;
- 3) Ease of organizing international transportation at competitive prices;
- 4) Quality and competence of logistics services;
- 5) Tracking the passage of goods;
- 6) Timeliness of deliveries.

The Logistics Performance Index (LPI) reflects the capacity of supplying goods and the condition of trade logistics at the national and international level; this study is based on surveys of international, national, or regional logistics, warehouse operators, and freight forwarding companies [7].

Aggregated indicators of logistics efficiency are presented in the context of the supply chain from China to Europe; in terms of traffic and consumption, Germany is one of the leading countries in Western Europe with the most highly developed transport and logistics system in the world. Try to objectively assess the supply chain from China through the countries of Central Asia to Europe, and understand the differences between the participating countries in the efficiency of logistics (Table 1).

**Table1** – Aggregated indicators LPI

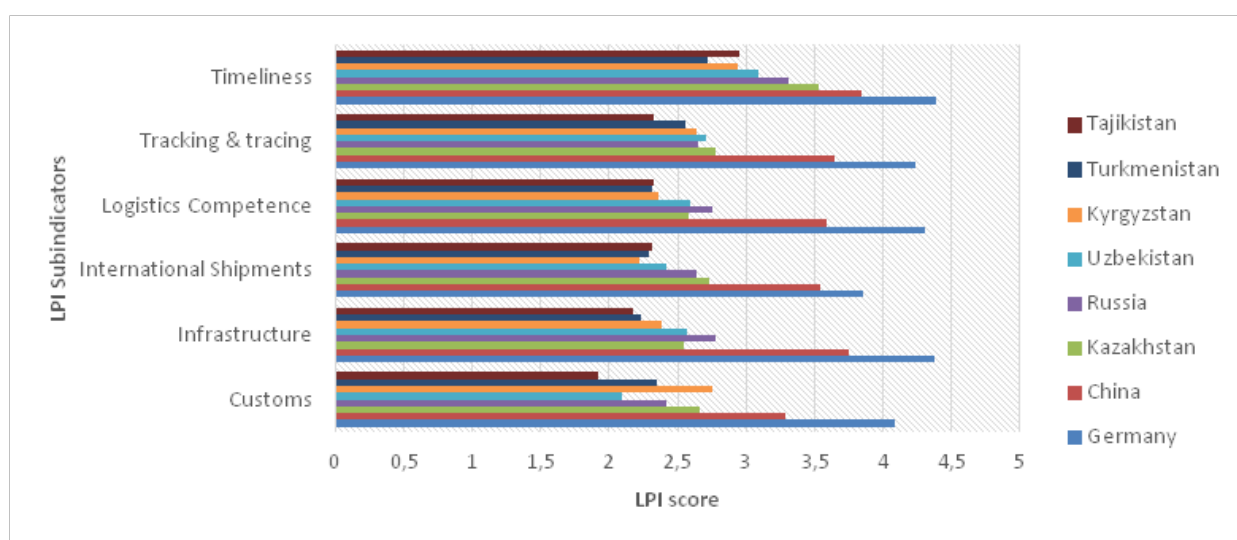
Countries	LPI ranking	LPI score	Customs	Infrastructure	International delivery	Logistics competence	Cargo tracking	Time-liness
1	2	3	4	5	6	7	8	9
Germany	1	4,2	4,09	4,37	3,86	4,31	4,24	4,39
China	26	3,61	3,29	3,75	3,54	3,59	3,65	3,84
Kazakhstan	71	2,81	2,66	2,55	2,73	2,58	2,78	3,53
Russia	75	2,76	2,42	2,78	2,64	2,75	2,65	3,31
Uzbekistan	99	2,58	2,1	2,57	2,42	2,59	2,71	3,09
Kyrgyzstan	108	2,55	2,75	2,38	2,22	2,36	2,64	2,94
Turkmenistan	126	2,41	2,35	2,23	2,29	2,31	2,56	2,72
Tajikistan	134	2,34	1,92	2,17	2,31	2,33	2,33	2,95

Note: Compiled by the authors based on the World Bank data [7].

As can be seen from the table, in the ranking of countries highly efficient in logistics, Germany takes the 1st place in the world (2018), China is on the 26th, which is a fairly high indicator, and significant differences are seen in transit countries such as Kazakhstan with 71st place, Russia - 75th place, Uzbekistan - 99th place, Kyrgyzstan - 108th place, Turkmenistan - 126th place, Tajikistan - 134th place [7]. Thus, the countries participating in the supply chain from China to Europe have significant disparities in the development of transport and logistics systems. These factors create a great risk of interaction between participants in the entire transportation system.

Thus, Figure 1 shows the differences in the LPI indicators of the Central Asian countries from China to Germany.

Thus, many indicators of Central Asia countries are almost twice lower than the level of Germany with the most developed transport and logistics system. In this regard, such components as cargo tracking, the competence of human resources that ensures transit, the coordination of transport and logistics companies' actions in international transportation, infrastructure and customs procedures fall under a high risk, which ultimately affects the time limits and timeliness of deliveries and possibly increase the final cost of supplied goods.



**Fig. 1.** Logistics performance sub-indices

Note: Compiled by the authors based on the World Bank data [7].

**Table 2** – The structure of investment needs in the transport sector until 2040, in billion US dollars

Countries	Airports		Ports		Railways		Highways	
	Fact	Need	Fact	Need	Fact	Need	Fact	Need
Kazakhstan	3,8	3,8	7,7	7,7	36	36	26	105
Russia	24	43	15	17	241	241	320	947
Germany	46	46	23	23	213	213	478	478
China	570	850	596	596	5400	5400	10000	10000
Asia	841	1200	923	998	7200	7300	16000	17000

Note: compiled by the authors based on data from the Global Infrastructure Hub [8].

In order to successfully implement the BRI project and develop initiatives for integration in the Euro-Asian space, international development institutions such as the European Bank for Reconstruction and Development [5], the Asian Development Bank, the Silk Road Fund [4], foreign direct investment of China [6] and others finance infrastructure projects related to the transport and logistics sector.

The G20 countries have created the Global Infrastructure Hub [8] where representatives of the international community exchange views to help achieve economic, social and environmental results by expanding and improving infrastructure.

Thus, the needs for investments in the development of the transport sector according to the forecasts of the experts of the Global Infrastructure Hub are as follows, Table 2.

Based on the data in Table 2, it can be seen that there is a need for investments until 2040 in such sectors as airports, air transport organization, and highways. So, in Kazakhstan, the need for investment in roads and infrastructure is covered only by 24.7%, in Russia - 33.8%, and these sectors need significant modernization and major construction. Strong investment flows are observed in Germany, where all sectors are provided with the necessary amount of investment. China has fully planned investment in sea transport, railways, and highways; however, there is a need for infrastructure development, accounting for 33%. In general, the Asian region has a high demand for investments in infrastructure development until 2040, and the

G20 countries are interested in its development. With a planned investment flow of \$ 46 trillion, there is still a need for \$ 4.6 trillion US dollars [8].

Analysis of global infrastructure needs reveals different numbers and different methods, but they all point out a growing gap in investment in global infrastructure. Most of the global investment gap appears in key sectors that are important to BRI. As the leader of the initiative, China has the capacity to meet the investment needs of the Central Asian countries.

However, the perspective objectives of 10-20 years, which presage a successful future, are a long-term goal in the Economic Belt of the New Silk Road. Therefore, the formation of valuable international relations and income streams from transit and trade in the BRI Global Supply Chains system allow extracting benefits and added value for all participants in this process in the short term.

Kazakhstan rightfully occupies a leading position in Central Asia, which provides tremendous opportunities for the participation of all countries of this macro region in the formation of Global Supply Chains; therefore, for Kazakhstan, as well as for all Central Asian countries, it is important to benefit from participation in regional supply chains by providing high-quality streaming processes in transit between China and Europe.

China's initiative "One Belt, One Road", supported by Elbasy N.A. Nazarbayev in 2013, is developing today thanks to the constant political direction of the President of the Republic of Kazakhstan Kassym-Zhomart Tokayev.

According to the Head of State, the introduction of advanced and high-quality digitalization will largely determine the effectiveness of all areas of integration work: "from digitalization of customs services to joint developments in Fintech". In this regard, emphasis has been placed on the creation of value chains in the food sector [9].

The current conditions and negative trends in the context of the COVID-19 pandemic require maximum integration of all participants in the supply chain; along with this, the schemes suitable for the food sector are quite identical for all other non-food sectors.

In the growing globalization of business, national boundaries are no longer as important as they used to be. Cross-country integration of supply chains is becoming a necessary condition for survival in a competitive environment, which implies commercial and industrial cooperation in order to obtain positive effect. This will ensure the achievement of world quality standards and access to a new level of key competencies in logistics business processes necessary to realize the consumer values of customers.

## Conclusion

The efficiency of logistics plays a key role not only in the exchange of goods and the provision of services, but also contributes to the development of infrastructure and technology, employment and improvement of human capital, and etc.

At the same time, investment flows from international financial institutions and Chinese investors that influence the efficiency of logistics should not be allocated only for financing the construction of infrastructure. Investments in the development of logistics competence, namely, the training of human resources, will give sustainable development and inclusive growth in the formation of transport and logistics networks of all countries participating in this process. Such systematic approach will accelerate the achievement of the Silk Road Economic Belt long-term goals, and participating countries should use foreign investments rationally in order to improve logistics and increase the value of supply chains on the way of the New Silk Road countries in the context of the Belt and Road megaproject.

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### "Белдеу және жол" мегажобасы контекстіндегі жаңа жібек жолы елдері жолындағы логистика тиімділігі мен жеткізу тізбектерінің құндылығын бағалау

**Аңдатпа.** Бұл зерттеудің өзектілігі "Белдеу – жол" стратегиялық бастамасының әлемдік экономика үшін де, оған тікелей кіретін елдердің дамуы үшін де маңыздылығымен анықталады. Осы мақалада "Бір белдеу – бір жол" бастамасының Орталық Азия елдері мен Қытай арасындағы инвестициялық қатынастарды нығайтуға әсері зерттеледі. Авторлар бастаманы іске асыруды құрылған қаржы құрылымдары (Еуропалық Қайта Құру және даму банкі, Азия даму банкі, Жібек Жолы Қоры, ҚХР тікелей шетелдік инвестициялары), сондай-ақ экономикалық, оның ішінде инвестициялық ынтымақтастық саласындағы екі жақты келісімдермен қамтамасыз ететіндігін анықтады. 2013 жылы Елбасы Н.Ә.Назарбаев қолдаған ҚХР-дың "Белдеу -жол" бастамасы бүгінде Қазақстан Республикасының Президенті Қасым-Жомарт Тоқаевтың саяси бағытының сабақтастығының арқасында дамып келе жатқаны анықталды. Бұл жобаны іске асырудың көліктік-логистикалық инфрақұрылымды дамыту үшін елеулі мәні бар екендігі, қытай тауарларын еуропалық нарыққа жеткізудің логистикалық жолдарын әртараптандыруға оң әсер ететіні, сондай-ақ Орталық Азия елдерінің және Қытайдың сауда-экономикалық ынтымақтастығының көлемін ұлғайтуға бағытталғаны дәлелденді.

**Түйінді сөздер:** Жаңа Жібек жолы, "Белдеу - жол", көліктік-логистикалық инфрақұрылым, логистика тиімділігінің индексі.

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### Оценка эффективности логистики и ценности цепей поставок на пути стран Нового шелкового пути в контексте мегапроекта «Пояс и путь»

**Аннотация.** Актуальность данного исследования определяется значимостью стратегической инициативы «Пояс и путь» как для мировой экономики в целом, так и для развития стран, непосредственно в нее входящих. В настоящей статье исследуется влияние инициативы «Пояс и путь» на усиление инвестиционных отношений между стран Центральной Азии и Китаем. Авторами выявлено, что реализация инициативы обеспечивается созданными финансовыми структурами (Европейский банк реконструкции и развития, Азиатский банк развития, Фонд Шелкового пути, прямые иностранные инвестиции КНР), а также двусторонними соглашениями в сфере экономического и в том числе инвестиционного сотрудничества. Установлено, что инициатива КНР «Пояс и путь», поддержанная Елбасы Н.А.Назарбаевым в 2013 году, сегодня развивается благодаря преемственности политического курса Президента Республики Казахстан Касым-Жомарт Токаева. Доказано, что реализация данного проекта имеет существенное значение для развития транспортно-логистической инфраструктуры, оказывает положительное воздействие на диверсификацию логистических путей поставки китайских товаров на европейский рынок, а также направлена на увеличение объемов торгово-экономического сотрудничества всех стран Центральной Азии и Китая.

**Ключевые слова:** Новый шелковый путь, «Пояс и путь», транспортно-логистическая инфраструктура, индекс эффективности логистики.

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