DOI: https://doi.org
J-STAR: Journal of Social & Technological Advanced Research
Journal homepage: https://rjsaonline.org/index.php/J-STAR

Transport and Logistics Infrastructure in Foreign Economic Activity: A Theoretical Framework and Conceptual Model

Irtaza Nawaz[1], Shengjian Pang[2]
[1] Department of Foreign Economic Activity, Tashkent State University of Oriental Studies, Tashkent, Uzbekistan
Email: Irtaza.joiya@yahoo.com
[2]Department of Foreign Economic Activity, Tashkent State University of Oriental Studies, Tashkent, Uzbekistan Email: 414830195@qq.com

ARTICLE INFO

Received:
March 07, 2026
Revised:
March 29, 2026
Accepted:
April 20, 2026
Available Online:
May 06, 2026

Keywords:

Transport Infrastructure, Logistics Efficiency, Customs Procedures, Digital Logistics Technologies, Foreign Economic Activity, International Trade, Conceptual Framework.

Corresponding Author:
414830195@qq.com

ABSTRACT

Transport and logistics infrastructure has become a vital factor in the foreign economic activity of a country in the era of rapid globalisation and growing complexity of international trade. The efficiency of transport systems, logistics services, customs clearance and digital technologies has a direct impact on the export competitiveness and trade costs in developing and landlocked economies. This article examines these relationships in detail, theoretically. It discusses important concepts regarding transport and logistics infrastructure, introduces concepts from transport economics, logistics management and supply chain management, as well as international trade (comparative advantage and trade facilitation), and pulls out empirical results. A gap is found in the literature, as most of the studies performed are based on any single factor or secondary data are used, without an integrated analysis using primary data that is quantitative. The article suggests that a novel conceptual model with five independent variables (transport infrastructure, logistics efficiency, customs and trade facilitation, digital logistics technologies, logistics service quality) and one dependent variable (foreign economic activity) is created to overcome this. 5 hypotheses are formulated to test (H1–H5). This theory provides foundation for the further empirical testing and a repeatable framework to evaluate logistics-driven trade performance.

Introduction

In the modern globalized world, one of the main factors influencing foreign economic activities is the transport and logistics infrastructure. Over the last few decades, the growing significance of international trade, technology and economic integration have made transportation and logistics systems more essential for developed and developing countries, and more and more efficient (Izteleuova et al., 2024). Infrastructure for transportation and logistics is the base and accelerates the flow of goods, services, raw materials and information from one country to another with efficiency. Effective logistics systems can be advantageous for the business not only for competitiveness reasons but also in terms of time and cost of transport (Kadyraliev et al., 2022).

Globalization drives countries to be more linked in the international trade world through regional trade agreement, regional economic cooperation and global supply chain. The modern transport system (roads, railways, airports, seaports, inland transport centers, warehouses) supports the implementation of trade activities and improves the links between the domestic and foreign markets. Moreover, logistics management systems, customs clearance, cargo monitoring systems and digital trade platforms are key to efficiency and delay reduction (Awain et al., 2022).

Logistics infrastructure is becoming more and more crucial as the demand for delivering faster, safer and more reliable systems is increasing. Advanced transportation systems and logistics performance are seen to be indicative of the success of countries in participating in global value chains and achieving sustainable economic development. Conversely, poor infrastructure, weak institutional coordination, inefficient customs procedures and logistics services are obstacles to trade and hinder national economies' competitiveness (Jayathilaka et al., 2022).

Problem Statement

Logistics systems have become more vital in worldwide trade, yet they present substantial issues for the developing and changeover economies, as a result of inadequate transport facilities and logistics inefficiency (Karriyeva, 2025). Impaired trade performance and economic competitiveness is due to poor road networks, underdeveloped railways, obsolete ports, underdeveloped freight terminals, high logistics costs, customs delays and lack of technological integration (Rahmanov et al., 2022). The complexity of international trade routes and the need for reliable options for delivery creates the need for resilient and innovative infrastructure (Hordieiev et al., 2025). The COVID-19 pandemic deepened the fragility of the traditional logistics systems, highlighting the need for the development of modern transport and logistics infrastructure based on technology (Grzelakowski, 2022).

Objectives of the Study

The main objectives are:

1. To determine the impact of transport infrastructure on foreign economic activity;
2. To assess the influence of logistics efficiency on international trade performance;
3. To evaluate the role of customs and digital logistics systems in trade facilitation;
4. To analyze the relationship between logistics services and export competitiveness;
5. To provide practical suggestions for improving transport and logistics infrastructure.

Research Questions

The study seeks to answer:

1. How does transport infrastructure affect foreign economic activity?
2. What is the relationship between logistics efficiency and international trade performance?
3. How do logistics services influence export competitiveness?
4. What role do digital logistics technologies play in foreign economic activity?
5. How can transport and logistics infrastructure be improved to enhance international trade?

Literature Review

Concept of Transport and Logistics Infrastructure

Transport and logistics infrastructure is a combination of physical infrastructure, organizational infrastructure, technologies and processes that facilitate the transportation, storage and distribution of goods in domestic and international markets (Liashenko et al., 2021). It involves the road, railway, seaports, airports, warehouses, logistics centres, customs centres and ICT systems for supply chain management. Transport infrastructure lowers transaction costs, improves market access and increases trade flows (Izteleuova et al., 2024). Road transport provides flexibility, rail large volume transport, sea dominant transport mode for international transport, air transport of time sensitive goods (Sapiński & Pochopień, 2023). The efficient functioning of trade operations is supported by logistics infrastructure such as warehouses, distribution centres and inventory management systems (Crainic et al., 2023). With the assistance of digital technologies (EDI, tracking systems, AI and blockchain), the transparency and efficiency of the supply chain are further improved (Sushchenko et al., 2023).

Theoretical Perspectives on Foreign Economic Activity

Foreign economic activity can be classified in three ways: export, import, foreign direct investment and international cooperation (Mirzaye & Mohiuddin, 2025). The concepts of absolute advantage theory by Adam Smith and comparative advantage theory by David Ricardo are key to understanding the benefits of specialization and trade in enhancing welfare (Flory & Nyaronga, 2025; Nawaz & Lyu, 2026). Modern theories include technological, infrastructure and logistics efficiency. The central issue of globalization theory is interconnected economies as expressed by Gutman and Malashenko (2025). In the

theory of supply chain management, attention is also drawn to the coordination of the supply chain between suppliers, manufacturers and consumers (Lu et al., 2026). Trade facilitation theory is based on the important aspect of customs and border controls (CBC) (Amani & Yawar, 2025).

Transport Infrastructure and International Trade

The efficient transportation reduces the transport cost, delay and enhances trade efficiency (Bottasso et al., 2022). The road, rail, port and airport infrastructure is an integrated system that creates an environment for strengthening trade connectivity (Li et al., 2023). Improved infrastructure leads to better performance in exports and market access (Allen & Arkolakis, 2022). Efficient infrastructure is a critical factor for countries without access to the sea to overcome geographical obstacles (Amankwah-Amoah et al., 2025). Many developing economies lack sufficient maintenance and investment shortfall, however (Lu et al., 2026).

Logistics Efficiency, Supply Chain Management, and Customs Procedures

Logistics efficiency has an impact on the speed, reliability and cost-effectiveness of trade (Shikur, 2022). The concept of supply chain management theory is to work towards integration with all stakeholders. There is also an association between the use of advanced logistics systems and export growth and global competitiveness (Adelajda Zaninović et al., 2021). Delays and paperwork burdens are key challenges in customs procedures, leading to inefficiencies in trade transactions (Rbehat & Marafi, 2024). Transparency and speed are improved by digital technologies, such as electronic documentation, automation, or electronic payments (Hendy & Zaki, 2021). The WTO Trade Facilitation Agreement promotes simplified customs. The Trade Facilitation Agreement promotes simplified customs (Qureshi, 2022).

Digital Technologies, Empirical Studies, and Research Gap

Digital logistics technologies encompass electronic customs, cargo monitoring, AI, WMS, blockchain and automated inventory systems (Kazak et al., 2025; Nawaz & Iqbal, 2025). These tools enhance efficiency and coordination as well as visibility (Verbivska et al., 2023). COVID-19 pandemic forced companies to increase the use of digital technologies, with those that had already developed advanced digital skills being able to operate better (Vasylkivskyi & Abasov, 2025). Empirical research has shown that a positive relationship between logistics performance and trade performance exists (Sénquiz-Díaz, 2021). But there is still a gap in research, as most studies are dedicated to single factors or secondary data and few use primary survey data in an integrated analysis that tests the simultaneous impact of all the elements of infrastructure on foreign economic activity.

Conceptual Framework and Hypothesis Development

This study's conceptual model illustrates the linkage between transport and logistics infrastructure development and foreign economic activity.

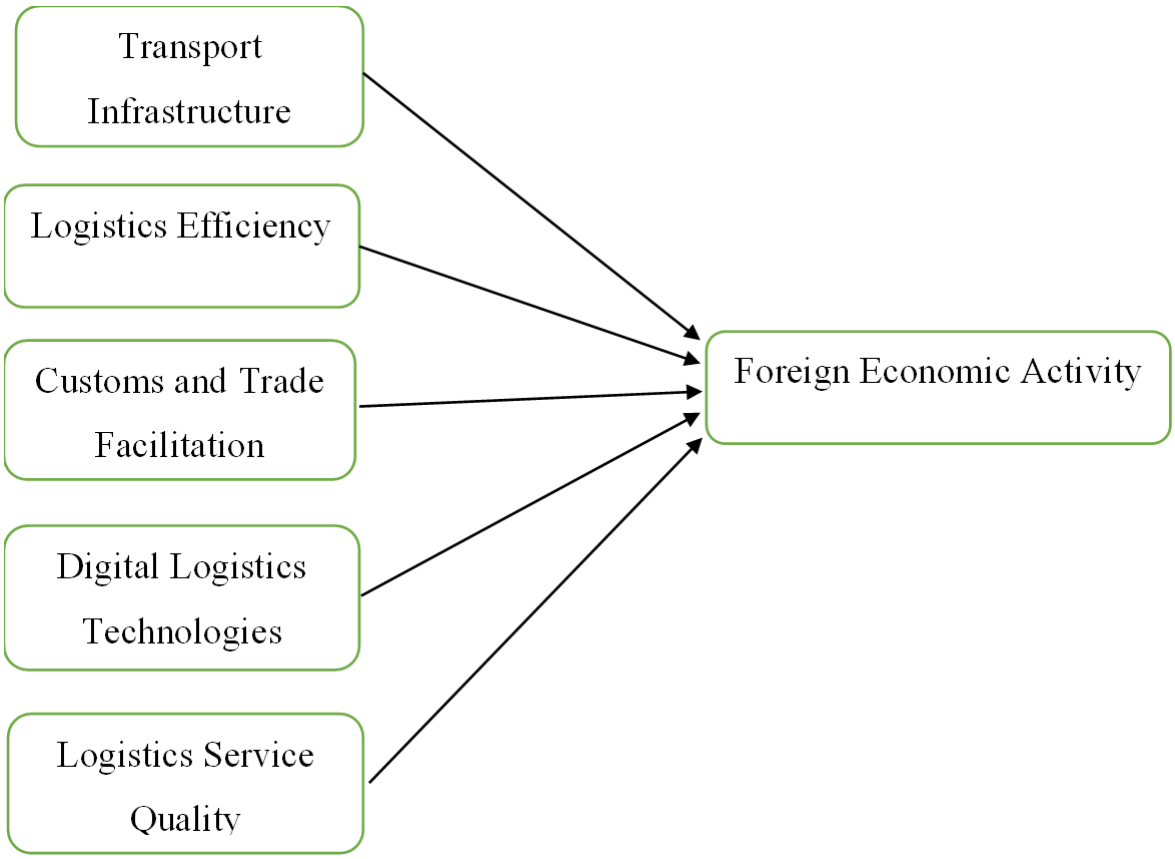

Figure 1: Conceptual Model

Foreign economic activity is positively influenced by the efficient transport system, the efficient logistics services, the efficiency of customs clearance and the digital logistics technologies, as they boost the efficiency of trade, reduce logistics costs, enhance export competitiveness and improve the functioning of the international supply chain (Meschi & Mayrhofer, 2025).

Hypotheses

H1: There is a significant positive relationship between transport infrastructure and foreign economic activity.

H2: Logistics efficiency has a significant positive impact on foreign economic activity.

H3: Customs procedures and trade facilitation have a significant positive effect on foreign economic activity.

H4: Digital logistics technologies have a significant positive relationship with foreign economic activity.

H5: Transport and logistics infrastructure collectively have a significant positive impact on foreign economic activity (Cerar et al., 2026).

Proposed Methodology

This research will be quantitative, descriptive-explanatory research with the deductive approach. Structured questionnaires, using the 5-point Likert scale (from 1=Strongly Disagree to 5=Strongly Agree) will be used to collect primary data which will be administered to 200-400 professionals in logistics, transport, customs and foreign trade. Multi-item scales, adapted from the literature, will be used to measure variables. SPSS will be used to analyze the data, descriptive statistics, reliability analysis (Cronbach's Alpha), Pearson correlation, and multiple regression analysis will be used in analyzing data.

Conclusion and Future Research

The article has given a deep analytical theoretical basis to understand the interdependence of transport and logistics infrastructure and foreign economic activity. Combined the main aspects of transport economics, logistics management, supply chain management and international trade. A concept model was proposed, where five independent variables

(transport infrastructure, logistics efficiency, customs and trade facilitation, digital logistics technologies and logistics service quality) and one dependent variable (foreign economic activity) are included, and five testable hypotheses are formulated.

The main theoretical implication is that in today's globalized and digitalized economy, foreign economic activity is no longer solely dependent on physical transport infrastructure. Rather, it is increasingly turning to effective logistics operations and cutting-edge digital technologies. While transport infrastructure still plays a crucial role, it is only through modern logistics, a streamlined customs process, and comprehensive digitalisation that the benefits of transport infrastructure can be realized in full.

The empirical testing of the proposed hypotheses with primary survey data and advanced statistical methods (e.g., SEM) should be considered for future research. Comparing cross country, longitudinal designs and adding other variables (such as FDI, political stability, green logistics) would further enrich the literature. Exploring new technologies like AI, blockchain, IoT, and smart logistics solutions can also be a worthwhile avenue to explore.

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