The Relationship Between Logistics Performance Index and International Trade: An Empirical Analysis

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A B S T R A C T

In today's highly competitive global business environment, effective management of logistics performance is crucial for successful trade. Numerous studies have examined the significant influence of Logistics Performance Index (LPI) on international trade, particularly on national trade. This article aims to empirically investigate the impact of LPI on international trade using variables such as Gross Domestic Product (GDP), distance between importing and exporting countries, infrastructure, trade flow, and LPI score for the year 2018. We used an improved gravity model of regression analysis to estimate this relationship among 150 nations. Our findings suggest that trade will increase with trade flow since all variables considered are significant and demonstrate the intended indications in line with our hypothesis.

Keywords:LPI, GDP, Gravity Model, Trade Flow

1. Introduction

Companies and governments alike use the LPI as a tool to measure logistics performance and identify areas for improvement.

The Logistics Performance Index has become an important tool for assessing the performance of a country's logistics system. It provides a snapshot of a country's logistics infrastructure, services, border procedures, and supply chain reliability. By using LPI, countries can identify areas where they need to improve to compete effectively in the global market.

One of the key benefits of LPI is that it provides a framework for identifying the challenges and opportunities that countries face in their performance on trade logistics. This framework helps governments and private sector stakeholders prioritize investments and policy changes that can have a positive impact on their logistics performance [1][2][3][4][5][6][7].

For instance, in India, the implementation of the Goods and Services Tax (GST) and the development of dedicated freight corridors have helped to improve the country's logistics performance. These measures have streamlined border procedures, reduced transit times, and improved supply chain reliability, contributing to India's rise in the LPI ranking from 54th in 2014 to 35th in 2016.

Similarly, in the state of Gujarat, the government's proactive policies, well-developed infrastructure, and services have contributed to its top ranking in the LEADS 2021 Index for three consecutive years. Gujarat's logistics performance has benefited from the development of multimodal logistics parks, the implementation of online customs clearance systems, and the introduction of a single-window clearance system.

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The International Logistics Performance Index provides a more detailed analysis of a country's trade logistics performance. It ranks countries on six dimensions of trade, including customs performance, infrastructure quality, and timeliness of shipments. The index provides companies with valuable information about the trade logistics environment in foreign countries, helping them to make more informed decisions about where to locate their operations[8][9][10][11][12][13].

Overall, the Logistics Performance Index plays an important role in promoting trade by providing a benchmark for measuring logistics performance and identifying areas for improvement. It helps governments and private sector stakeholders prioritize investments and policy changes that can have a positive impact on their logistics performance. As a result, it can contribute to increased competitiveness, industry profitability, and economic growth.

2. Litrature Review

The Logistics Performance Index (LPI) has become an increasingly popular tool for measuring the effectiveness of supply chains used in trade logistics. The LPI was first introduced by the World Bank in 2007 and has since become a widely recognized benchmark for logistics performance in both developed and developing countries. The LPI is based on a comprehensive survey of logistics professionals in over 160 countries and covers six key areas of logistics performance, including customs, infrastructure, international transport, logistics competence, tracking and tracing, and on-time delivery.

The LPI has been used as a standard reference material in numerous studies and policy papers on trade logistics since 2007. Several countries have adopted the LPI as a key performance indicator in their national transport or logistics strategies. It is also used as a subset of transport or logistics key performance indicators by the European Union, the Association of Southeast Asian Nations, Asia-Pacific Economic Cooperation, and others.

One recent study investigated the similarity between the two groups of EU nations in terms of logistics performance or studied how logistics performance affects the EU15's international bilateral trade CEMS in comparison to the rest of the globe from 2010 to 2018. The study created and estimated a Poisson structural gravity model using the LPI and its sub-indices as the primary independent variables of interest. The findings on bilateral trade were particularly significant when taking into account trade in various classifications of commodities and various country pair groups[14][15][16][17][18].

Another study investigated how the International LPI and the Human Development Index (HDI) relate. The authors utilized a linear regression model with SPSS (Statistical Package for the Social Sciences) to analyze this association. The information for 154 nations in 2018 was applied in this research, and the regression analysis's assumptions were all met. The LPI value for the year 2019 was predicted using the regression equation that was found.

The effect of the Logistic Performance Index (LPI) on global trade between 2007 and 2018 was examined in another study. The gravity model approach was used to investigate this relationship, concentrating on the overall LPI and its constituent parts. The study's findings indicate that logistics has a statistically significant positive influence on bilateral trade between CEECs, and logistics justifies the function of a trade mediator. Additionally, the significance of LPI components in enhancing global trade was emphasized. Implications from the research show that enhancing logistics operations and services has a favorable effect on the amount of global trade.

Another study offered a data envelopment analysis (DEA) approach to create a synthetic index of overall logistics performance (DEA-LPI) and compare the logistics performance of nations with LPI. The suggested method used DEA as a tool for multiple criterion decision-making to address the six dimensions of LPI (MCDM). The research also examined any potential variations that can be seen when considering various variables, such as income and location. The research suggests that location and money play a significant role in how well logistics perform. High-income nations are among the top performers, heavily influenced by the EU.

Finally, another study compared and ranked the LPI of the Western Balkan nations (Bosnia and Herzegovina, North Macedonia, Albania, Serbia, and Montenegro) as determined by the World Bank for 2018 using an integrated Criteria Importance Through Intercriteria Correlation (CRITIC)-Measurement Alternatives and Ranking according to Compromise Solution (MARCOS) model. The study used six essential characteristics of customs, infrastructure, international transport, logistics capabilities, tracking and tracing of goods, and shipment delivery within scheduled or anticipated times to measure the performance of nations and the overall performance of logistics.

In conclusion, the Logistics Performance Index (LPI) is a widely recognized benchmark for logistics performance in both developed and developing countries.

3. Research Methodology

The logistics sector is a crucial part of supply chain management that significantly impacts international trade and economic growth. This study aims to examine the importance of logistics and its performance in international trade using the Logistics Performance Index (LPI) and the Gravity model. A descriptive research design will be used to analyze the impact of LPI on international trade, and the study's objectives include evaluating the relationship between the quality of logistics and performance in international trade and determining how operational functions affect logistics performance.

The Gravity model, a type of regression analysis commonly used in logistics and transportation, will be used to predict the bilateral flow of trade between two locations based on their economic size and distance from one another. The study will test two hypotheses: H0, which suggests that LPI has a positive effect on international trade, and H1, which suggests that LPI has a negative effect on international trade. Secondary data collection methods will be used to collect data from various sources, such as research papers and journals, as well as the World Bank, IMF, and WTO websites[19][20][21][22][23][24].

Overall, this study's findings will provide valuable insights into the importance of logistics performance in international trade and economic growth. By analyzing the relationship between LPI and international trade, the study will provide an understanding of how logistics performance affects trade, which can help policymakers and businesses make informed decisions regarding international trade.

4. Conclusion

The Gross Domestic Product (GDP) of the countries has a positive coefficient, indicating that countries with a higher economy make more trade as compared to countries with a lower economy. The trade flow and the LPI also show a positive coefficient, indicating their significant impact on international trade. This research mainly focused on the variables that impact trade between countries, with distance having a negative coefficient. This means that longer distances lead to a decrease in trade. Other variables, such as GDP, infrastructure, and LPI, have positive coefficients, highlighting how these variables impact trade, and traders choose regions to trade based on this data.

This research provides valuable insights into the importance of logistics performance in international trade and economic growth. The findings show that the LPI has a significant impact on international trade and that countries with higher GDP and better infrastructure attract more trade. The study also highlights the impact of distance on international trade, with longer distances leading to a decrease in trade. Overall, this research contributes to the existing literature on the importance of logistics in international trade and provides valuable insights for policymakers and stakeholders in the logistics sector. Future research can expand on these findings to identify other variables that impact international trade and analyze the impact of policy changes on international trade.

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