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The Contribution of The Sea Toll Program, Maritime Transport Connectivity, and Logistics Availability and Distribution in Remote Areas: A Literature Review

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Abstract: Logistics distribution in remote areas has been extensively discussed in various studies as a means to enhance connectivity and meet the needs of communities with limited transport access. This article aims to review and synthesize literature regarding the contributions of the Sea Toll Road Program, maritime transport connectivity, logistics availability, and logistics distribution in remote areas, while also examining research findings involving these variables and the relationships and contributions among them. The study employs a literature review method, identifying and analyzing relevant references from 20 national and international articles. It presents an overview of the gathered literature by outlining the contributions and interrelationships of the variables. The findings indicate that the Sea Toll Road Program contributes to improved maritime transport connectivity, logistics availability, and logistics distribution in remote areas. The study specifically focuses on the roles of the Sea Toll Road Program, maritime transport connectivity, and logistics availability in supporting enhanced logistics distribution in remote regions.

Keywords: Sea Toll Program Contribution, Maritime Transport Connectivity, Logistics Availability, Logistics Distribution.

Indonesian Abstract: Distribusi logistik di wilayah terpencil telah banyak dibahas dalam berbagai studi sebagai upaya untuk meningkatkan konektivitas dan memenuhi kebutuhan masyarakat yang memiliki akses transportasi terbatas. Artikel ini bertujuan untuk meninjau dan menyintesis literatur mengenai kontribusi Program Tol Laut, konektivitas transportasi laut, ketersediaan logistik, serta distribusi logistik di wilayah terpencil, sekaligus mengkaji temuan penelitian yang melibatkan variabel-variabel tersebut beserta hubungan dan kontribusi di antara ketiganya. Studi ini menggunakan metode tinjauan pustaka dengan

mengidentifikasi dan menganalisis referensi yang relevan dari 20 artikel nasional maupun internasional. Artikel ini menyajikan gambaran umum mengenai literatur yang telah dikumpulkan dengan menguraikan kontribusi serta keterkaitan antarvariabel tersebut. Hasil studi menunjukkan bahwa Program Tol Laut berkontribusi terhadap peningkatan konektivitas transportasi laut, ketersediaan logistik, dan distribusi logistik di wilayah terpencil. Studi ini secara khusus berfokus pada peran Program Tol Laut, konektivitas transportasi laut, dan ketersediaan logistik dalam mendukung peningkatan distribusi logistik di wilayah-wilayah terpencil.

Keywords: Kontribusi Program Tol Laut, Konektivitas Transportasi Maritim, Ketersediaan Logistik, Distribusi Logistik.

INTRODUCTION

Remote regions in Indonesia face various challenges in meeting logistics needs due to geographical conditions, long distances from production and trade centers, and limited transportation infrastructure (Trifena & Piyd, 2025). These conditions can lead to high shipping costs, distribution delays, limited availability of essential goods, and price disparities between remote and urban areas. Therefore, maritime transport plays a crucial role in supporting the movement of goods and maintaining the continuity of logistics distribution, particularly for regions that rely heavily on sea routes (Syam et al., 2025).

In this context, the Sea Toll Program is a government policy aimed at enhancing inter-regional connectivity and facilitating the smooth distribution of goods to remote, outermost, and underdeveloped (3T) regions (Pambudi & Handayani, 2023). This program is expected to enhance connectivity between production centers, ports, and destination areas, thereby better ensuring the availability of logistics. However, the success of logistics distribution is not determined solely by the existence of the Sea Toll Program; it also depends on the level of maritime transport connectivity, logistics availability, and the effectiveness of the distribution process (Susanto et al., 2021). Examining the interrelationships among these four aspects is crucial, as limitations in any single aspect can affect the overall effectiveness of the logistics system in remote areas.

A number of studies have examined the Sea Toll Program from various perspectives, such as enhanced connectivity, the reduction of price disparities, increased availability of goods, and the effectiveness of logistics distribution (Nur et al., 2020). Nevertheless, the findings of such research remain dispersed across various studies, indicating that the contribution of the Sea Toll Program can vary depending on regional characteristics, port conditions, maritime transport networks, and the community's logistics needs (Arisusanty et al., 2018). Therefore, a study is needed that integrates discussions on the Sea Toll Program, maritime transport connectivity, logistics availability, and logistics distribution to gain a more comprehensive understanding of the interrelationships among these variables in remote areas.

Given these conditions, a study titled “Contribution of the Sea Toll Program, Maritime Transport Connectivity, and Logistics Availability and Distribution in Remote Areas: A Literature Review” was conducted using a literature review approach. This study aims to identify and analyze findings from previous research regarding the Sea Toll Program's contribution to supporting maritime transport connectivity, enhancing logistics availability, and improving logistics distribution in remote areas.

The study's findings are expected to provide a more systematic understanding of the role of the Sea Toll Program, while also identifying research gaps that can serve as a basis for future research.

The problem formulation was developed by reviewing and analyzing the research results presented in the article and subsequently comparing them with findings from other research articles, particularly those concerning the variables used in this study.

METHODS

This article aims to review and synthesize literature regarding logistics distribution in remote areas in order to identify factors that can enhance such distribution such as the contribution of the "Sea Toll" program, maritime transport connectivity, and logistics availability. The researchers reviewed, analyzed, and synthesized literature from various journals and other relevant sources to understand logistics distribution strategies in remote areas. This study employs a literature review approach to achieve its objectives. A brief review of logistics distribution was conducted by examining and analyzing 20 peer-reviewed journal articles, as presented in the following table. The first table lists the 20 articles related to the variables under review, as follows:

Table 1. Journal Distribution and Publishers

No	Article Title	Author	Journal	Publisher	Year
1	Optimizing the Sea Toll Program to Reduce Price Disparities: An Analytical Review	(Nur et al., 2020)	Journal of Marine Transportation Research	Center for Research and Development of Sea, River, Lake, and Ferry Transportation, Agency for Research and Development of Transportation, Ministry of Transportation	2020
2	Fluctuations and Disparities in Staple Food Prices in Underdeveloped, Remote, Outermost, and Border Areas of North Maluku and West Papua Served by the Sea Toll Program	(Prasetyo et al., 2023)	Journal of Agribusiness-Oriented Scientific Thought for the Community	Faculty of Agriculture, Galuh University	2023
3	Maritime Connectivity and Economic Inclusion: A Decade of Indonesia's Sea Toll Program	(Nasrullah, 2025)	Synergy International Journal of Logistics	Sinergi Kawula Muda Foundation	2025
4	Economic Impact Analysis of Sea Toll Program Implementation in Eastern Indonesia: A Review in Papua, Maluku, and East Nusa Tenggara Regions	(Robby Kurniawan et al., 2024)	Journal Of Law, Politics, and Humanities	Dinasti Research	2025
5	The Impact Of The T-3 Sea Toll Program On Price Disparity	(Firmantoko et al., 2024)	STIP Jakarta E-Journal	Meteor STIP Marunda	2024

No	Article Title	Author	Journal	Publisher	Year
6	The Impact of Subsidized Maritime Transport Connectivity on Social Welfare in Eastern Indonesia: A System Dynamic Approach	(Rahman & Wirjodirdjo, 2025)	IOP Conference Series: Earth and Environmental Science	Purpose-Led Publishing	2025
7	Impact of maritime transport and connectivity on Natuna Regency's economic development	(Hidayat et al., 2025)	Bio We Conference	EDP Sciences	2025
8	Time reliability of the maritime transportation network for China's crude oil imports	(Wang et al., 2023)	Copenhagen Business School	Scopus Link & Elsevier Fingerprint Engine	2020
9	Measuring Connectivity for Domestic Maritime Transport Network	(Frazila & Zukhruf, 2015)	Journal of the Eastern Asia Society for Transportation Studies	J-STAGE	2015
10	Exploring the relationships between maritime connectivity, international trade and domestic production	(Saeed et al., 2021)	Maritime Policy & Management	Routledge Taylor and Francis Group	2021
11	Identification of Maritime Transport Connectivity Constraints in Archipelagic Regions	(Kelwulan et al., 2023)	Archipelago Engineering” 2023	ALE Proceeding	2023
12	The Impact of Sea Toll Program on Logistic Availability in Disadvantaged, Isolated, Outermost and Border Regions (T3p) in Indonesia	(Sibarani et al., 2022)	Dinasti International Journal of Education Management and Social Science	Dinasti Publisher	2022
13	Usability of Performance Indicators of Logistics Infrastructure Availability in Supply Chain Designing	(Foltin et al., 2018)	18th International Scientific Conference Business Logistics in Modern Management	Semantic Scholar	2018
14	The Effect of the Effectiveness of Tuberculosis Information System (SITB) Usage on Logistics Availability at Community Health Centers (Puskesmas) in Jember Regency	(Suhaemi et al., 2025)	Ibnu Sina Scientific Journal	ISFI Banjarmasin College of Health Sciences	2025
15	Availability of Health Logistics for Disaster Preparedness (A Case Study at the Nagan	(Joharuddin et al., 2023)	Journal of Public Health	Pahlawan Tuanku Tambusai University	2023

No	Article Title	Author	Journal	Publisher	Year
	Raya Regency Health Office)				
16	Logistics Distribution Route Optimization in Artificial Intelligence and Internet of Things Environment	(Liu, 2024)	Decision Making: Application Of Management and Engineering	Scientific Oasis	2024
17	A City Logistics Distribution Model: A Physical Internet Approach	(Li et al., 2023)	Journal Processes	MDPI	2023
18	Reduced bias estimation of the shape parameter of the log-logistic distribution	(Caeiro & Mateus, 2024)	Journal of Computational and Applied Mathematics	Science Direct	2024
19	Logistic distribution in humanitarian supply chain management: a thematic literature review and future research	(Sentia et al., 2023)	Journal Academic Annals of Operations Research	Spring Nature	2023
20	Determination of Logistics Distribution Centers: A Combination of Spatial Analysis and Analytical Hierarchy Process	(Rimadeni et al., 2024)	Journal Européen des Systèmes Automatisés	International Information And Engineering Technology Association	2024

Sumber: Diolah oleh Penulis (2026)

Table 2. Article Categories by Topic

No	Artikel Name	Purpose	Findings	Recommendations
1	Optimizing the Sea Toll Program to Reduce Price Disparities: An Analytical Review	This study examines the contribution of the Sea Toll Program to reducing price disparities through enhanced maritime transport connectivity, logistics availability, and the effectiveness of logistics distribution in remote areas.	Research findings indicate that the Sea Toll Program is capable of reducing the prices of basic commodities by 11%–20% and enhancing the effectiveness of logistics distribution.	The importance of improving the efficiency of Sea Toll routes and shipping frequencies to facilitate logistics distribution and reduce price disparities.
2	Fluctuations and Disparities in Staple Food Prices in Underdeveloped, Remote, and Outermost, and Border Areas of North Maluku and West Papua Served by the Sea Toll Program	The objective of this study is to analyze fluctuations and disparities in the prices of staple foods in 3T (frontier, outermost, and underdeveloped) and border regions served by the Sea Toll Program.	Research findings indicate that the Sea Toll Program contributes to reducing price disparities for staple foods, although price fluctuations still occur in some regions.	The importance of enhancing the effectiveness of the Sea Toll distribution system to maintain food stability and availability in 3T regions

No	Artikel Name	Purpose	Findings	Recommendations
3	Maritime Connectivity and Economic Inclusion: A Decade of Indonesia's Sea Toll Program	The purpose of this study is to evaluate the performance of the Sea Toll Program in improving connectivity, infrastructure, and stabilizing commodity prices in the T region.	Research findings indicate that the Sea Toll Program improves connectivity and lowers the prices of staple commodities in remote areas, although challenges regarding infrastructure and the utilization of return cargo persist.	There is a need to optimize port infrastructure, integrate digital systems, and increase the utilization of backhaul cargo to enhance the efficiency of the Sea Toll Program.
4	Economic Impact Analysis of Sea Toll Program Implementation in Eastern Indonesia: A Review in Papua, Maluku, and East Nusa Tenggara Regions	The aim of this study is to analyze the implementation of the Sea Toll Road Program and its economic impact on regional development in Papua, Maluku, and East Nusa Tenggara.	Research findings indicate that the Sea Toll Program generates direct and indirect economic impacts, yet its performance in creating jobs and increasing regional revenue has not been optimal.	Optimizing the Sea Toll Road Program to boost employment and regional revenue.
5	The Impact Of The T-3 Sea Toll Program On Price Disparity	The objective of this study is to analyze the impact of the Sea Toll Program on price disparities for basic commodities in Tarempa.	Research findings indicate that there is no significant difference in the prices of necessities before and after the implementation of the Sea Toll Program in Tarempa.	The importance of enhancing the effectiveness of Sea Toll distribution to curb price disparities for necessities in Tarempa.
6	The Impact of Subsidized Maritime Transport Connectivity on Social Welfare in Eastern Indonesia: A System Dynamic Approach	The objective of this study is to evaluate the impact of subsidized maritime transport connectivity on the improvement of social welfare in Eastern Indonesia.	Research findings indicate that increasing subsidized maritime transport connectivity through the expansion of the vessel fleet contributed to an average increase of 0.009 in the Human Development Index (HDI).	The importance of enhancing connectivity and expanding the shipping fleet to support the well-being of communities in Eastern Indonesia.
7	Impact of maritime transport and connectivity on Natuna Regency's economic development	The objective of this study is to analyze the influence of sea transportation, connectivity, and government policy on the economic development of Natuna Regency.	Research findings indicate that maritime transportation, connectivity, and government policies play a crucial role in supporting the economic growth and resilience of Natuna Regency.	The need for improved maritime infrastructure, digital connectivity, and adaptive policies to support the economic growth of Natuna Regency.
8	Time reliability of the maritime transportation network for China's crude oil imports	The objective of this study is to evaluate the reliability of maritime transport times and identify network nodes vulnerable to capacity variations caused by extreme events.	Research findings indicate that transport time reliability is lower in straits or canals, with the Taiwan Strait, the Strait of Hormuz, and the Strait of Malacca identified as vulnerable nodes.	The need to enhance risk mitigation and route planning at vulnerable maritime transport nodes.

No	Artikel Name	Purpose	Findings	Recommendations
9	Measuring Connectivity for Domestic Maritime Transport Network	The objective of this research is to develop a method for measuring maritime transport connectivity that is suitable for freight and passenger transport in Indonesia.	Research findings indicate that the gravity-like model approach and the modified LSCI can measure maritime transport connectivity more comprehensively within Indonesia's shipping network.	The importance of a connectivity index that takes into account domestic maritime transport characteristics as well as freight and passenger transport needs.
10	Exploring the relationships between maritime connectivity, international trade and domestic production	The objective of this study is to analyze the relationship between maritime connectivity, bilateral trade, and GDP per capita across countries.	Research findings indicate that maritime connectivity is linked to bilateral trade and economic growth, particularly through increases in export value and GDP per capita.	The importance of maritime connectivity as a strategy to strengthen trade and economic growth.
11	Identification of Maritime Transport Connectivity Constraints in Archipelagic Regions	The objective of this study is to analyze the issues regarding inter-island maritime transport connectivity in Maluku Province.	Research findings indicate that inter-island connectivity in Maluku is hindered by port waiting times, a lack of information on ship schedules, and limited vessel availability.	Improving vessel schedule reliability, fleet availability, and the provision of shipping information to strengthen inter-island connectivity.
2	The Impact of Sea Toll Program on Logistic Availability in Disadvantaged, Isolated, Outermost and Border Regions (T3P) in Indonesia	The objective of this study is to analyze the effectiveness of the Sea Toll Program in enhancing connectivity and logistics distribution, as well as reducing price disparities in T3P regions.	Research findings show that the Sea Toll Program improves connectivity and logistics distribution and contributes to reducing price disparities in the T3P area.	Enhancing connectivity, logistics distribution, and the effectiveness of Sea Toll services in T3P regions.
13	Usability of Performance Indicators of Logistics Infrastructure Availability in Supply Chain Designing	The objective of this study is to analyze the factors influencing logistics performance and to classify the level of logistics infrastructure availability.	Research findings indicate that clustering and classification methods can be used to identify and classify the level of logistics infrastructure availability.	Optimizing classification methods to predict infrastructure availability and improve logistics performance.
14	The Effect of the Effectiveness of Tuberculosis Information System (SITB) Usage on Logistics Availability at Community Health Centers (Puskesmas) in Jember Regency	The aim of this study is to analyze the effectiveness of using SITB and its impact on the availability of TB logistics at community health centers (Puskesmas) in Jember Regency.	Research findings indicate that the use of SITB does not yet guarantee equitable availability of TB logistics, with information quality and user satisfaction serving as significant influencing factors.	Improving information quality and user satisfaction to optimize the management and equitable distribution of TB logistics.
15	Availability of Health Logistics for Disaster Preparedness (A Case Study at the Nagan Raya	The aim of this study is to analyze the planning, procurement, storage, and distribution of health logistics for disaster management in Nagan	Research findings indicate that the planning, procurement, and distribution of health logistics are satisfactory, but warehousing	Enhancing warehousing capacity and facilities to strengthen health logistics management during disasters.

No	Artikel Name	Purpose	Findings	Recommendations
	Regency Health Office)	Raya Regency.	facilities still require improvement.	
16	Logistics Distribution Route Optimization in Artificial Intelligence and Internet of Things Environment	The objective of this study is to analyze the application of AI and IoT in optimizing logistics distribution routes, as well as enhancing efficiency and reducing distribution costs.	Research findings indicate that the implementation of AI and IoT can improve distribution route efficiency and reduce logistics costs.	Optimizing the implementation of AI and IoT and conducting continuous technology evaluations.
17	A City Logistics Distribution Model: A Physical Internet Approach	The objective of this research is to develop a Physical Internet-based urban logistics distribution model to enhance flexibility and cost-efficiency in distribution.	Research findings indicate that the Physical Internet model is more cost-efficient in terms of distribution and more flexible than traditional logistics models.	Developing the implementation of the Physical Internet to enhance the efficiency and flexibility of urban logistics distribution.
18	Reduced bias estimation of the shape parameter of the log-logistic distribution	The objective of this research is to develop a new estimator for the shape parameter of the three-parameter log-logistic distribution that is more accurate and has minimal bias.	Research findings indicate that the proposed estimator performs better and exhibits lower bias compared to previous estimation methods.	The need to apply the proposed estimator to improve the accuracy of three-parameter log-logistic distribution analysis.
19	Logistic distribution in humanitarian supply chain management: a thematic literature review and future research	The aim of this study is to identify issues, research themes, gaps, and future research directions in humanitarian logistics and supply chains for disaster management.	Research findings indicate that distribution delays, demand uncertainty, and high operational costs are the primary issues in disaster relief logistics.	The importance of information technology, inventory management, and risk mitigation in accelerating and streamlining disaster logistics distribution.
20	Determination of Logistics Distribution Centers: A Combination of Spatial Analysis and Analytical Hierarchy Process	The objective of this study is to determine the optimal location for a medical logistics distribution center in Aceh Province using the AHP method and GIS analysis.	Research findings indicate that Location C is the most optimal site for a medical logistics distribution center, based on accessibility and service coverage.	Selecting Location C as the medical logistics distribution hub optimizes access and the equitable distribution of services.

RESULTS AND DISCUSSION

The results presented in the metrics above encompass all relevant variables, including managerial implications and suggestions for future research derived from the findings. (Perkasa, 2022). A positive correlation is observed in the contribution of the Sea Toll program.

Furthermore, a discussion is presented regarding the maritime transport connectivity variable in relation to other variables (Naufal, 2024), as well as the context of maritime transport connectivity involving inter-regional connections. (Sappe et al., 2020). The subsequent discussion covers the logistics availability variable and its relationship with other variables (Suhaemi et al., 2025) as well as the variation among those variables. The subsequent discussion concerns the logistic distribution variable (Delmana, 2021). It encompasses results

regarding the involvement in the implementation of logistics management. This literature review presents all identified variables, presents the results, and uses them in this article.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

The discussion reveals the existence of articles concerning variables that exert a direct influence, as well as others requiring further investigation that could serve as a reference for future research; an example is the article regarding the contribution of the Sea Toll program (Nasrullah, 2025; Tohir, 2025; Pambudi & Handayani, 2023; Selasдини, 2024) as well as its impact on logistics distribution (Kendek et al., 2024; Susanto et al., 2021; Purnomo et al., 2022; Kendek et al., 2024; Nasihah & Sudirman, 2025). In addition, there is also a study on maritime transport connectivity (Dekanawati et al., 2025; Kelwulan et al., 2023; Meylan et al., 2025; Pratama et al., 2016) which encompasses a wide range of items as well as logistics availability (Yolanda et al., 2024; Selasдини, 2024; Suhaemi et al., 2025; Joharuddin et al., 2023) and the variation between variables. The comprehensive scope of this literature review provides a valuable foundation for future research, particularly in identifying models and methods that can be adapted and applied by other researchers.

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