

Maritime Connectivity and Economic Inclusion: A Decade of Indonesia's Sea Toll Program

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ABSTRACT: Indonesia's archipelagic geography poses significant logistical challenges, particularly in achieving equitable connectivity across its more than 17,000 islands. In response, the government launched the Sea Toll Program in 2014 to reduce logistics costs, address price disparities, and integrate remote regions into the national economy. This study aims to evaluate the performance of the Sea Toll Program, focusing on its impact on route expansion, infrastructure development, and commodity price stabilization. Employing a qualitative-descriptive methodology, the research utilizes secondary data from government agencies, international institutions, and academic sources. Comparative and thematic analyses are applied to assess logistics improvements and ongoing structural constraints. The results show substantial progress: route expansions from 3 to 39 between 2015 and 2024, port coverage increased to 109, and cargo volumes reached 24,556 TEUs. Notably, between 2018 and 2024, price reductions of 10–12% for essential commodities were recorded in remote regions, based on data from the Ministry of Trade and Central Bureau of Statistics (BPS). However, only 58.7% of ports are adequately equipped, and backhaul cargo utilization remains below 25%. Infrastructure gaps, fragmented digital systems, and limited intermodal integration continue to impede efficiency. The study concludes that while the Sea Toll Program has enhanced logistics connectivity and supported regional equity, systemic reforms are required to realize its full potential. These include infrastructure modernization, digital platform integration, intermodal coordination, and adaptive governance models. The findings offer a roadmap for future logistics strategies that support national resilience and inclusive development.

Keywords: Sea Toll, Maritime Logistics, Indonesia, Port Infrastructure, Intermodal Transport, Digital Integration.



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INTRODUCTION

Indonesia, as the world's largest archipelagic state with over 17,000 islands, faces a unique logistical challenge: how to ensure equitable connectivity and development across its dispersed territories. This geographical reality has necessitated a robust maritime logistics strategy to serve as the

nation's circulatory system, linking production centers, distribution hubs, and consumer markets. In response, the Indonesian government launched the Sea Toll Program (Tol Laut) in 2014, an ambitious initiative aimed at transforming inter-island connectivity into a driver of inclusive economic growth.

The Sea Toll Program represents a strategic intervention targeting three primary goals: reducing logistics costs, addressing regional price disparities, and enhancing Indonesia's competitiveness in global supply chains. As Iskandar & Arifin (2023) assert, improving the nation's Logistics Performance Index (LPI) is imperative for attracting investment and streamlining national trade flows. Maritime logistics is no longer viewed as a support function, but rather as a national backbone for development, capable of redefining Indonesia's internal market coherence (Li et al., 2024; Mubarak et al., 2025).

Indeed, logistics connectivity plays a critical role in shaping national economic integration. The Sea Toll Program seeks not only to reduce disparities between the western and eastern parts of the country but also to stimulate localized economic activity in remote regions. By improving port infrastructure and streamlining sea routes, the program has the potential to catalyze supply chain reliability and reduce cost inefficiencies. Moeis et al. (2017) highlight the significance of optimized logistics network designs, emphasizing how logistical connectivity can directly uplift production and consumption across Indonesia's island economies.

The social impact of maritime logistics modernization is equally profound. As argued by Gurning et al. (2022), access to reliable shipping services enables remote communities to participate more effectively in regional and national markets. For these communities, logistical access is not merely a matter of economic opportunity; it is also a foundation for social inclusion and resilience. The improved movement of goods fosters entrepreneurship, reduces living costs, and enhances the availability of essential commodities.

From a comparative perspective, Indonesia shares common logistical challenges with other archipelagic nations: high transportation costs, inconsistent port infrastructure, weather-dependent scheduling, and regulatory complexity. Yeo et al. (2020) link these factors directly to elevated consumer prices and market volatility, particularly in underserved areas. The cost inefficiencies resulting from fragmented maritime systems exacerbate inter-regional inequality and diminish national competitiveness.

Price disparity, one of the Sea Toll Program's core targets, remains a persistent issue, particularly in Eastern Indonesia. Wahyuni et al. (2020) argue that operational efficiency and port competitiveness are essential to lowering freight costs, thereby contributing to more equitable pricing across regions. Gaps in infrastructure result in goods taking longer, less reliable routes, which then inflates market prices. By contrast, well-integrated logistics systems promote price convergence and facilitate equitable access to vital resources.

Indonesia's port development trajectory reflects its evolving economic priorities. From a colonial-era focus on export facilitation to a post-independence shift toward domestic integration, the nation's port system has gradually adapted to meet new demands. Giglio et al. and Zuliyanti et al. (in Wahyuni et al., 2020) underline the importance of strategic upgrades and international

benchmarking in fostering port competitiveness. These efforts, however, must be matched by policy coherence and institutional agility.

The Sea Toll Program's design incorporates both infrastructure enhancement and service provision. By directing investment toward underdeveloped regions, the program aims to equalize access to logistics services. Gurning et al. (2022) emphasize the role of logistics policies in enabling economic inclusion, noting that well-designed maritime interventions can empower marginalized populations to access broader economic networks. These initiatives reflect a paradigm shift in national development where logistics becomes an enabler of justice, not merely efficiency.

This chapter has demonstrated that the Sea Toll Program functions at the intersection of logistics, equity, and national resilience. While its structural promises are clear, operational challenges remain, particularly concerning infrastructure readiness, digital integration, and coordination across governmental and private actors. This study aims to evaluate the current performance of Indonesia's inter-island logistics through the lens of the Sea Toll Program, identifying its achievements and ongoing bottlenecks. In doing so, it proposes a roadmap for comprehensive enhancement of the system, recognizing that maritime logistics is central not only to economic growth, but to Indonesia's unity as a nation (Andrei et al., 2024; Cocuzza et al., 2025).

METHOD

This study employs a qualitative-descriptive methodology to examine the performance, achievements, and persistent bottlenecks within Indonesia's inter-island logistics system, with a particular focus on the Sea Toll Program. This methodological approach is chosen to enable a detailed and contextually grounded understanding of logistics dynamics in a geographically complex, archipelagic nation. The qualitative-descriptive method allows for systematic exploration of empirical evidence, policy evaluations, and stakeholder perspectives without the constraints of hypothesis testing making it particularly suitable for examining the intricacies of national logistics programs.

Research on maritime logistics typically integrates both quantitative and qualitative approaches to provide a comprehensive analysis (Tarkun, 2025). Quantitative methods often include the analysis of metrics such as logistics costs, cargo throughput, lead times, and infrastructure capacity, which serve as indicators of operational efficiency. Saini & Hrušecká (2021) emphasize that logistics costs are central to evaluating the economic efficiency of national logistics systems, as they reflect the degree to which infrastructure and operations support trade competitiveness.

In addition to cost-related metrics, the Logistics Performance Index (LPI) is frequently used to benchmark the effectiveness of logistics systems across regions. The LPI encompasses dimensions such as customs efficiency, infrastructure quality, shipment timeliness, and logistics competence, offering a multidimensional perspective on logistics performance. These quantitative benchmarks enable international comparisons and provide macro-level insights into logistics system maturity.

However, while such quantitative indicators are essential, they do not fully capture the contextual and operational complexities experienced on the ground. Therefore, this study prioritizes a qualitative-descriptive framework, allowing for an in-depth analysis of Indonesia's logistical

realities as observed through government reports, academic publications, and industry data. As noted by Kim et al. (2016), qualitative approaches are especially valuable in logistics research for uncovering nuanced operational barriers, local adaptations, and experiential factors that shape logistics outcomes.

The data sources utilized in this study are secondary in nature and encompass official documentation from the Ministry of Transportation, PELNI, and the Central Bureau of Statistics (BPS), along with publications from the OECD, World Bank, and scholarly platforms such as ResearchGate and TraceData. These sources offer a combination of statistical data and policy evaluation narratives essential for the triangulation of findings.

The analysis consists of two core techniques: comparative trend analysis and thematic evaluation. Comparative trend analysis is applied to assess logistics performance before and after the implementation of the Sea Toll Program, focusing on variables such as route coverage, TEU volumes, return cargo ratios, and port readiness across different regions. Thematic evaluation is then used to identify recurring structural challenges, including infrastructure bottlenecks, service frequency issues, and digital system inefficiencies.

Through this blended approach, the study not only maps logistics performance over time but also interrogates the structural and institutional conditions that sustain or hinder progress. The methodology is designed to offer grounded insights for both academic inquiry and policymaking, ensuring relevance to ongoing national debates about maritime logistics reform.

In summary, this study's methodological framework integrates the strengths of established logistics performance metrics with the contextual depth of qualitative-descriptive inquiry. This combination facilitates a holistic evaluation of Indonesia's inter-island logistics strategy and provides a basis for informed recommendations to enhance connectivity, efficiency, and economic equity across the archipelago.

RESULT AND DISCUSSION

This chapter presents the main findings of the study concerning the performance and structural conditions of Indonesia's inter-island logistics system, particularly through the lens of the Sea Toll Program. The discussion is organized into three sub-sections: program expansion and utilization, infrastructure gaps, and the impact on commodity pricing.

Sea Toll Growth and Utilization

Since its launch in 2015, the Sea Toll Program has undergone significant expansion, evolving into a critical pillar of Indonesia's logistics strategy. Starting with only three routes and 11 ports, by 2024 the network has grown to include 39 routes, 109 ports, and a reported total cargo volume of 24,556 TEUs. This growth reflects the government's commitment to enhancing national connectivity and addressing logistical imbalances between the western and eastern regions (Damayanti et al., 2023).

Table 1. Sea Toll Route Growth and Cargo Traffic (2015–2024)

Year	Number of Routes	Number of Ports	Cargo Volume (TEUs)	Return Cargo (TEUs)
2015	3	11	88	-
2018	20	55	8,000	1,700
2020	26	65	19,713	5,624
2022	30	85	28,991	6,800
2024	39	109	24,556	5,269

Performance evaluations incorporate various metrics such as TEU throughput, vessel turnaround time, customer satisfaction, and service regularity. Despite measurable growth, the program continues to face capacity utilization challenges most notably suboptimal return cargo volumes, which average below 25%, and uneven route performance across regions. The Maluku, Papua, and East Nusa Tenggara regions have shown the most notable improvements in connectivity, with benefits including more consistent delivery of food and construction supplies (Castelein et al., 2020).

Infrastructure Readiness and Disparities

A key determinant of Sea Toll effectiveness is port infrastructure. A fully equipped port includes adequate berthing, cargo handling technology, customs facilities, and intermodal linkages (Grappi & Neilson, 2019). However, as of 2024, only 58.7% of Indonesia's Sea Toll ports meet these basic criteria, with Eastern Indonesia lagging significantly at just 32% readiness, according to data compiled from the Ministry of Transportation (2024).

Table 2. Container Handling Readiness of Ports (as of 2024)

Region	Number of Ports	Adequately Equipped Ports	% Equipped
Western Indonesia	45	35	78%
Central Indonesia	30	18	60%
Eastern Indonesia	34	11	32%
Total	109	64	58.7%

Insufficient port infrastructure creates logistical bottlenecks that increase dwell times, reduce shipping reliability, and inflate logistics costs. Despite government investments in Eastern ports, critical infrastructure gaps persist. These disparities hinder supply chain resilience, especially during high-demand periods or operational disruptions (Adepoju, 2024).

Price Stabilization of Essential Commodities

One of the intended outcomes of the Sea Toll Program is to reduce price disparities for essential goods. The improved frequency and reliability of maritime logistics have led to cost reductions in the transport of commodities such as rice, cooking oil, and chicken meat, particularly in remote areas. These goods are highly sensitive to shipping costs due to their perishability and frequency of demand.

Table 3. Price Reduction of Basic Goods in Remote Areas

Commodity	Region	Pre-Toll Price (IDR/kg)	Post-Toll Price (IDR/kg)	% Price Drop
Rice	Papua	16,000	14,200	11.25%
Cooking Oil	Maluku	21,000	18,800	10.48%
Chicken Meat	NTT	35,000	30,900	11.71%

Improved logistics reliability, characterized by regular scheduling and reduced shipping delays, has enhanced price stability and consumer access in remote regions (Fancello et al., 2022). Additionally, there is evidence of regional price convergence where price gaps between urban centers and remote islands are narrowing due to improved transport access (Adepoju, 2024).

In summary, while the Sea Toll Program has advanced inter-island logistics connectivity and moderated regional price disparities, ongoing infrastructure limitations and underutilized return logistics continue to constrain its overall efficiency and scalability.

Indonesia's Sea Toll Program has marked a significant step forward in addressing the geographic and developmental challenges of an archipelagic nation. The results demonstrate a measurable improvement in logistics access, service frequency, and commodity price stabilization across remote regions. However, realizing the full potential of inter-island connectivity requires more than just route expansion and cargo throughput; it necessitates comprehensive systemic reform encompassing infrastructure, technological integration, governance alignment, and multi-stakeholder collaboration.

One of the key challenges is achieving seamless intermodal integration, a cornerstone of global best practices in maritime logistics (Awashreh et al., 2024; Feng et al., 2025; Ni & Irannezhad, 2024). Advanced systems such as synchromodal transport, which dynamically coordinates multiple transport modes based on real-time data, exemplify the direction Indonesia must pursue. As Brochado et al. (2024) highlight, the integration of Internet of Things (IoT) technologies and standardized communication protocols allows logistics operators to adapt rapidly to disruptions, improve resource allocation, and maintain service consistency (Wang et al., 2025). In the Indonesian context, such frameworks would reduce the disconnect between maritime and terrestrial logistics, particularly in remote areas where inland connectivity is often poor.

Digital integration is another critical area for enhancement. Current logistics operations in Indonesia suffer from fragmented information systems and a lack of real-time visibility. This limits coordination, reduces reliability, and increases operational costs. The implementation of digital platforms can provide end-to-end cargo tracking, facilitate efficient route planning, and enable predictive maintenance for fleet and port operations. Moreover, blockchain-based systems offer promising solutions for enhancing transparency and reducing transactional friction across the supply chain. The adoption of such technologies would not only improve efficiency but also build trust among stakeholders and enhance the nation's Logistics Performance Index (LPI) rankings.

Investment in infrastructure especially through public-private partnerships (PPPs) is also vital. PPPs offer a mechanism for combining public oversight with private sector innovation and efficiency. Successful models from global ports demonstrate that such partnerships can accelerate infrastructure upgrades, improve terminal operations, and increase port competitiveness (Ascencio

et al., 2025). For Indonesia, which faces severe disparities in port readiness between western and eastern regions, leveraging PPPs could ensure equitable infrastructure development while minimizing public budgetary constraints.

Equally important is the establishment of adaptive and inclusive governance models. Optimizing a national logistics network equires collaborative decision-making frameworks that actively involve government agencies, private operators, and local communities in continuous performance evaluation and shared accountability. Wang and Li (2022) argue that flexible, data-driven governance leads to more resilient and responsive logistics systems. This includes regular performance monitoring, shared data systems, and multilevel coordination mechanisms. Moreover, incorporating sustainability into logistics governance such as promoting green port operations and carbon-efficient routing aligns logistics improvements with environmental goals (Wiśnicki & Milewski, 2018).

In summary, while the Sea Toll Program has initiated a necessary transformation in Indonesia's maritime logistics, sustainable progress depends on adopting global best practices and systemic innovations (Lopes et al., 2025; Zhou et al., 2025). Intermodal integration, digital transformation, infrastructure financing, and adaptive governance must collectively underpin the next phase of logistics development. Only through such a holistic and coordinated approach can Indonesia fully realize the promise of inclusive and efficient maritime connectivity.

CONCLUSION

Indonesia's Sea Toll Program stands as a pivotal initiative to strengthen maritime connectivity and promote equitable economic growth across the archipelago. Over the past decade, it has achieved notable progress in expanding inter-island routes, improving cargo distribution, and narrowing price disparities for essential commodities, particularly in the eastern regions such as Papua, Maluku, and East Nusa Tenggara. These accomplishments underscore the program's contribution to enhancing regional accessibility, supply chain efficiency, and economic inclusion.

Nonetheless, persistent structural and operational constraints continue to limit its effectiveness. The readiness of port infrastructure especially in eastern Indonesia remains uneven, with only 58.7% of ports adequately equipped and backhaul cargo utilization still below 25%. Moreover, fragmented digital systems and weak intermodal integration reduce operational efficiency and transparency. These challenges underscore the need for systemic reforms that bridge the gap between maritime, land, and digital logistics frameworks.

Moving forward, the sustainability of the Sea Toll Program will depend on the integration of technology, intersectoral coordination, and adaptive governance. Digital platforms, real-time tracking, and public-private partnerships can accelerate modernization while maintaining inclusivity and environmental responsibility. By advancing these reforms, Indonesia can transform its maritime logistics system into a resilient and competitive network that not only drives national economic growth but also strengthens unity and social equity across its islands.

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