



Optimization of Maritime Logistics Transportation as a Catalyst for Economic Equity in Indonesia

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Abstract. The maritime axis is a strategy introduced by the Indonesian government to strengthen the logistics transportation sector to promote economic equity through-out the archipelago. This research aims to analyze the impact of the maritime axis on the effectiveness of logistics distribution and how related infrastructure and policies can drive economic equity in Indonesia. The method used is a quantitative analysis of secondary data combined with case studies in several strategic areas. The research results show that optimizing the maritime axis has the potential to improve the efficiency of goods distribution, reduce logistics costs, and accelerate economic development in underdeveloped areas. This article provides strategic recommendations for strengthening infrastructure and policies supporting the maritime axis development.

Keywords: Maritime Axis, Maritime Transportation; Economic Equity, Regional Economy.

1 Introduction

As an archipelagic country with over 17,000 islands, Indonesia faces significant challenges in achieving effective and efficient logistics distribution [1]. The economic disparity between western and eastern Indonesia is mainly due to limited access to adequate transportation and infrastructure [2]. In recent years, the government has introduced the concept of the Maritime Axis as a strategic effort to strengthen the logistics transportation sector and promote economic equity. The Maritime Axis aims to increase national logistics competitiveness and create better connectivity between regions, which is expected to reduce economic inequality [3], [4]. This study explores how implementing the Maritime Axis can optimize logistics distribution and contribute to economic equity in Indonesia.

The Indonesian government has recognized the importance of logistics transportation as the backbone of the economy, particularly in an archipelagic nation with unique geographic challenges [4], [5], [6], [7]. Before initiating the Maritime Axis, logistics distribution in Indonesia faced numerous obstacles, such as high transportation costs, long delivery times, and infrastructure access gaps between western and eastern

Indonesia [2], [8]. These conditions resulted in price disparities and limited access to essential goods in remote areas, further deepening economic inequality between regions [9].

In the global context, Indonesia's role as a strategically located maritime navigation between two oceans is crucial for international trade routes [8], [10]. However, this potential has not been fully realized due to infrastructure limitations and poorly integrated logistics policies. Therefore, the Maritime Axis is designed to strengthen domestic logistics transportation networks and enhance Indonesia's competitiveness in the global market [11]. Indonesia is expected to maximize its position as a regional maritime logistics hub by developing significant ports and efficient distribution routes [12].

This research aims to evaluate the effectiveness of the Maritime Axis in addressing economic inequality in Indonesia by improving logistics efficiency. The study also aims to identify existing barriers to implementing the Maritime Axis and provide recommendations for overcoming them. As such, the research results are expected to contribute to formulating more effective policies in strengthening the logistics transportation sector and supporting national economic equity.

With the advancement of technology and globalization, the demand for a more efficient and integrated logistics system has grown [13]. Optimal supply chain management moves goods from point A to point B. It involves other aspects such as time management, cost reduction, and risk mitigation throughout the logistics process [14], [15]. In Indonesia, this is more critical due to the country's unique geographical conditions, which require logistics solutions that are specific and adaptable to local contexts.

The reliability of the logistics transportation system is also a significant concern. Irregular shipping schedules, delays, and damaged or lost goods during shipping are frequent problems that significantly impact economic activities [14], [15], [16], [17]. Therefore, improving the reliability of logistics transportation through route optimization, port infrastructure improvements, and the use of advanced information technology is a necessary step [13], [18], [19], [20].

On the other hand, high logistics costs remain a significant barrier for many companies, especially micro, small, and medium enterprises (MSMEs), which form the backbone of the national economy. These high costs are often caused by inefficiencies in the transportation system, both by land and sea, and complicated bureaucracy. Therefore, policies are needed to support the reduction of logistics costs through deregulation, increased infrastructure capacity, and technological development [10], [18].

Optimizing logistics transportation through the Maritime Axis will positively impact the efficiency and effectiveness of goods delivery and play an essential role in supporting equitable economic development. By strengthening connectivity between islands and reducing regional disparities, more equitable economic distribution can be achieved, improving the welfare of people throughout Indonesia.

Thus, optimizing logistics transportation through the Maritime Axis is a strategic step that must be implemented immediately to address the challenges in managing the supply chain in Indonesia. By improving efficiency, reducing costs, and increasing reliability in the logistics system, Indonesia can strengthen its economic competitiveness on the global stage. Moreover, this step is also expected to promote equitable economic development between regions so that all levels of society can benefit from more

inclusive and sustainable development. In this context, joint commitment from the government, industry players, and all stakeholders is required to realize Indonesia's vision as a strong and competitive global maritime axis.

2 Methods

This study uses a qualitative descriptive approach to understand the phenomenon of logistics transportation optimization in the maritime axis and its impact on economic equity in Indonesia. This approach is chosen to thoroughly examine the factors that influence logistics system efficiency, costs, and reliability and how these factors can support economic equity. This study uses primary and secondary Data. Primary data will be obtained through in-depth interviews with experts in logistics, transportation management, and maritime policymakers. Respondents include decision-makers in logistics companies, government officials at the Ministry of Transportation, and academics who focus on maritime economic studies. Additionally, Secondary data will be collected from annual reports, academic journals, previous case studies, and relevant policy documents. These data sources include reports from the Ministry of Transportation, the World Bank, the Asian Development Bank (ADB), and various scientific publications on logistics and transportation.

This study uses semi-structured interviews and document analysis to collect the data. Interviews will be conducted with stakeholders to gain deep insights into key issues in maritime logistics transportation optimization. Semi-structured interviews are chosen as they allow flexibility in exploring important topics that may arise during discussions. Moreover, relevant documents will be analyzed to identify trends, policies, and best practices implemented in the maritime logistics sector in Indonesia and other countries with similar geographic conditions. The researchers analyze the data using content analysis and data triangulation. In content Analysis, data from interviews and documents will be analyzed using content analysis methods to identify emerging key themes.

3 Results and Discussions

3.1 Research Results

The results of the analysis indicate that implementing the Maritime Axis has significantly contributed to improving logistics efficiency in Indonesia. Several regions, particularly in Western Indonesia, have experienced increased accessibility, resulting in reduced distribution costs and improved local economies. For example, the development of Pangkalbalam Port, Pangkalpinang, Bangka Belitung Islands, as a logistics hub, has reduced distribution travel time by 25%, directly affecting the prices of goods in the area [21].

The research revealed several key findings related to the efficiency, costs, and reliability of the logistics system in the region in the context of optimizing logistics transportation at Pangkalbalam Port, Pangkalpinang City, Bangka Belitung Province.

3.2 Operational Efficiency at The Port

Pangkalbalam Port, one of the main ports in the Bangka Belitung Islands, has improved operational efficiency in recent years, particularly following the implementation of smart port technologies and the digitization of administrative processes [22], [23]. However, challenges remain in terms of infrastructure capacity and loading/unloading speed, which need to be enhanced. Implementing a more integrated port management system has successfully reduced ship waiting times, which had previously been a significant factor in operational inefficiency. However, the study found that there is still a need to increase dock capacity and storage facilities to support the growing traffic volume.

3.3 Reduction in Logistics Costs

Logistics costs at Pangkalbalam Port are relatively high compared to other ports in Indonesia [24], [25]. This is due to several factors, including the lack of road infrastructure connecting the port to major production areas on Bangka Island and high operational costs resulting from the limited use of technology. Efforts to reduce logistics costs through infrastructure improvements and the development of alternative transportation routes are expected to lessen the dependence on existing sea routes, which have long been a significant cause of high costs. The study also indicates that with increased port efficiency, there is potential to reduce logistics costs by 15-20% in the medium term, which would positively impact the competitiveness of local products.

3.4 Reliability of The Logistics System

The reliability of the logistics system at Pangkalbalam Port still faces challenges, particularly in terms of consistency in delivery schedules and operational risk management. Some delivery delays have been caused by unpredictable weather conditions and limitations in port infrastructure, which cannot accommodate spikes in shipping volume [26], [27]. However, with ongoing improvements to port infrastructure and better tracking systems, the reliability of the logistics system at Pangkalbalam Port is expected to increase significantly. This will positively impact user trust in port services and support local economic growth.

3.5 Impact on Economic Equity

The optimization of Pangkalbalam Port has a direct impact on economic equity in the Bangka Belitung Islands Province. Research shows that increased connectivity and logistics efficiency at this port have opened greater access for local products to national and international markets, stimulating economic growth in the region. Additionally, with reduced logistics costs, SMEs in Bangka Belitung can more easily compete in broader markets, improving the financial well-being of the local community. This research highlights the importance of sustainable development at Pangkalbalam Port to

ensure that all segments of society in the Bangka Belitung Islands feel the benefits of logistics optimization.

4 Discussions

Despite significant improvements, some regions still face policy consistency and infrastructure limitations. To maximize the Maritime Axis's potential, the government needs to accelerate the development of supporting infrastructure, such as connecting roads and storage facilities. Additionally, better coordination between the central and regional governments is required to ensure policies have a uniform impact across Indonesia.

Several aspects need to be considered when analyzing the effectiveness of the Maritime Axis. First, the increased logistics efficiency resulting from improved maritime infrastructure, such as ports and supporting facilities, has positively impacted goods distribution. For example, reduced port waiting times and increased transport capacity on significant routes have helped lower national logistics costs, reducing commodity prices in various regions. However, this effect is not uniform across Indonesia, indicating that infrastructure is just one element of a more complex solution.

A critical finding from this analysis is that economic disparities between regions remain a significant challenge despite the Maritime Axis. Data show that areas with better basic infrastructure before the program's launch, such as Java and Sumatra, benefited more than regions with minimal basic infrastructure, such as Papua and Maluku. This disparity indicates that although the Maritime Axis has great potential to improve economic equity, implementation on the ground needs to focus more on lagging regions.

Policy-wise, this analysis suggests the need for more specific and locally-based strategies to support the implementation of the Maritime Axis. The government should consider a decentralized approach that allows local governments to play a more significant role in planning and managing maritime infrastructure projects. Additionally, incentives for the private sector to invest in lagging regions should be strengthened to accelerate economic development equity.

Compared with global studies, this research finds that countries with similar geographical characteristics, such as the Philippines and Japan, have successfully addressed logistics and economic equity challenges through focused and integrated maritime policies. These studies show that regulatory aspects and collaboration between government agencies and the private sector are crucial for successful maritime strategies besides physical infrastructure. In Indonesia, the Maritime Axis policy must be integrated with other initiatives, such as logistics digitalization programs and improved financial access for small and medium enterprises (SMEs), to achieve more sustainable outcomes.

5 Conclusion, Implication, Recommendation, Limitation, and Suggestion

5.1 Conclusions

The Maritime Axis has proven an effective strategy for enhancing logistics efficiency and supporting economic equity in Indonesia. However, to fully realize this strategy's potential, additional efforts are needed to strengthen infrastructure, improve policy coordination, and ensure sustainable investment. By doing so, Indonesia can leverage its maritime position to boost global competitiveness and ensure that economic benefits are equitably distributed across all segments of society.

This research reveals that optimizing logistics transportation at Pangkalbalam Port in Pangkalpinang City, Bangka Belitung Islands Province plays a crucial role in improving the efficiency and effectiveness of Indonesia's maritime logistics system. The study shows that investment in improving and developing port infrastructure, such as docks and storage facilities, is essential to address existing operational challenges. Reducing logistics costs through developing alternative transportation routes and enhanced access infrastructure is also vital to improving the competitiveness of local products.

Although there has been progress in digitalization and port management, the reliability of the logistics system needs enhancement through the implementation of advanced risk management systems and tracking technologies. This optimization has significant potential to support economic equity in the Bangka Belitung Islands by improving inter-regional connectivity and reducing logistics costs, thereby opening broader market access for local products and fostering inclusive economic growth. These steps will help Pangkalbalam Port become a more efficient and competitive logistics hub, contributing to sustainable economic development in Indonesia.

5.2 Policy Implications and Recommendations

One major implication of these findings is improved coordination between central and regional governments in implementing infrastructure projects. Coordination limitations leading to project delays suggest that policy decentralization may be necessary to address existing barriers. The central government should grant more autonomy to local governments, particularly in planning and managing regional projects related to the Maritime Axis. A more flexible and adaptive regulatory framework is needed to support infrastructure development collaboration between the public and private sectors.

The strategic recommendations suggest several vital actions. To optimize infrastructure benefits, the government should integrate the Maritime Axis policy with other economic initiatives, including human resource development and logistics digitalization. Particular attention should be given to lagging regions like Papua and Maluku by incentivizing investors through tax benefits, improved financing access, and local training programs. Innovative financing models like public-private partnerships and infrastructure bonds should be considered to address funding challenges. Additionally,

investments in logistics technologies, such as blockchain-based cargo tracking and port automation, are crucial to enhancing efficiency and transparency in the supply chain.

5.3 Limitations and Future Suggestions

This study has limitations regarding the number of respondents interviewed, as it focuses on expert perspectives. Additionally, the secondary data used depends on the availability and reliability of reports published by various institutions. Another limitation includes potential bias in interviews that may affect the interpretation of the results.

Future research should expand the sample size by including a broader range of respondents, such as stakeholders from various industries, to provide a more comprehensive understanding of the topic. Additionally, incorporating more diverse and up-to-date secondary data sources will enhance the reliability of findings. Future studies could also explore alternative data collection methods, such as surveys or case studies, to mitigate potential biases in interviews and offer more balanced interpretations of the results. Further, comparative studies across different regions or sectors could provide deeper insights into the effectiveness of policy integration and development initiatives.

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