E-ISSN : 3063-4245
P-ISSN : 3063-5705

VOLUME 1 NOMOR 2, AUGUST 2024

Journal of Maritime Policy Science

Published by:
Center for Maritime Policy and Governance Studies
Universitas Maritim Raja Ali Haji. Indonesia
Email: cmpgs@umrah.ac.id
Website :cmpgs.umrah.ac.id

Volume 1
Nomor 2
August, 2024
Journal of Maritime Policy Science

E-ISSN : 3063-4245
P-ISSN : 3063-5705

PREFACE

Journal of Maritime Policy Sciences, managed by the Center for Maritime Policy Governance Studies (CMPGS) Universitas Maritim Raja Ali Haji. Indonesia, serves as a vital platform for the dissemination of research and scholarly work in the field of maritime policy. This journal aims to foster a deeper understanding of maritime issues, promote innovative policy frameworks, and facilitate discussions that are crucial for the sustainable development of maritime resources. The journal invites contributions from researchers, policymakers, and practitioners interested in various aspects of maritime studies, including maritime governance, shipping regulations, marine environmental protection, maritime security, and the socio-economic impacts of maritime activities.

The first article, KADO SPESIAL: Strategic Innovation for Conservation Area Management in Pieh Island National Marine Protected Area, West Sumatra. Focuses on innovative strategies for managing conservation areas within the Pieh Island National Marine Protected Area. The paper discusses the importance of integrating strategic innovations to balance conservation efforts with sustainable development, highlighting the role of local communities, government, and technology in protecting marine biodiversity while promoting eco-friendly tourism. The second article, Galang Batang SEZ Advancing the Blue Economy through Strategic Development, examines the development of the Galang Batang Special Economic Zone (SEZ) as a driving force for Indonesia's blue economy. The paper analyzes how strategic infrastructure and policy initiatives within the SEZ contribute to sustainable economic growth, particularly in maritime industries like fisheries, aquaculture, and ocean-based tourism. The third article, Exploring Technological Innovation in Wave Forecasting Using Machine Learning: A Literature Analysis, reviews the use of machine learning technologies in improving wave forecasting models. This paper explores the potential of artificial intelligence and data-driven approaches to enhance the accuracy of wave predictions, which are critical for maritime safety, coastal management, and the shipping industry. The fourth article, Stakeholder Analysis of Indonesia's Trade in the Regional Comprehensive Economic Partnership (RCEP) with Non-ASEAN Actors, offers a comprehensive analysis of Indonesia's trade relationships within the framework of the Regional Comprehensive Economic Partnership (RCEP), focusing on non-ASEAN stakeholders. The study identifies key players, trade dynamics, and challenges in engaging with non-ASEAN countries, emphasizing the need for strategic trade policies and collaboration to maximize Indonesia's benefits from the RCEP agreement. The final article, Nation Branding of Kepulauan Riau Through Subregional Cooperation in The Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT), explores how the Riau Islands Province is enhancing its international image through its involvement in the IMT-GT subregional cooperation. The paper highlights the province's efforts to position itself as a key player in economic growth, tourism, and cultural exchange in the subregion.

Volume 1
Nomor 2
August, 2024
Journal of Maritime Policy Science

E-ISSN : 3063-4245
P-ISSN : 3063-5705

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Volume 1
Nomor 2
August, 2024
Journal of Maritime Policy Science

E-ISSN : 3063-4245
P-ISSN : 3063-5705

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Volume 1
Nomor 2
August, 2024
Journal of Maritime Policy Science

E-ISSN : 3063-4245
P-ISSN : 3063-5705

TABLE OF CONTENT

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

KADO SPESIAL: Strategic Innovation for Conservation Area Management in Pieh Island National Marine Protected Area, West Sumatra

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Received: July 20, 2024 | Revised: July 26, 2024 | Accepted: August 28, 2024

https://doi.org/10.31629/jmps.v1i2.6939

ABSTRACT

The Pieh Island National Marine Protected Area (NMPA) is managed by the LKKPN (National Marine Protected Area Office) Pekanbaru and includes distinct zones: a 197.34-hectare core zone, a 39,681.1-hectare limited utilization zone, and a 41.56-hectare anchoring and habitat rehabilitation zone. The largest, the limited utilization zone, highlights the importance of managing human interactions within the MPA. This research focuses on identifying and exploring strategies to address challenges faced by LKKPN Pekanbaru in managing the Pieh Island NMPA, specifically using the Bando Island area as a case study. Bando Island, a survival tourism destination within the MPA, needs to be more adequately managed. A literature review and data collection through focus group discussions (FGD) were conducted. Issues were explored and validated using the APKL (Aktual, Problematik, Khalayak, Layak) analysis, with priorities determined by the USG (Urgency, Seriousness, Growth) matrix. Fishbone analysis was used to identify root causes of top-priority issues, and alternative strategies were ranked using the McNamara approach. The research identified the lack of stakeholder collaboration as the primary issue, leading to the development of the "KADO SPESIAL" model—focusing on stakeholder involvement in every phase of the management process.

Keyword: Kado Spesial, Strategic Innovation, Conservation Area Management

INTRODUCTION

Pieh Island National Marine Protected Area (NMPA) is a national conservation area managed by Indonesian Ministry of Marine Affairs and Fisheries through the LKKPN (National Marine Protected Area Office) Pekanbaru. The area was first regulated by the Decree of the Minister of Marine Affairs and Fisheries Number 38 of 2014, and this regulation was updated by the Decree Number 31 of 2022, covering 39,920 hectares. This conservation area aims to maintain and improve the quality of marine and coastal biodiversity through various programs, including protection, conservation, and sustainable utilization. Coral reefs, sea turtles, and groupers are the primary focus of the conservation initiatives in Pieh Island NMPA.

LKKPN Pekanbaru is the Technical Implementation Unit (UPT) under the Directorate General of Marine Affairs and Spatial Management, responsible for the effective management

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

of the Pieh Island NMPA. The management of the MPA is conducted based on regulated zonations. There are three zones within the MPA: the core zone, the limited utilization zone, and other designated zone for anchoring and habitat rehabilitation.

Five core zones, covering 197.34 hectares, are allocated as fully protected areas and act as no-take zones, where no activities are allowed except for research and management purposes. The limited utilization zone, which spans 39,681.1 hectares and is the largest designated area within the MPA, provides for the sustainable use of MPA resources, primarily for tourism and fishing. Since the MPA is designed mainly for the utilization of marine and coastal resources, managing human interactions with the MPA is a primary concern for the management.

Conservation areas are crucial components of intricate ecological systems and serve multiple essential functions. They not only sustain ecosystem services and preserve biodiversity but also enhance the quality of social life and foster connections between society and nature across a broad spectrum of social actors (Maretti et al., 2023). Managing these areas represents an investment in the future aimed at improving environmental health, safeguarding biodiversity, and protecting both natural and cultural heritage. In the Anthropocene era, these areas face numerous threats, including climate change, invasive species, development pressures, and extreme environmental events. Conservation practitioners are tasked with proactively and responsively managing these areas to address contemporary challenges, ensuring that they continue to offer benefits to the environment and future generations (Worboys et al., 2015).

This research focuses on developing strategies to address the current management challenges faced by LKKPN Pekanbaru in overseeing the Pieh Island National Marine Protected Area (NMPA). The Bando Island area, a designated survival tourism destination within the MPA, has been selected as a case study. Bando Island is an uninhabited island located approximately 19.7 kilometers from Pariaman City. It provides habitat for a diverse array of coastal and marine species. By focusing on the Bando Island case study, the research seeks to uncover solutions that can enhance the management and conservation of this critical area. As a special interest tourism destination, Bando Island attracts many international visitors who, despite the island's limited resources, come to explore its rich ecosystems and abundant marine biodiversity.

Given the island's role as a tourist destination and its ecological significance, developing a robust management plan is crucial. This plan must address the challenges of balancing tourism with conservation, ensuring that the island's natural resources are protected while still accommodating the interests of visitors. However, the management of this area has yet to be thoroughly planned, designed, or implemented. By addressing current issues and exploring innovative solutions, the research seeks to contribute to more effective conservation practices and ensure that the island remains a vibrant and sustainable destination for both wildlife and visitors.

METHODOLOGY

This research adopts a qualitative approach, utilizing a literature review and focus group discussion (FGD). The FGD was conducted at the LKKPN Pekanbaru Office in June 2024, with participation from employees and leadership. The study aims to explore creative solutions to the organization's current issues. The research involved issue identification, validation, prioritization, root cause analysis, creative idea exploration, and solution prioritization. Issues were identified and validated during FGD using APKL (Aktual, Problematik, Khalayak, Layak) analysis (LAN RI, 2008), which assesses the actuality, problematicity, publicity/public relevance, and eligibility of each issue. This approach is known for helping researchers identify the fitting issue in research design (Pertapan, 2022). The APKL analysis has been applied to

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

various research topics, including state-owned enterprise development (Yurianto, 2021), community service programs (Effendi et al., 2021), and analyzing misconceptions in mathematics (Darmawan et al., 2024).

Once identified and validated, issues were further analyzed using the USG (Urgency, Seriousness, Growth) matrix (LAN RI, 2008) to prioritize them. The USG method allows for the systematic prioritization of issues by creating an ordered sequence based on their urgency, seriousness, and potential for growth (Ariyanti et al., 2020). The USG method ranks issues by priority, which has been applied in research on client registration optimization (Pertapan, 2022), employee dissatisfaction (Naser et al., 2022), and performance control strategies (Nurcahyo et al., 2023). This process helps determine the single priority issue to be addressed. The top priority issue was then analyzed using fishbone analysis, a root cause analysis method. Fishbone analysis, also known as the Ishikawa diagram, has been used in various studies, such as exploring causes of complaints in the distribution and transportation sector (Santoso, 2017), analyzing decision-making delays (Sakdiyah et al., 2022), and investigating turnaround time issues in laboratories (Lestari et al., 2014).

Finally, creative solutions were explored through FGD, guided by the root cause analysis results. The McNamara approach, or quantitative fallacy, was used to select the most effective solutions through quantitative observations or matrices. This method has been applied in studies on governance of state-owned enterprises (Yurianto, 2021) and pharmacy service waiting times in hospitals (Nazlinawaty et al., 2021).

RESULTS AND DISCUSSION

1. Issues Identification

An issue is the main topic or problem that can be discussed, talked, avoided, faced, and decision made. Issues that have been gathered through FGD are:

a. Lack of promotion for the Bando Island area as a tourism destination
b. Protection, preservation, and utilization activities in the Bando Island area are not yet integrated
c. Interactive collaboration among stakeholders in the management of the Bando Island area has not yet been established
d. The regulations for MPA management do not grant management authority over the island's land area to the LKKPN Pekanbaru
e. Limited number of human resources for managing the MPA

Table 1. APKL Analysis of the Identified Issues

No	Issues	Criteria			
		Actuality	Problematic	Publicity/Public Relevance	Eligibility
1	Lack of promotion for the Bando Island area as a tourism destination	Yes	Yes	Yes	Yes
2	Protection, preservation, and utilization activities in the Bando Island area are not yet integrated	Yes	Yes	Yes	Yes
3	Interactive collaboration among stakeholders in the management of the Bando Island area has not yet been established	Yes	Yes	Yes	Yes

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

No	Issues	Criteria			
		Actuality	Problematic	Publicity/Public Relevance	Eligibility
4	The regulations for MPA management do not grant management authority over the island's land area to the LKKPN Pekanbaru	Yes	Yes	Yes	Yes
5	Limited number of human resources for managing the MPA	Yes	Yes	Yes	Yes

Source: Author, 2024

The APLK analysis helps determine whether the issues collected during the FGD are genuinely significant. This analysis evaluates each issue based on its actuality (A), problematicity (P), public relevance (K), and eligibility (L). Actual means that the issue is still being discussed or has not been resolved up to the present time; Problematic means that the issue deviates from expected standards or regulations and causes concern, necessitating immediate investigation of its causes and solutions; Public relevance means that the issue directly affects the public interest and is not merely for the benefit of an individual or a small group of people; and Eligibility means that the issue is reasonable (logical), appropriate, realistic, and can be discussed in accordance with duties, rights, authorities, and responsibilities, ultimately becoming a priority issue.

Based on the APKL analysis presented in Table 1, all the issues discussed during the FGD have been validated. This validation indicates that the issues meet the criteria of actuality, problematicity, public relevance, and eligibility, highlighting their significance in the management of the Bando Island area. Each issue identified is pertinent to the current challenges faced and holds substantial relevance to the public and stakeholders involved. However, to address these challenges effectively, the organization needs to prioritize the most pressing issues. Therefore, the issues confirmed through the APKL analysis are subjected to a further evaluation process using the USG matrix. This matrix helps rank the issues by their urgency and importance, enabling the organization to focus resources and efforts on addressing the highest-priority concerns first. By systematically ranking the issues, the organization can develop a targeted approach to manage the Bando Island area more efficiently and address the most critical problems in a timely manner.

2. Ranking the Issue Priority

The method used to rank the priority of issues to be addressed was the Urgency-Seriousness-Growth (USG) matrix. This analysis will determine which issues should be prioritized among the many that have arisen (Naser et al., 2022). The USG matrix is often employed to pinpoint the primary issue among those identified in the APKL analysis (Yurianto, 2021). Urgency (U) evaluates how urgently the issue needs to be addressed, considering the available time and the level of time pressure to resolve the underlying problem. Seriousness (S) assesses how serious the issue is and the need for it to be addressed in relation to the consequences of delaying the resolution of the problem that caused the issue or the potential for it to cause other problems if not resolved. It should be understood that, under the same circumstances, an issue that could lead to further complications is more severe than one that stands alone. Growth (G) measures the likelihood of the issue escalating, considering the possibility that the underlying problem will worsen if left unaddressed.

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Table 2. USG Analysis of the Identified Issues

No.	Issues	Criteria			Score	Rank
		U	S	G		
1	Lack of promotion for the Bando Island area as a tourism destination	4	3	3	10	5
2	Protection, preservation, and utilization activities in the Bando Island area are not yet integrated	5	5	4	14	2
3	Interactive collaboration among stakeholders in the management of the Bando Island area has not yet been established	5	5	5	15	1
4	The regulations for MPA management do not grant management authority over the island's land area to the LKKPN Pekanbaru	4	5	3	12	4
5	Limited number of human resources for managing the MPA	4	5	4	13	3

Source: Author, 2024

Not all problems can be addressed simultaneously (LAN RI, 2008), despite the APKL analysis identifying five valid issues that require intervention. Addressing numerous problems simultaneously can strain resources, including human resources, budgets, and time. Therefore, it is essential to prioritize issues to ensure they are resolved effectively and efficiently. The USG matrix evaluates each issue based on three criteria using a rating scale of 1 to 5. A score of 5 in each criterion indicates that the issue is highly urgent, extremely serious, and has a strong likelihood of escalation. As shown in Table 2, the lack of interactive collaboration among stakeholders in the management of the Bando Island area is the top priority. It is also the only issue that received the maximum score in all USG criteria, underscoring the need for immediate intervention to achieve effective management of the Bando Island area. The matrix provides a ranking of the issues, which can be used as a guide to determine the order in which they should be addressed.

3. Root Causes Analysis of the Issue

The lack of interactive collaboration among stakeholders in the management of the Bando Island area has been identified as the most urgent issue that needs to be resolved. To develop effective strategies for addressing this issue, this research explored its root causes. The exploration began with an examination of the facts to understand why establishing interactive collaboration among stakeholders is essential. Based on input from participants during the FGD, there are at least seven reasons why this issue should be the top priority:

a. The budget required for managing the Pieh Island NMPA, including Bando Island area, as outlined in the 2022-2042 Management Plan, is IDR 9 billion in the first year. However, the budget allocation for 2024 is approximately IDR 4.081 billion, indicating that the available budget meets only 45% of the management needs. To date, budget support has

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

solely come from the national budget (APBN), with no contributions from other stakeholders.

b. The sea turtle conservation program conducted by LKKPN Pekanbaru on Bando Island has not yet been able to fully optimize the necessary facilities or apply technology to control the sex ratio of hatchlings. This is due to the limitations of the organization's duties and functions. Currently, there is no support from other stakeholders, even though such support is crucial to enhance the success of the conservation program.
c. Capacity building for local community groups or organizations, facilitated by LKKPN Pekanbaru, has so far been limited to activities such as diving training, turtle conservation, and ecosystem monitoring. These local organizations have yet to receive other essential training, such as digital content promotion for tourism, snorkeling guides, food and beverage services, and others, which are expected to be supported by other stakeholders.
d. Data and information dissemination is still being conducted exclusively through the official website of LKKPN Pekanbaru and has yet to utilize other information channels from additional stakeholders.
e. Waste management in the Bando Island area has not been effectively implemented, with waste currently being burned to protect turtle nesting habitats. There is no collaborative waste management effort with other stakeholders.
f. The promotion of tourism potential and the biodiversity of the MPA, including the Bando Island area, has so far been carried out solely by LKKPN Pekanbaru, with no support from other stakeholders.
g. The revenue from Non-Tax Revenues (PNBP) generated by survival tourism activities remains low, at only around IDR 8 million per year, highlighting the need to strengthen collaboration with other stakeholders.

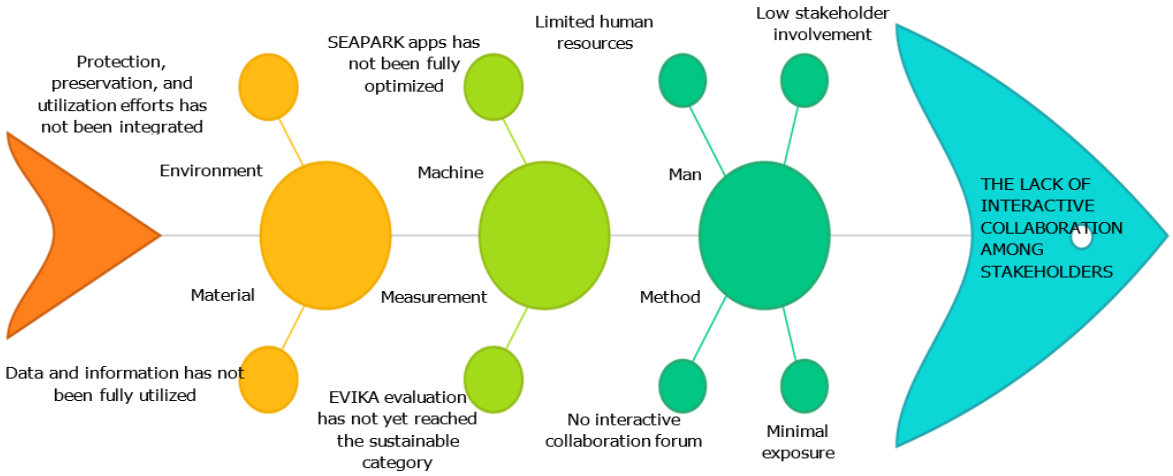
Root cause analysis was performed to address the issue more clearly using fishbone analysis or Ishikawa diagram. This diagram visualizes the root causes that are closely related to the issue or problem. This analysis is recognized for its effectiveness in pinpointing the key cause(s) of sentinel events or near misses. It aids in preventing the recurrence of unexpected incidents by examining system weaknesses, promoting voluntary event reporting, and moving the focus away from individual blame (Gupta & Varkey, 2009). Problem causes in the diagram are categorized into materials, machines and equipment, manpower, methods, mother nature or environment, and measurements. Participants during FGD identified the causes of the chosen issue or problem in every cause category.

Figure 1 illustrates the root causes of the lack of interactive collaboration among stakeholders. The analysis reveals that the root causes of this issue include:

a. Man: Limited human resources for managing the Bando Island area and low stakeholder involvement in its management.
b. Method: There is no interactive collaboration forum among stakeholders in the management of the Bando Island area to encourage increased participation and stakeholder initiatives. Additionally, the potential of the Bando Island area has minimal exposure and needs to be well known to the public.
c. Machine: The SEAPARK application, which serves as the MPA entrance permit system, needs to be optimized more effectively in the field.
d. Measurement: The evaluation of MPA management effectiveness (EVIKA) for the Pieh Island NMPA, including the Bando Island area, has yet to reach the sustainable category, which is the highest level in the EVIKA evaluation.
e. Environment: Protection, preservation, and utilization efforts in the management of the Bando Island area still need to be integrated.
f. Material: Conservation data and information have not been utilized to their full potential.

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Figure 1. Fishbone Analysis of the Issue



Source: Author, 2024

4. Creative Ideas Exploration

Through a comprehensive analysis, it has been identified that Pieh Island NMPA, particularly in managing the Bando Island area as a tourism destination, faces a critical issue: the lack of interactive collaboration among stakeholders. During the FGD, participants agreed to address this issue by developing a model called KADO SPESIAL. KADO SPESIAL stands for Kawasan Bando Spesifik Konservasi Alam Laut or Bando Area for Specific Marine Nature Conservation, and it aims to serve as a pilot project for a specialized management model within LKKPN Pekanbaru.

KADO SPESIAL is designed as a long-term project, with the expectation that it can be replicated in other areas within the LKKPN Pekanbaru working region. As both a model and a concept, KADO SPESIAL comprises three key strategies to address the issue of stakeholder collaboration. These strategies represent the initial tasks for LKKPN Pekanbaru in tackling the lack of interactive collaboration, including:

a. Conducting stakeholder mapping related to the management of the Bando Island area
b. Integrate protection, preservation, and utilization efforts for the Bando Island area into a single platform or model for more focused, effective, and sustainable management
c. Build interactive collaboration with various parties to achieve integrated protection, preservation, and utilization of the Bando Island area through the KADO SPESIAL model

These three main strategies were further evaluated using the McNamara approach to determine the priority for implementing the KADO SPESIAL model. The McNamara matrix uses three criteria to assess the strategies: Contribution (K), Feasibility (L), and Costs (B). The evaluation was performed using a rating scale of 1 to 5, with the following scoring references:

Score 5 = very high contribution / highly feasible / very low cost
Score 4 = high contribution / feasible / low cost
Score 3 = adequate contribution / moderately feasible / moderate cost
Score 2 = low contribution / not feasible / high cost
Score 1 = very low contribution / highly unfeasible / very high cost

Table 3 illustrates the ratings for the level of contribution, feasibility, and cost of each strategy. The table reveals that building interactive collaboration with various parties to achieve integrated protection, preservation, and utilization of the Bando Island area through the KADO SPESIAL model is the most reasonable approach in terms of contribution, feasibility,

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

and costs. This makes sense as it serves as the foundation of KADO SPESIAL, focusing on stakeholder involvement initiation, which is currently lacking in the management of the MPA within the LKKPN Pekanbaru working area.

Table 3. McNamara Ideas Filter Analysis

No.	Alternative Ideas	Criteria			Score	Priority
		K	L	B		
1	Conducting stakeholder mapping related to the management of the Bando Island area	4	4	3	11	III
2	Integrate protection, preservation, and utilization efforts for the Bando Island area into a single platform or model for more focused, effective, and sustainable management	5	4	3	12	II
3	Build interactive collaboration with various parties to achieve integrated protection, preservation, and utilization of the Bando Island area through the KADO SPESIAL model	5	4	5	14	I

Source: Author, 2024

5. KADO SPESIAL as a strategic innovation

KADO SPESIAL is an innovative approach to integrated conservation area management, offering a model based on interactive collaboration among stakeholders. Since its initial designation as a conservation area, the Pieh Island NMPA, which includes the Bando Island area, has not optimally engaged stakeholders in its management. However, it has been proven that the success of conservation areas heavily relies on the involvement and management of stakeholders, not only during the planning stage but throughout the entire management process (IUCN, 2004).

As the organizational unit responsible for managing Pieh Island NMPA, LKKPN Pekanbaru urgently needs effective stakeholder management to ensure that activities within the MPA zonations are conducted sustainably. Involving stakeholder's participation in all aspects – from planning and implementation to monitoring and evaluation – is crucial for the success of an MPA. Especially when managing tourism withing an MPA, managers must collaborate with a diverse range of stakeholders. This includes both terrestrial and marine-based groups, such as agricultural and fishing interests, waste management agencies, forestry experts, recreationists, and other relevant parties. The level of participation can range from passive (where stakeholders are merely informed through unilateral announcements by administration or management), to informed and active (where stakeholders are given information, consulted, and may play an active role), and up to interactive and decision-making (where stakeholders play a significant role or even lead an initiative) (IUCN, 2004).

At the three levels of stakeholder participation in conservation area management (passive-active-interactive), KADO SPESIAL aims to encourage stakeholder involvement up to the levels of being interactive and involved in decision-making. KADO SPESIAL offers a

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

collaborative cross-stakeholder approach to conservation area management. This collaboration addresses the gaps in the management of conservation areas, particularly in ensuring biodiversity conservation efforts, facing various threats, and providing benefits to the surrounding communities. The Bando Island area, part of the Pieh Island NMPA, serves as the pilot project for this concept in LKKPN Pekanbaru working region. The design of the KADO SPESIAL model, which was also adopted and modified from the conservation area/park management framework used by the New South Wales National Parks and Wildlife Service (Worboys et al., 2015), is illustrated in the Figure 2.

Figure 2 shows stakeholders at the center of the model, emphasizing the need for their role in each step of the conservation area management cycle. Multi-stakeholder involvement is believed to help bring different perspectives to light and elevate discussions from conflict to negotiation (Wallner & Wiesmann, 2009). This involvement is crucial, especially given the complex and dynamic nature of conservation areas, which are characterized by linkages and interdependencies, multiple stakeholders with diverse and often conflicting views, and a lack of control by any single group or individual (Jamal & Stronza, 2009). In addition, a well-functioning and effective governance system is marked by the ability of various stakeholders to coordinate, cooperate, and collaborate in decision-making and management processes that are efficient, transparent, and accountable (Islam et al., 2019). The conservation area must receive enhanced economic, political, and, above all, social support, considering the variety of partnership models with diverse stakeholders in multiple arrangements. Greater recognition, understanding, and participation of stakeholders in activities within the conservation area can help researchers and governmental agents develop and implement more collaborative solutions (Maretti et al., 2023).

Figure 2. KADO SPESIAL model

Source: Author, 2024

Protected area managers who are aware of both the full range of protected area benefits and the range of stakeholders affected have a far better chance of managing

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

successfully (Worboys et al., 2015). Stakeholders can include government agencies, NGOs, local communities and fishers, universities and research institutions, the private sector, management staff, international visitors, and more. These stakeholders are those who utilize and depend on the conservation area, engage in activities that affect or impact the conservation area, and have an interest in the conservation area (IUCN, 2004). Collaborative arrangements can function through both formal and informal agreements, as well as in less structured forms. For instance, networks and grassroots initiatives might emerge temporarily to address specific issues in the field. Social movements often involve coalition-building and joint actions that may occur without formal agreements (Jamal & Stronza, 2009).

CONCLUSION

In conclusion, our study emphasizes that the lack of interactive collaboration among stakeholders in managing the Bando Island area, part of the Pieh Island NMPA, is the top priority issue that LKKPN Pekanbaru must address. The research proposes the KADO SPESIAL model, which serves both as a framework and a guiding principle for tackling this critical issue and its underlying causes. This model stresses the importance of stakeholder involvement at every stage of the MPA management cycle. Its implementation in the field is crucial and should be continuously adjusted and refined, considering the dynamic nature of MPA management and the need to adapt to ongoing changes.

Recommendations for implementing the KADO SPESIAL model are structured into three phases: short-term, medium-term, and long-term. In the short term, the initial phase focuses on laying the groundwork for stakeholder involvement strategies. Key tasks include: (1) forming an effective team and holding stakeholder mapping discussion meetings; (2) meetings in addressing key issues and challenges in managing the conservation area on Bando Island, strengthening the database, mapping key stakeholders, building interactive collaboration, and developing the KADO SPESIAL information platform; (3) preparing the KADO SPESIAL information platform; (4) establishing interactive collaboration with key stakeholders through focus group discussions and the formation and declaration of the KADO SPESIAL Collaboration Forum; (5) launching and promoting the KADO SPESIAL Collaboration Forum and information platform; (6) creating KADO SPESIAL media publications; (7) implementing KADO SPESIAL interactive collaboration in the field; and (8) conducting monitoring and evaluation.

The medium-term involves: (1) discussing the budget plan and gathering input and suggestions for improving KADO SPESIAL; (2) implementing collaborative management with the KADO SPESIAL Forum; and (3) conducting ongoing monitoring and evaluation. Additionally, in the long term, activities include (1) refining the KADO SPESIAL information platform, (2) continuing the implementation of collaborative management with the KADO SPESIAL Forum, (3) expanding collaboration within the KADO SPESIAL Forum by increasing the number of participating stakeholders, and (4) replicating the interactive collaboration model.

ACKNOWLEDGEMENT

The authors would like to express their gratitude to the LKKPN Pekanbaru and Balai Diklat Aparatur Sukamandi for facilitating this research throughout the entire process.

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Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
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Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Galang Batang SEZ: Advancing the Blue Economy through Strategic Development

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Received: July 26, 2024 | Revised: August 12, 2024 | Accepted: August 30, 2024

https://doi.org/10.31629/jmps.v1i2.6940

ABSTRACT

The development of the Galang Batang Special Economic Zone (SEZ) is a strategic effort by Indonesia to boost its Blue Economy, leveraging its coastal resources for sustainable economic growth. This study aims to explore the effectiveness of Galang Batang SEZ in advancing Indonesia's Blue Economy by analyzing the zone's infrastructure development, investment climate, and regulatory framework. The research employs a qualitative approach, examining reports, regulations, and investment data collected from government agencies, SEZ administrators, and key stakeholders. Findings reveal that Galang Batang SEZ has successfully attracted significant foreign direct investment, particularly in the alumina refinery and supporting industries, positioning it as a critical hub for marine-based industries. Additionally, the SEZ's focus on sustainable infrastructure, including environmentally friendly power plants and modern port facilities, aligns with the principles of the Blue Economy. However, challenges remain, such as environmental compliance issues and the need for improved local accessibility. The study concludes that while the Galang Batang SEZ shows promise in contributing to Indonesia's Blue Economy, it requires ongoing policy support, infrastructure enhancement, and environmental management strategies to fully realize its potential. This research underscores the importance of strategic SEZ development in achieving sustainable coastal economic growth and offers insights for future policy implementations in similar zones.

Keyword: Galang Batang, Blue Economy, Special Economic Zone (SEZ)

INTRODUCTION

The concept of the blue economy has gained traction in recent years, highlighting the potential of ocean resources to drive economic growth while ensuring sustainability (Hidayat & Negara, 2020; Moberg, 2015). As nations seek innovative strategies to address economic challenges and environmental degradation, the establishment of Special Economic Zones (SEZs) emerges as a critical solution (Asri et al., 2022; Rasyid & Darumurti, 2022). SEZ positioned strategically along vital maritime routes, presents a unique opportunity to leverage local marine resources while fostering sustainable development (Farole & Akinci, 2011; Fauzi et al., 2022). This article examines the core issues surrounding the Galang Batang SEZ's role in advancing the blue economy, shedding light on the multifaceted benefits and challenges it presents.

The urgency of addressing the blue economy in the context of SEZ is underscored by the pressing need for sustainable development amid escalating environmental concerns (Aggarwal, 2007; Harto, 2016). Coastal regions are particularly vulnerable to the impacts of climate change, overfishing, and pollution, necessitating a shift towards sustainable practices

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

that can rejuvenate marine ecosystems while promoting economic growth (Aritenang & Chandramidi, 2020; United Nations Conference On Trade And Development, 2019). The potential for the Galang Batang SEZ to serve as a model for integrating sustainable practices into economic development strategies cannot be overstated, making it imperative to explore its implications comprehensively.

In discussing this issue, the article positions itself within the broader discourse surrounding SEZs and sustainable development. Previous studies have illuminated the potential of SEZs to stimulate economic activity (Hidayat & Hidayat, 2010; Trisniati et al., 2022). However, there remains a gap in the literature concerning the specific application of these concepts to the blue economy, particularly in the context of the Galang Batang SEZ. This article aims to fill this gap by providing a thorough analysis of the unique characteristics of the Galang Batang SEZ and its potential contributions to the blue economy, drawing on insights from existing literature while introducing original perspectives.

One of the primary aspects to be explored is the economic significance of the blue economy, which encompasses a wide range of sectors, including fisheries, tourism, and marine biotechnology (Pramoda & Apriliani, 2016; Wibowo & Silitonga, 2020). The article will discuss how the strategic development of the Galang Batang SEZ can catalyze investment in these sectors, creating jobs and fostering innovation. Moreover, the implications of sustainable resource management practices will be examined, emphasizing how the SEZ can contribute to the conservation of marine biodiversity and the resilience of coastal communities (Alfiandri & Mahadiansar, 2020; Ramdani, 2020).

The importance of this discussion lies not only in its theoretical contributions but also in its practical implications for policymakers and stakeholders. By providing a comprehensive analysis of the Galang Batang SEZ's potential within the blue economy framework, the article aims to inform decision-making processes and contribute to the formulation of effective policies that prioritize sustainability alongside economic growth. This approach aligns with the global commitment to achieving the Sustainable Development Goals (SDGs), particularly those related to life below water (SDG 14) and decent work and economic growth (SDG 8).

Galang Batang SEZ represents a pivotal opportunity to advance the blue economy through strategic development initiatives. As the world grapples with the dual challenges of economic recovery and environmental sustainability, this article seeks to illuminate the path forward, offering a roadmap for harnessing the potential of marine resources while safeguarding the health of our oceans. The findings and discussions presented herein will contribute to the broader understanding of how SEZs can serve as catalysts for sustainable development in coastal regions, ultimately promoting a more resilient and equitable blue economy.

METHODOLOGY

This study employs a mixed-methods approach to comprehensively examine the role of the Galang Batang Special Economic Zone (SEZ) in advancing the blue economy. The methodology is structured to incorporate both quantitative and qualitative data, allowing for a robust analysis of the economic, environmental, and social dimensions associated with the SEZ. The quantitative component includes the collection of relevant economic indicators such as employment rates, investment flows, and output from various sectors within the SEZ. This data will be gathered from official government reports, industry publications, and economic databases to provide a statistical foundation for assessing the SEZ's impact (Bungin, 2015; Moleong, 2012).

In addition to quantitative analysis, qualitative methods will be employed to gain deeper insights into the experiences and perspectives of stakeholders involved in the Galang Batang SEZ. Semi-structured interviews will be conducted with a diverse range of participants,

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

including government officials, local business owners, community leaders, and environmental activists. This qualitative data will help to contextualize the quantitative findings, revealing the complexities and nuances of how the SEZ is perceived and experienced by those directly affected by its development. Thematic analysis will be used to identify key patterns and themes within the interview data, facilitating a comprehensive understanding of stakeholder viewpoints (Galvan & Galvan, 2017).

Furthermore, case studies of similar SEZs that have successfully integrated blue economy principles will be analyzed to draw lessons and best practices applicable to the Galang Batang SEZ. By examining these precedents, the research aims to identify critical success factors and potential challenges that could inform the strategic development of the Galang Batang SEZ. This comparative analysis will also provide a broader context for understanding how other regions have navigated the complexities of balancing economic growth with environmental sustainability. The overall research design emphasizes triangulation, which enhances the validity and reliability of the findings. By integrating quantitative and qualitative methods, as well as comparative case studies, this study aims to provide a well-rounded assessment of the Galang Batang SEZ's contributions to the blue economy. Ultimately, the research seeks to inform policymakers and stakeholders about effective strategies for sustainable development within the framework of SEZs, contributing to a more resilient and equitable marine economy.

RESULTS AND DISCUSSION

1. Development of Special Economic Zones (SEZs) in Galang Batang

The development and operationalization of the Galang Batang Special Economic Zone (SEZ) represent a crucial component of Indonesia's strategy to accelerate economic growth, attract foreign investment, and create job opportunities. This initiative, guided by Law No. 39/2009 on SEZs and amended under Law No. 11/2020 concerning Job Creation, aims to enhance industrial activities, particularly in the aluminum sector. However, the initial stages of the SEZ's development faced numerous challenges, such as slow infrastructure growth and inadequate job creation, necessitating revitalization and structural adjustments by the national and local governments. The administrative structure of Galang Batang SEZ was established in 2018 through regional coordination between the National Council and local authorities, comprising sixteen key officials responsible for monitoring investments, managing operational activities, and overseeing licensing procedures. These officials play a critical role in ensuring smooth operations, maintaining compliance with regulatory frameworks, and reporting to the National Council to provide consistent updates on progress and issues faced.

Significant investments in infrastructure have been a hallmark of Galang Batang SEZ's development strategy. The zone has seen substantial improvements, including the construction of the Alumina Refinery, Power Plant, and Gas Plant. The Alumina Refinery, an essential project within the zone, has completed its first phase, reaching its target capacity of 1 million tons per year. Further expansions aim to double this output, demonstrating the zone's ambitions to become a major player in the global aluminum industry. Concurrently, the development of the Power Plant is progressing in stages to support the electricity needs of the refinery and future aluminum smelter projects. The power infrastructure is designed to scale up according to the expanding demands of the SEZ, ensuring that energy needs are met efficiently and sustainably. However, these infrastructure projects, while promising, also highlight the challenges related to the environmental and regulatory landscape, particularly concerning energy use and sustainability targets.

Attracting foreign and local investments has been another critical focus for Galang Batang SEZ. The zone has succeeded in drawing numerous investors, with PT Bintan Alumina Indonesia (BAI) taking a leading role as both developer and manager, injecting significant

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

capital into the SEZ's projects. Other foreign companies, such as Shandong Zhengtai Construction, have also contributed to building the industrial and logistical framework necessary for SEZ operations. The influx of these investments underscores the strategic importance of the SEZ in boosting Indonesia's industrial capabilities and expanding its international business partnerships. The construction of key logistical infrastructure, such as the multi-purpose wharf, is integral to these efforts. The wharf, capable of accommodating vessels up to 35,000 DWT, is designed to facilitate the import of raw materials and export of processed goods efficiently, thus improving the competitiveness of the SEZ on a global scale. This logistical infrastructure supports not only current operations but also the zone's future growth as it scales production capacity.

Employment and housing development are other critical aspects of the Galang Batang SEZ's strategy to ensure that the benefits of economic growth reach the local population. The SEZ has already created numerous jobs, and to accommodate the growing workforce, substantial housing projects are underway. These include the construction of executive housing and dormitories capable of housing up to 20,000 workers. The dormitory complex is nearing completion and is designed with supporting facilities such as mosques, schools, healthcare centers, and commercial areas to foster a vibrant and sustainable community within the SEZ. Additionally, the zone's development plan includes road construction to improve access and transportation within and around the SEZ, thus facilitating smoother movement of goods and personnel. These developments are critical in transforming the area into a self-sufficient and well-integrated economic hub.

Despite these advancements, energy supply remains a significant challenge for Galang Batang SEZ. The current power plant, with a capacity of 6 x 25 MW, has been operational, but the SEZ's expansion plans necessitate further stages of development to meet the growing energy requirements of the aluminum refinery and smelter. To support these energy demands, additional capacity is being added in phases. However, the SEZ must also navigate Indonesia's regulations on renewable energy. The government mandates a 23% contribution from renewable sources (EBT), but the available options for renewable energy on small islands like Bintan, where the SEZ is located, are limited. This regulatory challenge requires innovative solutions to align energy consumption with national sustainability goals while ensuring sufficient power for the SEZ's industrial activities.

Environmental compliance and regulatory challenges are also prominent as the SEZ expands its operations. The increase in alumina production capacity from 1 million tons per year to 2 million tons per year necessitated a new environmental impact assessment (AMDAL). This process is ongoing, and adjustments are being made to align the SEZ's operations with the necessary environmental regulations. Additionally, the SEZ faces challenges in converting protected forest areas into industrial zones. Securing permits and land rights for these areas has proven complex, with ongoing efforts to finalize legal and administrative processes required for land conversion and certification. The SEZ's commitment to managing environmental impacts and adhering to regulatory requirements is crucial for maintaining its operational license and public support.

In addressing these strategic issues, the Galang Batang SEZ must align its operations with national energy and environmental policies while ensuring that its expansion plans remain viable. The Indonesian government's focus on renewable energy and environmental sustainability poses a complex challenge for the SEZ, especially given the high energy demands of aluminum refining and smelting activities. The SEZ's reliance on coal power, while practical in the short term, may face regulatory and public scrutiny unless supplemented with cleaner energy solutions. This regulatory environment presents both risks and opportunities, as compliance can lead to access to further governmental support and incentives.

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Nonetheless, failure to meet these requirements could impede future growth and reduce investor confidence.

2. Strategic issues surrounding the operationalization of the Galang Batang Special Economic Zone (KEK)

The strategic issues and solutions related to the operationalization of the Special Economic Zone (SEZ) at Galang Batang, based on the provided document, can be analyzed and elaborated as follows:

a. Environmental Impact Assessment (AMDAL) Challenges; The expansion of the alumina refinery's production capacity from 1 million tons per year to 2 million tons necessitates a new AMDAL (Environmental Impact Assessment). The current progress involves revising documents before the assessment process at the Kepri Provincial Environmental Agency (DLH). This delay in AMDAL approval has a direct impact on construction timelines and operational efficiency, highlighting the need for a streamlined and efficient environmental review process to keep development on schedule.
b. Accessibility and Infrastructure Development; For enhancing accessibility to the SEZ, the widening of access roads falls under the authority of the Provincial Government of Kepulauan Riau and the Central Government. This requires close coordination between local, regional, and national authorities to ensure that infrastructure projects align with the growth and operational needs of the SEZ. Accelerating these road expansions is crucial for better logistics and transportation efficiency, improving the zone's attractiveness to investors.
c. Land Conversion Issues; The conversion of forest land (production forest) into other uses within the SEZ has secured an approval for 371 hectares. However, further steps such as boundary determination and land rights processes are still ongoing. This bottleneck indicates the complexity and time-consuming nature of land acquisition and conversion processes. The authorities need to expedite these procedures to provide certainty for investors and facilitate the full utilization of the designated area.
d. Energy Supply Constraints; The refinery and smelter operations require a substantial power supply of 2,850 MW. The plan involves building a coal-fired power plant that meets carbon emission standards using ultra-supercritical technology. However, meeting the government’s renewable energy mix target of 23% is challenging on small islands like Bintan, where renewable energy options are limited. The SEZ must explore innovative solutions or partnerships for renewable energy integration to comply with national policies while securing the necessary power supply.
e. Detailed Environmental Management Plans (RKL/RPL) Compliance; There is a compliance gap among businesses operating within the SEZ concerning the detailed Environmental Management and Monitoring Plans (RKL/RPL) mandated by the Ministry of Industry Regulation No. 1 of 2020. These detailed plans are critical for sustainable and responsible operations. Ensuring that all companies within the SEZ comply with these regulations is essential for long-term environmental sustainability and avoiding potential sanctions.
f. Building Permit Issues (PBG); The SEZ’s management company has begun processing building permits for the power plant and alumina factory since 2021. However, many other operational buildings still lack these permits, presenting a compliance issue that could lead to regulatory penalties or operational delays. Streamlining the permit application process and ensuring that all infrastructure projects meet regulatory requirements is vital for maintaining operational continuity and legality.
g. Administrative Staffing and Optimization; The administration of the SEZ currently involves dual roles, with personnel managing both the SEZ and the Investment and One-Stop Integrated Services (DPMPTSP) of Bintan Regency. This dual role results in suboptimal

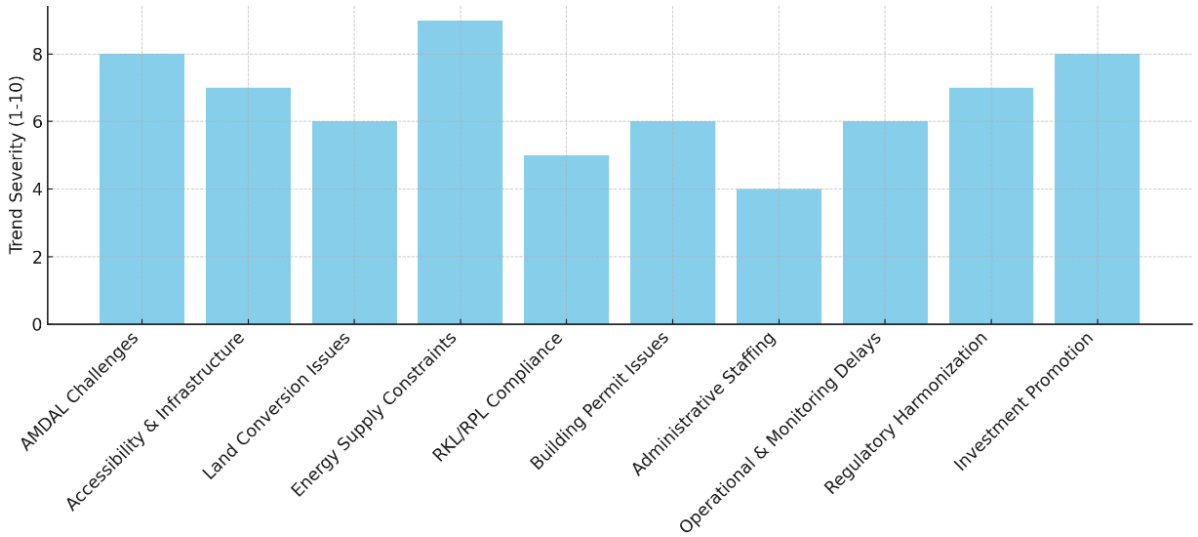
Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

performance, as staff are stretched between responsibilities. To improve service quality and efficiency, there is a need to separate the personnel for dedicated SEZ management, ensuring a focused and responsive administrative team.

h. Delays in Operational and Monitoring Reporting; While the SEZ's administrator is required to submit operational reports every six months, delays and discrepancies in reporting have been observed. Efficient monitoring and reporting mechanisms are crucial for maintaining transparency and evaluating progress. The SEZ authority must establish a reliable digital reporting system and enhance coordination with businesses to ensure accurate and timely submission of these reports.
i. Regulatory Harmonization and Coordination; The complexity of regulations governing SEZs, including those related to permits, environmental management, and infrastructure development, poses a significant challenge. The SEZ authority must work closely with national and regional governments to harmonize regulations and provide a clear framework for businesses. Simplifying the regulatory landscape will not only attract more investment but also ensure compliance and sustainable growth.
j. Investment Promotion and Stakeholder Engagement; Despite the development of critical infrastructure, the full potential of the SEZ has not been realized due to insufficient promotion and investor engagement strategies. The SEZ authority must intensify its efforts in global marketing and stakeholder collaboration to attract diverse investments beyond the current industrial focus. Engaging with local communities and ensuring that SEZ development aligns with local economic and social needs is also crucial for gaining broader support and reducing resistance.

The successful operationalization of the Galang Batang SEZ requires addressing environmental compliance, improving infrastructure, ensuring regulatory compliance, and optimizing administrative functions. By strategically resolving these issues, the SEZ can enhance its efficiency, attract more investments, and achieve sustainable growth.

Figure 2. Trend Analysis of Key Issues at Galang Batang SEZ



Source Author, 2024

The bar diagram illustrates the trend analysis of key challenges faced by the Galang Batang SEZ, ranked by their severity on a scale of 1 to 10. Energy supply constraints emerge as the most critical issue with a score of 9, reflecting the significant power requirements of the refinery and smelter operations, alongside the challenge of meeting national renewable energy targets on small islands. AMDAL challenges and investment promotion both score 8,

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

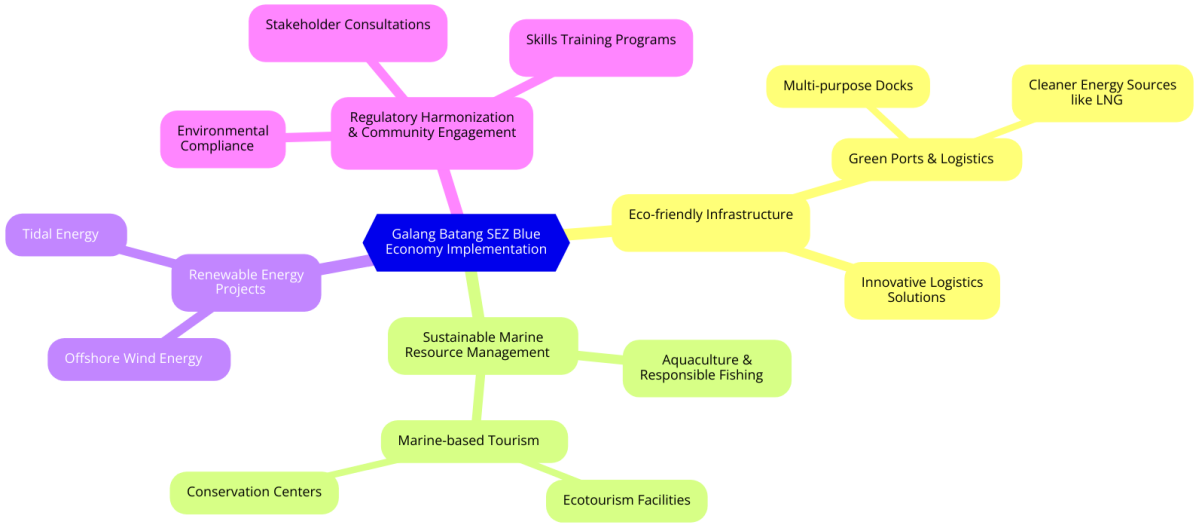
indicating that delays in environmental impact assessments and insufficient investor engagement are major bottlenecks that threaten project timelines and overall development progress.

Regulatory harmonization and coordination and accessibility and infrastructure development are also pressing issues, scoring 7, as these areas require efficient collaboration between national, regional, and local authorities to streamline processes and ensure that infrastructure and regulatory frameworks support SEZ growth. Issues like land conversion, building permits, and operational monitoring score moderately, reflecting ongoing complexities that, while significant, can be mitigated through administrative improvements and procedural streamlining. Lastly, administrative staffing and optimization rank slightly lower with a score of 4, suggesting that while important, this issue may not be as urgent as the others, although it still impacts the overall operational efficiency of the SEZ.

3. Implementation Blue Economy through Strategic Development Galang Batang SEZ

The implementation of the Blue Economy through strategic development at the Galang Batang SEZ (Special Economic Zone) involves integrating sustainable ocean-based economic practices with industrial and infrastructural growth. The Galang Batang SEZ's strategic location in the Riau Archipelago presents a significant opportunity to align its economic activities with Blue Economy principles, leveraging the coastal and marine resources sustainably. The focus includes developing eco-friendly infrastructure, enhancing marine logistics, and promoting industries such as fisheries, tourism, and renewable energy. These initiatives aim to not only drive economic growth but also preserve the marine ecosystem, ensuring long-term economic and environmental sustainability for the region.

Figure 1. Mindmap Implementation



Source: Author, 2024

To realize the Blue Economy, the Galang Batang SEZ must prioritize the development of eco-friendly ports and logistics systems. Given the SEZ's reliance on shipping for its alumina refinery operations and other industrial activities, building ports that minimize environmental impact is essential. The construction of multi-purpose docks must integrate green technologies, such as waste management systems and cleaner energy sources like LNG (Liquefied Natural Gas), to reduce carbon emissions. Additionally, enhancing the efficiency of

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

these facilities through innovative logistics solutions can streamline the supply chain and attract further investments, while maintaining harmony with marine biodiversity.

Another key area for implementing the Blue Economy is sustainable marine resource management. The SEZ has the potential to support aquaculture, fisheries, and marine-based tourism activities that align with sustainable practices. By investing in aquaculture technologies and responsible fishing practices, the SEZ can generate employment while maintaining the health of local fish populations and marine ecosystems. Additionally, developing tourism facilities that promote ecotourism, such as guided snorkeling tours and educational marine conservation centers, could diversify the local economy and raise environmental awareness. These efforts would contribute to the region's economic resilience and environmental stewardship.

The development of renewable energy infrastructure is also critical in applying Blue Economy principles to the Galang Batang SEZ. The area's reliance on coal-fired power plants highlights the need for alternative energy solutions, particularly in the form of offshore wind or tidal energy, which are suitable for its coastal environment. Establishing these renewable energy projects can reduce the SEZ's carbon footprint and align with Indonesia's national targets for renewable energy use. Moreover, integrating renewable energy into the industrial zone not only supports sustainable development but also enhances the competitiveness of businesses within the SEZ by lowering operational costs over time.

Finally, to fully embed the Blue Economy within the SEZ's development strategy, regulatory harmonization and community engagement are crucial. The SEZ authority must ensure that all industrial and infrastructural projects comply with environmental regulations and international standards related to marine resource management. Engaging local communities, particularly those dependent on marine resources, is essential for fostering cooperation and minimizing conflicts. Initiatives such as stakeholder consultations, community-based marine conservation programs, and skills training for the Blue Economy workforce can align local development with broader economic goals, ensuring the SEZ's growth is both inclusive and sustainable.

CONCLUSION

The development and operationalization of the Galang Batang Special Economic Zone (SEZ) play a crucial role in Indonesia's economic strategy, focusing on enhancing the aluminum industry while also creating employment and fostering foreign investment. Despite these positive efforts, the SEZ faces several strategic and operational challenges that could potentially hinder its progress. Environmental and regulatory issues, such as delays in securing AMDAL approvals and meeting renewable energy targets, illustrate the complexity of balancing industrial expansion with sustainability goals. Additionally, infrastructure constraints, such as the need for road expansions and energy supply improvements, reveal the critical need for coordination between various levels of government. These challenges highlight the importance of a well-structured development plan that not only focuses on rapid industrial growth but also ensures that these developments align with national policies and international environmental standards.

The SEZ's efforts in attracting investment and building infrastructure demonstrate a strong potential for becoming a major economic hub in the region. Significant investments in projects like the alumina refinery, power plants, and logistical facilities underscore the SEZ's ambitions to scale up its production capacity and integrate into global supply chains. However, issues such as land conversion delays, energy supply limitations, and the complexity of regulatory compliance suggest that continuous adaptation and innovation are necessary for the SEZ to achieve its goals. Addressing these concerns involves streamlining administrative processes, securing the necessary permits for ongoing and future projects, and enhancing the

SEZ's capacity to comply with environmental and regulatory frameworks. Moreover, by optimizing administrative staffing and improving reporting mechanisms, the SEZ can ensure better efficiency, transparency, and overall operational continuity, making it more attractive to investors while maintaining compliance with regulations.

The SEZ's pursuit of Blue Economy principles and sustainable development reflects its long-term vision to harmonize economic growth with environmental stewardship. The SEZ's initiatives to develop eco-friendly ports, promote sustainable aquaculture and tourism, and explore renewable energy sources demonstrate a commitment to integrating marine and coastal resources into its economic model responsibly. By implementing strategies that align with the Blue Economy, the Galang Batang SEZ not only contributes to Indonesia's national energy and environmental targets but also establishes itself as a model for sustainable development in special economic zones. However, for these efforts to be effective, regulatory harmonization, investment promotion, and stakeholder engagement must be prioritized. Ensuring local community involvement and fostering international business partnerships will be critical for the SEZ's inclusive and resilient growth, helping to overcome challenges and achieve a balanced, sustainable, and prosperous economic future for the region.

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Journal of Maritime Policy Science
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Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Exploring Technological Innovation in Wave Forecasting Using Machine Learning: A Literature Analysis

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Received: July 11, 2024 | Revised: July 29, 2024 | Accepted: August 30, 2024

https://doi.org/10.31629/jmps.v1i2.6941

ABSTRACK

In the face of rapid technological advancements, innovations in wave forecasting are increasingly essential for effectively addressing the complex impacts of climate change. This study aims to explore technological developments in wave forecasting that can manage the complexities related to climate change and enhance the accuracy and efficiency of predictions in dynamic marine environments. Employing a qualitative approach through a Systematic Literature Review (SLR) methodology, the research focuses on literature from databases such as Scopus, DOAJ, and Google Scholar, specifically targeting publications from 2014 to 2024. Recent findings reveal that advancements in machine learning technologies, including deep learning, ensemble learning, transfer learning, and data augmentation, have significantly improved the precision and efficiency of wave forecasting models. Techniques like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) have been particularly effective in capturing complex, non-linear patterns within wave data, enhancing the overall prediction accuracy. Ensemble learning methods have further contributed by increasing the stability and robustness of forecasts. Moreover, transfer learning and data augmentation play vital roles in adapting these models to rapidly changing environmental conditions, making them highly relevant in the context of climate change. These approaches are crucial for models to remain adaptable and responsive to dynamic oceanic conditions influenced by climate variability. The insights derived from this study are expected to provide valuable direction for the future development of machine learning-based wave forecasting models, emphasizing the need for innovative techniques that can accommodate the complexities and uncertainties brought about by climate change.

Keyword: Technological Innovation, Wave Forecasting, Machine Learning, Prediction Models

INTRODUCTION

Wave forecasting plays a crucial role in various sectors, including maritime navigation, coastal safety, renewable energy, and disaster mitigation. In maritime navigation, accurate wave condition information is essential for determining safe and efficient sailing routes, thereby reducing the risk of accidents and optimizing travel time and costs (Aslam et al., 2020). In the coastal safety sector, precise wave forecasting aids in flood and coastal erosion management, as well as in preparing evacuation and protection measures for coastal communities (Arkema et al., 2017). Additionally, in the development of renewable energy, particularly wave energy, a deep understanding of wave patterns enables the optimization of device design and placement, thereby enhancing energy production efficiency (Garcia-Teruel & Forehand, 2021). In disaster mitigation efforts, such as tsunamis and storms, accurate wave

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

prediction is critical for providing early warnings and reducing the destructive impact of these events (Angove et al., 2019).

In the past decade, technology has undergone significant advancements to support wave forecasting, particularly through progress in sensors, satellites, and numerical models. Advanced sensors can now measure various ocean parameters in real-time, such as wave height, currents, sea surface temperature, and salinity, all of which are crucial data for developing predictive wave models (Isern-Fontanet et al., 2017). Additionally, satellite technology has advanced with higher resolution and observation frequency, enabling more detailed and extensive monitoring of ocean conditions (Vinogradova et al., 2019). Modern satellites can provide accurate and comprehensive data on atmospheric and oceanic conditions, which are then used to inform forecasting models.

Furthermore, numerical models have been refined with greater computational capabilities and more complex algorithms, allowing for more accurate simulations of wave dynamics (Sonnewald et al., 2021). The combination of data from sensors and satellites, processed through advanced numerical models, has significantly enhanced our ability to predict ocean waves more accurately and swiftly (Shutler et al., 2016).

Machine learning is an innovative technology that has revolutionized various fields, ranging from healthcare and finance to environmental science. Essentially, machine learning is a branch of artificial intelligence (AI) that enables computer systems to learn from data and make predictions or decisions without being explicitly programmed (Jordan & Mitchell, 2015). This technology operates by identifying patterns or trends within large and complex datasets, which may be challenging for humans or traditional analytical methods to discern.

Machine learning offers a novel approach to data processing through the use of algorithms that can automatically improve their performance as more data is analyzed (Ling, 2023). With this capability, machine learning can produce more accurate and adaptive predictions in response to changing conditions or continuously evolving data. In the context of wave forecasting, for example, machine learning can process vast amounts of historical and real-time data, such as weather conditions, ocean currents, and wave heights, to predict wave patterns more effectively (James et al., 2018).

Machine learning has been widely applied in wave forecasting, offering a new and more accurate and adaptive approach. Algorithms such as neural networks and support vector machines have been used to process complex ocean data, including wave heights, ocean currents, and weather conditions. Research indicates that machine learning techniques like the Ensemble of Extreme Learning Machine (Ens-ELM) outperform Extreme Learning Machine (ELM), Online Sequential ELM (OS-ELM), and Support Vector Regression (SVR) in predicting daily wave heights (Kumar et al., 2018). Other techniques, such as multilayer perceptron, gradient boosting decision trees, and ensemble methods, also enhance the accuracy of the Puertos del Estado (PdE) forecasting system, reducing the prediction error of numerical models by approximately 36% (Gracia et al., 2021).

Sequential learning algorithms like Minimal Resource Allocation Network (MRAN) and Growing and Pruning Radial Basis Function (GAP-RBF) are more effective than SVR and ELM, with MRAN demonstrating a more efficient architecture (kumar et al., 2017). The use of machine learning in ocean data analysis is increasingly popular due to its ability to handle large volumes and dimensions of data, with significant applications in marine environmental protection and responses to extreme weather (Lou et al., 2023). In Monterey Bay, a machine learning framework successfully replicated wave heights with an error of 9 cm and correctly identified over 90% of characteristic periods, while reducing computation time compared to physics-based models (James et al., 2018). Climate change affecting wave patterns drives the need for more advanced and adaptive technologies, such as machine learning and complex numerical models, to address these challenges and dynamically update prediction models.

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Global challenges such as climate change have a significant impact on sea wave patterns, which in turn create an urgent need for continuous technological innovation to maintain forecasting accuracy. Hünicke et al. (2015) observed changes in sea level and wind waves in the Baltic Sea over the past 200 years, finding that the relative sea level in the Bothnian Bay decreased by 8.2 mm per year, while in the southern Baltic Sea, there was a slight rise, with an increasing trend in sea level primarily during the winter season. (Woodworth et al., 2019) discussed the greater and more complex variability of coastal sea levels compared to deep oceans; however, aspects such as the influence of waves and river flows on sea level records remain under-researched.

(Reguero et al., 2019) found that the global sea wave power has increased by 0.4% per year since 1948 due to sea surface warming, making it an important indicator of climate change. Meanwhile, (Melet et al., 2020) estimated a 20-year average change in "wave setup" on sandy coastlines due to climate change based on the RCP 8.5 scenario, with results indicating small but significant regional variations that need to be incorporated into regional sea level change projections, particularly for studies of extreme events.

Several key studies have been conducted on the integration of machine learning and technological innovation in wave forecasting, contributing significantly to the enhancement of prediction models' accuracy and efficiency. For instance, a study utilizing deep learning to predict wave height with high accuracy through the analysis of historical weather and wave data demonstrated that this algorithm is capable of capturing complex and nonlinear patterns (Afzal et al., 2023). Another study employed support vector machines to predict sea wave changes based on various environmental parameters, finding that this method can improve prediction reliability compared to traditional statistical models (Imani et al., 2018).

Additionally, research leveraging ensemble learning showed that combining various machine learning algorithms can yield more stable and accurate predictions under fluctuating sea conditions (Zhang et al., 2022). Although these studies have laid a strong foundation for the application of machine learning in wave forecasting, there remains room for further exploration, particularly in handling highly variable and dynamic data and developing models that are more adaptive to climate change.

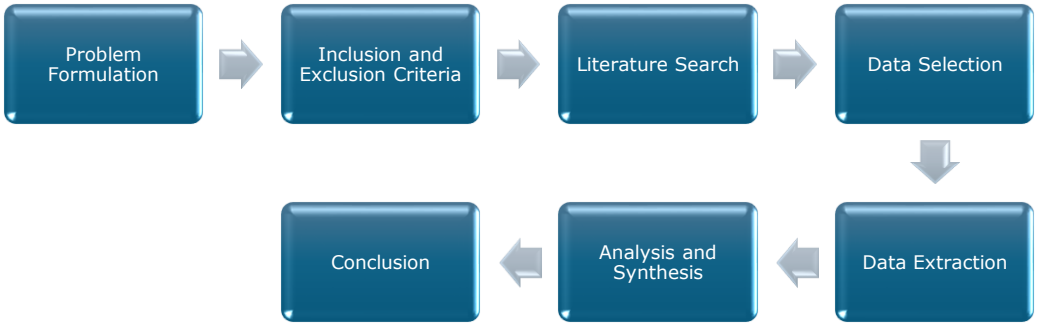
Research findings have demonstrated the successful application of machine learning in wave forecasting; however, there remains a gap in the adaptation of models to climate change, which dynamically affects wave patterns. Previous studies have predominantly focused on short-term prediction accuracy and have not fully integrated long-term challenges, such as regional variability and extreme phenomena in sea level projections. Therefore, this study aims to explore technological innovations in wave forecasting that can address the complexities of climate change while enhancing the accuracy and efficiency of predictions in ever-changing sea conditions.

METHODOLOGY

This study employs a Systematic Literature Review approach to explore technological innovations in wave forecasting that can address the complexities of climate change while enhancing prediction accuracy and efficiency. The process begins with formulating the research problem, which focuses on identifying the latest technologies and the application of machine learning in wave forecasting. Inclusion criteria encompass peer-reviewed journal articles, international conference papers, books, and relevant research reports published between 2014 and 2024, in English, discussing the application of machine learning and recent technological innovations. Exclusion criteria include opinion articles, editorials, letters to the editor, non-peer-reviewed publications, those published before 2014, and studies not related to machine learning or technological innovations in wave forecasting.

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Figure 1. Flow of Research Implementation



Source: Author, 2024

The research methodology involves searching for literature through databases such as Scopus, DOAJ, and Google Scholar using keywords like Technological Innovation, Wave Forecasting, Machine Learning, and Prediction Models. Relevant data will be selected based on the predefined criteria and then extracted to obtain information about methodologies, results, and technological innovations. The extracted data will be analyzed to identify patterns and trends and to assess the effectiveness of machine learning in wave forecasting. The analysis will be synthesized to provide a comprehensive overview of advancements and challenges in the field, culminating in conclusions that offer recommendations for further research and development.

RESULTS AND DISCUSSION

After conducting an in-depth literature review, we identified several relevant studies that provide significant insights supporting the focus and objectives of this research. These studies offer critical contributions that enrich our understanding of the topic, particularly in the context of technological innovation and the adaptation of wave forecasting to the challenges posed by climate change. The information gathered from these studies not only enhances the depth of our analysis but also provides a robust foundation for developing a more comprehensive conceptual framework for this research. The additional knowledge derived from these studies is invaluable in addressing the research questions posed and in supporting the development of more accurate and efficient wave forecasting models based on machine learning. The findings from these studies have been organized and synthesized in Table 1.

Table 1. Research Variables Discussed in the article

No	Focus or Scope	Authors	Insights or Research Variables Discussed
1	Deep Learning in Wave Forecasting	Chen et al. (2020), A. Ali et al. (2021), Jörges et al. (2023), M. Ali et al. (2021)	Use of Deep Learning such as CNN and RNN to capture complex and non-linear patterns in wave data. Improved prediction accuracy through these technologies over traditional methods.
2	Ensemble Learning in Wave Forecasting	Mienye & Sun (2022), Freeman et al. (2015), Mittendorf et al. (2022), Troin et al. (2021)	Implementation of Ensemble Learning such as Random Forests and Gradient Boosting Machines to combine the power of various models to produce more stable and accurate

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

No	Focus or Scope	Authors	Insights or Research Variables Discussed
			predictions. This method is also used to deal with diverse climate scenarios.
3	Adaptive and Online Learning	Moubayed et al. (2018), Zhang et al. (2023)	Development of Online/Adaptive Learning to handle changing data patterns, as well as improved model performance under dynamic ocean conditions.
4	Transfer Learning in Climate Adaptation	Guan (2020), Bellagarda et al. (2022), Lu et al. (2015)	Use of Transfer Learning to accelerate model adaptation to rapid climate change, by utilizing existing data for new conditions. This innovation helps the model adapt to fast-changing environmental dynamics.
5	Data Augmentation for Climate Challenges	Ahmad et al. (2018), Hipsey et al. (2015)	Application of Data Augmentation to expand the variability of training data, including extreme conditions and regional variability, to improve model robustness and accuracy in the face of climate change challenges.
6	Impact of Climate Change on Wave Forecasting	Shi et al. (2020), Moazami et al. (2019)	This research discusses how machine learning models, especially in the context of climate change, can be more effective in dealing with regional variability and extreme phenomena than traditional methods. The use of historical data covering long-term climate variability is the main focus.

Source: Author, 2024

Table 1 categorizes recent studies focused on the application of machine learning technologies in wave forecasting, particularly in the context of climate change adaptation. These studies include the use of deep learning techniques, such as CNNs and RNNs, to enhance prediction accuracy by capturing complex non-linear patterns. Additionally, ensemble learning methods are highlighted for their ability to produce more stable predictions through the combination of various models. Innovations in adaptive and online learning are also noted, addressing the challenge of continuously evolving data patterns. Moreover, transfer learning techniques are employed to expedite model adaptation to new climate conditions. Data augmentation is utilized to improve model robustness in extreme conditions. Other studies emphasize the impact of climate change on wave forecasting, with a focus on regional variability and extreme phenomena that are difficult to predict using traditional methods. These topics will be explored in greater detail in the following discussion.

1. The latest technological innovations applied in ocean wave forecasting using machine learning

Recent advancements in wave forecasting models using machine learning incorporate various sophisticated methods that have demonstrated improved accuracy and efficiency in

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

predictions (Chen et al., 2020). A major innovation is the application of deep learning, which utilizes deep neural networks to capture complex and non-linear patterns in wave data. Techniques such as Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) have shown superior capabilities in predicting wave heights and patterns more accurately compared to traditional methods (Guan, 2020). Additionally, ensemble learning techniques play a crucial role by combining the outputs of multiple machine learning algorithms to produce more stable and reliable predictions (Mienye & Sun, 2022). This approach, which includes methods such as Random Forests and Gradient Boosting Machines, integrates the strengths of various models to reduce prediction errors and enhance overall performance (Freeman et al., 2015).

The application of advanced machine learning technologies, such as deep learning and ensemble learning, significantly impacts the accuracy and efficiency of wave forecasting models compared to traditional methods (A. Ali et al., 2021). Deep learning technologies, with their ability to capture complex and non-linear patterns in data, have been shown to enhance prediction accuracy by reducing estimation errors common in classical statistical models (Ahmad et al., 2018). Models like Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) offer improved capabilities for processing temporal and spatial data, resulting in more precise predictions (Jörges et al., 2023). Meanwhile, ensemble learning combines the strengths of various machine learning algorithms, such as Random Forests and Gradient Boosting Machines, to produce more stable and consistent predictions (Mittendorf et al., 2022). These technologies also demonstrate higher effectiveness in addressing the complexities of climate change by adapting to evolving data dynamics. In the context of climate change, machine learning models can better account for regional variability and extreme phenomena compared to traditional methods, which may be less responsive to rapid and drastic climate fluctuations (Shi et al., 2020).

These trends highlight significant advancements in the application of machine learning for wave forecasting. The use of deep learning models, such as CNNs and RNNs, has proven superior in capturing the complexity of wave data compared to traditional methods, particularly in identifying non-linear and hard-to-predict patterns. Ensemble learning enhances prediction stability and accuracy by combining multiple models, while transfer learning accelerates model adaptation to new conditions by leveraging knowledge from existing datasets. Data augmentation introduces additional variability in training data, crucial for ensuring that models adapt well to extreme conditions and regional variations commonly encountered in wave forecasting. However, several challenges accompany these advancements.

Deep learning, despite its effectiveness, demands substantial computational resources and long training times, which may pose practical limitations, especially in resource-constrained environments. While ensemble learning improves stability, it also increases overall model complexity, potentially leading to difficulties in result interpretation and risks of overfitting if not carefully managed. Transfer learning's success heavily relies on the relevance and quality of prior datasets, meaning that suboptimal datasets could hinder performance. Additionally, the effectiveness of data augmentation depends on how well these techniques replicate real-world conditions, which is vital for practical applications.

2. Key challenges in using machine learning for ocean wave forecasting in the context of climate change

The primary challenges related to data variability and dynamic sea conditions impacting machine learning model performance include the instability of data arising from rapid environmental fluctuations and changes in wave patterns that are difficult to predict (Zheng et al., 2020). This variability can lead to inaccuracies in predictions and reduce model

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

accuracy. Researchers address these challenges through several innovative approaches. One method involves the continuous updating and training of machine learning models to handle evolving data over time (Moubayed et al., 2018), including the integration of data augmentation techniques that expand training data variability to cover extreme conditions and regional variability. Additionally, the application of algorithms capable of adaptively adjusting to changing data patterns, such as online learning or adaptive learning models, has been introduced to enhance model performance in dynamic sea conditions (Zhang et al., 2023). These approaches enable models to continuously learn and refine predictions based on the most recent data, thereby improving resilience and accuracy in wave forecasting amidst evolving climate uncertainties.

Existing machine learning models adapt to the continuously evolving climate by employing several strategies to address the associated complexities and dynamics. One major approach is integrating historical data that encompasses long-term climate variability and extreme phenomena, allowing models to recognize changing patterns and adapt to new conditions (Moazami et al., 2019). These models often utilize feature engineering techniques to incorporate additional relevant variables, such as sea surface temperature and wind patterns, which can influence wave patterns.

Furthermore, the use of ensemble learning methods enables the combination of multiple predictive models to handle various climate scenarios simultaneously, thereby enhancing model resilience to data uncertainties (Troin et al., 2021). Transfer learning models are also applied to transfer knowledge from existing data to new conditions, accelerating adaptation to rapid climate changes (Bellagarda et al., 2022). Despite these advancements, challenges remain in accounting for extreme phenomena and long-term changes due to the high complexity and variability involved.

The research findings indicate that the primary challenges in applying machine learning for wave forecasting are closely tied to the uncertainty posed by data variability and rapid environmental changes due to climate change. This variability challenges model stability and requires continuous updates and responsive adaptations to the latest data. By integrating historical data and employing adaptive learning algorithms, models can improve prediction accuracy and resilience. Ensemble learning provides advantages in handling diverse and complex climate scenarios, while transfer learning enables quicker adaptation to changing conditions. However, these approaches also present limitations.

Continuous model updates and training are crucial but demand significant computational resources and up-to-date data, which may not always be available. Data augmentation and feature engineering extend training data coverage, yet their effectiveness hinges on the appropriate selection of features and the relevance of augmented data to actual conditions. While ensemble and transfer learning offer robust solutions to data uncertainty, they also increase model complexity, potentially leading to challenges like overfitting and higher computational requirements.

3. Trends and future directions in the development of machine learning technology for ocean wave forecasting

Recent trends in machine learning technology integrated with wave forecasting encompass several new methods and innovative approaches emerging from current research. A major trend is the application of deep learning, particularly models such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), which have demonstrated superior capabilities in capturing complex and non-linear patterns in wave data (M. Ali et al., 2021). Additionally, ensemble learning methods have gained popularity due to their ability to combine results from multiple machine learning models, such as Random Forests and Gradient Boosting Machines, to produce more stable and accurate predictions (Mienye & Sun, 2022).

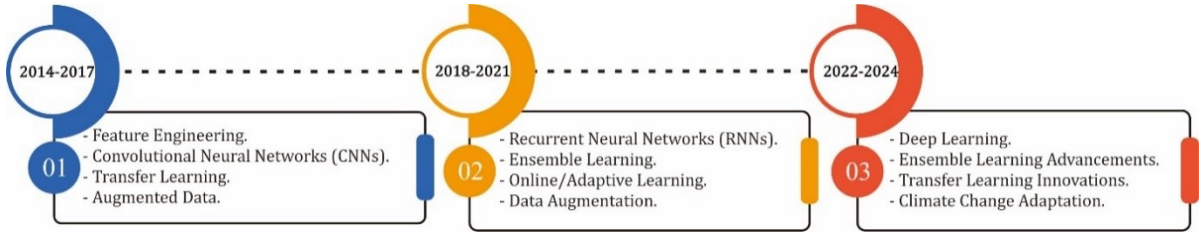
Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Another emerging approach is the use of transfer learning techniques, which leverage knowledge from existing datasets to enhance model performance in new conditions (Lu et al., 2015). Finally, the integration of augmented data, which expands training data variability to include extreme conditions and regional variability, is also a key focus, aiding models in adapting to changing environmental dynamics (Hipsey et al., 2015). All these innovations contribute to improved accuracy and efficiency in wave forecasting amidst the ongoing challenges posed by climate change.

These trends highlight significant advancements in machine learning for wave forecasting. Deep learning models like CNNs and RNNs excel in capturing the complex, non-linear patterns of wave data, outperforming traditional methods. Ensemble learning enhances prediction stability and accuracy by combining multiple models, while transfer learning accelerates model adaptation to new conditions by leveraging prior datasets. Data augmentation introduces variability in training data, crucial for adapting to extreme conditions and regional differences.

Despite these advancements, challenges remain. Deep learning requires substantial computational resources and long training times, which can be limiting in resource-constrained environments. Ensemble learning, while improving accuracy, increases model complexity, potentially leading to difficulties in result interpretation and risks of overfitting. Transfer learning's effectiveness depends on the quality and relevance of prior datasets, and data augmentation's success relies on accurately replicating real-world conditions for practical applications.

Figure 2. Research Variables Contained in this Study



Source: Author, 2024

Figure 2 illustrates the significant advancements in wave forecasting technology over recent years, highlighting the increasing sophistication in the use of key research variables. During the 2014-2017 period, the primary focus was on "Feature Engineering" to incorporate variables such as sea surface temperature and wind patterns into forecasting models. Additionally, there was an initial implementation of "Convolutional Neural Networks (CNNs)" aimed at capturing non-linear patterns within wave data. "Transfer Learning" also began to be applied, leveraging existing data to enhance performance in new conditions, while the integration of "Augmented Data" was introduced to increase the variability of training data, including under extreme conditions. In the 2018-2021 period, there was a marked increase in the use of "Recurrent Neural Networks (RNNs)" for temporal data prediction, alongside the growing popularity of "Ensemble Learning" techniques, such as Random Forests and Gradient Boosting Machines, which contributed to more stable predictions.

This era also saw the introduction of "Online/Adaptive Learning" models designed to adapt to continuously changing data patterns, supported by broader application of "Data Augmentation" techniques to address the challenges posed by climate change. Moving into the 2022-2024 period, advancements in "Deep Learning" technologies, particularly CNNs and RNNs, further enhanced predictive accuracy. Simultaneously, "Ensemble Learning" techniques were further refined to combine various models for better handling of diverse climate

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

scenarios. Innovations in "Transfer Learning" continued to evolve, speeding up model adaptation to rapid climate changes, with a significant emphasis on "Climate Change Adaptation" strategies to address increasingly complex environmental dynamics, including the management of extreme events and long-term variability.

CONCLUSION

Recent evaluations of research indicate that innovations in machine learning technologies, particularly through deep learning, ensemble learning, transfer learning, and data augmentation, have significantly enhanced the accuracy and efficiency of wave forecasting. Models such as CNNs and RNNs have proven effective in capturing the complexity of non-linear data, while ensemble learning has contributed to increased prediction stability. Additionally, transfer learning and data augmentation play crucial roles in accelerating model adaptation to rapidly changing environmental conditions, particularly in addressing the challenges posed by climate change. However, there remain significant obstacles, including the high computational demands, reliance on high-quality data, and the risk of overfitting due to the increasing complexity of these models.

These gaps highlight urgent research opportunities for the future, including the development of more computationally efficient machine learning algorithms that can perform well even with limited resources. Further research is needed to enhance the effectiveness of data augmentation in replicating real-world conditions and to develop more adaptive transfer learning methods capable of responding to unexpected environmental changes. Moreover, the integration of broader oceanographic data and the development of predictive models capable of handling extreme conditions are essential to ensure that wave forecasting remains reliable and sustainable in the long term.

ACKNOWLEDGEMENT

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VOL 1 NO 2 AUGUST 2024
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e-ISSN: 3063-4245 p-ISSN: 3063-5705
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Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Stakeholder Analysis of Indonesia's Trade the Regional Comprehensive Economic Partnership (RCEP) Actor Non-ASEAN

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Received: July 25, 2024 | Revised: August 20, 2024 | Accepted: August 30, 2024

https://doi.org/10.31629/jmps.v1i1.6942

ABSTRACT

This study examines Indonesia's trade relations with non-ASEAN member countries under the Regional Comprehensive Economic Partnership (RCEP). The RCEP, signed in 2020, presents Indonesia with significant opportunities to expand market access, particularly with key partners like China, Japan, South Korea, Australia, and New Zealand. However, challenges persist, particularly in terms of trade imbalances and competitive pressures. The research employs a mixed-methods approach, combining quantitative data from trade flow statistics and tariff reductions with qualitative insights from interviews and focus group discussions with key stakeholders. The Importance Performance Analysis (IPA) method was applied to assess the effectiveness of RCEP provisions. Results show that while Indonesia benefits from improved market access, significant trade deficits remain, especially with China and Australia. Stakeholders, including government agencies and private sector exporters, play pivotal roles in mitigating these challenges by addressing non-tariff barriers and enhancing trade facilitation. In conclusion, Indonesia must strategically leverage the RCEP framework to address trade imbalances and improve export competitiveness. Policy recommendations include enhancing stakeholder collaboration, improving infrastructure, and increasing awareness among small and medium enterprises (SMEs) to fully utilize RCEP benefits. These efforts will ensure Indonesia remains competitive in global trade.

Keyword: Stakeholder Analysis; RCEP; Non-ASEAN Countries

INTRODUCTION

The issue examined in this study is Indonesia's trade relations with non-ASEAN members under the framework of the Regional Comprehensive Economic Partnership (RCEP). Signed in 2020, RCEP is one of the largest trade agreements globally, covering nearly 30% of the world's population and GDP (Bobowski, 2017). For Indonesia, the RCEP presents both opportunities and challenges, especially in its dealings with key non-ASEAN countries such as China, Japan, South Korea, Australia, and New Zealand. While the agreement is poised to enhance Indonesia's market access and strengthen its trade competitiveness, significant trade imbalances persist, particularly with China and Australia. This paper focuses on addressing these imbalances and maximizing the benefits of RCEP by examining Indonesia's trade strategies with these non-ASEAN members (Gao, 2022; Raghavan et al., 2023). Prior studies on RCEP, such as those have provided a macroeconomic perspective on the agreement's potential. However, fewer studies have focused on Indonesia's specific engagement with non-ASEAN members, particularly in the context of stakeholder analysis, making this paper a unique contribution to the field.

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

The urgency of addressing Indonesia's trade imbalance with non-ASEAN RCEP countries stems from its growing deficits in recent years. Data from 2020 shows significant trade deficits with China, South Korea, and Australia, which, if not addressed, could undermine Indonesia's economic gains under RCEP (Adila et al., 2023; Campbell, 2023). Moreover, the competitive pressures posed by other RCEP members, such as Vietnam and Thailand, make it essential for Indonesia to adopt strategies that improve its export competitiveness and market positioning. The rise of regional value chains, especially centered around China, adds further urgency, as Indonesia risks being marginalized in these value chains unless it actively engages in targeted trade and investment strategies. This study responds to these challenges by analyzing how Indonesia can strategically position itself to benefit from RCEP and reduce its trade imbalances (Chakraborty & Chaisse, 2021; Zreik, 2024).

Previous research has explored the broader economic implications of RCEP for ASEAN and its member states, focusing largely on the agreement's potential to boost GDP growth, foreign direct investment (FDI), and trade flows. For instance, Wardani and Cooray (2019) examined the role of ASEAN in facilitating RCEP negotiations and its geopolitical implications. (Lando, 2022; Wu, 2020) provided insights into the technical complexities of RCEP, particularly its trade liberalization measures. While these studies offer valuable insights, they lack a focused analysis on Indonesia's trade performance non-ASEAN partners within the RCEP framework. This paper aims to fill that gap by offering a comprehensive review of Indonesia's trade dynamics with these key partners, identifying the specific challenges faced by Indonesian exporters, and offering policy recommendations tailored to enhancing Indonesia's competitive position under RCEP.

The key aspect of this study is its focus on Indonesia's engagement with five non-ASEAN RCEP countries, which are pivotal to Indonesia's trade strategy. China, Japan, South Korea, Australia, and New Zealand represent crucial markets for Indonesian exports, but they also pose significant challenges due to their established trade networks and advanced industries. Understanding the specific dynamics of trade with these countries is essential for Indonesia to effectively leverage the RCEP framework (Dosch & Kliem, 2023; Wardani, 2022). This study places particular emphasis on non-tariff barriers, rules of origin, and the role of regional value chains, as these factors have a significant impact on Indonesia's trade performance. By focusing on these areas, the paper seeks to provide a detailed analysis of the structural and policy-related factors that influence Indonesia's trade outcomes under RCEP (Estrades et al., 2023; Mahadevan & Nugroho, 2019).

One of the original contributions of this study is its use of both quantitative and qualitative data to assess the effectiveness of RCEP provisions in enhancing Indonesia's trade. By incorporating primary data from stakeholders, including government officials, trade experts, and industry representatives, this research goes beyond the typical macroeconomic analysis found in previous studies (Pitakdumrongkit, 2023; Wardani & Cooray, 2019). It provides a stakeholder-driven approach to understanding the real-world challenges faced by Indonesia in its RCEP implementation. Additionally, this study applies the Importance Performance Analysis (IPA) method, which has not been widely used in RCEP-related research, to evaluate the performance of key trade-related chapters of RCEP in Indonesia's trade with non-ASEAN countries. This methodological approach adds a unique dimension to the study and contributes to its originality.

The objectives of this paper are twofold. First, it aims to identify the specific provisions of RCEP that Indonesia can utilize to enhance its trade performance with non-ASEAN partners. This includes an analysis of market access, rules of origin, and trade facilitation measures. Second, the study seeks to assess the trade practices and commitments of Indonesia's non-ASEAN RCEP partners to determine areas where Indonesia can improve its market positioning and export competitiveness. By addressing these objectives, the paper provides actionable

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

insights for policymakers and trade negotiators, offering recommendations that can help Indonesia optimize its RCEP engagement.

This study contributes to the broader discourse on regional trade agreements by providing a focused analysis of Indonesia's trade strategies within the RCEP framework. It underscores the importance of addressing trade imbalances with non-ASEAN members and offers practical solutions for enhancing Indonesia's competitive edge. By combining stakeholder analysis (Agwu, 2019; Varvasovszky & Brugha, 2000) with a detailed review of RCEP provisions, this study provides a nuanced understanding of how Indonesia can navigate the complexities of this mega trade agreement to achieve more balanced and sustainable trade outcomes. The findings of this research are intended to inform both policymakers and businesses, helping them to make more informed decisions regarding Indonesia's participation in the global trade landscape shaped by RCEP.

METHODOLOGY

This research utilizes a mixed-methods approach (Sale et al., 2002), combining both quantitative and qualitative techniques to examine Indonesia's trade relations under the Regional Comprehensive Economic Partnership (RCEP). The mixed-methods design allows for a comprehensive understanding of trade dynamics by triangulating data from multiple sources. Quantitative data, including trade flows, tariff reductions, and economic indicators, were analyzed to identify trends in Indonesia's trade performance with non-ASEAN RCEP members (Creswell & Creswell, 2018; Neuman, 2007). Simultaneously, qualitative insights were gathered through expert interviews, focus group discussions (FGDs), and surveys involving key stakeholders such as government officials, trade associations, and private sector representatives.

For the quantitative analysis, trade data from Indonesia and its five key non-ASEAN partners—China, Japan, South Korea, Australia, and New Zealand—were collected from reputable sources such as the Indonesian Ministry of Trade and international databases. These data sets covered a period of five years (2019–2024) to capture pre- and post-RCEP trends. Various economic models, including the Gravity Model of Trade, were used to assess the impact of RCEP provisions on trade flows. Descriptive statistics were used to analyze trade deficits, export and import volumes, and changes in tariff structures between Indonesia and its non-ASEAN partners.

The qualitative component involved conducting in-depth interviews with stakeholders to gain insights into the challenges and opportunities presented by RCEP (Guba & Lincoln, 1994; Miles et al., 2014). Experts from the Ministry of Foreign Affairs, industry leaders, and representatives from Indonesian trade associations participated in FGDs to discuss the practical implementation of RCEP provisions. These discussions focused on non-tariff barriers, rules of origin, and market access challenges, providing valuable qualitative data to supplement the quantitative findings. The Importance-Performance Analysis (IPA) method was applied to evaluate the effectiveness of various RCEP-related policies and their influence on Indonesia's export competitiveness. Data integration was achieved through a triangulation approach (Thurmond, 2001), where findings from the quantitative and qualitative analyses were cross-validated to ensure robustness.

RESULTS AND DISCUSSION

1. Roles of Stakeholders in Enhancing Indonesia's Trade under RCEP with Non-ASEAN Countries

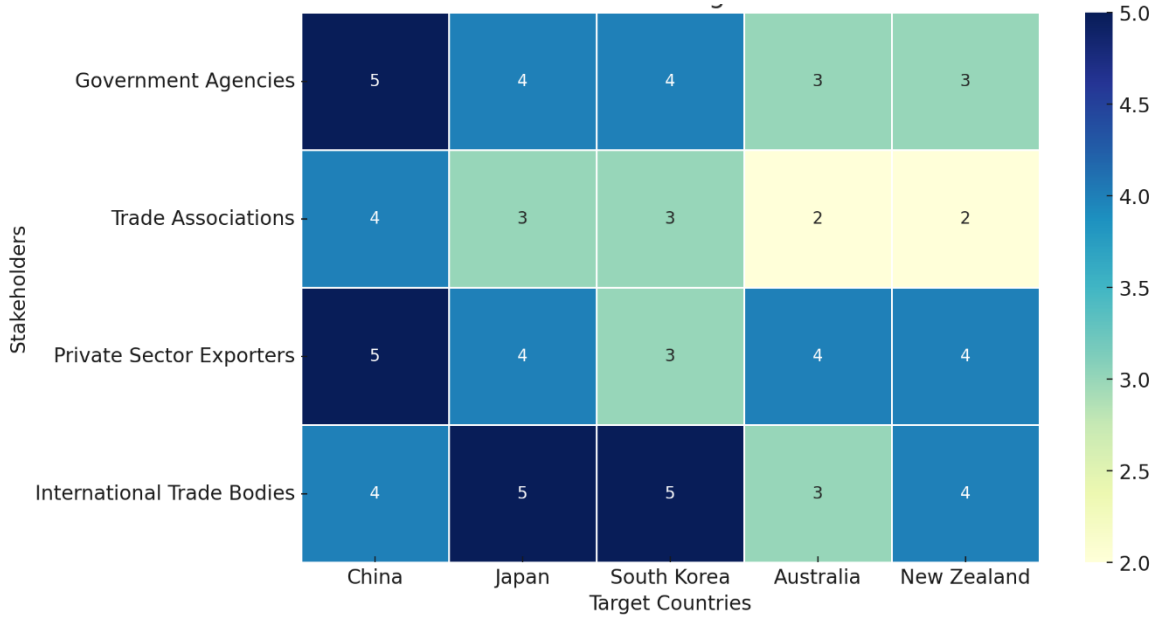
The role of stakeholders in enhancing Indonesia's trade with five non-ASEAN countries under the Regional Comprehensive Economic Partnership (RCEP) is pivotal. Stakeholders involved in this process include government agencies, trade associations, private sector

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

exporters, and international trade bodies. The Ministry of Foreign Affairs, in collaboration with various national institutions, plays a central role in overseeing and facilitating Indonesia's RCEP-related strategies. This government-led effort aims to optimize the benefits of the RCEP framework, targeting specific non-ASEAN members: China, Japan, South Korea, Australia, and New Zealand. Each stakeholder has a unique role in ensuring the effective implementation of RCEP's provisions to enhance Indonesia's trade balance with these countries.

First, the Indonesian government acts as a key facilitator in driving trade policies and negotiating favorable terms for market access under RCEP. Government agencies such as the Ministry of Trade and the Ministry of Foreign Affairs are responsible for ensuring that RCEP commitments are honored, and that Indonesia's trade interests are protected. They are also tasked with addressing non-tariff barriers, negotiating favorable rules of origin, and ensuring smooth customs procedures. The government works closely with private sector stakeholders to ensure that RCEP provisions are fully utilized and that challenges faced by Indonesian businesses in non-ASEAN markets are mitigated.

Figure 1. Stakakeholder Involvement in Enhancing Indonesia's Trade under RCEF



Source: Gephi Map, 2024

The heatmap above highlights the significant role that various stakeholders play in enhancing Indonesia's trade with five non-ASEAN countries—China, Japan, South Korea, Australia, and New Zealand—under the RCEP framework. Government agencies, particularly Indonesia's Ministry of Foreign Affairs, are shown to have the most prominent involvement, especially in relations with China, where they score the highest level of engagement. This high involvement reflects the importance of diplomatic and policy-level interventions in ensuring that trade strategies align with the RCEP provisions, facilitating smoother negotiations and bilateral agreements. The government's role in Japan and South Korea is also substantial, indicating focused efforts on strengthening economic ties in Northeast Asia.

Private sector exporters, who are crucial in translating trade agreements into tangible exports, show strong involvement across all five countries, particularly in China and Australia. This suggests that businesses in Indonesia are highly proactive in capitalizing on the trade opportunities presented by the RCEP, especially with China's large market and Australia's demand for Indonesian goods. Their engagement in New Zealand and South Korea also

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

reflects growing trade activities, where exporters benefit from the reduction in tariffs and barriers under the RCEP, enabling them to increase competitiveness in these markets. The participation of trade associations complements the private sector's efforts, with moderate involvement seen across most countries, highlighting their role in providing support, advocacy, and coordination for exporters.

Lastly, international trade bodies such as chambers of commerce and global trade organizations also play a key role, particularly in Japan and South Korea. Their involvement in these markets underscores the need for multilateral support to maintain and expand trade relations. These organizations often assist in navigating regulatory landscapes and providing dispute resolution mechanisms under the RCEP framework. Their moderate engagement with Australia and New Zealand indicates that while trade with these countries is important, it may not require the same level of multilateral involvement due to stronger bilateral frameworks already in place. In conclusion, the heatmap effectively illustrates how various stakeholders, led by the Indonesian government, are working in synergy to optimize the benefits of the RCEP with different levels of engagement depending on the market conditions and strategic priorities.

The private sector, particularly Indonesian exporters, is another critical stakeholder. These businesses are directly impacted by RCEP's trade facilitation measures, such as the elimination of tariffs and the simplification of rules of origin. Exporters must adapt their operations to meet the standards and technical regulations set by non-ASEAN RCEP countries. Key industries, such as electronics, textiles, and automotive components, stand to benefit significantly from reduced trade barriers, but they also face challenges related to competition and compliance with international standards. Active engagement from the private sector is essential to maximize RCEP's benefits, as businesses must capitalize on new market opportunities while addressing trade barriers specific to each partner country.

Trade associations and business chambers also play a supportive role in facilitating Indonesia's trade enhancement under RCEP. These associations help bridge the gap between the government and private sector by providing feedback on policy implementation and representing industry concerns. They also organize workshops, training sessions, and provide up-to-date information on the technical aspects of RCEP, including the utilization of preferential tariffs and the application of rules of origin. Their involvement ensures that businesses are well-informed and capable of navigating the complexities of trade regulations in non-ASEAN markets.

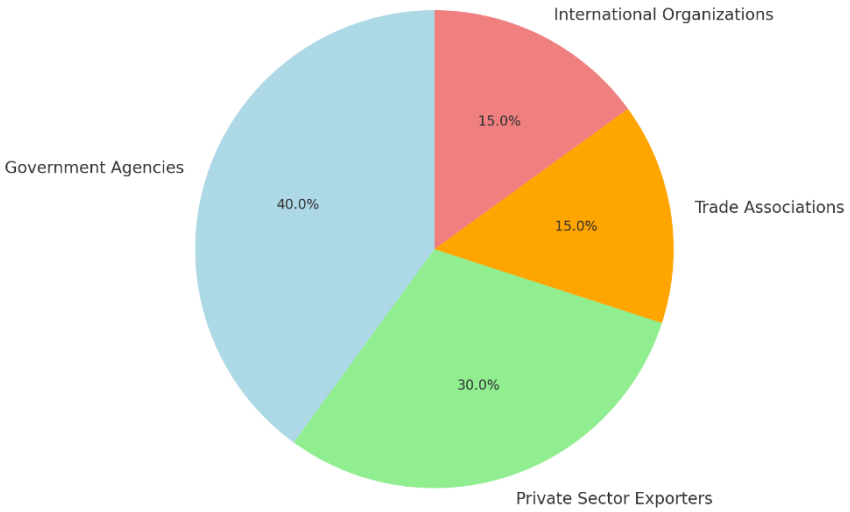
Additionally, international organizations, such as the World Trade Organization (WTO) and the ASEAN Secretariat, are involved in monitoring the implementation of RCEP. These bodies provide oversight to ensure that member countries, including Indonesia, adhere to their commitments under the agreement. They also support capacity-building efforts in areas like trade facilitation, customs procedures, and intellectual property rights, which are critical for Indonesian businesses to compete effectively in global markets. Their role is crucial in promoting transparency and accountability, ensuring that all RCEP members, including non-ASEAN partners, comply with the agreed terms.

The pie chart illustrates the division of responsibilities and influence among various stakeholders in enhancing Indonesia's trade under the RCEP agreement. Government agencies, represented by 40%, play the most significant role in driving trade policies and negotiating favorable terms for Indonesia. Agencies like the Ministry of Trade and the Ministry of Foreign Affairs are crucial in ensuring that Indonesia's interests are protected within the RCEP framework. These government bodies are responsible for managing compliance with the agreement, addressing non-tariff barriers, and ensuring smooth customs procedures. They also collaborate closely with private sector stakeholders, ensuring that Indonesia's export

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

sector can fully benefit from the reduced trade barriers and streamlined trade processes under RCEP.

Figure 2. Stakeholder Roles in Enhancing Indonesia's Trade under RCEP



Source: Author, 2024

Private sector exporters, accounting for 30% of the influence in the chart, are the direct beneficiaries of RCEP's trade facilitation measures. These businesses must adapt to the elimination of tariffs and simplified rules of origin, which can greatly enhance their competitiveness in non-ASEAN markets such as China, Japan, South Korea, Australia, and New Zealand. Exporters, especially those in industries like electronics, textiles, and automotive components, are expected to capitalize on new market opportunities. However, they also face challenges such as increased competition and the need to comply with international standards. Active participation from the private sector is essential to ensuring that the full potential of RCEP is realized, as these businesses must navigate both the opportunities and complexities brought about by the agreement.

Lastly, trade associations and international organizations each hold a 15% share of involvement. Trade associations serve as a bridge between the government and the private sector, providing feedback on policy implementation and helping businesses understand and utilize RCEP provisions. They organize workshops, provide training, and ensure that Indonesian exporters are well-equipped to navigate international trade regulations. Meanwhile, international organizations such as the World Trade Organization (WTO) and ASEAN Secretariat play a critical oversight role. These bodies ensure that all RCEP member countries, including Indonesia, adhere to their commitments and facilitate capacity-building in areas such as trade facilitation, intellectual property rights, and customs procedures. Their involvement promotes transparency and accountability, enabling smoother trade operations between Indonesia and its non-ASEAN RCEP partners.

2. Internal and External Stakeholders in RCEP for Indonesia's Trade Enhancement with Five Non-ASEAN Countries

The analysis of stakeholders involved in Indonesia's utilization of the Regional Comprehensive Economic Partnership (RCEP) reveals the distinct roles of both internal and external actors in optimizing trade with China, Japan, South Korea, Australia, and New Zealand. Internal stakeholders include government agencies, business associations, and private sector entities within Indonesia, while external stakeholders primarily consist of trade

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

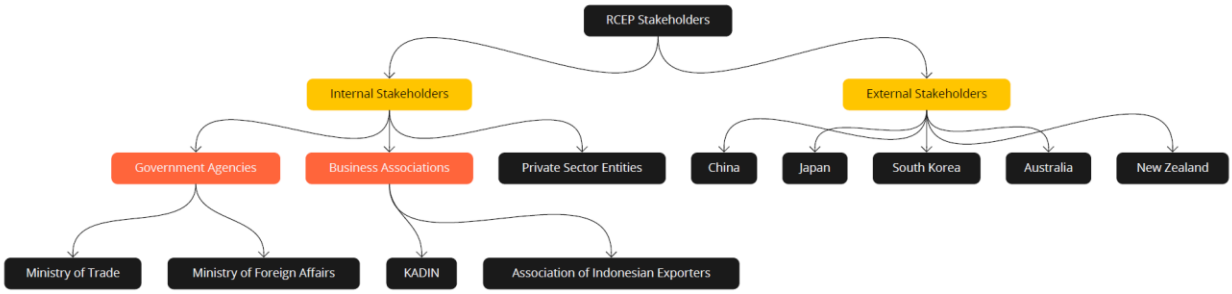
partners from the five non-ASEAN RCEP countries. Each group plays a pivotal role in shaping trade strategies, negotiating terms, and ensuring compliance with RCEP provisions. This discussion covers their roles, interests, and influence on trade practices under the RCEP framework.

Internally, the Indonesian Ministry of Trade and the Ministry of Foreign Affairs serve as the primary governmental stakeholders, driving Indonesia's trade negotiations and policy implementation. These ministries collaborate closely with the private sector, particularly through business associations such as the Indonesian Chamber of Commerce and Industry (KADIN) and the Association of Indonesian Exporters. Their collective objective is to maximize Indonesia's access to RCEP's trade benefits, especially in reducing trade barriers and enhancing export competitiveness in the non-ASEAN RCEP markets. The government's role is to facilitate smoother trade procedures, promote Indonesian exports, and address non-tariff barriers that inhibit market access, particularly in sectors such as electronics, agriculture, and textiles.

External stakeholders include key trade and investment partners from China, Japan, South Korea, Australia, and New Zealand. These countries have established trade relations with Indonesia, with China and Japan leading as major trade and investment sources. However, challenges such as Indonesia's trade deficit with China and South Korea persist, making external stakeholder engagement critical. Each partner country has its own set of trade practices, regulatory frameworks, and market demands, influencing Indonesia's ability to fully leverage RCEP's benefits. For example, Japan's focus on technological investments and South Korea's emphasis on electronic components necessitate targeted trade strategies by Indonesia.

In terms of trade practices, Indonesia's internal stakeholders must adapt to the varying requirements of external stakeholders, particularly in complying with rules of origin, sanitary and phytosanitary standards (SPS), and technical regulations. External actors, such as China, impose strict standards and regulatory frameworks that Indonesian exporters must navigate to penetrate these markets. External stakeholders, especially from Australia and New Zealand, demand higher quality and safety standards for agricultural exports, necessitating Indonesian domestic stakeholders to enhance their compliance capabilities.

Figure 3. Stakeholders in Indonesia's RCEP Utilization



Source: Author, 2024

Indonesia's strategy for increasing its competitive edge in these five non-ASEAN countries also hinges on effective collaboration with both internal and external stakeholders to foster regional value chain integration. China and South Korea, in particular, are pivotal in the regional value chains for electronics and automotive sectors. Internal stakeholders in Indonesia must therefore focus on aligning their production and export practices to fit within these value chains. Moreover, Australia and New Zealand offer significant opportunities for

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

agricultural exports, requiring Indonesia to optimize its agricultural trade policies and improve its export readiness in sectors such as palm oil, rubber, and coffee.

Focus group discussions (FGDs) and surveys conducted among Indonesian business leaders and trade officials highlighted key internal challenges, such as limited awareness of RCEP's provisions among small and medium enterprises (SMEs) and inadequate infrastructure to support export growth. These internal weaknesses must be addressed through better stakeholder engagement and capacity-building programs. Government agencies must play a more proactive role in educating local businesses about the opportunities and challenges within RCEP, ensuring that Indonesian products meet international standards and can compete effectively in these external markets.

External actors, particularly government trade representatives from the five countries, also play a significant role in shaping the trade landscape through bilateral negotiations and trade facilitation measures. For instance, Japan and Australia have actively sought to deepen economic cooperation with Indonesia through the Comprehensive Economic Partnership Agreements (CEPA) and other bilateral trade accords, further complementing the RCEP framework. These external actors are essential in shaping Indonesia's export potential, as they provide the necessary market access and investment opportunities.

3. Challenges of Global Supply Chain Integration under Globalization

In the future, the influence of globalization will present several significant challenges for Indonesia, particularly in the context of trade relations with non-ASEAN countries under the Regional Comprehensive Economic Partnership (RCEP). One of the key challenges will be adapting to the increasing complexity of global supply chains. As multinational corporations continue to fragment production processes across different countries, Indonesia will need to ensure its industries remain competitive and integrated into these global value chains. This will require the country to not only upgrade its infrastructure but also improve its industrial capabilities to meet the evolving demands of international trade, particularly in the high-tech sectors dominated by countries like Japan and South Korea.

Another challenge stemming from globalization is the increasing pressure to comply with international trade standards and regulations. Countries such as China, Australia, and New Zealand have stringent non-tariff measures (NTMs), including sanitary and phytosanitary standards and technical barriers to trade. For Indonesia, aligning its domestic production standards with these international regulations will be crucial to avoiding trade barriers that could limit its export potential. Additionally, as environmental and labor standards become more integrated into trade agreements, Indonesia may face heightened scrutiny from trade partners, particularly in areas related to sustainable development and fair labor practices.

Globalization also intensifies competition among emerging economies, especially in Southeast Asia. Countries like Vietnam and Thailand are rapidly enhancing their export competitiveness and increasing their market share in key sectors, such as electronics and automotive parts. Indonesia will need to implement strategies to boost its own competitiveness, particularly by investing in education, technology, and innovation. The challenge lies in ensuring that Indonesia does not fall behind in the race for foreign direct investment (FDI) and remains an attractive destination for multinational corporations looking to establish regional headquarters or production hubs.

Finally, the geopolitical implications of globalization pose a challenge for Indonesia as it navigates its trade relationships within the RCEP framework. As the trade war between the United States and China continues to evolve, Indonesia may find itself needing to balance its economic interests between its trade dependence on China and its strategic partnerships with other global powers. The RCEP has provided Indonesia with opportunities to strengthen its

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

ties with non-ASEAN countries, but this also means that the country will need to carefully manage its geopolitical positioning to avoid being overly reliant on any single trade partner.

CONCLUSION

The Regional Comprehensive Economic Partnership (RCEP) represents a significant opportunity for Indonesia to enhance its trade relationships with non-ASEAN countries, particularly China, Japan, South Korea, Australia, and New Zealand. The involvement of various stakeholders—government agencies, private sector exporters, trade associations, and international organizations—is crucial in maximizing the benefits of this framework. The Indonesian government plays a central role in negotiating favorable terms and facilitating compliance with RCEP provisions, while the private sector is essential in translating these agreements into actual trade flows. The synergy among these stakeholders highlights the importance of coordinated efforts to overcome trade barriers and optimize market access.

The analysis of internal and external stakeholders underscores the complexity of trade dynamics under RCEP. Internally, government ministries like the Ministry of Trade and the Ministry of Foreign Affairs are pivotal in shaping trade policies and promoting Indonesian exports. Externally, the varying regulatory environments and market demands of partner countries necessitate targeted strategies for Indonesia to fully leverage RCEP's benefits. The engagement of trade associations and international bodies further enhances Indonesia's capacity to navigate these complexities, ensuring that domestic stakeholders are equipped to meet the standards expected by foreign markets.

Despite the promising opportunities presented by RCEP, Indonesia faces significant challenges in adapting to the evolving landscape of global trade. The increasing complexity of global supply chains requires Indonesia to enhance its industrial capabilities and infrastructure to remain competitive. Additionally, compliance with stringent international trade standards and regulations, particularly in sectors like agriculture and electronics, poses further hurdles. As Indonesia strives to integrate into these global value chains, it must prioritize capacity building and awareness among small and medium enterprises (SMEs) to ensure they can compete effectively.

In conclusion, the path forward for Indonesia under the RCEP framework involves not only leveraging the strengths of its stakeholders but also addressing the internal and external challenges that may impede its trade ambitions. A proactive approach in stakeholder engagement, coupled with investments in technology, education, and infrastructure, will be essential for Indonesia to enhance its competitiveness in the global marketplace. As geopolitical dynamics shift, maintaining a balanced approach to trade relationships will be crucial for Indonesia to navigate its position in the region and beyond effectively.

ACKNOWLEDGEMENT

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Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Nation Branding of Kepulauan Riau Through Subregional Cooperation in The Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT)

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Received: July 30, 2024 | Revised: August 22, 2024 | Accepted: August 30, 2024

https://doi.org/10.31629/jmps.v1i1.6944

ABSTRACT

Nation branding has become a key element in modern communication strategies, particularly in the context of globalization. Countries strive to establish a positive international image, reflecting their unique identity and values. Nation branding is a marketing and communication strategy aimed at enhancing a country's image, both domestically and globally. Kepulauan Riau participation in the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) cooperation, and its hosting of the IMT-GT event in 2023, represents an effort to strengthen its image internationally. The IMT-GT is a subregional economic collaboration involving Indonesia (Sumatra), Malaysia, and Thailand, with the Kepulauan Riau being an active participant. This research utilizes a descriptive-analytical approach, supported by secondary data, to examine the impact of this initiative. One of the notable implementations of this cooperation is the IMT-GT Expo "Gebyar Melayu Pesisir," which showcases Kepulauan Riau local culture and products. This event aims to foster economic growth among the three countries, particularly in the Kepulauan Riau as the host region. The outcomes of the IMT-GT initiatives include agreements that enhance connectivity among member countries, fostering an integrated, innovative, inclusive, green, and sustainable growth strategy, with a vision extending to 2036. This research highlights the potential for the Kepulauan Riau to leverage nation branding through subregional cooperation, enhancing economic growth and international recognition.

Keywords: Nation Branding, Connectivity, IMT-GT, Economic Growth

INTRODUCTION

Nation branding aims to reshape the world's perception of a country through various marketing and communication strategies. It encompasses multiple complex elements such as culture, history, arts, geography, education, politics, economics, and numerous other aspects that reflect a nation's character and identity. National branding efforts typically include promotional campaigns, the use of social media, participation in international events, enhancement of tourism, foreign investment, and cooperation across various sectors (Hassan & Mahrous, 2019). Overall, nation branding plays a crucial role in enhancing a country's competitive advantage, expanding global presence, and supporting diplomatic and international collaboration efforts. A positive national image can attract investment, boost tourism, and strengthen both cultural and diplomatic appeal. By effectively managing its external image, a country can achieve broader strategic objectives and contribute to its overall progress (Hao et al., 2021)

Globalization and regionalism are expected to intensify among countries engaged in international cooperation. Such collaborations span multiple sectors to support economic

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

balance and strengthen diplomatic relations between states. One notable partnership explored in this study is the trilateral cooperation within the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT). The IMT-GT initiative was officially announced on July 20, 1993, during the Ministerial Meeting in Langkawi, Malaysia, and subsequently recognized by the United Nations. The cooperation is designed to promote investment, infrastructure development, and economic growth within the triangle region (Aziza et al., 2015). The IMT-GT framework primarily focuses on fostering economic development and improving the welfare of communities in the border areas of its member states (Wiranata et al., 2019). This cooperation was initiated by Malaysia's Tun Dr. Mahathir Mohamad, Indonesia's President Soeharto, and Thailand's Prime Minister Chuan Leekpai. The IMT-GT subregional cooperation aligns with the Master Plan on ASEAN Connectivity, aiming to enhance inter-member state connectivity within ASEAN (Raharjo, 2023; Raharjo et al., 2017). The IMT-GT comprises 10 provinces from Sumatra, Indonesia, 11 states from Peninsular Malaysia, and 14 provinces from southern Thailand (Yuniarti, 2019), as outlined in Table 1.1.

Table 1. Members IMT GT

Indonesia-GT	Malaysia-GT	Thailand-GT
Aceh	Johor	Chumphon
Bangka Belitung	Kedah	Krabi
Bengkulu	Kelantan	Nakhon Si Thammarat
Jambi	Melaka	Narathiwat
Lampung	Negeri Sembilan	Phang Nga
Sumatera Utara	Pahang	Phatthalung
Riau	Penang	Phuket
Kepulauan Riau	Perak	Ranong
Sumatera Selatan	Perlis	Satun
Sumatera Barat	Selangor	Songkhla
	Terengganu	Surat Thani
		Trang
		Yal
		Pattani

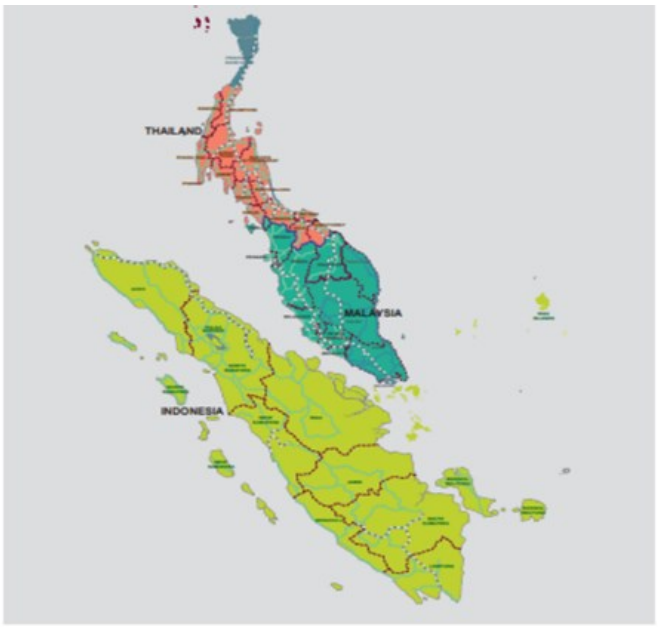
Source: IMT-GT, 2023

Based on the IMT-GT Blueprint, seven strategic pillars support the achievement of Vision 2036. These pillars have been carefully identified as the key focus areas that can deliver the most significant economic and social impact in the subregion during the 2017–2026 period. These pillars include: (a) Agriculture and Agro-based Industries; (b) Tourism; (c) Halal Products and Services; (d) Transport and ICT Connectivity; (e) Trade and Investment Facilitation; (f) Environment; and (g) Human Resource Development (HRD), Education, and Culture. To support the promotion of the IMT-GT subregion as a trade- and investment-friendly area, efforts in trade and investment facilitation are expected to be realized by 2026 (IMT-GT Implementation Blueprint 2022–2026, 2022; IMT-GT Vision 2036, 2018). Baseline metrics have been established to monitor the inflow of intra-IMT-GT trade and foreign direct investment (FDI) into special economic zones (SEZs) or designated economic zones for performance evaluation (IMT-GT Vision 2036, 2018). Because the IMT-GT subregion is committed to enhancing its role as a competitive economic zone, the strategic pillars outlined in the IMT-GT Blueprint have been meticulously developed to address key areas that will drive sustainable growth and regional integration. Each pillar is designed to leverage the subregion's strengths and opportunities, such as its agricultural potential, tourism appeal, and expertise

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

in halal products and services, while also focusing on critical enablers like transport and ICT connectivity, which are vital for seamless trade and investment flows. In particular, the pillar of trade and investment facilitation aims to create a more conducive environment for business by reducing barriers and fostering collaboration across borders, thereby promoting the IMT-GT as an attractive destination for foreign direct investment (FDI).

Figure 1. Map of the IMT-GT (Indonesia-Malaysia-Thailand Growth Triangle)



Source: Centre for IMT-GT (CIMT) Subregional Cooperation

This figure would typically show a geographical representation of the IMT-GT region, highlighting the key areas of cooperation between Indonesia, Malaysia, and Thailand. It would likely include the provinces of Sumatra in Indonesia, the peninsular states of Malaysia, and the southern provinces of Thailand, which form the core of this subregional cooperation framework. The map would also indicate important economic corridors, connectivity routes, and significant special economic zones (SEZs) that are critical for trade, investment, and development in the region. Because this map serves as a visual representation of the IMT-GT region, it is crucial for illustrating the spatial relationships and geographical proximity that underpin economic cooperation among Indonesia, Malaysia, and Thailand. It highlights the key areas that are strategically important for the subregion's growth, such as the provinces of Sumatra in Indonesia, the southern provinces of Thailand, and the peninsular states of Malaysia. These areas are central to the IMT-GT's mission of promoting cross-border trade, investment, and development

Furthermore, the figure would likely detail economic corridors and connectivity routes, such as major highways, rail links, and maritime routes, which facilitate the movement of goods, services, and people between the three countries. It would also pinpoint significant special economic zones (SEZs) that have been established to attract foreign direct investment (FDI) and foster industrial growth. These SEZs play a vital role in advancing the IMT-GT's objectives by offering incentives and infrastructure to support industries like manufacturing, agriculture, and tourism.

The map would serve not only as a tool for policymakers to understand the region's economic landscape but also as a means to communicate the IMT-GT's strategic vision for enhancing regional connectivity and integration. By highlighting the physical and economic

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

linkages between member states, it underscores the importance of collaborative efforts in boosting competitiveness, fostering inclusive growth, and achieving the long-term goals outlined in the IMT-GT Vision 2036.

Figure 2. Indicative Plan for Sumatra, Indonesia

Source : Asian Development Bank based on the National Medium-Term Development Plan (RPJMN) 2020–2024

This figure would typically depict a strategic development plan for Sumatra, highlighting key infrastructure projects, economic corridors, and areas of focus for growth. It may include transportation networks (such as highways, ports, and airports), special economic zones (SEZs), and regions prioritized for investment and development. The indicative plan aims to align with broader national and regional goals, such as enhancing connectivity, fostering economic integration, and leveraging Sumatra's strategic location within initiatives like the IMT-GT and ASEAN connectivity frameworks. The plan would also emphasize sustainable development and the optimization of natural and human resources in Sumatra.

To implement Sumatra's regional development plan, the 2020-2024 National Medium-Term Development Plan (RPJMN) emphasizes the international role of cooperation initiatives such as the IMT-GT, Belt and Road Initiative, and the ASEAN Economic Community in expanding trade, investment, and promoting regional and global markets. Consequently, Sumatra is poised to become a key gateway for international trade (ARF, 2019; ARF-Maritime Security, 2020). These partnerships are expected to strengthen the business community and local governments, with leaders promoting investor-focused incentives. The Kepulauan Riau, located in Sumatra, are part of this IMT-GT development plan. IMT-GT represents a broader subregional cooperation compared to SIJORI (Singapore, Johor, and Riau) (Xiaodong, 2019).

The establishment of IMT-GT follows the development of collaboration that has been ongoing between private entrepreneurs from Indonesia, Malaysia, and Thailand. As a result, the development of the IMT-GT subregional economic cooperation is the government's effort to equitably improve the well-being of its people while ensuring the sustainable use of natural and human resources across each region. The economic sector was selected in this research because it provides speed and accuracy, while also considering the region's potential (Avianto & Koestoer, 2015). The economic sector also plays a crucial role in strengthening regional connectivity, such as in trade, investment, and tourism (Raharjo, 2023; Rai et al., 2019;

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Ridwan, 2019). Kepulauan Riau geographical advantages can facilitate the development of cooperation with other countries. Several areas, such as Batam, Bintan, and Karimun, have been designated as FTZ/SEZ zones, and if projected optimally, the economic growth of the Kepulauan Riau will increase, creating job opportunities for the local population. Furthermore, in 2023, the Kepulauan Riau were declared the host of the IMT-GT, highlighting their diverse potential, including tourism, economy, SMEs, fisheries, mining, and more. Through IMT-GT, it is expected that the Kepulauan Riau national branding on the international stage will be enhanced.

METHODOLOGY

The research employs a qualitative descriptive method aimed at identifying the potential and analyzing both primary and secondary data related to the issues being examined. This approach allows the researchers to explore the phenomenon in question in detail, drawing from credible sources to form a comprehensive understanding. The data collection process involves various tools such as document analysis, literature reviews, and observations, ensuring that the analysis captures the multifaceted aspects of nation branding in the Kepulauan Riau within the context of IMT-GT cooperation The study was conducted in Tanjungpinang, the capital of the Kepulauan Riau Province. The location was selected due to its strategic importance as a host region for the IMT-GT initiatives. By focusing on this area, the research seeks to provide a localized perspective on the broader subregional cooperation efforts.

The data collected is analyzed deductively, with conclusions being drawn based on observed patterns and the interrelationship between the IMT-GT initiatives and the nation branding efforts of the Kepulauan Riau. This method is intended to clarify the impact of IMT-GT on economic growth, cultural promotion, and regional development. The researchers emphasize the use of secondary data from credible sources, including government reports, academic publications, and relevant documentation of the IMT-GT Expo and related events. This data supports the analytical framework used in the study and helps provide a detailed account of how the Kepulauan Riau have utilized IMT-GT to enhance their nation branding. Through a systematic analysis of these sources, the study aims to offer actionable insights into the success and challenges of subregional cooperation as a tool for promoting regional identity and economic development.

RESULTS AND DISCUSSION

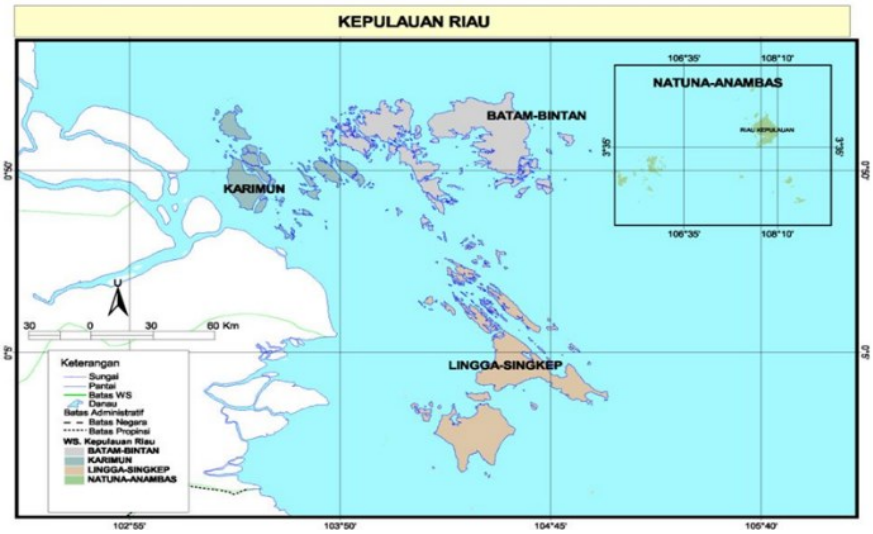
1. The Potential of the Kepulauan Riau

The Kepulauan Riau Province was established under Law Number 25 of 2002, making it the 32nd province of Indonesia. Geographically, the Kepulauan Riau are strategically located, sharing borders with neighboring countries such as Malaysia and Singapore. To the west, the province is bordered by South Sumatra and Jambi Provinces, while to the north lies the South China Sea. Its southern borders are with Malaysia and West Kalimantan Province, and to the east, it is bordered by Singapore, Malaysia, and Riau Province. Administratively, the Kepulauan Riau Province consists of two cities: Tanjungpinang, the provincial capital, and Batam, as well as five regencies: Karimun, Bintan, Natuna, Lingga, and the Anambas Islands (General Overview of the Kepulauan Riau, n.d.).

Economic Growth in the Kepulauan Riau Province in the first quarter of 2023, the Kepulauan Riau Province recorded a year-on-year (yoy) growth rate of 6.51%, surpassing the previous quarter's growth of 6.40% (yoy). This consistent growth trajectory has been evident since the first quarter of 2022, positioning the province as the fastest-growing region in Sumatra and the fourth-highest in Indonesia, significantly exceeding the national growth rate of 5.03% (yoy) (Faridatussalam et al., 2023).

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

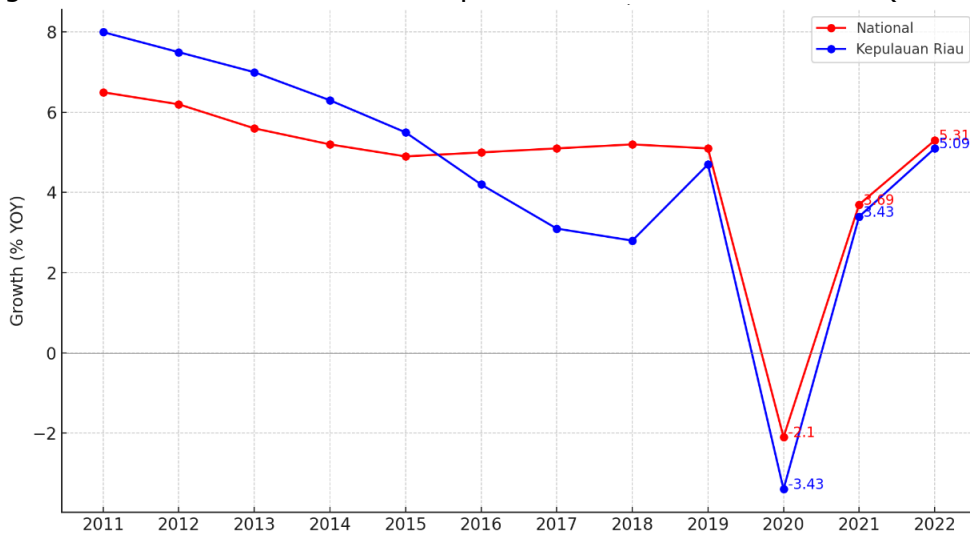
Figure 3. Map of the Kepulauan Riau



Source: BPK RI Kepulauan Riau

One of the primary drivers of this growth has been the continued infrastructure development and steady investment flows, which align with the gradual increase in mobility following the post-COVID-19 recovery phase. Additionally, the rise in tourist visits, particularly in the transportation, hospitality, and restaurant sectors, has further supported this growth. The manufacturing sector has also performed strongly, with notable outputs in the production of metals, optics, maritime transport equipment, and electronic products. Figure 4 highlights the growth trends in the Kepulauan Riau and nationally from 2012 to 2022. The economic downturn in 2020, caused by the COVID-19 pandemic, led to a decline in both national and regional economies. However, in 2021, the economy of the Kepulauan Riau began to recover, driven by the relaxation of mobility restrictions and the resumption of economic activities, both domestically and internationally (Bank Indonesia, 2022).

Figure 4. Economic Growth of the Kepulauan Riau and National Level (2012-2022)



Source: Bank Indonesia, Kepulauan Riau

The economic growth of the Kepulauan Riau and the national economy during the period from 2012 to 2022 exhibited both regional and macroeconomic trends. This decade

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

witnessed fluctuating growth rates, influenced by both domestic and global factors, including changes in commodity prices, trade dynamics, and policy interventions aimed at stabilizing the economy. For the Kepulauan Riau specifically, the region's economic development was largely shaped by its strategic location as a key hub for trade and industry, benefiting from its proximity to neighboring countries like Singapore and Malaysia. However, this advantage also made the province's economy vulnerable to external shocks, such as fluctuations in global demand and regional trade disruptions.

Nationally, Indonesia experienced moderate growth, driven by various sectors, including agriculture, manufacturing, and services. Nevertheless, the Indonesian economy faced challenges such as infrastructure gaps, uneven regional development, and the need for structural reforms to enhance competitiveness. The period under review also includes the effects of the global financial crisis, fluctuations in oil prices, and, towards the end of the decade, the economic impact of the COVID-19 pandemic, which had profound implications for both regional and national economic performance. In sum, the economic trajectory of the Kepulauan Riau mirrors broader national trends, with both experiencing periods of robust growth and contraction due to varying internal and external conditions. Understanding this economic evolution requires a comprehensive analysis of both regional and national policy responses and economic drivers.

The development orientation in border regions also needs to shift from being "inward-looking" to "outward-looking" in order to serve as gateways for economic and trade activities with neighboring countries (Try Setyasih et al., 2020). The mission to develop underdeveloped and border areas has further inspired the growth of subregional economic cooperation. The Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) was established in 1993 to accelerate the economic transformation of underdeveloped provinces or states in the three member countries. Its goal is to reduce the development gap between regions in these three neighboring countries. IMT-GT is a subregional cooperation program aimed at promoting economic cooperation and integration between Indonesia, Malaysia, and Thailand (Avianto & Koestoer, 2015; Fadhil, 2023).

Table 2. IMT-GT Local Development

Special Economic Zone	National Strategic Activity Center	Industrial Zone	National Strategic Tourism Zone	Free Trade Zone and Free Port	Metropolitan Region	Integrated Marine and Fishery Center
Arun (Lhokseumawe, Aceh)	Sabang (Aceh)	Kuala Tanjung (Batubara, North Sumatra)	Lake Toba (North Sumatra)	Sabang (Aceh)	Palembang	Sabang (Aceh)
Sei Mangkei (Simalungun, North Sumatra)	Ranai (Natuna, Kepulauan Riau)	Bintan Aerospace (Kepulauan Riau)	Padang-Bukittinggi (West Sumatra)	Batam–Bintan–Karimun (Kepulauan Riau)	Medan	Mentawai (West Sumatra)
Galang Batang (Kepulauan Riau)	Bengkalis (Riau)	Tanjung Enim (Muara Enim, South Sumatra)	Batam-Bintan (Kepulauan Riau)			

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

Special Economic Zone	National Strategic Activity Center	Industrial Zone	National Strategic Tourism Zone	Free Trade Zone and Free Port	Metropolitan Region	Integrated Marine and Fishery Center
Tanjung Api-Api (Banyuasin, South Sumatra)		Kemingking (Muaro Jambi, Jambi)	Bangka Belitung (Bangka Belitung Islands)			
Tanjung Kelayang (Belitung, Bangka Belitung Islands)		Sadai (Bangka Belitung Islands)				
		Tenayan (Riau)				
		Tanggamus (Lampung)				
		Pesawaran (Lampung)				
		Way Pisang (Lampung)				
		Katibung (Lampung)				
		Tanjung Buton (Riau)				
		Ladong (Aceh)				

Source: Based on the National Medium-Term Development Plan (RPJMN) 2020–2024.

Kepulauan Riau region is included in this development initiative, with the aim of boosting Gross Domestic Product (GDP), which is part of a shared agreement between the participating countries, creating job opportunities, and integrating domestic industries into global value chains through an integrated, innovative, inclusive, and sustainable sub-regional approach. In 2023, the Kepulauan Riau will host the IMT-GT, with the expectation of having a positive impact on both the Kepulauan Riau and Indonesia as a whole. In fact, the economic growth of the Kepulauan Riau has increased post-COVID-19 pandemic (Putri et al., 2023).

This economic acceleration is also driven by investment growth in border areas, one example being the completion of the Base Transceiver Station (BTS) network construction as a result of the Kepulauan Riau becoming the launch station for the Satria-1 satellite (Satelit Republik Indonesia). The Kepulauan Riau also possess other potential sectors, such as industry and tourism. The implementation of the IMT-GT in the Kepulauan Riau will foster the development of halal industries through the Bintan Halal Hub, the digital technology industry at Nongsa Digital Park, the MRO industry, and the Galang Batang Special Economic Zone. Kepulauan Riau strategic location, directly bordering neighboring countries, strengthens Indonesia's role in the Malacca Strait (Anggarkasih & Resma, 2022; Diskominfo Kepri, 2023).

2. Nation Branding in the Implementation of IMT-GT in Kepulauan Riau

The vision of IMT-GT for 2036 includes (1) revitalizing the tourism sector within the sub-region, (2) accelerating the development of hard and soft infrastructure, and (3) realizing

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

a green and sustainable sub-regional economy, supported by collaboration among stakeholders from member countries who work synergistically to achieve the implementation of these three focus areas. The performance of the IMT-GT in the Kepulauan Riau reflects the region's branding in executing IMT-GT activities and promotional events aimed at building the national branding of the Kepulauan Riau. One such event is the IMT-GT Expo "Gebyar Melayu Pesisir." The Kepulauan Riau, predominantly characterized by Malay culture, leverage "Malay" branding, with the hope that this will be recognized by attending delegates through international promotions. The potential for tourism in the Kepulauan Riau has increased significantly post-COVID-19, with a rise of 35.93% or approximately 126,527 international tourist visits in March 2023 compared to previous periods. The launch of the IMT-GT Visit for 2023-2025 aims to promote tourism and local SMEs from the Kepulauan Riau through the IMT-GT Expo "Gebyar Melayu Pesisir."

Figure 5. IMT-GT Expo Gebyar Melayu Pesisir

Source : IMT-GT

The IMT-GT Expo "Gebyar Melayu Pesisir" was held concurrently with the commemoration of the 30th anniversary of the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) cooperation. The event took place from September 26 to October 1, 2023. In addition to showcasing cultural arts, cuisine, fashion, and souvenirs, the IMT-GT Expo 2023 aimed to unlock the potential for increasing cross-border trade within the Indonesia-Malaysia-Thailand Growth Triangle. Furthermore, the IMT-GT event was designed as a platform to highlight the strengths of the creative industries in Indonesia, Malaysia, and Thailand. This event served as a forum to promote the local economies within the Indonesia, Malaysia, and Thailand Growth Triangle. The presentations featured 10 SMEs from Thailand, 14 from Malaysia, and dozens of booths representing SMEs from Indonesia and Sumatra. The event also aimed to promote the SME sectors of the three countries and served as a platform for sharing experiences in building and developing SMEs, with the goal of advancing and growing these enterprises so they can enter the Asian and global markets, thereby becoming a driving force for economic development in the region.

The IMT-GT "Gebyar Melayu Pesisir" exhibition coincided with the 30th anniversary of IMT-GT. The expo was attended by approximately 38 participants, offering a variety of activities such as culinary bazaars, beverages, handicrafts, fashion products, and other high-quality goods from SMEs of the three countries. The IMT-GT Expo also served as a platform to showcase the strengths of the creative industries within the IMT-GT region. The exhibition,

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

which was attended by SME representatives from Indonesia, Malaysia, and Thailand, was expected to open opportunities for business actors to expand market access and inspire more concrete cross-border collaboration to support economic growth in the region. The event also featured the Regional Local Currency Transaction (LCT), which is the implementation of an initiative by five ASEAN countries—Indonesia, Singapore, Malaysia, Thailand, and the Philippines—using QR Codes or e-wallets for cross-border payments (Humas Kementerian Ekon, 2023).

Figure 6. Booth IMT-GT Expo Gebyar Melayu Pesisir

Source: Author, 2024

The IMT-GT "Gebyar Melayu Pesisir" exhibition, marking the 30th anniversary of the IMT-GT collaboration, represents a significant milestone in regional economic integration, particularly in fostering cross-border trade and cultural exchange between Indonesia, Malaysia, and Thailand. The participation of approximately 38 SMEs offering diverse products such as food, beverages, handicrafts, and fashion items highlights the event's focus on promoting local businesses. This initiative is not only a showcase of creative industry strengths within the region but also an essential platform for SMEs to gain exposure to international markets. The inclusion of cultural elements, through the "Melayu" branding, further adds value by providing a unique identity that differentiates the region on the global stage. By drawing attention to the local creative industries, the exhibition emphasizes the importance of supporting SMEs as drivers of economic growth and regional development.

Moreover, the introduction of the Regional Local Currency Transaction (LCT) system during the expo reflects a progressive step towards financial integration in ASEAN. By implementing QR code and e-wallet systems for cross-border payments, IMT-GT member countries are promoting smoother and more efficient economic transactions, reducing dependency on major international currencies. This initiative, part of a broader ASEAN agenda involving Indonesia, Singapore, Malaysia, Thailand, and the Philippines, fosters regional financial resilience and strengthens local economies. The use of digital payment systems also signals a shift towards greater technological adoption in the region, enabling SMEs to engage in cross-border commerce with greater ease. Ultimately, the IMT-GT Expo and its associated initiatives are poised to create long-term opportunities for economic collaboration and sustainable growth in the region.

The implementation of IMT-GT UNINET (an IMT-GT side event) held at UMRAH involved delegates from various universities within the IMT-GT subregion. In this event, UMRAH, as the host, provided souvenirs as part of the branding of the Kepulauan Riau. Female

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

delegates were given shawls with the distinctive batik motif of the Kepulauan Riau, known as Batik Gonggong, while male delegates received "Tanjak," a traditional Malay men's headpiece. After the event, the delegates were also invited to visit Penyengat Island to explore the heritage of the Malay people in the Kepulauan Riau

Figure 7. IMT-GT UNINET in UMRAH

Source: Author, 2024

The IMT-GT UNINET event at UMRAH not only served as an academic platform for universities within the subregion but also played a significant role in promoting cultural diplomacy and nation branding for the Kepulauan Riau. By offering souvenirs like the Batik Gonggong shawls and the Tanjak headpieces, UMRAH strategically used cultural symbols to create lasting impressions on international delegates. These gifts were not merely tokens of appreciation but represented the unique identity and heritage of the Kepulauan Riau, tying local traditions into a broader regional collaboration. The incorporation of traditional Malay attire into the event aligns with the overarching goals of the IMT-GT initiative to foster economic, cultural, and academic connections across the borders of Indonesia, Malaysia, and Thailand. Through these branding efforts, the Kepulauan Riau can enhance their visibility and reputation in the region, while positioning themselves as a key player in cultural and educational exchanges within the IMT-GT framework.

Furthermore, the visit to Penyengat Island provided an immersive experience for the delegates, allowing them to connect more deeply with the cultural and historical roots of the Malay people in the Kepulauan Riau. This post-event excursion served a dual purpose: it reinforced the cultural narrative introduced during the official proceedings and further highlighted the potential of the Kepulauan Riau as a destination rich in historical significance. By integrating cultural tourism with academic collaboration, the event demonstrated how soft power initiatives could contribute to regional development. The combination of academic exchange and cultural diplomacy at IMT-GT UNINET exemplifies how education and heritage can work in tandem to strengthen regional ties and promote sustainable growth within the IMT-GT subregion.

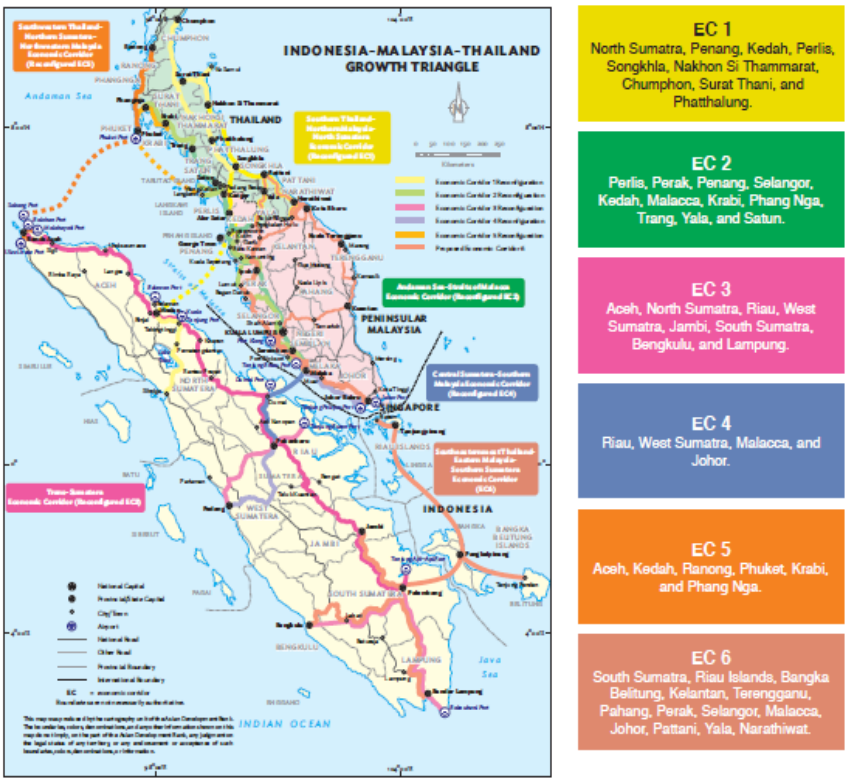
3. Strategic Opportunities for the Kepulauan Riau in the IMT-GT Subregional Cooperation

The Kepulauan Riau Province consists of 1,796 islands situated between Sumatra, the Semenanjung Malaya, and Kalimantan. Located along the strategic Malacca Strait, the province shares maritime borders with neighboring countries such as Malaysia, Singapore, and Vietnam. The Kepulauan Riau have substantial potential in mineral, energy, and marine resources. Capture fisheries dominate the local industry, producing 122,433 tons in Karimun

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

and Tanjungpinang in 2018. Fish processing plants in Batam, Tanjungpinang, and Natuna produce frozen fillets, salted fish, and fish chips. Other fresh seafood products include grouper, which is exported to Hong Kong and China. Seaweed is exported to China, Vietnam, and Singapore. Other key products include Chinese cabbage (Batam and Bintan), chili peppers (Batam), rubber (Karimun and Lingga), and coconuts (Natuna) (Guina, 2023).

Figure 8. IMT-GT Economic Corridor



Source: Asian Development Bank. 2021.

The IMT-GT has played a crucial role in the development of Economic Corridors (EC) in Sumatra, as identified in the Development Roadmap 2007-2011 through various Economic Corridors (EC). These corridors are designed to enhance connectivity, foster regional trade, and promote integrated development among the participating regions of Indonesia, Malaysia, and Thailand. The first of these is EC 1: The Extended Songkhla–Penang–Medan Economic Corridor, which stretches across Nakhon Si Thammarat, Phatthalung, Songkhla, Yala, Pattani, Penang, and Medan, linking these key cities for trade and economic cooperation. EC 2: The Malacca Strait Corridor covers the western coastal belt from Trang in southern Thailand to Melaka in Peninsular Malaysia, promoting maritime and trade activities along this strategic waterway. EC 3: The Banda Aceh–Medan–Pekanbaru–Palembang Economic Corridor is a north-south road corridor across Sumatra that enhances land connectivity and supports economic integration from the northern to the southern parts of the island.

Another significant route is EC 4: The Dumai–Melaka Economic Corridor, a maritime corridor that connects Sumatra to Peninsular Malaysia, serving as a vital shipping route for bilateral trade. EC 5: The Ranong–Phuket–Aceh Economic Corridor further strengthens connectivity between Thailand's west coast and northern Sumatra. Lastly, EC 6 links Pattani, Yala, and Narathiwat in Thailand with Perak and Kelantan in Malaysia, and extends to the Kepulauan Riau, Bangka Belitung, and southern provinces of Sumatra in Indonesia. These economic corridors are integral to the IMT-GT framework, aiming to boost cross-border

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

economic activities, infrastructure development, and regional collaboration, which in turn supports sustainable and inclusive growth in the broader subregion.

Figure 9. Map of the 6th Economic Corridor (EC) in the Kepulauan Riau

Source: Asian Development Bank

Including Johor in EC4 will establish a crucial connection to the Kepulauan Riau (particularly Batam) and the Bangka Belitung Islands, which form part of the proposed route for EC6. The rapid urban and industrial transformation of Johor, as part of the Iskandar Malaysia Special Economic Zone and significant planned rail projects aimed at enhancing connectivity with the entire peninsula and Singapore, will create positive spillover effects across the region. Tanjung Pelepas Port and Johor Port serve as key maritime gateways to the southern islands and international destinations. Tanjung Pelepas Port, in particular, has a direct rail link to Malaysia's national railway network, which connects to Singapore and Southern Thailand (Guina, 2023).

Thailand proposed the sixth economic corridor (EC6) during the 24th Ministerial Level Meeting held in Melaka on October 1, 2018. The ministers directed a study to determine the proposed route for this corridor. The suggested route for EC6 is expected to connect Thailand's southern provinces of Pattani, Yala, and Narathiwat with Malaysia's east coast through Perak and Kelantan, and with Indonesia in southern Sumatra, as shown in Figure 3.7, Map of the Sixth Economic Corridor (EC6) in the Kepulauan Riau. Regional development in Sumatra is being carried out through two main approaches: the growth approach and the equity approach. Both methods are reflected in designated growth corridors and equitable or island-based distribution corridors. Growth corridors promote national economic growth through the acceleration of regional development. The growth areas identified in the plan are designated

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

as national activity centers, regional activity centers, special economic zones (SEZ), industrial zones, national strategic tourism areas, as well as urban agglomeration areas in districts and small cities located within the growth corridors. The equitable corridors are oriented toward providing more equitable access to essential services.

The Kepulauan Riau are located along one of the world's busiest shipping routes through the Strait of Malacca, sharing maritime borders with neighboring countries—Brunei Darussalam, Malaysia, and Singapore. Some Thai fishing vessels also operate near the Natuna Sea (around 17.4% of foreign vessels). Given that the Kepulauan Riau Province shares a border with West Kalimantan Province on the island of Kalimantan, EC6 has the potential to establish connectivity with the West Kalimantan Economic Corridor in the East ASEAN Growth Area (BIMP-EAGA), comprising Brunei Darussalam, Indonesia, Malaysia, and the Philippines. The Kepulauan Riau have maritime links with Malaysia. Due to their location, ports in Riau, as well as islands such as Bangka Belitung, are mainly connected to Singapore and Johor. The economic relationship between Johor and Batam began in the 1980s with the establishment of the Singapore-Johor-Riau Triangle.

Batam–Bintan–Karimun has been designated as a free trade zone and free port and is also part of the National Strategic Tourism Area. Tanjungpinang (Bintan) is the capital of the Kepulauan Riau Province, located on Bintan Island. The Galang Batang SEZ, which covers an area of 2,334 hectares, is also located on the same island. Operating since December 2018, this SEZ focuses on bauxite as the primary source for aluminum minerals. Among Indonesia's ten SEZs, Galang Batang has made the highest contribution to Indonesia's economy, amounting to IDR 36.25 trillion (38.60%) as of November 2019. It plays a crucial role in the bauxite supply chain in Sumatra and other IMT-GT regions. Tanjungpinang also hosts the Bintan Aerospace Industrial Zone.

IMT-GT has driven significant infrastructure and industrial development in Batam and Tanjungpinang (Bintan), aligning with Indonesia’s goal to make Batam a regional hub for industry, logistics, and tourism. Malaysia’s proposal to include Johor in EC4 would open up opportunities for collaboration between Johor and the Kepulauan Riau. The distance between South Sumatra and southern Thailand has made it challenging to establish strong economic ties between the two regions. The Kepulauan Riau have no direct sea or air connections with southern Thailand. Trade between the Kepulauan Riau and Thailand is minimal, contributing an average of only 1.14% to provincial exports between 2014 and 2018 and less than 1% to imports.

Nevertheless, the Kepulauan Riau could serve as a transit point for foreign trade from southern Sumatra, which has a significant share of trade with Thailand, particularly Jambi (12.89%), Lampung (4.63%), and Bengkulu (2.98%). For Bengkulu, Palembang (South Sumatra) would need to transport its commodities by land to ports on Sumatra’s east coast. The Kepulauan Riau could also serve as a transit point for the Bangka Belitung Islands, which had a combined average trade growth rate with Thailand of 44.06% from 2014 to 2018, promising an improvement in future trade performance.

EC6 could play a role in domestic supply chains, where upstream and intermediate products from southern Sumatra, such as crude palm oil (CPO), rubber, white pepper, and raw fishery products, could be processed in industrial zones and special economic zones in the Kepulauan Riau. This would align with the Indonesian government’s plan to position Batam as an international logistics hub for Indonesia. The inclusion of southern Sumatra provinces (Bangka Belitung Islands, South Sumatra, Jambi, Bengkulu, and Lampung), along with the Kepulauan Riau as a transit point and industrial hub, has excellent potential for strengthening economic relations between Malaysia and Thailand through the IMT-GT economic corridor network.

Journal of Maritime Policy Science
e-ISSN: 3063-4245 p-ISSN: 3063-5705
VOL 1 NO 2 AUGUST 2024
https://ojs.umrah.ac.id/index.php/jmps

CONCLUSION

The IMT-GT (Indonesia-Malaysia-Thailand Growth Triangle) program involves 32 provinces or states with a combined population of approximately 70 million people, consisting of 10 regions in Indonesia, 8 states in Malaysia, and 14 provinces in Thailand. IMT-GT promotes private sector-led economic growth and facilitates subregional development by leveraging the complementary and comparative advantages of the member countries. All participating provinces in the IMT-GT are located on the island of Sumatra, which plays a crucial role in Indonesia's national development. Covering a land area of 480,793.3 square kilometers (km²), Sumatra constitutes 25.08% of Indonesia's total landmass. The geographic features of the Kepulauan Riau offer significant advantages for fostering international cooperation. Notably, certain areas, such as Batam, Bintan, and Karimun, have been designated as Free Trade Zones (FTZ) or Special Economic Zones (SEZ), which, if fully optimized, could lead to increased economic growth in the Kepulauan Riau and the creation of job opportunities for the local population.

Batam, Bintan, and Karimun are strategically important within the IMT-GT framework due to their status as economic hubs. These zones benefit from special incentives designed to attract investment and facilitate trade, positioning them as focal points for economic activity. As key nodes within the growth triangle, they serve as gateways for trade and tourism between Indonesia, Malaysia, and Thailand. The Kepulauan Riau unique geographical location, bordering both Malaysia and Singapore, enhances their potential for trade expansion and cross-border collaboration. In particular, the industrial and economic potential of Batam, with its focus on manufacturing, logistics, and high-tech industries, holds great promise for further development under the IMT-GT initiative. Meanwhile, Bintan's emphasis on tourism and Karimun's maritime and trade capabilities complement the broader subregional development goals.

In 2023, the Kepulauan Riau Province hosted the IMT-GT event, highlighting its diverse potential across various sectors, including tourism, economy, SMEs, fisheries, and mining. Hosting this event demonstrated the province's growing significance in the subregional economic landscape, further promoting its image on the international stage. Through IMT-GT, there is a strong expectation that the Kepulauan Riau will continue to enhance their global branding, tapping into their natural resources, strategic location, and industrial capabilities.

ACKNOWLEDGEMENT

The author expresses gratitude to the Research and Community Service Institute (LPPM) of Universitas Maritim Raja Ali Haji , as it is through this funding that this research has been able to proceed successfully and contribute to the community.

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VOL 1 NO 2 AUGUST 2024
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