Constraints to Opportunities, Rethinking Industrial and Economic Policy in Archipelagos: A Comparative Analysis Using Friedmann's and Krugman's Models

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A B S T R A C T

This literature review *examines the unique economic challenges and opportunities of archipelagic regions, focusing on their development constraints due to geographic fragmentation, isolation, and limited resources, alongside their potential in tourism industry and the blue economy.*
Its purpose *is to synthesize research from the past 15 years to provide a comprehensive understanding of these economic realities and identify pathways for sustainable growth.*
The method *involves a thematic analysis of existing literature, integrating economic theories such as core-periphery models with empirical case studies from regions like the Philippines, Indonesia, and small island states.*
The results *reveal that while isolation often leads to spatial inequalities and vulnerability, it can also foster resilience, niche industries, and entrepreneurial innovation. However, over-reliance on sectors like tourism poses risks to long-term diversification and stability. The implication is that effective policy must be tailored to archipelagic contexts, balancing maritime connectivity with environmental sustainability and leveraging unique geographic traits to build competitive, resilient economies.*

A B S T R A K

Tinjauan literatur ini mengkaji tantangan dan peluang ekonomi unik di wilayah kepulauan, dengan fokus pada hambatan pengembangan industri dan ekonomi akibat fragmentasi geografis, isolasi, dan sumber daya yang terbatas, serta potensi mereka dalam industri pariwisata dan ekonomi biru.
Tujuannya adalah untuk mensintesis penelitian selama 15 tahun terakhir guna memberikan pemahaman komprehensif tentang realitas ekonomi yang ada dan mengidentifikasi peluang pertumbuhan berkelanjutan.
Metode yang digunakan melibatkan analisis tematik terhadap literatur yang ada, menggabungkan teori ekonomi seperti model inti-periferi dengan studi kasus empiris dari wilayah seperti Filipina, Indonesia, dan negara-negara pulau kecil.
Hasilnya menunjukkan bahwa meskipun keterisolasian seringkali menyebabkan ketidaksetaraan spasial dan kerentanan, hal ini juga dapat memupuk ketahanan, ceruk industri, dan inovasi kewirausahaan. Namun, ketergantungan berlebihan pada sektor seperti pariwisata dapat menimbulkan risiko bagi diversifikasi dan stabilitas jangka panjang. Implikasinya adalah bahwa kebijakan yang efektif harus disesuaikan dengan karakteristik kepulauan, menyeimbangkan konektivitas maritim dengan keberlanjutan lingkungan, dan memanfaatkan ciri khas geografis untuk membangun ekonomi yang kompetitif dan tangguh.

1. INTRODUCTION

Unlike common economic systems, archipelagos or regions composed of a multitude of islands have their own set of challenges and economic opportunities. Their location, limited resources, and over-reliance on oceanic links than other places makes their economic development paths quite unique from the ones affiliated with the mainland (McClung, 2023). As there is a major imbalance of features which creates opportunity constraints, this

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conditions also makes archipelagos critical case study subject for economic development, sustainability, and resilience (Mcmahon & Godfrey, 2023).

Main idea for defining feature of archipelagos shackled economics is their seclusion from mainland (Narotama, 2021) or maybe the rest of the world. Such features largely limit the prospects of economic development and far from reach of politics because of their large territory of water. Because of such isolation, public services, infrastructural development, and the mobility of people and goods get increasingly more challenging to manage as time goes on.

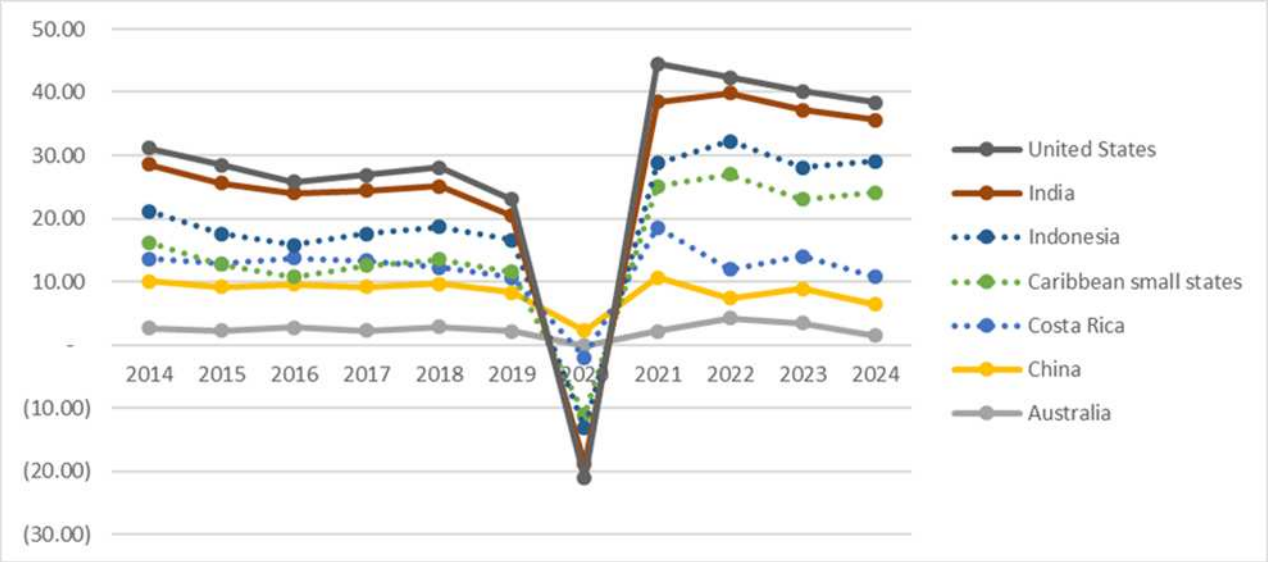

Figure 1.Comparison of Growth of Archipelagos and Non-Archipelagos Country (World Bank, 2025)

Government policy impact on a difference result in the core-periphery distances. This is why in countries like the Philippines and Indonesia, the central government has a difficult time providing good management for their remote islands with services such as healthcare, education, and even modes of transportation. This geographic fragmentation tends to create a loophole economy as much of the economic growth is focused on central islands. (Ravago et al., 2008; Narotama, 2021; Rudi, 2023; Wardhani et al., 2023; Telaumbanua, 2024). Phillip McCann (2016) in his book certainly emphasis how England divide in more inequalities between London and his peripheral area. Many parts of the UK, like Wales and North Ireland have lagged in many investment, financial expansion and agglomeration economies. This spatial inequality is considered as an obstacle to national economic performance because national data mask the underperformance regions and can create perserve policy incentives. Meanwhile, it's not always the problem as how the result difference as it shows by how Singapore and Japan successfully govern their islands and bring industries distributes more evenly among their provinces (Tan, 2019; Kitagawa, 2024). The difference result between archipelagos countries ignite a need for deep review on how the archipelagos policy should be treated.

With limited resources, the challenges every archipelago faces are harder as goes on. As report by International Monetary Fund (IMF) for Asia and Pacific Department (IMF, 2023) the case of small island economies like Kiribati in the Pacific is even more critical as they have limited arable land and freshwater, and so they are compelled to depend on imports for a host of necessities, including food. This can often provide very difficult circumstances. Furthermore, as these countries have a stronger competition amongst them, the size of these economies also limits their possibility to invest and compete in the world markets, making the situation worse. Another research by (Zittis et al., 2023) said the notable characteristic of archipelagic economies is their reliance on sea linked integration. The ocean is a means of unlocking opportunities while simultaneously serving as an encompassing wall for the regions. While marine transport is paramount for commerce, tourism, and travels, it is hampered by the expense of building and operating a port and shipping infrastructure that sometime exceeds the available budget. Due to their geographical characteristics, archipelagos regions depend heavily on sea oriented transportation and commerce, making maritime connectivity an essential aspect of their economic development. The maritime industry spans a wide range of industries, including shipping, fishing, tourism and port operations. Efficient maritime connectivity is vital to fostering trade, attracting investment and encouraging tourism (Glückler et al.,

2023). But even so, maritime connectivity oftenly is known to sacrifice the enviroment (Bekteshi et al., 2024).

Even with the hard challenge its facing, most of the islands sit in their beautiful scenery, that's the positive side of archipelagos which is also the opportunities that may ignite economic growth and development even though these regions face various challenges and may create space for entrepreneurship. As shown in Figure 1, in general, archipelagic countries have relatively same growth situation and developments compared to non-archipelagic countries even if its compared to the big countries as China and United States despite their challenging geographics but that also reflected how archipelagic countries found its vulnerable condition when its meets the external challenge like the graph shown in 2020 case covid. Even so, in some case its said that geographic traits opportunities can be exploited to build competitive advantages in some of the fields. As report by Pounder & Naresh (2021) Islands are also well known for their natural beauty and biodiversity, which promote entrepreneurship by digging for utilization of exotic tourism destinations for economic growth and development. In the same manner, the extensive maritime domains of archipelagos open up spaces for sustainable blue economy activities such as fisheries, aquaculture, and renewable energy. Some researches said by Rini et al. (2021) & Elegbede et al. (2023) This blue economy concept was begin from remoteness of archipelagos and in the same way encourage inventiveness and the sense of being self-sufficient like fisheries industry or tourism. With little access to global markets, many islands developed specific local industries and cultural practices that generate economic resilience. Some of the islands state also worked with this unique concept as policy which make them mostly dependent from tourism sector to bring their economic growth sustain (Shareef & Hoti, 2005; Hampton & Jeyacheya, 2020). In addition, island nations are now at the center of the sustainable development conversation. This is gaining traction as more people realize how important marine resources and oceans are to the world economy. Island states are critical in promoting the sustainable use of marine resources, which is underpinned by UN initiatives such as Sustainable Development Goal (SDGs) 14 "Life Below Water" (Kerton, 2023). On this basis, island territories should be pioneers in environmental management and sustainable development by embracing blue economy principles.

However, although some island economies have relied on tourism as a pillar of income and it may have a positive impact on the environment, some research shows different results. This condition also happen in Cyprus (Boukas, 2025)in which happen to be too much dependent on tourism economies, their rapid growth finally becoming a hindering for diversification of the economies in the long run. This meant a blue economy which also encourage to do a tourism sector is also vulnerable to the impact on macroeconomy downturn even it maybe helpful in the beginning.

This article is referring to two commonly used ideas for discussions related to island economies such as issues of economic development and sustainability, using a John Friedmann and Krugman's Theory about island economics. As many articles studied, this literature review may also occur a contradiction result based on many research that done. This article also aims to cover their economy obstacles by synthesizing research mostly from the past 15 years, synthetizing a comprehensive understanding of the economic realities of archipelagos and identify pathways for sustainable economic growth. The narratives also may intersect on how their geographic and environmental characteristics influence economic growth, development strategies, and policy frameworks for the industries on it.

The study of island economies is not only important for the people living in these regions, but also for the wider global community. Archipelago regions are often at the forefront of global challenges such as climate change, resource scarcity and economic inequality. By understanding the unique dynamics of island economies hopefully some policymakers, researchers and development practitioners can design more effective policy interventions that align with their constraints to promote sustainable growth. By providing a comprehensive overview of island economies and integrating perspectives from economic theory, empirical studies, and policy frameworks, this review aims to contribute to the growing body of knowledge on island economies and inform future research and policy efforts.

2. THEORETICAL FRAMEWORK

Core-Periphery Dynamics in Archipelagos Countries

2.1 Friedmann's Core-Periphery Model: A Policy-Oriented Approach

The center-coastal or known as core-periphery model is a commonly used concept in the context of regional economics and provides a useful foundation for understanding the economic dynamics of island regions. This concept was developed by John

Friedmann in 1966 with an emphasis on geographical distance from the city center. This model describes the spatial distribution of economic activity within a region, where the central region (generally an island or cluster of islands) plays as the center of politic and economic activity, while the coastal island region (remote or outer islands) remains undeveloped. His approach combines various approaches from research studies such as the input-output focus of Françoise Perroux (1955), the theory of unbalanced development from the work of Albert O. Hirschman (1958) and collaborates the export-based approach proposed by Douglass C. North (1955) as well as the theory of cumulative and circular causation theory of Gunnar Myrdal (1957) which explores studies where urban development is likely to accumulate resources and labor from the surrounding regions may degrade the quality of those regions because of the politics and economics activities mostly conduct in main island.

Table 1.
Key Differences Between Friedmann's and Krugman's Models

Aspect	Friedmann's Core-Periphery Model	Krugman's Core-Periphery Model
Focus	Regional development and spatial inequality.	Spatial distribution of industries and economic hubs.
Key Drivers	Political and economic power, resource allocation.	Economies of scale, transportation costs, market size.
Mechanisms	Polarization and trickle-down effects.	Agglomeration economies and trade-offs.
Orientation	Policy Oriented - Emphasizes the role of government policies and planning in tackling island economics problem.	Market Oriented - Focuses on market forces and private sector or enterprises decisions in forming island economic structure.
Policy Implications	Advocates for redistributive policies and regional planning to reduce disparities.	Advocates for infrastructure investment and trade liberalization to promote economic integration.
Role of Transportation	Transportation is seen as a tool for development but not a central focus.	Transportation costs are a central driver of industrial location and economic geography.
Globalization	Does not explicitly address globalization.	Explicitly addresses the impact of globalization on industrial location and trade patterns.
Scale of Analysis	Focuses on macro-level regional disparities (e.g., urban vs. rural).	Focuses on micro-level firm and industry decisions (e.g., why firms cluster in specific locations).

2.2 Krugman's Core-Periphery Model: An Economic Approach

Another theory that also examine the center and coastal effects is based on the industrial approach which based on research by Paul R. Krugman in 1991. In Krugman's theory, increased income on the main island is partly achieved through sacrifices on the surrounding islands. It is also noted that the process of globalization causes disproportions in development among the islands. It is also well understood that international trade shows how the integration of international market trade can result in losses for some other countries. The main element of Krugman's model is the mobility of manufacturing workers due to wage differences between regions. In addition, firms also tend to locate production in the largest markets because it helps save on shipping costs and other costs that would arise if the destination market is far away. The scale of a market is determined by its population and income level. Thus, a crucial parameter refers to the quantity and quality of jobs available. If a large number of larger manufacturing companies concentrate in one island or region, this will increase the number of jobs available and goods produced there. As a result, the income of workers on the island will increase, which will lead to the migration of other workers to the island. The cycle will then continue to repeat itself as the size of the market that can consume the goods produced there increases (A. Klimczuk & Klimczuk-Kochańska, 2019).

Essentially in archipelagic countries theories,

the center-coast structure is formed due to geographical separation. Core islands, which are driven by denser populations, usually have better infrastructure, higher levels of investment, and greater access to markets, and can thus become centers of economic and another important activity. In contrast, lack of development face by coastal island, lack of access to government services, limited infrastructure, and poor internet connectivity is mostly happening. With unfair conditions this may lead to economic and social disparities, which may be posing challenges for policymakers. for instances, Indonesia which said as the biggest archipelagos country has Java Island as the main island which play the crucial economic and political activity, the capital may change in the future as they relocated the capital to another island (Kalimantan). Meanwhile, eastern parts of Indonesia such as Papua and Maluku may remain underdeveloped, with limited access to basic services and economic opportunities (World Bank, 2015).

3. RESEARCH METHOD

To solve the research problem, this research utilizes a qualitative research method. The objective of qualitative research is to build, refine, and enhance the understanding of scientific studies. This can be accomplished by creating a broad diversity of what has been done before and understanding the phenomenon being researched. The primary objective of this approach is to provide a comprehensive, critical, overview of the literature and research gaps rather than conduct systematic review.

3.1 Data Search Strategy

The literature was identified through searches on academic databases and repositories, including Google Scholar, Researchgate, Directory of Open Access Journals (DOAJ), and Internet Archive. This article explores research information with the keywords island economics, maritime connectivity and blue economy published before 2025. However, with so many explanations and results from research related to island economies, it is still necessary to summarize them so that the benefits can be taken.

3.2 Inclusion Criteria

To ensure relevance and manageability, the following criteria were applied as, The articles which studied in this research is published before 2025, contain peer-reviewed journal articles, book, policy reports, with a focus on economic development, sustainability, and policy in archipelagic context.

3.3 Analytical Framework

The analysis is structured around key theoritical lenses, primarily John Friedmann's Core-Periphery Model and Paul Krugman's Model. These theories provide the framework for categorizing the literature, analyzing spatial economic disparities, and understanding the role of connectivity and market forces in archipelagic development. Then the findings are synthesized thematically.

4. DATA ANALYSIS AND DISCUSSION

4.1 Policy in Core-Periphery Condition

Various policies aimed at empowering the economies of peripheral regions have a significant impact, not only economically but also in terms of the perspectives and trust of peripheral communities towards the central government. As the research proves, the tendency of European communities to trust policies on regional funding is increasingly positive. In addition, several European regional policies have also succeeded in encouraging economically weak regions to grow, improve infrastructure, attract investment, and reduce the gap between the centre and the regions (Kersan-Škabić, 2020; Bachtrögler-Unger et al., 2024; Debus & Schweizer, 2025).

However, policies aimed at reducing inequality and providing economic assistance to peripheral areas also have the potential to backfire. Research by Nicholas Sheard (2012) underscores the potential negative impact on areas that continuously receive funding assistance without achieving economic success, as long-term subsidies actually harm the regional economy itself. Other research also reveals that sometimes the government encourages development in city centres in the hope of accelerating urban growth. This often results in the sacrifice of suburban areas, which become increasingly marginalised both economically and demographically (Mock, 2014; Bowen & Webber, 2024). In addition, economic concentration in core areas makes it difficult to achieve economic equality, as in the case of the Japanese economy (Masahiko, 2022).

In Friedmann's perspective, the policies implemented by the government to promote socio-economic equality do indeed refer to the political and economic power of the centre, which is applied to peripheral regions. However, referring to the research above, it must also be understood that other social factors are also necessary to ensure that the results are as expected. Factors such as human capital and institutional efficiency can also be factors that ensure the effectiveness of the programmes implemented play a significant role (Sheard, 2012). In addition, it is also important to understand that each

region has different potential mapping from one another, so that the policies implemented also need to .

4.2 Maritime Economy on Archipelagos Connectivity

Due to their geographical characteristics, archipelagos regions depend heavily on sea oriented transportation and commerce, making maritime connectivity an essential aspect of their economic development. The maritime industry spans a wide range of industries, including shipping, fishing, tourism and port operations. Efficient maritime connectivity is vital to fostering trade, attracting investment and encouraging tourism (Glückler et al., 2023) and increasing market access (Ducruet et al., 2024). Thus, an effective and efficient maritime connectivity is vital.

Maritime economy argument also emphasizes the need for governments that are regionally collaborative and effective at long-term goals (Yang t al., 2022). Another research on 91 countries by Munim & Schramm (2018) also reinforced this argument in his explanation that port infrastructure, which supports logistics, plays a very large role in promoting maritime trade and leads to a larger share of the economy, although in the long term this role will diminish as the country's economy grows. The same thing is happening in African countries, which are experiencing increased productivity, reduced export and import costs, accelerated industrialisation, food supply, and reduced poverty (Sahoo et al., 2025). Port integration between region or provinces also has the potential to increase its economic impact (Ma et al., 2021), although trade bloc agreements between countries also significantly influence the characteristics of maritime connectivity outcomes (Chang et al., 2020). Another paper by Timothy J. Sturgeon (2017) also suggest It is also important to highlight that close cooperation in a bilateral context will lead to cost efficiencies in export trade. This argument is also strengthened by Bouazza et al., (2023) which said the close link between a region's economic and logistical growth and bilateral connectivity.

But mostly, negative impact of continuos improvement on maritime economic is environmental harm (Bekteshi et al., 2024) including trade off for the land changing and noises (Ducruet et al., 2024). An article by Chen et al., (2019) also emphasizes this, which reporting that ports are vital to global trade, but they are under increasing pressure to reduce their environmental effect, which includes carbon emissions, water pollution, and waste management difficulties. International regulations also emphasize the need for cleaner port operations. At the same time, within the growth of trades a significant demand also examine and consider this aspect in order for the policies to be effective (Bănică et al., 2024)
brings a needs for more efficiency, necessitating the use of smart technologies such as modernization and AI-powered logistics to improve port management and reduce congestion. In the end, results of investigation indicate that effective governance of green and smart ports involves a multi-stakeholder strategy that incorporates these difficulties into integrated policies. It also emphasizes the importance of strong government policies, technical innovation, and infrastructure investment in developing sustainable port systems. But mostly, there is no consistent framework for managing green and smart port development. Because often different countries and ports have differing policies on sustainable port infrastructure.

Several studies reinforce that the maritime economy has strong economic implications not only for port-owning countries but also for neighbouring countries. The impact of maritime strengthening is regional in nature, especially if the archipelagic country is located in a strategic trade route. (Nakamura et al., 2011; Bosco & Nicholson, 2019). In addition, several studies also imply that the negative impact of ports that are not controlled by the government and released to the private sector will threaten economic sustainability itself, including the negative impact on the marine environment, which increases as the economy develops (Garcia-Alonso et al., 2025).

4.3 Blue Economy on Core-Periphery Model

Blue economy may different context in between Friedmann and Krugman's model but many said that blue economy is an answer for economy in the context of the Paris Climate Agreement (Elegbede et al., 2023; Kavroudakis et al., 2023; Qi, 2024). As research by M. Klimczuk (2019) core periphery model tend to emphasise that economic activity mostly concretate in the core region which hard to be avoided in many economics model. In the blue economy perspectives Martínez-Vázquez et al., (2021) policies and infrastructure is needed to support the growth of blue economy especially to prevent ecosystem damage but the economics it self may create a spatial and sectoral disparities. So even the economics has positive impact, the structural changes, government issues and enviromental externalities it self create another problems in core-periphery context.

Dual side of blue economy impact is also explained by Fulton et al., (2017) which because of National Determined Carbon (NDC) ambition levels, with targets varying by per capita, it can bring differences approaches. The studies explain ports play an important role in the transportation industry and the economics, especially in island nations that rely on

trade. But the ports also contribute significantly to CO2 emissions, so the blue economy can be also applied in this context by encourage the using of biofuels or another alternatives energy that reduce the pollution. This research suggests a greener transportation options or energy efficient port operations to correlate with national climate change mitigation issues. This argument also emphasizes the need for regionally collaborative and effective governments in achieving long-term goals as blue economy may emerges as a option for solution.

In case of economics model, blue economy model contributes a lot especially to the development in the fisheries industries (Telaumbanua, 2024; Yasser et al., 2024) and tourism (Fernández-Palacios et al., 2023; Kavroudakis et al., 2023). This model on economic impact was also developed into biotechnology (Elegbede et al., 2023; Kavroudakis et al., 2023; Marwan, 2024) aquaculture (Bentour, 2016; Elegbede et al., 2023; Fernández-Palacios et al., 2023) and alternative energy (Garcia-Alonso et al., 2025). This model also more locally benefit because of the characteristics of the tourist areas which can attract business (Antonova et al., 2025).

But even so the negatives impact that's follow In this model, pollution increases due to increased port trade transactions, including noise pollution, traffic congestion, and air pollution. In addition, land use in blue economy development can also have a negative impact by reducing the amount of land that may be needed to maintain the tourism ecosystem. It should also be understood that tourism goes hand in hand with changes in infrastructure and side effects such as waste and reduced in biodiversity (Boukas, 2025).

Naylor et al., (2023) research also emphasizes the need for infrastructure that accommodates population growth while still taking into account natural life, especially in coastal areas. this is generally an area that has been overlooked because economic growth, which is often related to urbanization in island contexts, ignores environmental impacts.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

Every decision made by the government that is designed to empower peripheral regions sometimes creates different results. Some are able to create positive and sustainable results, improve infrastructure, and create prosperity and a positive image. However, there are also those that actually create economic disparities, stagnation, and even dependence on subsidies. Sometimes, policies aimed at accelerating economic growth through urbanization actually accelerate the process of marginalization of peripheral areas, both socially and economically, which ultimately has an impact on central areas due to the weakness of the supporting areas.

Every policy made by the government needs to be reviewed periodically so that the initial desire to equalize welfare between the center and the periphery does not backfire and instead create inefficiency due to the trap of economic dependence. This review also shows that regional development policies, especially in island regions, must take into account the development of institutional capacity, human capital, and regional economic specialization. This is necessary to prevent the unsuitable application of a model that is successful in one region to all regions.

The implementation of a maritime-based central-peripheral economic model through the development of infrastructure such as ports, shipping, and related industries will certainly have the potential to stimulate trade, tourism, and investment. However, this model also faces logical consequences that impact nature and the environment, such as pollution and congestion. In addition, as the economy develops, the contribution of maritime trade to GDP will remain relatively stable or even decline, indicating the need for new policies for long-term development. In this regard, the integration of ports both regionally (bilaterally and multilaterally) and domestically is also necessary to optimize their performance, in addition to the use of more advanced technologies such as artificial intelligence.

Implication of this research is leads to several critical analysis for regional industrial development policy, first it implies that the success of empowerment industrial policies is not guaranteed by infrastructure alone. Investment without knowing what capacity and what the region strength and weakness may create or accelerate marginalization. Second, the discussion underscores that development policies is dynamic and non linear, therefore the model need improvement in many aspects and cant relies on one single sector to survive. Finally for first and second implication we know that government especially in archipelagos region need to be adaptive and tactful when considering on manage their resources.

Limitation may occur in this research, which may consider that this topic in macro level even talking about industrial impact. This research also did not provide spesific case for evidence for the claims regarding economic stagnation or dependent which may need more depth empirical study on spesific nation or region. So on the limitations may become the suggestion for the next research in this topic to studies in more micro level and in some spesific case

for nation or region.

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