

Galang Batang Special Economic Zone: Downstreaming Strategy and Economic Transformation of Bintan

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ABSTRACT

This study examines the Galang Batang Special Economic Zone as a strategic instrument for accelerating downstreaming-based economic transformation in Bintan, Kepulauan Riau Province, Indonesia. The main problem addressed in this article is the extent to which Galang Batang SEZ can move Bintan's economy beyond dependence on raw-resource extraction, tourism, and service-based activities toward a more integrated industrial structure based on bauxite processing, alumina production, investment facilitation, and export-oriented value creation. The objective of this study is to analyze the role of Galang Batang SEZ in supporting mineral downstreaming, strengthening industrial infrastructure, generating local economic linkages, and contributing to sustainable regional transformation. This research uses a qualitative descriptive-analytical method based entirely on secondary data. The data were obtained from academic literature, government documents, official reports, statistical publications, policy documents, and credible online sources related to special economic zones, downstreaming policy, regional industrialization, and Bintan's economic development. The data were analyzed through document review and content analysis by classifying information into strategic foundations, industrial infrastructure, value creation, regional economic effects, governance challenges, and sustainability risks. The findings show that Galang Batang SEZ has strong potential to become a downstreaming hub because it combines strategic maritime location, bauxite-processing orientation, investment incentives, industrial infrastructure, port connectivity, and export market access. The SEZ also has the potential to support employment creation, local business growth, economic diversification, and regional competitiveness. However, its long-term impact depends on the ability of policymakers and industrial actors to prevent enclave industrialization, strengthen local supplier participation, improve workforce skills, ensure environmental management, and build adaptive governance.

Keywords: SEZ, Downstreaming, Economic Transformation, Industrial Policy.

INTRODUCTION

Galang Batang Special Economic Zone in Bintan represents one of Indonesia's strategic efforts to reposition mineral-rich regions from raw commodity suppliers into integrated industrial production bases. Located in Gunung Kijang District, Bintan

Regency, Kepulauan Riau Province, the zone has been developed as a processing hub for bauxite and its derivative products, particularly alumina and aluminum-related industrial activities. Its geographic position near the Malacca Strait, Batam Free Trade Zone, and regional maritime routes gives it strong logistical relevance for export-oriented downstream industries. Within the broader literature on industrial transformation, Galang Batang is important because it connects three major issues: special economic zone development, mineral downstreaming, and regional economic restructuring beyond Java. The article therefore positions Galang Batang not merely as an investment estate, but as a policy instrument for examining how place-based industrial policy can accelerate structural transformation in an outer-island economy (Aritenang, 2021; Kim, 2021; Warburton, 2024; Rothenberg et al., 2025).

The core issue examined in this article is the extent to which Galang Batang SEZ can function as a downstreaming platform capable of transforming Bintan's economic structure. Indonesia's development strategy has increasingly emphasized value addition through domestic processing, especially in mineral-based sectors that previously depended heavily on raw material exports. In this context, downstreaming is not only a technical industrial agenda, but also a political-economic strategy to increase export value, deepen domestic supply chains, expand employment opportunities, and strengthen regional competitiveness. However, the success of this strategy depends on whether industrial zones can build strong linkages with local economies, rather than becoming isolated production enclaves. This makes Galang Batang a relevant case for analyzing the opportunities and limitations of mineral-based industrial transformation at the regional level (Warburton, 2024; Chen et al., 2025; Kim, 2021; Budiono, 2023).

Previous studies on special economic zones show that SEZs are often designed to attract foreign direct investment, improve infrastructure, and stimulate industrial agglomeration. Yet, their developmental outcomes are not automatic. Some SEZs succeed when fiscal incentives are combined with infrastructure readiness, institutional coordination, skilled labor availability, and market access, while others underperform when they rely only on tax incentives without broader productivity-enhancing reforms. Studies on Indonesia's earlier zone-based development policies also indicate that location-based incentives may fail to generate strong regional growth when not supported by connectivity, governance capacity, and industrial linkage formation. Therefore, the originality of this article lies in examining Galang Batang as a specific downstreaming-oriented SEZ, where the main analytical concern is not only investment attraction, but also whether bauxite processing can become a foundation for long-term economic transformation in Bintan (Rothenberg et al., 2025; Aritenang, 2021; Danja, 2024; Narayan, 2022).

The development of Galang Batang is closely linked to PT Bintan Alumina Indonesia as the main industrial actor in the zone. Official investment information describes the zone as a center for bauxite mineral processing and downstream products from refinery and smelter activities, with projected employment absorption reaching 23,200 workers. Other official and investment references identify the zone's area at around 2,333.6 hectares and its main industrial orientation toward bauxite, alumina, energy, and logistics. This shows that the zone's economic function is built around an integrated industrial chain, starting from mineral input, refining, smelting, energy support, port services, and export distribution. In this sense, Galang Batang provides an empirical entry point for studying how industrial estates can convert natural resource

advantages into higher-value production systems when supported by infrastructure and regulatory facilitation (Hill, 1990; Kim, 2021; Warburton, 2024; Aisyah, 2024).

An important aspect of Galang Batang SEZ is its potential role in shifting Bintan's economy from a service- and tourism-oriented island economy toward a more diversified industrial structure. Bintan has long been associated with tourism, maritime connectivity, and proximity to Singapore and Batam, but the presence of large-scale alumina processing introduces a different development trajectory based on manufacturing, logistics, and mineral-based industrialization. This transformation is significant because industrial diversification can reduce regional vulnerability to fluctuations in tourism demand and strengthen the productive base of the local economy. However, the transformation also requires careful governance to ensure that industrial expansion contributes to inclusive growth, local employment quality, technology transfer, and environmental sustainability. Thus, Galang Batang must be examined not only as a site of capital accumulation, but also as a test case for balancing industrial competitiveness with broader regional welfare outcomes (Halim, 2025; Thorbecke, 2023; Hill, 1990; Chen et al., 2025).

The author's approach in this article is to discuss Galang Batang through the framework of downstreaming-based economic transformation. This approach views SEZ development as a process involving resource conversion, industrial deepening, infrastructure integration, investment governance, and regional spillover effects. The discussion therefore does not stop at describing the existence of the SEZ, but examines how bauxite processing can generate value added, stimulate supporting sectors, and reshape Bintan's economic orientation. At the same time, the article pays attention to possible risks, including enclave industrialization, weak local supply-chain participation, dependence on foreign investment, environmental pressure, and limited institutional capacity. By combining these perspectives, the article contributes to debates on how Indonesia's downstreaming policy can be assessed at the regional level, especially in outer-island territories that are strategically located but structurally dependent on external investment and export markets (Warburton, 2024; Umar, 2025; Rothenberg et al., 2025; Aritenang, 2021).

Table 1. Key Analytical Dimensions of Galang Batang SEZ in Bintan's Downstreaming-Based Economic Transformation

No.	Analytical Dimension	Focus	Relevance to Bintan's Economic Transformation
1	Mineral downstreaming	Processing bauxite into alumina and related products	Increases value added and reduces dependence on raw commodity exports
2	Industrial infrastructure	Refinery, smelter, energy supply, port, and logistics facilities	Strengthens production capacity and export connectivity
3	Investment attraction	Foreign direct investment and industrial capital formation	Expands industrial base and accelerates regional economic growth
4	Local economic linkage	Employment, supplier networks, services, and supporting industries	Determines whether the SEZ creates spillover effects for the local economy

No.	Analytical Dimension	Focus	Relevance to Bintan's Economic Transformation
5	Governance and regulation	Incentives, licensing, coordination, and institutional capacity	Ensures that SEZ development is efficient, accountable, and sustainable
6	Sustainability	Environmental management, resource efficiency, and social safeguards	Prevents downstreaming from producing ecological and social externalities

Source: Author, 2026

The scientific contribution of this article lies in its effort to connect national downstreaming policy with regional development outcomes in Bintan. Many studies discuss downstreaming at the national level, particularly in relation to mineral export bans, industrial policy, and global value chains. However, fewer studies examine how downstreaming operates spatially within a particular SEZ and how it affects the economic transformation of a specific district. Galang Batang is therefore important because it enables a more grounded analysis of how national industrial ambitions are translated into local production systems, infrastructure development, labor absorption, and institutional coordination. This article argues that the success of Galang Batang should be measured not only by investment realization and export performance, but also by the depth of local linkages, quality of governance, and sustainability of regional transformation (Kim, 2021; Narayan, 2022; Warburton, 2024; Pangestu, 2025).

Based on this background, the purpose of this article is to analyze Galang Batang Special Economic Zone as a downstreaming strategy and as a driver of economic transformation in Bintan. The article seeks to explain how the SEZ contributes to industrial value creation, what strategic factors support its development, and what governance challenges must be addressed to ensure that downstreaming produces inclusive and sustainable regional benefits. By focusing on Galang Batang, this study offers an analytical perspective on the relationship between mineral-based industrialization and local economic restructuring in Indonesia's archipelagic regions. Therefore, the article is expected to enrich academic discussions on SEZ policy, downstream industrialization, and regional transformation, while also providing policy relevance for strengthening Bintan's position as a strategic industrial node in western Indonesia.

METHODOLOGY

This study employed a qualitative research design with a descriptive-analytical approach to examine the Galang Batang Special Economic Zone as a downstreaming strategy and as an instrument of economic transformation in Bintan. The qualitative design was selected because the study focuses on understanding policy direction, institutional arrangements, industrial development patterns, and regional economic implications rather than measuring causal relationships statistically. The analysis was conducted by interpreting relevant policy documents, academic literature, official reports, and secondary statistical data related to special economic zones, mineral downstreaming, regional industrialization, and economic transformation. This approach enables the research to explain how Galang Batang SEZ functions within Indonesia's

broader downstreaming agenda and how its development may influence industrial diversification, investment growth, labor absorption, and regional competitiveness in Bintan (Creswell & Creswell, 2018; Bowen, 2009).

The data used in this study consisted entirely of secondary data obtained from journal articles, books, government regulations, official reports, statistical publications, institutional documents, and credible online sources related to Galang Batang SEZ, Bintan Regency, mineral processing industries, and Indonesia's special economic zone policy. Data collection was carried out through a structured literature review by identifying relevant sources, screening their suitability, classifying the information based on research themes, and synthesizing the findings into an analytical discussion. The selected documents were examined using content analysis, focusing on recurring themes such as downstreaming policy, industrial infrastructure, investment facilitation, local economic linkages, governance challenges, and transformation outcomes. This method allowed the study to build a coherent interpretation of the issue based on documented evidence and previously published scientific works (Snyder, 2019; Krippendorff, 2019).

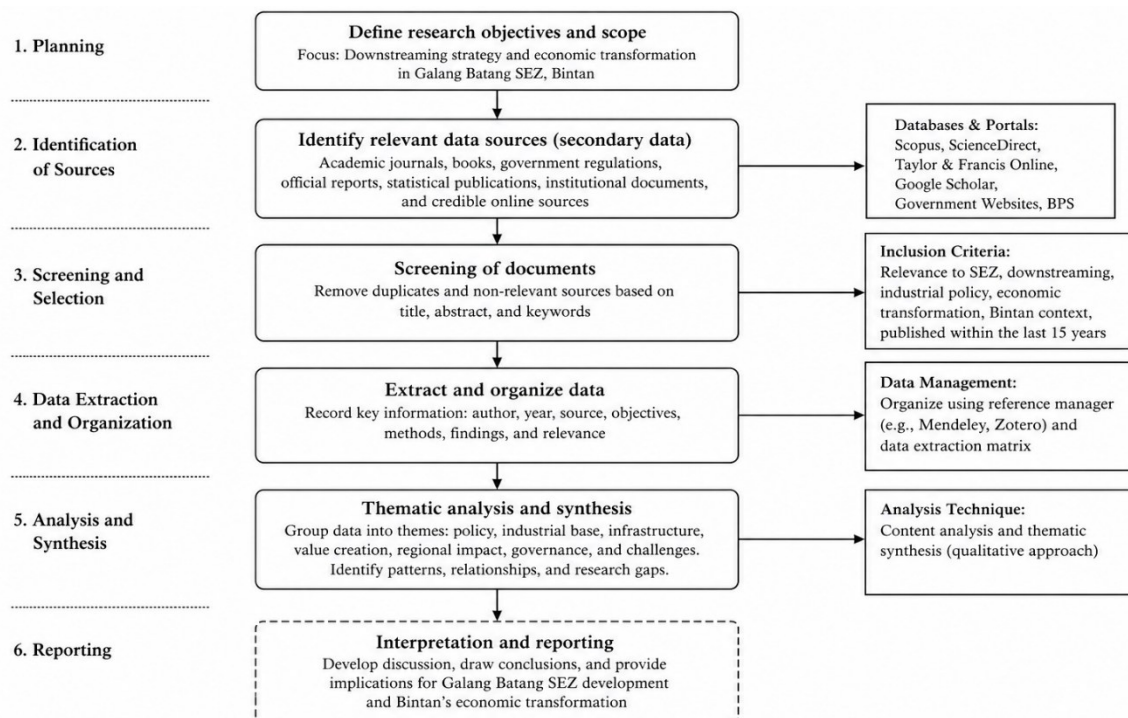


Figure 1. Literature Review Process for Analyzing Galang Batang Special Economic Zone
Source: Author, 2026

Data analysis was conducted through several stages, beginning with data reduction, followed by data categorization, thematic interpretation, and conclusion drawing. The collected secondary data were organized according to the main analytical dimensions of the study, namely strategic foundations, industrial base, supporting infrastructure, production and value creation, regional economic effects, governance needs, and key challenges. Since the study did not involve primary data collection or human participants, procedures such as interviews, surveys, informed consent, and institutional review board approval were not applied. Nevertheless, ethical standards were maintained by ensuring accurate citation, transparent use of sources, avoidance of

data manipulation, and careful interpretation of all secondary materials. This methodological structure supports the credibility, traceability, and academic accountability of the research.

RESULTS AND DISCUSSION

1. Strategic Position of Galang Batang SEZ in Bintan's Downstreaming Agenda

Galang Batang Special Economic Zone demonstrates that Bintan's development trajectory is no longer limited to tourism, maritime services, and cross-border trade, but is increasingly directed toward industrial transformation based on mineral processing. The existence of a bauxite-oriented industrial zone indicates a shift from resource extraction toward value-added production, where raw materials are processed into industrial inputs with higher economic value. This finding confirms that the SEZ functions as a spatial policy instrument designed to connect natural resource potential, infrastructure development, investment facilitation, and oriented industrialization within one integrated territorial framework. In this sense, Galang Batang is not merely an industrial estate, but a strategic mechanism for accelerating downstreaming as part of Bintan's long-term economic restructuring (Farole, 2011; Zeng, 2015).

The strategic value of Galang Batang is strongly influenced by its geographic location in Bintan, which is close to major regional shipping routes and connected to broader maritime economic networks in western Indonesia. This location provides logistical advantages for export-oriented industries, particularly because downstream mineral products require efficient port access, stable energy supply, and reliable transportation systems. The proximity of Bintan to Batam, Singapore, Malaysia, and the Malacca Strait strengthens the zone's potential as an industrial and logistics node. Therefore, the zone's competitiveness is shaped not only by fiscal incentives, but also by its ability to integrate production activities with maritime connectivity and regional market access (Frick et al., 2023; Bergantino et al., 2026).

The development of Galang Batang also reflects the broader logic of resource-based industrialization, where the state attempts to capture greater value from domestic mineral resources through processing, refining, and industrial deepening. In the context of bauxite downstreaming, the transformation process involves moving from raw mineral extraction to alumina production and related industrial activities. This pattern is important because the economic value generated from processed minerals is generally higher than that obtained from unprocessed commodities. However, downstreaming becomes meaningful only when it is supported by technology, infrastructure, industrial skills, and market integration, rather than relying solely on export restrictions or investment incentives (Bam & De Bruyne, 2017; Neilson et al., 2020).

The findings indicate that Galang Batang SEZ serves as an anchor for industrial concentration in Bintan. The presence of refinery-related activities, port facilities, energy support, and investment-oriented regulation creates a basis for industrial agglomeration. Such agglomeration can reduce transaction costs, improve production efficiency, and encourage supporting industries to grow around the main downstreaming activity. Nevertheless, the effectiveness of this process depends on whether the zone can generate local industrial linkages, including supplier participation, labor absorption, service sector growth, and institutional coordination with the local government. Without these linkages, the zone may create strong production output but limited regional multiplier effects (Ge, 1999; Bräutigam & Tang, 2014).

From a regional development perspective, the strategic foundation of Galang Batang lies in its ability to combine industrial policy with place-based development. SEZs are often expected to correct regional disparities by directing investment to specific territories, but their performance varies depending on governance quality, infrastructure readiness, and the compatibility between regional assets and industrial specialization. In the case of Galang Batang, Bintan's strategic maritime position, availability of industrial land, and bauxite downstreaming orientation provide a basis for such compatibility. However, the long-term outcome will depend on whether these advantages are translated into productive capability, local employment quality, and sustainable regional diversification (Hazakis, 2014; Otchia, 2025).

Table 2. Strategic Foundations of Galang Batang SEZ in Supporting Bintan's Economic Transformation

No.	Strategic Foundation	Finding	Implication for Bintan
1	Geographic location	Located near regional maritime routes and export markets	Strengthens logistics and export competitiveness
2	Mineral resource orientation	Focused on bauxite downstreaming and alumina processing	Supports value-added industrialization
3	SEZ policy support	Receives investment facilitation and regulatory incentives	Improves attractiveness for industrial investors
4	Industrial infrastructure	Supported by refinery, energy, port, and internal logistics systems	Enables integrated production activities
5	Regional connectivity	Linked to Batam, Singapore, Malaysia, and broader maritime routes	Expands market access and supply-chain integration
6	Transformation potential	Encourages diversification from tourism and raw-resource dependence	Strengthens the productive base of Bintan's economy

Source: Author, 2026

The overall strategic position of Galang Batang SEZ shows that downstreaming can become a key pathway for economic transformation when it is embedded in a broader regional development strategy. The zone provides an institutional and spatial platform for linking mineral resources with industrial production, investment flows, infrastructure systems, and export markets. However, the transformation process should not be assessed only through investment value or production capacity. It must also be evaluated through its contribution to local economic integration, industrial capability formation, and regional welfare improvement. This confirms that Galang Batang's strategic role lies not only in processing bauxite, but also in reshaping Bintan's economic structure toward a more diversified and industrially productive region (Rodríguez-Pose & Wilkie, 2017; Aggarwal, 2022).

2. Industrial Infrastructure, Investment Linkages, and Value Creation

The second major finding concerns the role of industrial infrastructure in enabling downstream activities within Galang Batang SEZ. Mineral processing industries require large-scale and highly integrated infrastructure, including energy supply, port facilities, roads, storage areas, water systems, waste management, and industrial services. In Galang Batang, the downstreaming process depends on whether these facilities can operate as a connected production ecosystem rather than as fragmented physical assets. Infrastructure therefore becomes a productive factor that determines the efficiency, reliability, and competitiveness of the entire industrial chain. This finding supports the argument that SEZ performance is strongly influenced by the quality of infrastructure and the ability of the zone to reduce operational costs for investors (Johansson & Nilsson, 1997; Zheng et al., 2017).

Investment linkages are also central to Galang Batang's value creation process. The presence of anchor industries in mineral processing can attract additional investment in logistics, construction, maintenance, energy services, transportation, warehousing, and supporting manufacturing activities. These linkages are important because downstreaming does not only occur inside the refinery or smelter, but also through the expansion of related sectors that support production and distribution. If managed effectively, Galang Batang can generate a layered industrial ecosystem where the main bauxite-processing activity stimulates secondary and tertiary economic activities. However, if investment remains concentrated in a narrow production chain, the zone may produce high export value without creating broad-based local development (Tafese, 2025; Sukadi, 2025).

The value creation process in Galang Batang is closely associated with the conversion of bauxite into higher-value industrial outputs. This transformation increases the economic value of mineral resources because processed products have broader industrial applications and stronger export potential. The downstreaming chain can also improve Indonesia's position in global production networks by reducing dependence on raw commodity exports. Nevertheless, value creation should not be interpreted only as price enhancement. It also includes technological learning, workforce capability, supplier development, institutional upgrading, and the creation of new industrial services around the zone. These elements determine whether downstreaming contributes to structural transformation or remains limited to resource processing (Morris et al., 2012; Gereffi, 2018).

The analysis further shows that the integration between industrial infrastructure and investment policy is essential for strengthening Galang Batang's competitiveness. Fiscal incentives may attract investors at the initial stage, but long-term competitiveness depends on reliable infrastructure, predictable regulations, efficient licensing, skilled labor availability, and access to input and output markets. In this regard, Galang Batang's development should be understood as a combined process of physical infrastructure provision and institutional facilitation. The zone can become more competitive when industrial services, customs procedures, logistics systems, and environmental management are coordinated under a clear governance framework (Xia et al., 2025; Hussinger et al., 2025).

The regional implication of this infrastructure-investment relationship is the possibility of creating multiplier effects beyond the core industrial area. Supporting sectors such as transportation, accommodation, food supply, small services, technical

maintenance, and local trade may benefit from the expansion of industrial activities. However, these benefits require deliberate policies to connect local firms and workers with the SEZ economy. Without supplier development, vocational training, and local procurement strategies, the benefits of infrastructure and investment may remain concentrated among large firms and external actors. Therefore, Bintan's economic transformation depends on the depth of local participation in the downstreaming ecosystem (Phelps et al., 2018; Oqubay, 2020).

Table 3. Industrial Infrastructure and Value Creation Linkages in Galang Batang SEZ

No.	Component	Function in the SEZ	Value Creation Effect
1	Energy and utilities	Supports refinery, smelter, and industrial operations	Ensures production continuity and cost efficiency
2	Port and maritime logistics	Connects industrial output to export markets	Reduces distribution barriers and supports trade expansion
3	Internal roads	Links production sites, storage areas, and logistics nodes	Improves movement of goods and operational efficiency
4	Warehousing facilities	Supports storage of inputs and processed outputs	Strengthens supply-chain reliability
5	Industrial services	Provides maintenance, technical, and operational support	Encourages supporting business growth
6	Investment facilitation	Simplifies licensing and improves investor confidence	Attracts additional capital and industrial expansion

Source: Author, 2026

The findings confirm that Galang Batang's downstreaming strategy is highly dependent on the interaction between infrastructure readiness and industrial value creation. Infrastructure provides the physical foundation for production, while investment linkages expand the economic effects of that production. The stronger the connection between anchor industries, supporting sectors, local suppliers, and logistics systems, the greater the potential for Galang Batang to generate transformation beyond the boundaries of the SEZ. Therefore, the zone's development should prioritize not only large-scale processing capacity, but also the creation of an integrated industrial ecosystem that benefits Bintan's wider economy.

3. Regional Economic Effects and Local Transformation in Bintan

The development of Galang Batang SEZ creates important regional economic effects through employment generation, industrial diversification, and increased investment activity. As a large-scale downstreaming zone, Galang Batang has the potential to absorb labor in production, construction, logistics, administration, maintenance, and service-related activities. Employment effects are significant because they connect industrial transformation with household income and local economic welfare. However, the quality of employment matters as much as the quantity. If the majority of local workers are concentrated in low-skilled positions while technical and

managerial roles are filled externally, the zone's contribution to human capital development may remain limited (Jenkins et al., 1998; Cirera & Lakshman, 2017).

The zone also contributes to economic diversification by introducing a stronger manufacturing and processing base into Bintan's economy. Before the expansion of mineral-based industrialization, Bintan's economic profile was largely associated with tourism, trade, public services, and maritime activities. Galang Batang adds a new productive layer by strengthening the role of industrial output and export-oriented processing. This diversification is important because it can reduce the region's vulnerability to shocks affecting tourism or service sectors. However, diversification will become more resilient if the SEZ encourages related industries, technical services, and local entrepreneurship rather than relying on a single large industrial actor (Imbs & Wacziarg, 2003; Cadot et al., 2011).

Another regional effect is the potential increase in fiscal and economic circulation around Bintan. Industrial activity can stimulate demand for local goods and services, including food supply, housing, transportation, retail, construction materials, and maintenance services. This creates opportunities for micro, small, and medium enterprises to participate in the industrial economy. Yet these opportunities do not emerge automatically. Local businesses often face barriers related to quality standards, scale, capital access, certification, and procurement procedures. Therefore, local economic transformation requires intermediary policies that help local firms meet industrial requirements and participate in the SEZ supply chain (Markusen & Venables, 1999; Altenburg, 2000).

The presence of Galang Batang SEZ also affects Bintan's spatial development pattern. Industrial growth can increase demand for land, housing, transport networks, environmental services, and public facilities around the zone. If spatial planning is well managed, the SEZ can support balanced regional development by connecting industrial zones with settlements, ports, service centers, and local economic areas. Conversely, weak spatial governance may generate congestion, land-use conflict, environmental pressure, and uneven access to economic benefits. Therefore, the transformation of Bintan through Galang Batang must be accompanied by integrated spatial planning and coordinated infrastructure policy (Scott & Storper, 2015; Turok, 2016).

The social dimension of regional transformation is equally important. Downstreaming-based industrialization can change labor patterns, migration flows, community livelihoods, and local expectations regarding employment and welfare. Industrial expansion may create new opportunities for young workers, but it may also produce social tension if local communities perceive limited access to employment or unequal distribution of benefits. For this reason, the SEZ's development should include vocational training, local recruitment mechanisms, community engagement, and transparent communication between government, firms, and residents. These measures are necessary to ensure that Galang Batang becomes a source of inclusive transformation rather than merely an industrial enclave (Bebbington et al., 2008; Banks et al., 2016).

Overall, the regional economic effects of Galang Batang SEZ are promising but conditional. The zone can contribute to employment, diversification, investment growth, and regional competitiveness, but these outcomes depend on the depth of its integration with the local economy. The strongest transformation will occur if downstreaming activities are connected to human capital development, local supplier participation, spatial planning, and community welfare. Therefore, Galang Batang should be assessed

not only as a production site, but as a regional development platform that must balance industrial efficiency with inclusive economic transformation in Bintan.

4. Governance Challenges, Sustainability Risks, and Transformation Outcomes

The fourth finding concerns the governance challenges that accompany Galang Batang's downstreaming strategy. SEZ development requires coordination among national government agencies, regional government, zone administrators, investors, industrial operators, and surrounding communities. This coordination is necessary because downstreaming involves licensing, infrastructure provision, land management, environmental control, labor regulation, and investment facilitation. If governance is fragmented, the SEZ may face delays, overlapping authority, weak monitoring, and uneven policy implementation. Therefore, the effectiveness of Galang Batang depends not only on capital and infrastructure, but also on institutional capacity and regulatory coherence (Jessop, 2004; Meadowcroft, 2007).

A major risk in downstreaming-based SEZ development is enclave industrialization. This occurs when industrial activity generates high output but remains weakly connected to the surrounding regional economy. In such a condition, the SEZ may depend heavily on imported technology, external capital, outside suppliers, and non-local skilled labor. The result is that the zone contributes to export growth but produces limited local capability formation. For Galang Batang, this risk can be reduced by strengthening local procurement, supplier upgrading, workforce training, and business partnerships between large industrial firms and local enterprises. These mechanisms are essential for transforming downstreaming from an isolated industrial project into a regional development strategy (Ferguson, 2005; Hansen, 2020).

Environmental sustainability is another important challenge. Mineral processing industries require careful management of emissions, energy use, water consumption, waste, and land-use impacts. If environmental governance is weak, downstreaming may generate ecological costs that reduce the long-term benefits of industrial transformation. Galang Batang therefore needs strong environmental monitoring, transparent reporting, cleaner production technology, and compliance with environmental standards. Sustainability should not be treated as an additional requirement after industrial development, but as a core component of competitiveness and regional resilience. This is particularly important for Bintan, where industrial growth coexists with coastal ecosystems, tourism assets, and community livelihoods (Sovacool, 2021; Lèbre et al., 2020).

The transformation outcomes of Galang Batang should be evaluated through multiple indicators. Investment realization, production capacity, export value, and infrastructure development are important, but they do not fully capture the quality of regional transformation. More comprehensive indicators should include local employment absorption, skill upgrading, local supplier involvement, environmental performance, fiscal contribution, and the growth of supporting sectors. These indicators can help policymakers distinguish between narrow industrial expansion and broader economic transformation. In this context, Galang Batang's success should be measured by whether it can create durable regional capabilities and reduce Bintan's dependence on limited economic sectors (Andreoni & Chang, 2020; Whitfield et al., 2020).

The governance model required for Galang Batang should combine investment facilitation with developmental regulation. Investment facilitation is needed to maintain

business certainty, reduce administrative barriers, and attract industrial capital. Developmental regulation is needed to ensure that industrial growth produces local benefits, protects the environment, and supports long-term regional upgrading. This balance is crucial because excessive emphasis on investor incentives may weaken public accountability, while excessive bureaucracy may reduce competitiveness. Therefore, Galang Batang requires adaptive governance that can respond to industrial needs while maintaining social, environmental, and regional development objectives (Evans, 1995; Doner et al., 2005).

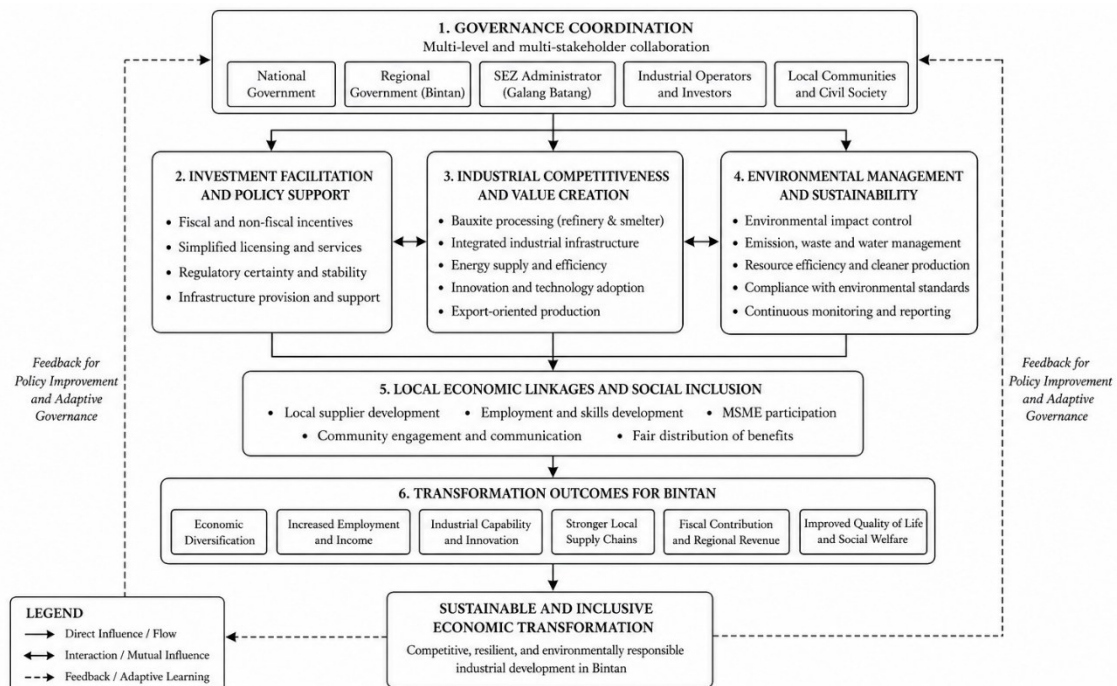


Figure 2. Governance and Sustainability Framework for Galang Batang SEZ Transformation
Source: Author, 2026

In conclusion, Galang Batang SEZ represents a strategic opportunity for Bintan to transform its economic structure through downstream-based industrialization. The findings show that the zone has strong potential because it combines strategic location, mineral processing orientation, industrial infrastructure, investment facilitation, and export connectivity. However, its long-term contribution will depend on whether the SEZ can avoid enclave development, strengthen local linkages, improve labor capability, and maintain environmental sustainability. Thus, the main policy implication is that Galang Batang should be governed not merely as an investment zone, but as an integrated regional transformation platform that aligns industrial growth with inclusive and sustainable development outcomes.

CONCLUSION

Galang Batang Special Economic Zone represents a strategic instrument for accelerating downstream-based economic transformation in Bintan. The development of this zone demonstrates that regional industrialization can be directed beyond raw-resource extraction toward higher value-added production through bauxite

processing, alumina refining, export-oriented industrial activities, and integrated logistics support. Its strategic location in Bintan, proximity to regional maritime routes, availability of industrial land, and policy support as a special economic zone provide an important foundation for strengthening Bintan role as an industrial node in western Indonesia. Therefore, Galang Batang SEZ can be understood not only as an investment area, but also as a spatial development strategy that connects mineral downstreaming, industrial infrastructure, and regional competitiveness.

The findings indicate that the contribution of Galang Batang SEZ to Bintan's economic transformation depends on the depth of its linkages with the local economy. Industrial infrastructure, investment facilitation, energy support, port connectivity, and production capacity are important prerequisites, but they are not sufficient if the zone operates as an isolated industrial enclave. The downstreaming strategy will generate broader regional benefits when it strengthens local supplier participation, expands employment opportunities, improves workforce skills, stimulates supporting businesses, and encourages MSME involvement in the industrial ecosystem. In this regard, the transformation value of Galang Batang should be measured not only through investment realization and export output, but also through its ability to create inclusive economic spillovers for communities and local economic actors in Bintan.

Overall, Galang Batang SEZ has strong potential to support long-term regional transformation, but its success requires effective governance, institutional coordination, and sustainable industrial management. Policy coordination among national government, regional government, SEZ administrators, industrial operators, and local communities is essential to ensure that investment growth aligns with social inclusion and environmental responsibility. The zone must also address key challenges such as dependence on external capital, limited local supply-chain integration, environmental pressure, and the need for adaptive regulation. Thus, Galang Batang should be governed as an integrated regional transformation platform that balances industrial competitiveness, local economic empowerment, and sustainable development in Bintan.

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