



The Batam Free Trade Zone's Logistics Management Approach in Contrast to the Countries of Eastern Europe

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Abstract

Efficiency is critical to economic and business development. In the Batam free trade zone, investment and trade traffic are determined by efficiency in logistics management. This research aims to explore key logistics management problems and identify strategic opportunities to improve logistics management in the Batam Free Trade Zone. The methods used in this research were the Miles and Huberman method and the Root-Cause-Analysis (RCA) as the analysis tool. The research found that the Batam Free Trade Zone has obstacles to overcome to improve the competitiveness of the free trade zone. This endeavor is through changes in rules and frameworks. Despite these measures, the logistics ecosystem in Batam has primarily become a door-to-door logistics ecosystem, which is different from expectations. Thus, the impact of this research is to overcome the obstacles faced by re-evaluating logistics planning from national to local planning.

Keywords: Logistics, Free Trade Zone, Batam, Investment, Economic Development, Strategic Management

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INTRODUCTION

Logistics traffic is one of the keys to enhancing growth, developing regions, and promoting investment areas. Logistics cost efficiency requires improved standards of service facilities and rational pricing. The Free Trade Zone fosters economic activities like trade, maritime, industry, transportation, banking, tourism, and other fields. To optimize the utilization of the area and increase Batam's competitiveness in the industrial, logistics, and trade sectors, the Batam Free Trade Zone must be able to develop the Port and its port business strategy (Muzwardi, 2017).

Batam's location on the world's international trade routes and its essential role as one of the gateways and spearheads of Indonesia's economy are the main considerations for establishing the Batam Area as a Free Trade Area and Free Port. Batam's unique and special geographical location makes its position so central because it can be used as a gateway for the inflow of investment, goods, and services from abroad that are useful for improving the welfare of the Indonesian people. In addition to functioning as a center for developing technological industries that can provide future benefits and develop industries with high-added value, the Batam area can also function as a place for collecting and distributing production from and to all parts of Indonesia and other countries. Considering its location on the international sea route, the Batam area can become the center of international ship traffic services. In addition, the position of Batam is supported by the condition of Sumatra, which has been far developed, facilitating the provision of labor and means of developing labor capabilities (Hutchinson, 2017).

By regulation, Batam has been designated as a bounded zone since 1986. Batam Bounded Zone has a function to facilitate manufacturing exports. To provide free market freedom, in 2007, the government established this area as a Free Trade Zone through Government Regulation No. 46 of 2007. The regulation was strengthened by Government Regulation No. 10/2012, which provides free customs clearance, no "master list" for imported goods, and free port facilities. Primary industries such as electronics, shipyards, and offshore industries have grown within the Batam Free Trade Zone. The large number of industries creates a large supply chain flow. The speed of supply chain flow is the key to the growth of this area. The main bottleneck of the Batam Free Trade Zone is the limited logistics management that disrupts the supply chain capacity. In the service sector, such as logistics, the important thing that must be prioritized is service quality. Service quality is the expected level of excellence and the control of the level of excellence that meets customer needs. Service quality is generally not viewed in separate constructs but in aggregate, where individual dimensions are included to obtain overall service quality (Asriyati et al., 2023).

Batam's Free Trade Zone position gives it great potential because the Malacca Strait is the second-largest chokepoint in the world, where the oil cargo passing through the Malacca Strait in that year was 15.2 million barrels daily. The volume of ship traffic through the waters is 70,000 ships annually, with container ships and tankers filling the route to transport energy and non-energy needs from the Middle East to the South China Sea and vice versa (Muzwardi et al., 2023). This huge potential makes the logistics sector in the Batam Free Trade Zone require a logistics management strategy to optimize the efficiency of goods circulation and reduce logistics costs by simplifying upstream to downstream processes.

This qualitative research uses the Miles and Huberman Method and the Root-Cause-Analysis as the analysis tool. This research builds an argument about the logistics work ecosystem in Batam through literature study methods, observation, and discussion towards logistics benchmarking through a comparison of policy and innovation to see the gaps in the Batam

Logistics ecosystem with countries that have the best Logistics Performance Index (LPI) in the world.

LITERATURE REVIEW

In a free trade zone, logistical efficiency is key to economic and business development, as in Indonesia's free trade zone. However, investment and trade traffic are determined by logistics management. In particular, several logistics-related studies show the logistics integration between establishing Free Trade Zones and utilizing global cross-logistics routes. (Dunrui, Lia; Xu, Xinb; Shaorui, 2023) Finding Free Ports in China that successfully utilize Free Trade Zones as the center of the global logistics chain. With its Free Ports, such as Shanghai Port, China has transformed into a Port City. Based on data analysis, Shanghai is the most successful Free Port model. Meanwhile, (Lavissière & Rodrigue, 2017) in the study of Ports in Free Trade Zones showed that Free Ports are ports located in free trade zones that have been transformed into integration tools for global logistics trade, such as the unification of trade networks between East Asia and Southeast Asia in one export destination. The success of the Free Port model can be seen in the success of Asian countries in using the Free Port tool as a key to economic success. Logistics strategy is the set of guiding principles, driving forces, and ingrained attitudes that help coordinate goals, plans, and policies and are reinforced through conscious and subconscious behavior within and between partners across a network (Harrison et al., 2008).

Based on analysis (Lavissière & Rodrigue, 2017), five groups of Free Port models take advantage through differentiation: 1) Storage, 2) Transformation, 3) Value Added, 4) Supply Chain, and 5) Zone Specialization. These five models characterize Free Ports in various countries. The Port Paradigm is the basis for logistics development in free trade zones. This condition requires exploration of the key strategic factors of the free trade zone. However, previous research has not been able to map logistics management specifically in free trade zones.

This problem becomes a gap in this research that needs further research. Furthermore, this research focuses on the development opportunities of logistics services in the Batam free trade zone. Therefore, the novelty of this research is that it is a strategy recommendation that can improve competitiveness to overcome obstacles in the development of logistics management, particularly in the Batam free trade zone. This research maps logistics management in the Batam free trade zone based on its potential, opportunities, and differentiation. This research uses a theory-formed process to see the logistics model with business networks to become value added from the logistics management that has been built. This method is to see the innovation model that can be developed.

METHODOLOGY

Qualitative analysis is an analysis tool used in this study. The analytical tools in this study consist of observation and analysis of discourse and literature studies. The purpose of using qualitative methods in this study is to compare actual maritime connectivity port business with the theory theory-formed process or contextualism would not be interesting if its product, that is, a seaport cluster conceptualized as $2s+3n$, will not serve as a building block for other theoretical or practical seaport purposes, which are part of the institutional and/or operational systems, situated respectively at the governance level and administration and management levels of decision-making (Ibrahimi, 2017). of Graph Connectivity so that an optimal and

integrated strategy for developing maritime connectivity can be formulated (Creswell, 2009). Observations were made to obtain visual information related to the condition of the port at the research location, including the shape and condition of the port, which is part of the connectivity node. Analysis of discourse studies and literature studies is used to look at stakeholder perceptions of problems and obstacles to port development as maritime connectivity, making it a historical and infographic basis, which is then compared with the Graph Connectivity Node theory (Diestel, 2005).

The technique used in data analysis uses the model from Miles and Huberman. The model from Miles and Huberman divides the steps in data analysis activities into several parts: data collection, data reduction, data display, and conclusion and verification. In the first model analysis, both primary and secondary data were collected based on categorization according to the problem, which was then developed to sharpen the data through further data searches. Next, data reduction was carried out. Data reduction is a form of analysis that sharpens, classifies, directs, discards unnecessary data, and organizes data so that conclusions can be drawn and verified (Miles, Huberman, & Saldana, 2014). Data reduction occurs continuously as long as the activity has not been terminated. The product of data reduction is a summary of field notes, from initial notes, expansions, and additions per the activity's objectives. After obtaining the data as needed, the data presentation is carried out. Data presentation is a series of information organizations that allows research conclusions to be drawn. The presentation of data is intended to find meaningful patterns and provide the possibility of drawing conclusions and providing action (Miles, Huberman & Saldana, 2014). Data will be presented in narrative sentences, pictures/schemes, networks, graphs, and tables as the narrative.

The verification and conclusion stages are part of a complete configuration activity (Miles, Huberman & Saldana, 2014). The conclusions were also verified during the activity. Conclusions are drawn since the researcher compiles records, patterns, statements, configurations, causal directives, and propositions. In addition, after the conclusion, recommendations will be given so that the development strategy can be implemented in a directed and integrated manner. The implementation of data analysis using the Miles and Huberman models can be seen in Figure 1. This research was conducted in the Batam Free Trade Zone, where this area is designed as one of Indonesia's national logistics hubs with the regulation of the Batam Logistics ecosystem. Data collection in this research was conducted from the Central Bureau of Statistics, and observations were conducted during 2021 of logistics conditions and activities in the Batam Free Trade Zone. The field study was carried out from May to August 2021 by observing three logistics service companies, including loading and unloading companies, shipping companies, and companies using logistics services located in Batam Island. The companies were observed to see the potential problems and strategic issues of the logistics ecosystem in Batam. The observation result was then reduced and displayed following the Miles and Huberman Model in Figure 1.

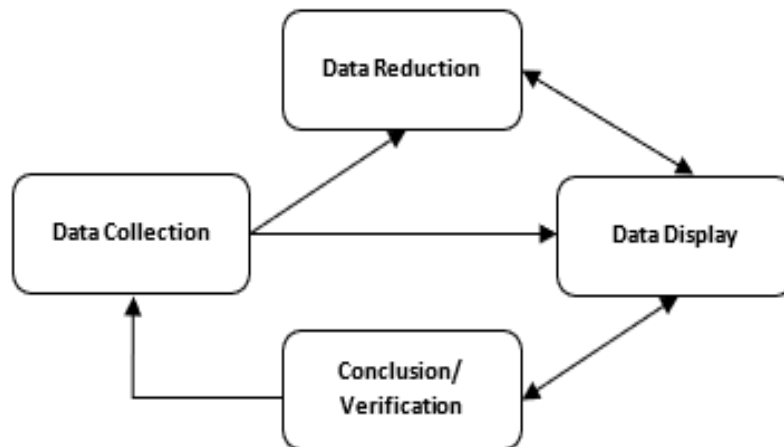


Fig. 1: Miles and Huberman Model

RESULT AND DISCUSSION

According to the 2023 logistics performance index published by the World Bank, Singapore and Finland have the best logistics performance efficiency in the world. Singapore got a score of 4.3, and Finland got a score of 4.2 (<https://lpi.worldbank.org/international/global>). Singapore's success cannot be separated from the modernization of its logistics system. Singapore's modern logistics industry has five main characteristics: high efficiency, robust technology, strong professionalism, high service concentration, and strength (Shao et al., 2023).

On the other hand, Finland is the country with the second-best logistics performance index (LPI) in the world and has the best logistics efficiency in Europe. This achievement must be connected to infrastructure modernization and logistics policies, which support strengthening Finland's access as a major export and import market through Reliable supply chains, which are crucial for global trade, efficient customs operations, modern technology, and collaborative efforts. The key to this efficiency is realized in market sector programs, regulations, intensified dialogue, connection and infrastructure, international lobbying, and interest protection (Helsinki Times, 2023).

The performance of these two countries can be a reflection of the logistics environment in Batam. Use of Autonomous vehicles, smart mobility services, and Telematics in the transportation logistics sector. This is a modernization step Singapore and Finland took to increase efficiency (P.-N. Nguyen & Kim, 2024). Batam still needs to take these steps. Batam's logistics system is highly dependent on the role of the government, while Singapore has relied on privatization and collaboration. Such classical management cannot bring modernization. For example, Singapore's port system has been connected to various world-renowned ports; this cannot be separated from the collaboration of PSA Singapore with global shipping companies. On the other hand, the Indonesian Port Network system is not connected to international ports because it needs collaboration.

Batam is a strategic area that was developed as Indonesia's national logistics hub. This development is in line with the development of transportation infrastructure, namely, terminal

development and improvement of human resources in logistics management development. Based on the analysis, the provision of modal shifts through road infrastructure and head truck services are the basis for developing logistics services in the Batam free trade zone. The target of logistics integration includes producers, exporters, and importers. Currently, 21 industrial estates are part of the supply chain process in the Batam free trade zone. The current supply chain performance is mostly supported by Container Singapore's success, which must be connected to the modernization of its logistics system transportation within the free trade zone area. At the same time, the central government, through the National Transportation System and the National Logistics System, is part of the system in supporting logistics management performance.

This effort is done by synchronizing the National Logistics Ecosystem (NLE) of the logistics ecosystem in Batam by tidying up and simplifying through integrated inspection services through single submission, port services, and licensing. China also synchronizes this through the service supply platform by integrating the ecosystem structure, namely logistics facilities and information technology, through business agreements between the focal firm, primary suppliers, supplementary suppliers, and customer chains. This logistics ecosystem is very strong because it is fully supported by the China Federation of Logistics and Purchasing (CFLP)(Lin et al., 2021).

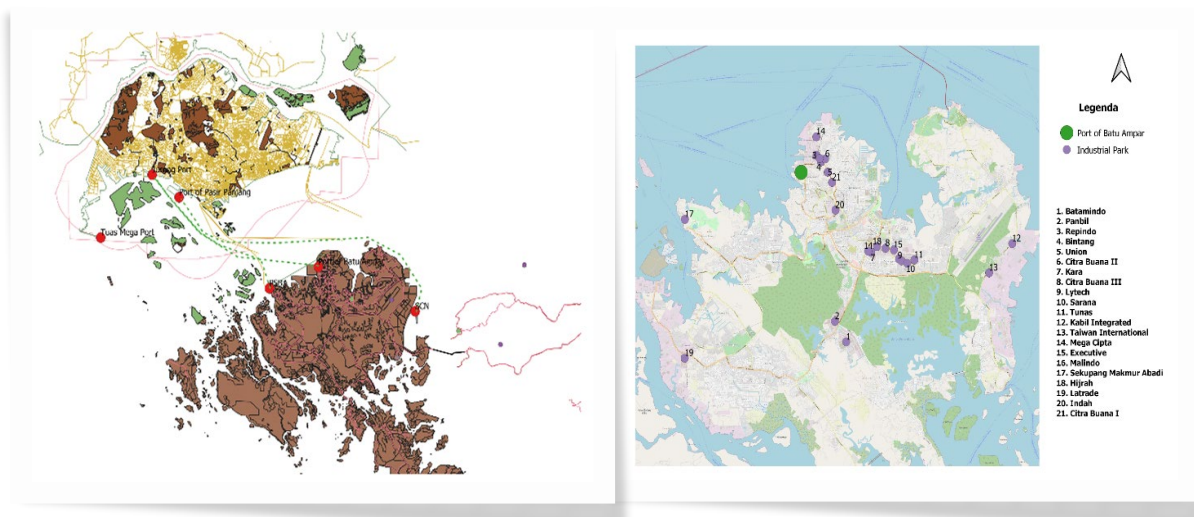


Fig. 2: Map of Logistics Connectivity in Free Trade Zone Batam (Left) & Distribution of Industrial Estates in Free Trade Zone Batam (Right)

Therefore, in structuring the business process, this synchronization is through the integration of services at public institutions, namely seven ministries that are combined in one submission system, namely the Ministry of Finance, Ministry of Transportation, Ministry of Trade, Ministry of Agriculture, Ministry of Industry, Ministry of KKP, BKPM, the Batam Free Zone Authority, and related ministries/agencies. In general, Batam's potential as a national logistics hub is due to its geographical location on the Strait of Malacca and its market share of industrial estates. The number of industrial estates that require export-import goods is part of Batam's logistics ecosystem. Figure 2 displays the map of logistics connectivity and the distribution of industrial estates in the Batam Free Trade Zone.

Factors that influence the level of competitiveness of the logistics region consist of shippers, shipping agents, shipping companies, transportation, and logistics operators. By calculation,

there are six variables in logistics competitiveness: Customs, Infrastructure, International shipping, Quality logistics competence, Tracking and tracing, and Timeliness (Polat et al., 2023). Each of these groups has its level of influence on the choice of terminals in a given logistics chain and is simultaneously driven by a different set of criteria. The efficiency and effectiveness of the logistics chain also has its part (Brooks, 2009; Vieira et al., 2014). (González Laxe et al., 2016). According to (González Laxe et al. (2016), ports are the focus of every logistics chain. According to Verhoeven and Vanoutrive (2012), the development of logistics management can be promoted in the following areas: a) Development of sustainable port activities. b) Port integration in the logistics chain. c) Development of market strategies for port management.

In the logistics planning strategy, Batam has a vision as an International Logistics Hub by optimizing the industrial area as a value-added, absorbing strategic commodities of other regions, absorbing strategic commodities of the Sumatra region, utilizing ASEAN and ASIA markets, and creating business markets from Europe and America. Logistics potentials and challenges in the Free Trade Zone Batam include logistics performance, infrastructure, geographical, and policy issues. The Batam Free Zone Authority's role is very central in optimizing outbound logistics via Batam, namely the ability to map the potential and prepare a business framework. The large volume of goods on the north coast of Java and the east coast of Sumatra is a potential flow of goods that the Batam Free Zone Authority can utilize. The growth of the industrial area and Batam's economic growth aim to become a stable supporting factor. Currently, Batam still has the challenge of high logistics costs; the challenge is divided into three: the high cost of transportation, inventory, and administration. The three cost components become accumulated costs.

Logistics costs are currently a serious problem in the logistics chain in the Batam free trade zone. Entrepreneurs in Batam have protested the increase in logistics costs in the form of container shipping rates on the Batam-Singapore route. The increase has been experienced since 2022 until this year, with a 6-14 percent increase for 20-foot containers and 8-11 percent for 40-foot containers (Bisnis.com, 2023). Logistics cost, a problem in Batam free trade, accumulates all costs sacrificed for implementing goods movement activities in a series of supply chain processes.

The trigger of logistics cost is logistics activity with reduced transport time and improved reliability, which can be computed as the total cost reduction (including externalities) (Minken & Johansen, 2019). Logistic activities in the Batam free trade zone occur in both inbound and outbound logistics. Thus, logistics costs include both inbound logistics and outbound logistics costs. Inbound logistics activities include loading and unloading costs, transportation costs, warehousing costs, inventory costs, and labor costs. Inbound logistics costs will add to the acquisition price of the product. In outbound activities, logistics costs include loading and unloading, inventory, warehousing, distribution, and labor costs from the factory warehouse to distributors, retailers, and/or end consumers. Outbound logistics costs will increase the selling price of the product. When calculated, loading and unloading costs have increased; the 20-foot container rate in 2021 is US\$470. In 2022, the rate increased by 6 percent to US\$500, and finally increased by 14 percent to US\$570 this year. Meanwhile, the 40-foot container rate in 2021 was US\$665, then increased by 8 percent to US\$720, and finally increased by 11 percent to US\$800 this year. These rates come from forwarders or expedition companies (Bisnis.com, 2023). Figure 3 displays the logistics issues in the Batam Free Trade Zone.

The high logistics cost affects Batam's competitiveness. Compared with other regions, when shipping Batam to Hong Kong via Singapore, the container (size) 20 feet is US\$800 with a trip of 3 days. If we compare Jakarta-Hong Kong's 6-7 days journey, only US\$450 means it is

cheaper to travel from Jakarta to Hong Kong by 50 percent (Owntalk.co.id, 2023). Figure 4 displays the logistics ecosystem in the Batam Free Trade Zone.

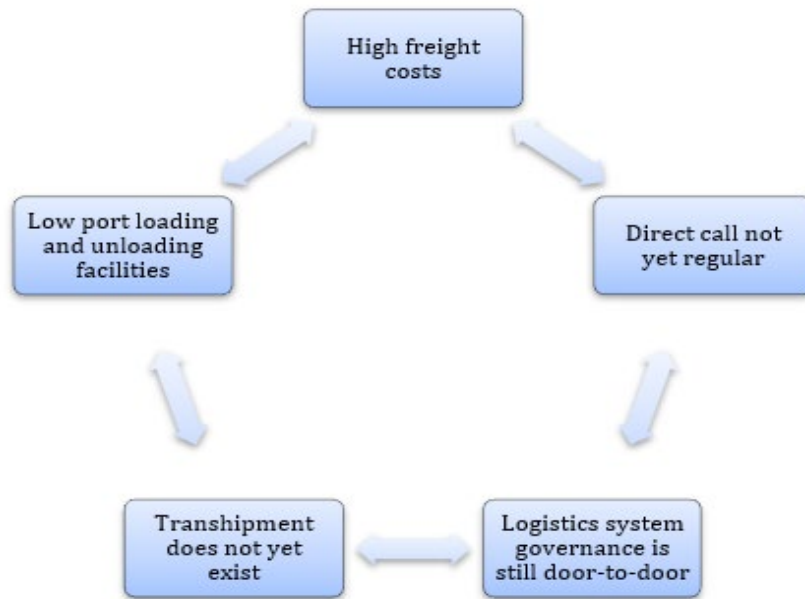


Fig. 3: Logistics Issues in the Batam Free Trade Zone

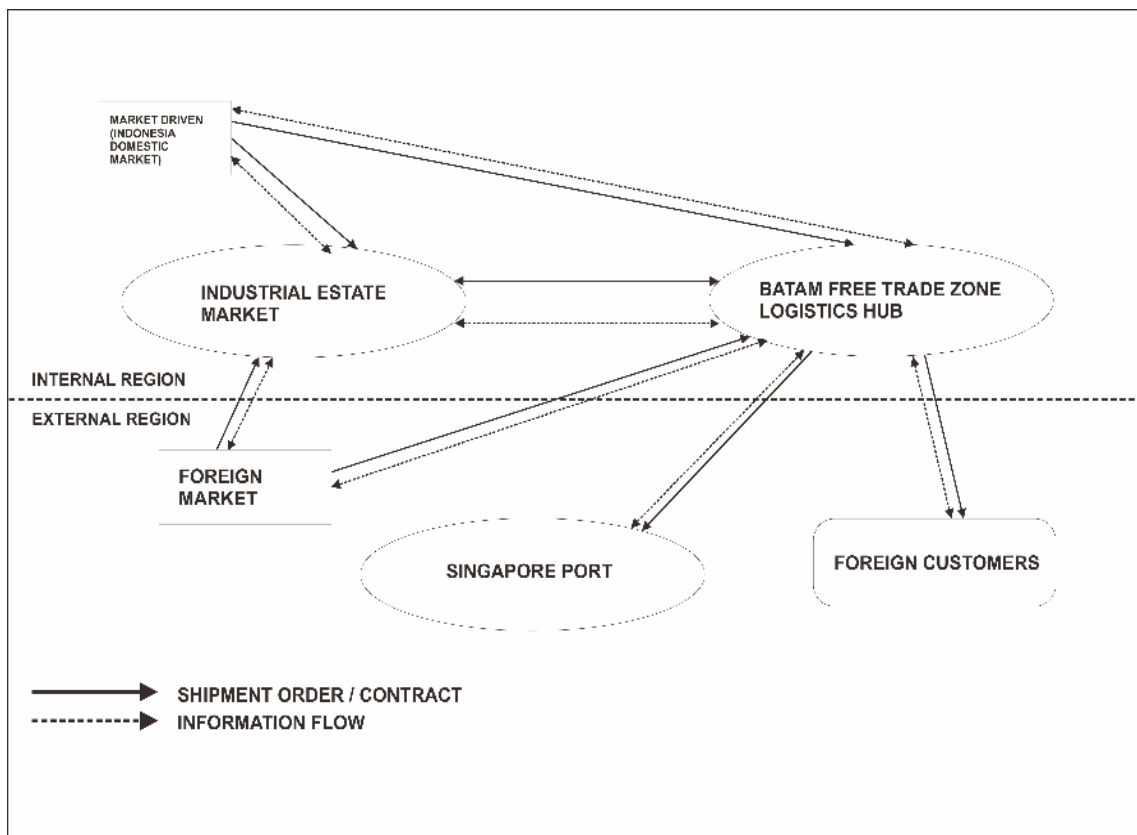


Fig. 4: Batam Free Trade Zone Logistics Ecosystem

Based on the analysis, Batam's role as a logistics hub has yet to be optimized; Batam can reflect on Singapore in optimizing its role as a world logistics hub through a logistics system connected to 600 ports in 120 countries (Dewiatena, 2023). This is due to the low supply of materials from the national market and the high dependence on freight forwarding services through the Singapore Port. Meanwhile, currently, the biggest advantage of the logistics market in Batam lies in the large demand for goods flowing from the Industrial Estate in the Batam Free Trade Zone. The large logistics flow through the Singapore hub is reflected in the large volume of imports, which reached 33.28%, with the FOB percentage reaching 43.89%. The import volume and value in the Batam Free Trade Zone are displayed in Table 1.

Table 1. Import Volume and Value by Country of Origin in Batam Free Trade Zone (2019 and 2020)

Country of Origin	Volume (ton)				Value FOB (US\$)			
	2019		2020*		2019		2020*	
Singapore	1.052.097.311	33,28%	820.050.319	28,75%	3.744.754.579	43,89%	2.952.709.086	34,70%
PRC	451.695.207	14,29%	397.905.610	13,95%	1.097.978.987	12,87%	1.412.269.581	16,60%
Japan	264.139.617	8,36%	431.787.593	15,14%	538.218.274	6,31%	590.184.588	6,94%
Malaysia	318.768.553	10,08%	257.893.094	9,04%	487.667.489	5,72%	547.214.493	6,43%
Hongkong	33.601.318	1,06%	33.745.444	1,18%	281.150.248	3,30%	458.399.335	5,39%
Taiwan	38.937.624	1,23%	40.626.341	1,42%	354.553.843	4,16%	407.668.276	4,79%
South Korea	192.586.492	6,09%	116.832.593	4,10%	193.303.363	2,27%	281.663.578	3,31%
Germany	74.281.354	2,35%	81.161.217	2,85%	208.412.052	2,44%	228.166.430	2,68%
Thailand	36.642.049	1,16%	35.899.433	1,26%	62.856.864	0,74%	227.638.205	2,68%
USA	30.005.720	0,95%	104.397.301	3,66%	217.235.590	2,55%	206.337.862	2,42%
More	668.141.768	21,14%	532.292.667	18,66%	1.346.263.643	15,78%	1.197.218.448	14,07%
Amount	3.160.897.01	100	2.852.591.61	100	8.532.394.93	100	8.509.469.88	100
Total	3	%	2	%	2	%	2	%

Source: Central Bureau of Statistics, Batam City in Figures (2020)

Based on the analysis, 14 entry points for goods are part of the logistics ecosystem in Batam. The processed data shows that the Batu Ampar public terminal is the biggest logistics entrance. In 2019, there were 2,654 foreign ship visits with an import volume of 724,936 tons. Meanwhile, several special terminals are part of the supporting components of the logistics flow in Batam. Batam has five special terminals, contributing 29% of ship visits, 32% of GT, and 8% of imports. The terminal's performance in the Batam Free Trade Zone in 2019 is displayed in Table 2.

Table 2. Terminal Performance in the Batam Free Trade Zone in 2019

No	Public Terminals and Special Owned Sea Terminals	Foreign flag		Import (Ton)	Export (Ton)	Total (Ton)
		Call	Gt			
1	Public Terminal of Batu Ampar	2,654	2,183,780	724,936	42,323	767,259
2	Public Terminal of Magcobar dan Tersus di KIM Batu Ampar	548	963,173	42,693	6,442	49,135
3	Public Terminal of Sekupang	-	-	31	2	33
4	Terminal Umum Roro Sekupang	913	711,053	904	28	932
5	Special Owned Sea Terminals in the Industrial Maritime Area of Sekupang Sektor 1 dan 6	421	1,487,652	36,962	76	37,038
6	Special Owned Sea Terminals in the Industrial Maritime Area of Sekupang Sektor 2	964	2,342,936	1,206	5,083	6,289

7	Special Owned Sea Terminals in the Industrial Maritime Area of Sekupang Sektor 3,4,5	562	1,402,545	6,171	1,018	7,189
8	Special Owned Sea Terminals in the Industrial Maritime Area of Nongsa - Batam Center	8	1,949	-	-	-
9	Public Terminal of Curah Cair Kabil	262	3,424,740	226,736	2,243,490	2,470,226
10	Public Terminal of Sarana Citra Nusa Kabil	82	773,537	136,301	25,655	161,956
11	Special Owned Sea Terminals in the Industrial Maritime Area of Kabil	189	573,808	31,257	4,303	35,560
12	Work Area of Rempang Galang	12	24,087	2,975	25	3,000
13	Work Area of Perairan	161	2,620,460	38,237	51,487	89,724
14	Special Owned Sea Terminals of Telaga Punggur	-	-	-	-	-
	Total	6,776	16,509,720	1,248,409	2,379,932	3,628,341

Source: Author's Work (2023)

The number of entry points for logistics flow has yet to be able to reduce logistics costs. This condition reduces the competitiveness of the Batam free trade zone. Batam can merge and integrate entry points to improve logistics cost efficiency, minimize transaction costs, reduce cargo handling operational time, and ensure security and service quality standards (Kollia & Pallis, 2024). Logistics costs are the domain of each logistics service provider. Each provider provides its own standard cost and speed of service with different resource conditions in logistics activities. The Batam Free Zone Authority, as the logistics operator and regulator in the Batam Free Trade Zone, has yet to unite these stakeholders in logistics integration aimed at reducing logistics costs. In addition, in the logistics chain, non-value-added logistics activities will lead to the emergence of non-value-added logistics costs, reducing Batam's competitiveness. Conversely, eliminating non-value-added logistics activities will reduce logistics costs and ultimately increase Batam's competitiveness.

That strategy needs value chain management (VCM) and global supply chain management (GSCM) support by logistics service providers (LSPs) (Lee, 2021). The logistics costs in Batam that need to be reduced are non-value-added logistics costs. Since logistics activities consume logistics costs, the strategy needs to be related to a series of logistics activities and the parties involved in the logistics activities. The strategy to reduce non-value-added logistics costs needs to be linked to 1) the Collaboration platform, 2) the Logistics agent, 3) the Logistics facility, 4) the Harbor system and layout, 5) Service activity and time, and 6) Cost structure. The matrix of logistics cost reduction strategy is displayed in Table 3.

Table 3. Logistics Cost Reduction Strategy Matrix

No	Element	Strategy
1	Collaboration platform	They are creating a collaboration platform between logistics actors, both government and private agencies, so that information about the availability of logistics services, ordering logistics services, monitoring the implementation of logistics activities, and paying logistics costs can be done online.
2	Logistic agent	Adjust the number of logistics actors to match the needs (logistics volume) and encourage more logistics actors to join the collaboration platform.
3	Logistic facility	Improve the logistics facilities provided by each logistics actor to match the demands of the domestic and international logistics market and illustrate the "state of the art" of logistics facilities.
4	Harbor system and layout	Organize the port system and layout so that people, goods, and equipment can move smoothly.

5	Service activity and time	Identify the activity units within each logistics service and determine the standard time for executing these activities.
6	Cost structure	Identify the cost structure for each logistics activity and determine a reasonable rate for each activity and standardized time.

Source: Author's Work (2023)

Based on the analysis, we find that the two main strategies are using a collaboration platform and cost structure, which need to develop a national logistics system (Zdrenyk et al., 2023). A collaboration platform refers to creating strategic collaboration between logistics actors, both government and private agencies, to ease activities such as obtaining information about the availability, ordering logistics services, monitoring the implementation of logistics activities, and paying logistics costs by using an online platform. Each logistics actor has their platform. Because various logistics activities are related to various logistics activity actors, creating a collaboration platform to integrate various activities is necessary. With this collaboration platform, A) The availability of transportation services can be known, booked, paid for, and monitored online. B) The existence of space on the ship can be known, booked, paid for, and monitored online. C) Container delivery services at the port can be found online. D) Warehouse search, space availability in warehouses, booking, and payment of warehousing services can be done online. E) Obtaining information about class container depots and services provided, and booking container depot services can be done online.

The business model in Batam Port includes cooperation in port management, vessel management, container yard, auto gate system, and trucking system, implementation of better service system for Port Operating System (POS) and Terminal Operating System (TOS), improvement of the ecosystem and governance of Batu Ampar Batam Port, and optimization of the north jetty, cooperation in port development and operations to bring in direct calls and increase the volume and traffic of cargo or containers by creating transshipment and transshipment services, cooperation with the private sector or synergy of maritime or logistics or third parties that can bring in larger volumes of cargo so that they are mutually beneficial (Muzwardi et al., 2023). This business model is successful in China through the development of a logistics ecosystem at the Port of Shanghai, which successfully synchronizes internal logistics business cooperation with global shipping management; this system is strong because it is fully supported by China's national shipping industry (Dewiatena, 2023).

Furthermore, strategies related to cost structure elements become the main element in reducing logistics costs in Batam, as China has successfully regulated transportation costs, storage costs, and administrative costs; this strategy succeeds by analyzing logistics costs and the elements that play an important role in understanding the national logistics industry as a whole (Hooi Lean et al., 2014). its current stages, finding the main problems, and suggesting valid solutions. Based on the analysis, we find that by identifying the cost structure for each logistics activity in Batam, the logistics costs are determined by container lending and shipping company services. The weakness in controlling the cost structure is that the Batam companies depend on Singapore container companies. The container manufacturing industry could be initiated to reduce costs and dependency on Singaporean ports.

This can be seen from Vietnam as a country that has successfully optimized the operations of stevedoring companies through the implementation of a logistics system at Cat Lai Port so that in 1 month, it can accommodate 267 vessels (including 211 container vessels and 44 transshipment vessels) (N.-T. Nguyen & Tran, 2019) Finding business partners to manage stevedoring activities at the Port terminal is an obstacle. The cost structure includes cost elements for the implementation of activities. These cost elements include direct costs and

indirect costs. The cost structure is also related to the behavior of fixed and variable costs. The cost per unit of activity can be properly identified if the type of activity and the time required to carry out the activity are known. Standard costs per unit of activity can be developed based on the existing cost structure. The minimum and maximum cost ranges can also be determined if the activity inventory, completion time, and cost structure are transparent.

The performance of Batam Port can certainly be seen from the number of ship visits. Some sea transportation service providers (shipping) mostly make Batam a temporary market; Batam can learn from Singapore's success in establishing a regular market through the provision of shipping services operated by shipping lines containing the number of vessels involved, names of each vessel, vessel type, vessel size, vessel operator, partner carriers, service frequency, port-of-rotation and whether the service is operated under an alliance, Singapore's success is said to be the existence of maritime policies that enhance logistics stakeholders in the same alliance (Yap et al., 2023). On the other hand, the most used service for containers is barge services. Therefore, the role of the Batam Free Zone Authority is essential in overcoming these problems. This cannot be separated from the responsibility of both the regulator and operator of these ports. Some of the roles of the Batam Free Zone Authority in improving port performance include providing network infrastructure, creating network models, providing transportation mode suggestions, creating transportation mode schedules, and creating efficient logistics tariff models.

CONCLUSION AND RECOMMENDATIONS

The logistics application model in the Batam Free Trade Zone is still door-to-door; the unresponsive infrastructure of the Port aggravates this condition. This condition shows that a new logistics model is needed to create a cheap and fast logistics ecosystem. The existence of the Batam Logistic Ecosystem is a good step. Unfortunately, the logistics industry has not supported this step to ensure the ecosystem is running optimally. Therefore, it is recommended that the Batam Concession Agency create a logistics management body to manage the logistics system to bridge the interests of all parties involved and organize it in a collaboration platform.

The Free Trade Zone has great potential as a global logistics transshipment due to its location and capacity. Still, the carrying capacity is weak. Thus, the carrying capacity should be a major concern in calculating logistics costs—determination of the logistics cost. The logistics cost structure should encompass the service standards and indirect costs of industrial estates. The government can identify the cost structure in the future through a logistics proportion analysis.

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