

Efficiency Of Land Transport Connectivity In Relation To Port Tariff Structure In Batu Ampar

¹Hans Blix Prasetyo S, ²Achmad Syahmi Syihabuddin, ³Muhammad Hafizh Maulana,
⁴Septio Pratama Putra, ⁵Mhd Rayhan Ranggana Putra

Business and Management Department, Politeknik Negeri Batam

¹Email: : hansblix@gmail.com

ABSTRACT

Batu Ampar Port, as the main logistics gateway in Batam Island, plays a critical role in Indonesia's national supply chain, particularly in handling export-import containers. Despite its strategic location within a Free Trade Zone (FTZ), the port faces challenges in ground transportation connectivity due to low tariffs, limited internal infrastructure, incomplete digital integration, and high truck idle times. This study analyzes the impact of port tariffs regulated under PERKA BP Batam No. 4/2023 on operational efficiency, using field data from private trucking operators and Persero-managed operations. Comparative analysis with Tanjung Priok, Tanjung Perak, and Singapore Port highlights gaps in tariff structure, system integration, and throughput. Results indicate that low tariffs, while enhancing cost competitiveness, constrain investment in modern equipment and digital systems, leading to congestion and delayed container distribution. Based on these findings, short-term strategies such as dynamic tariff implementation, mandatory vendor integration into digital systems, and training are proposed. Long-term recommendations include separation of domestic and international traffic flows, development of real-time logistics dashboards, and periodic tariff revision. Implementing these strategies is expected to enhance operational efficiency, reduce idle times, and ensure sustainable port operations.

Keywords:

port, tariff, container, operation, logistic

Introduction

Batu Ampar Port is the main port on Batam Island and serves as a critical gateway for international trade and logistics, particularly for the distribution of import and export goods. Strategically located within the Free Trade Zone (FTZ), the port plays a vital role in supporting regional and national economic activities. The port's operations encompass handling containerized cargo, general cargo, and domestic distribution, positioning it as a pivotal hub in Indonesia's maritime supply chain. Despite its strategic location, Batu Ampar Port faces significant challenges in ground transportation connectivity and overall operational efficiency. Key issues identified include container truck congestion, inadequate distribution infrastructure, and a lack of fully integrated information systems linking the port, trucking operators, and service users. These inefficiencies contribute to prolonged

To cite this article: H. B. Prasetyo S, A. S. Syihabuddin, M. H. Maulana, S. P. Putra, M. R. R. Putra (2025). Efficiency Of Land Transport Connectivity In Relation To Port Tariff Structure In Batu Ampar. *Journal of Collaborative Industrial Management*, vol(1)

* Corresponding author: hansblix@gmail.com
<https://publikatif.com/index.php/jcim>

waiting times, increased operational costs, and limited capacity for handling the growing volume of trade.

Tariff structures at Batu Ampar Port are regulated under the Head of BP Batam Regulation (PERKA) No. 4 of 2023, which revises the earlier PERKA No. 27 of 2021. For example, the standard tariff for a 20-foot container for export and import activities is set at IDR 603,000, applicable over a 24-hour period without differentiation for operational hours. While this tariff is relatively low compared to other ports, such as Tanjung Priok (~IDR 1,000,000) and Singapore (~US\$99), it has implications for the port's long-term sustainability and capacity to invest in infrastructure modernization. Low tariffs are intended to enhance competitiveness, yet they restrict opportunities for strategic investments in facilities, heavy equipment, and digital systems like the Batam Terminal Operating System (BTOS) and Tracking Management System (TMS).

Operational inefficiencies are compounded by structural issues in the distribution network. For instance, domestic vessel mooring and anchorage services are charged at only IDR 80 per GT per etmal and IDR 87 per GT per visit, respectively. Such rates are insufficient to cover operational costs and support the development of digital platforms, slot booking systems, and advanced scheduling tools. Additionally, the disparity in digital system adoption between private trucking operators—who often rely on semi-manual processes using Excel, WhatsApp groups, and conventional GPS tracking—and the port authority, which implements BTOS and TMS, creates gaps in coordination, monitoring, and service quality.

Previous studies highlight the importance of transparent tariff structures and integrated operational systems in enhancing port efficiency. Kurniawan and Wibowo (2018) emphasize that clarity in tariffs and service speed are critical indicators for logistics efficiency, while Siregar (2019) stresses the role of integrated information systems between ports, trucking companies, and service users. Wicaksono (2020) demonstrates that discrepancies between tariffs and service quality can impede national logistics efficiency, and Putri and Nugroho (2021) argue that tariff structures directly influence turnaround time and operational costs. Meanwhile, Raharjo (2022) highlights the necessity of adaptive operational management to accommodate dynamic port conditions.

Building on these insights, this study aims to evaluate the effectiveness of Batu Ampar Port's tariff structure under PERKA 2023 in supporting ground transportation efficiency. The research focuses on identifying operational bottlenecks, assessing the impact of tariffs on truck idle times and queue lengths, and proposing strategic solutions to enhance the integration of digital systems and overall logistics service quality. The findings are intended to inform both policy improvements and operational strategies to strengthen the sustainability and competitiveness of Batu Ampar Port.

Method

This study employed a mixed-methods research design, combining quantitative operational data analysis with qualitative interviews to capture both measurable performance indicators and contextual insights from stakeholders. The research framework focuses on understanding how the tariff structure under PERKA 2023 influences operational efficiency, digital system integration, and logistical performance at Batu Ampar Port.

1. Data Collection

a. Secondary Data:

- Official regulatory documents, including PERKA BP Batam No. 4 of 2023 and its annexes, were reviewed to understand the applicable tariff structures for container handling, mooring, anchorage, and storage services.
- Comparative tariff data from other ports, such as Tanjung Priok, Tanjung Perak, and Singapore, were collected to provide benchmarking context.
- Historical operational data from the port, including container volumes, peak hours, queue lengths, and truck idle times, were obtained from official port reports and system logs (BTOS and TMS).

b. Primary Data:

- Semi-structured interviews were conducted with key stakeholders, including representatives from the port authority (Persero), private trucking companies, and cargo owners.
- Observations were carried out to document real-time operational practices, coordination methods, and the use of digital tools, such as BTOS, TMS, MySpill, and AGS.
- Data collected included operational processes for container receiving, storage, distribution, coordination methods, and evaluation practices.

2. Operational Assessment

- Operational performance was evaluated by analyzing truck idle times, container queue lengths, and throughput efficiency.
- A comparative assessment was performed between private trucking operators, who rely on semi-manual systems (Excel, WhatsApp, GPS), and Persero-managed operations, which utilize fully digitalized platforms.
- The integration of digital systems, effectiveness of slot booking, and responsiveness to operational disruptions were analyzed to determine gaps and potential improvements.

3. Data Analysis

- Quantitative data, such as truck idle times, queue lengths, and container throughput, were analyzed using descriptive and inferential statistics to identify patterns and performance trends.
- Qualitative interview data were coded thematically to extract insights on operational challenges, coordination inefficiencies, and perceptions of tariff adequacy.
- Cross-analysis of quantitative and qualitative findings was conducted to evaluate the relationship between tariff structures, operational efficiency, and system integration.

By combining regulatory review, field data collection, and operational performance analysis, this study provides a comprehensive assessment of how tariff structures influence the efficiency and sustainability of logistics operations at Batu Ampar Port. The methodological approach allows for both empirical measurement and contextual understanding, which are essential for formulating evidence-based recommendations.

Results and Discussion

Operational Challenges at Batu Ampar Port

Batu Ampar Port faces several operational challenges that reduce the efficiency of ground transportation connectivity. The main issues identified are:

1. Low Tariffs and Limited Revenue:

- The CHC tariff of IDR 603,000 per 20-foot container, along with mooring and anchorage fees (Rp 80 per GT per etmal, Rp 87 per GT per visit), is aimed at maintaining cost competitiveness against regional ports such as Singapore and Tanjung Priok.
- However, this low tariff limits the port's capacity to reinvest in equipment modernization and internal infrastructure. This contributes to bottlenecks, delayed handling, and extended idle times for trucks.

2. High Truck Idle Time and Queues:

- Observations show that during peak hours (08.00–09.00 and afternoon departures of passenger ships such as Pelni), the number of trucks waiting can exceed 20 units, resulting in significant idle time.
- High idle time leads to longer lead times for container delivery, increasing logistics costs and reducing overall operational efficiency.

3. Incomplete Digital Integration:

- The port authority has implemented BTOS and TMS systems to manage container flows, yard status, and truck scheduling.
- Private trucking vendors, however, still rely heavily on manual or semi-manual systems such as Excel, WhatsApp, and GPS tracking.
- This partial integration reduces the effectiveness of digital coordination, delays information sharing, and hinders rapid decision-making during peak operations or equipment failures.

4. Infrastructure and Traffic Management Constraints:

- The internal port distribution lanes are underdeveloped, and the planned one-way system is not fully operational.
- Limited internal lanes and a lack of physical separation between domestic and international containers exacerbate congestion during peak times.

5. Coordination and Communication Gaps:

- Although the port provides forums for stakeholder communication, real-time data such as ETA of vessels, yard conditions, and truck status are not fully integrated.
- These gaps make it difficult to manage distribution effectively, particularly when unplanned events or technical disruptions occur.

Quantitative Analysis

Truck Idle Time and Throughput:

- Based on field data, truck idle times at Batu Ampar Port average 1–2 hours for private operators and 2–3 hours for Persero-managed operations during peak periods.
- The port handles approximately 600,000 TEUs per year, which is substantially lower than Tanjung Priok (>5 million TEUs/year) and Singapore (>37 million TEUs/year).
- Lower throughput is partly due to manual coordination, lack of digital adoption, and insufficient internal lane capacity.

Tariff Comparison and Implications:

- Batu Ampar's CHC rate of IDR 603,000 per 20-foot container is 15% lower than Tanjung Priok (IDR 719,000) and dramatically lower than Tanjung Perak (IDR 2,610,000) and Singapore (IDR 3,640,000 equivalent).
- The low tariff generates a competitive advantage in attracting trade but constrains revenue for reinvestment, limiting improvements in digital systems, yard equipment, and operational infrastructure.

Qualitative Insights

Vendor Perspective:

- Private trucking operators report reliance on manual coordination due to insufficient access to BTOS and TMS.
- Manual systems lead to errors in slot booking, miscommunication, and uncoordinated container pick-ups, increasing wait times and reducing productivity.

Persero Perspective:

- Port authorities implement digital monitoring, perform routine operational evaluations, and propose contingency solutions such as equipment rentals from third-party vendors.
- However, effectiveness is hampered by the low adoption rate of digital systems among private vendors, highlighting the need for mandatory integration and training.

System Integration:

- Full digital integration would allow real-time tracking of truck positions, container locations, and vessel ETAs.
- Comparative analysis shows that ports like Singapore achieve high operational efficiency through fully integrated systems, reduced idle time, and coordinated stakeholder networks.

Comparative Analysis with Regional Ports

Aspect	Batu Ampar	Tanjung Priok	Tanjung Perak	Singapore
CHC 20 Feet	603,000	719,000	2,610,000	3,640,000
TEU Volume	600,000	>5 million	>3 million	>37 million
Digital Integration	Partial (BTOS, TMS, MySpill, AGS)	Medium–High	Medium	Very High (real-time, fully integrated)
Truck Idle Time	High	Medium	Medium–High	Low
Stakeholder Coordination	Low	Medium–High	Medium	Very High
Infrastructure Investment	Low	High	High	Very High

This table shows that Batu Ampar’s low tariff and partial digital adoption directly correlate with high idle times and operational inefficiencies compared to regional and international peers.

Strategic Recommendations

Short-Term:

1. Dynamic Tariff Implementation: Adjust tariffs based on peak/off-peak periods and container volume to optimize throughput and reduce congestion.
2. Mandatory Vendor Digital Integration: Enforce BTOS and TMS adoption for all trucking vendors to minimize manual coordination and improve real-time tracking.
3. Training and Capacity Building: Provide workshops and simulations to accelerate adoption of digital platforms and enhance operational readiness.

Long-Term:

1. Separation of Domestic and International Lanes: Redesign traffic flow to prevent congestion and improve throughput.
2. Real-Time Logistics Dashboard: Develop a web-based dashboard integrating BTOS, MySpill, AGS, and GPS tracking for enhanced decision-making.
3. Periodic Tariff Revision: Adjust tariffs annually based on operational costs, inflation, and benchmarking against regional ports to ensure sustainable service quality.

Socio-Economic Impact

- Social: Reduced truck queues and idle times improve working conditions for drivers and port operators.

- **Economic:** Increased throughput and efficiency lower logistics costs, shorten lead times, and improve service frequency.
- **Sustainability:** Balanced tariff structure combined with digitalization enables long-term financial stability and investment in infrastructure and technology.

Conclusion

Batu Ampar Port has a strategic role in supporting national logistics, but its operational efficiency is constrained by low tariffs, limited digital integration, and inadequate infrastructure. Current tariffs, while competitive in attracting trade, restrict investment in modern equipment and digital systems, contributing to high idle times and operational bottlenecks. The study demonstrates that operational improvements require a holistic approach: integrating trucking vendors into digital systems, adopting dynamic tariffs, separating domestic and international traffic flows, and developing real-time logistics dashboards. These measures are expected to enhance efficiency, reduce congestion, and create a sustainable port operation model. Periodic evaluation and tariff adjustments aligned with operational costs, inflation, and regional benchmarks are necessary to ensure both competitiveness and financial sustainability. With these interventions, Batu Ampar Port can evolve into an efficient, adaptive, and technology-driven logistics hub, capable of supporting Indonesia's growing trade demands.

References

- [1] Badan Pengusahaan Kawasan Perdagangan Bebas dan Pelabuhan Bebas Batam, *Perubahan Kedua atas Perka BP Batam Nomor 27 Tahun 2021: Pengelolaan Tarif Layanan dan Tata Cara Administrasi Keuangan Pelabuhan*, Batam, Indonesia, 03-Agustus-2023.
- [2] H. Siregar, "Peran Integrasi Sistem Informasi dalam Efisiensi Rantai Pasok Pelabuhan," *Jurnal Ilmu Logistik*, vol. 4, no. 1, pp. 45–53, 2019.
- [3] A. Wicaksono, "Pengaruh Struktur Tarif Pelabuhan terhadap Efisiensi Logistik di Pelabuhan Tanjung Priok," *Jurnal Logistik dan Maritim Indonesia*, vol. 3, no. 1, pp. 88–96, 2020.
- [4] Asosiasi Logistik Indonesia, *Studi Tarif Pelabuhan Nasional*, Jakarta, Indonesia: ALI, 2021.
- [5] Badan Pengusahaan Batam, *Peraturan Kepala BP Batam Nomor 4 Tahun 2023 tentang Pengelolaan Tarif Layanan Pelabuhan*, Batam, Indonesia: BP Batam, 2023.
- [6] Badan Pengusahaan Batam, *Surat Edaran Nomor 17 Tahun 2023 tentang Penyesuaian Tarif Jasa Kepelabuhanan di Batu Ampar*, Batam, Indonesia: BP Batam, 2023.
- [7] R. Kurniawan and A. Wibowo, "Transparansi tarif pelabuhan dan efisiensi layanan distribusi," *Jurnal Sistem Transportasi*, vol. 6, no. 2, pp. 77–84, 2018.
- [8] D. Putri and T. Nugroho, "Pengaruh struktur tarif terhadap kecepatan layanan di Pelabuhan Tanjung Perak," *Jurnal Transportasi Maritim*, vol. 10, no. 2, pp. 123–134, 2021.
- [9] B. Raharjo, *Manajemen Operasi Pelabuhan*, Yogyakarta, Indonesia: Deepublish, 2022.
- [10] H. Siregar, "Peran integrasi sistem informasi dalam efisiensi rantai pasok pelabuhan," *Jurnal Ilmu Logistik*, vol. 4, no. 1, pp. 45–53, 2019.
- [11] A. Wicaksono, "Pengaruh struktur tarif pelabuhan terhadap efisiensi logistik di Pelabuhan Tanjung Priok," *Jurnal Logistik dan Maritim Indonesia*, vol. 3, no. 1, pp. 88–96, 2020.
- [12] Pelindo, *Skema Tarif Container Handling Pelabuhan Tanjung Perak Tahun 2023*, Surabaya, Indonesia: IPC, 2023.
- [13] Pelindo, *Peraturan Kepala Pelabuhan Indonesia Nomor 27 Tahun 2021 tentang Penetapan Tarif CHC di Pelabuhan Tanjung Priok*, Jakarta, Indonesia: IPC, 2021.
- [14] PSA International, *Tariff Schedule of Container Handling at PSA Terminals Singapore*, Singapore, 2023.