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JENIS ARTIKEL: ARTIKEL PENELITIAN

Operational performance of a port business entity under a concession agreement: Evidence from PT Batu Alam Makmur, Banten

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ABSTRAK

Penelitian ini mengevaluasi kinerja operasional Terminal PT Batu Alam Makmur (BAM) dalam konteks konsesi pelabuhan yang dimulai pada 21 April 2022. Studi kasus kualitatif menggunakan triangulasi data historis 2016, perjanjian konsesi, dokumen aset, dan laporan kinerja Januari 2026. Waktu tunggu historis tiga jam dibandingkan dengan 0,23 jam (luar negeri) dan 0,48 jam (dalam negeri) pada Januari 2026. Namun, rasio effective time terhadap berthing time hanya 48,43% dan 36,88%, di bawah acuan 80%. Berth occupancy ratio meningkat dari 60% menjadi 87%, sedangkan kesiapan alat berubah dari 90% menjadi 88%. Konsesi memiliki jangka waktu 16 tahun dengan imbalan empat persen dari pendapatan bruto. Temuan menunjukkan perbaikan waktu tunggu disertai tantangan produktivitas waktu sandar dan pemanfaatan kapasitas. Perbedaan periode dan definisi data membatasi kesimpulan kausal. Rekomendasi mencakup pencatatan idle time, perencanaan tambatan, perawatan alat, dan pelaporan indikator yang konsisten.

Kata Kunci: konsesi pelabuhan, kinerja terminal, okupansi dermaga, waktu tunggu.

ABSTRACT

This study evaluates the operational performance of PT Batu Alam Makmur (BAM) in the context of a port concession commencing on 21 April 2022. A qualitative case study triangulates 2016 historical indicators, concession documents, asset records, and the January 2026 terminal performance report. Historical vessel waiting time was three hours, compared with 0.23 hours for international and 0.48 hours for domestic services in January 2026. However, effective-time-to-berthing-time ratios were 48.43% and 36.88%, below the 80% benchmark. Berth occupancy rose from 60% to 87%, while equipment readiness changed from 90% to 88%. The concession runs for 16 years with a fee of 4% of gross revenue. The findings indicate lower reported waiting times alongside persistent challenges in productive berth time and capacity utilization. Differences in observation periods and reporting definitions preclude causal attribution to the concession. Recommended actions include systematic idle-time recording, berth planning, equipment maintenance, and consistent performance reporting.

Keywords: *berth occupancy, port concession, terminal performance, waiting time.*

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INTRODUCTION

Ports are critical interfaces in maritime logistics, where vessel arrivals, berth capacity, cargo handling and institutional arrangements jointly shape service quality. The landlord-port framework separates public oversight from terminal operation, but concession contracts alone do not demonstrate operational efficiency [1], [2], [3]. Port performance must therefore be evaluated through multiple, mutually reinforcing indicators rather than a single measure of throughput [4], [5]. A concession can align private investment with public objectives, provided that contractual incentives, monitoring and asset accountability are sufficiently clear [6], [7], [8]. Agency problems arise when the operator has better information about costs, activity and maintenance than the concession authority [9]. Performance monitoring and revenue reconciliation help address this information asymmetry.

At BAM, the concession commenced on 21 April 2022 for 16 years with a fee of 4% of gross revenue. The 2016 historical record provides a pre-concession reference, whereas January 2026 reports service-specific performance after commencement. These sources offer a useful but temporally asymmetric comparison. This article assesses the documented indicators, interprets the concession governance arrangements and identifies operational priorities without attributing observed differences solely to the contract.

RESEARCH METHODOLOGY

The study adopts an applied qualitative case-study design [10]. The unit of analysis is BAM general-terminal operations in Banten. The documentary corpus comprises the Banten Port Master Plan historical statistics for 2016, the 2022 concession agreement, 2024 state-asset records, reconciliation information and BAM's January 2026 terminal performance report (Ministry of Transportation, 2024; KSOP Banten & PT BAM, 2022; Directorate General of Sea Transportation, 2024; PT BAM, 2026). Evidence was condensed into a source-indicator matrix, classified by vessel service, berth productivity, capacity use, equipment readiness and governance, and interpreted through cross-document triangulation [11], [12]. Descriptive percentage-point differences and illustrative relative changes were calculated only for documented observations. The pre- and post-concession periods differ in duration, service mix and potentially measurement definitions; no statistical causal test, time-series model or difference-in-differences estimator was performed.

Waiting time (WT) denotes the reported interval before service; approach time (AT) denotes the reported approach interval. Berth occupancy ratio (BOR) denotes occupied berth time relative to available berth time, and ET/BT is effective cargo-handling time divided by total berthing time, expressed as a percentage. These are working definitions for interpretation; original timestamp conventions, eligible service calls and denominator rules were not independently verified. The 2016 annual reference and January 2026 monthly, service-specific indicators must therefore not be treated as a matched longitudinal sample.

RESULTS AND DISCUSSION

Concession characteristics and historical baseline

The 2016 baseline recorded 482 vessel calls and 1,871,497.513 tonnes of cargo. Waiting time was three hours, berth occupancy was 60%, and equipment readiness was 90%. The concession dossier specifies a 16-year term and a gross-revenue fee of 4%. The asset record reports an acquisition value of approximately IDR 88.78 billion; this figure should not be interpreted as market value or new post-concession investment [13], [14].

Waiting time and approach time

The January 2026 report shows waiting times of 0.23 hours for international and 0.48 hours for domestic vessel services; corresponding approach times were 1.08 and 1.36 hours. Relative to the historical three-hour reference, the descriptive waiting-time differences are 92.33% and 84.00%, respectively. These are cross-period comparisons, not estimated concession effects. Variability in arrivals and service times can alter congestion even at similar average utilization [15].

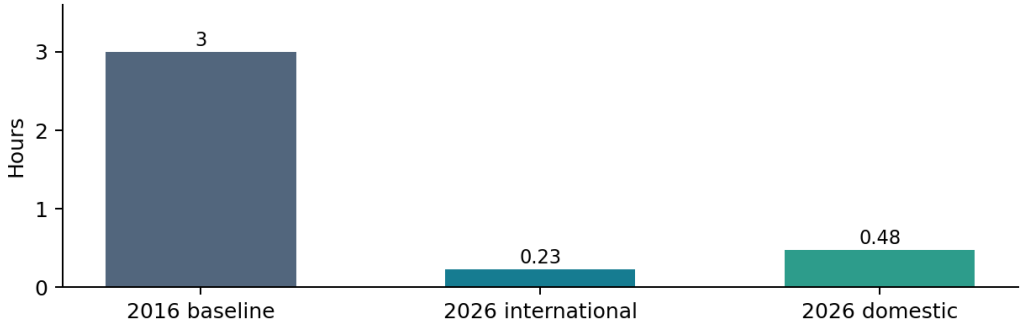


Figure 1. Reported vessel waiting times: historical and January 2026 observations (different reporting periods).

Berth-time effectiveness and facility utilization

Despite short reported waiting times, the effective-time-to-berthing-time (ET/BT) ratios were 48.43% for international services and 36.88% for domestic services. Against the reported 80% benchmark, the gaps are 31.57 and 43.12 percentage points. Such discrepancies indicate that reducing queue time does not necessarily increase productive berth time. Operational diagnosis should distinguish cargo unavailability, equipment interruptions, shift changes, access constraints and other idle-time categories [16], [17].

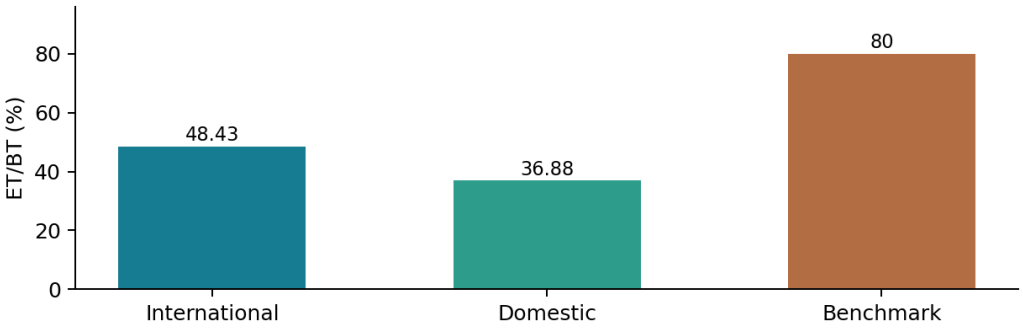


Figure 2. January 2026 effective-time-to-berthing-time ratios compared with the reported benchmark.

Berth occupancy rose from the 2016 reference of 60% to 87% in January 2026. High occupancy signals intensive asset use but can reduce resilience to variability in arrival patterns and handling durations [3], [15]. Equipment readiness was 88% in January 2026 compared with 90% historically, a two-percentage-point difference. The combination of high berth occupancy and low ET/BT merits detailed event-level analysis rather than an immediate conclusion that more berth capacity is needed. In January 2026, the reported BOR and equipment readiness were 87% and 88%, respectively. The two ET/BT gaps (31.57 and 43.12 percentage points) indicate the need to investigate the composition of nonproductive berth time rather than assume the concession caused the observed changes. Monthly monitoring should retain the service category and number of calls, the underlying time stamps, berth availability, equipment downtime, and the reason for idle intervals.

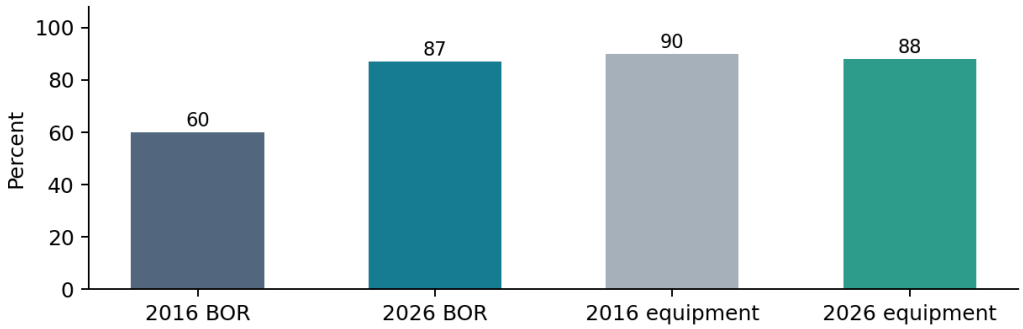


Figure 3. Historical and January 2026 berth occupancy and equipment readiness (percentage).

Summary of documented operational indicators

Table 1. Comparative evidence and interpretation

Indicator	2016 reference	January 2026	Interpretation
Waiting time	3.00 h	0.23 h INT; 0.48 h DOM	Lower reported times; limited comparability
Approach time	Not established	1.08 h INT; 1.36 h DOM	Post-concession observation only
ET/BT	Not established	48.43% INT; 36.88% DOM	Below 80% benchmark
Berth occupancy	60%	87%	+27 percentage points
Equipment readiness	90%	88%	−2 percentage points

Concession accountability and managerial implications

A revenue-linked fee requires transparent gross-revenue definitions, verifiable transaction records and periodic reconciliation. The presence of concession and asset documentation establishes a formal governance framework, but the documents alone do not establish the effectiveness of all monitoring controls [1], [18], [19]. The 4% concession rate should therefore be interpreted alongside operational obligations, maintenance performance and auditable revenue reporting. The first operational priority is to record and classify nonproductive berth intervals by vessel, commodity, shift and berth. The second is to monitor berth occupancy together with arrival variability, waiting time and ET/BT; the third is to link equipment downtime to preventive maintenance plans. A monthly dashboard should retain consistent definitions, disaggregate international and domestic services, and distinguish missing observations from genuine zero activity [20], [4], [5]. The findings should not be read as proof of concession-induced improvement. The baseline is an annual historical reference from 2016, while the later figures describe a single month in 2026; other changes in traffic, cargo mix, reporting practices and infrastructure are uncontrolled.

A future longitudinal evaluation should use comparable monthly observations before and after April 2022 and, where feasible, an appropriate comparison terminal [21]. Port governance research addresses concession arrangements, authority–operator relations, and terminal performance as distinct aspects [22], [23], [24]. These studies provide a comparison framework; their settings and methods do not establish the validity or magnitude of the findings of the present study. Research on port operations addresses pilotage scheduling, berth allocation, waiting time, and vessel arrival coordination [25], [26], [27], [28]. These studies provide a comparison framework; their settings and methods do not establish the validity or magnitude of the findings of the present study. Research on port operations addresses pilotage scheduling, berth allocation, waiting time, and vessel arrival coordination [29], [30], [31], [32], [33], [34], [35], [36], [37]. The research settings and study designs differ. These publications provide context for interpreting the topic. They do not independently validate the results of the present study.

CONCLUSION

The BAM case documents a substantial descriptive reduction in reported vessel waiting time between the 2016 historical reference and January 2026, but this coexists with ET/BT ratios below the 80% benchmark, berth occupancy of 87%, and equipment readiness of 88%. The 16-year concession and 4% gross-revenue fee provide a formal contractual framework supported by asset and reconciliation records. The central managerial finding is that short waiting times should not obscure low productive berth-time shares and potentially constrained capacity buffers. Improvement should prioritize systematic idle-time diagnosis, berth scheduling, maintenance and transparent monthly KPI reporting. Given the unequal comparison periods and possible differences in definitions, these observations cannot establish a causal effect of the concession. The recommended sequence is to establish consistent KPI definitions and event-level records, diagnose idle-time categories, and then assess scheduling and maintenance interventions using comparable monthly observations. The present evidence does not identify the causal effect of the concession or the operational benefit of any untested intervention.

DECLARATIONS AND ADDITIONAL INFORMATION

ORIGINALITY AND EXCLUSIVE SUBMISSION

The authors are requested to confirm that the manuscript is original, has not been published and is not under consideration elsewhere.

AUTHOR CONTRIBUTIONS

Fauhidzi Zulistian: conceptualization, methodology, formal analysis, writing – original draft. Syairi Anwar; Rudi Harun Irwansyah; Rahmat Santoso; Riski Putra Ananta; Nurul Hikmah: investigation, validation and writing – review & editing.

CONFLICT OF INTEREST

No competing interests have been reported.

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ETHICAL APPROVAL

This study uses historical operational records, concession documents, asset records and terminal performance reports. Ethics approval details are not reported.

INFORMED CONSENT

No participant recruitment is reported for this records-based or technical study.

DATA AVAILABILITY

The study draws on historical operational records, concession documents, asset records and terminal performance reports. Access to underlying material should be requested from the corresponding author and is subject to confidentiality and applicable permissions.

USE OF ARTIFICIAL INTELLIGENCE

ChatGPT (OpenAI) assisted with language editing, consistency checks, structure and formatting. The authors remain responsible for the data, interpretation and scientific content.

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