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Prioritizing Cargo-Handling Quality Dimensions for B2B Customer Continuance Intention in Container Ports: An Importance–Performance and Relative-Importance Approach

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ABSTRACT

Although research on port service quality has consistently shown that operational quality is associated with customer-related outcomes, it provides comparatively limited guidance on which cargo-handling dimensions should be preserved, accelerated, or improved first. This study develops a priority-based assessment of cargo-handling operational quality by examining how operational speed, accuracy and error reduction, operational safety, and equipment availability and readiness should be ranked in relation to the continuance intention of organizational customers in a container-port setting. A cross-sectional survey was conducted among representatives of organizational customers directly involved in container loading and unloading activities at Imam Khomeini Port, yielding 110 valid responses. The analytical framework combined dimension-level multiple regression, Pratt-based relative-importance decomposition, importance–performance analysis and an action-priority score that integrated each dimension's contribution to explained variance with its remaining performance gap. Because all variables were measured contemporaneously in a cross-sectional survey, the resulting importance estimates are interpreted as outcome-specific statistical associations rather than causal effects**.** The findings showed that the four cargo-handling dimensions jointly explained 59.5% of the variance in B2B customer continuance intention. Operational speed recorded the largest standardized regression coefficient (β = 0.32) and the highest relative-importance share (35.4%), followed by equipment availability and readiness (β = 0.29; relative-importance share = 29.2%). When relative importance was considered alongside the remaining performance gaps, operational speed retained the highest action priority, followed by equipment readiness, operational safety, and accuracy and error reduction. Notably, although accuracy and error reduction received the lowest perceived performance score, its comparatively weaker contribution to continuance intention prevented it from emerging as the most urgent improvement priority. By moving beyond the question of whether cargo-handling quality is associated with customer continuance intention, this study shows how individual operational dimensions can be translated into a defensible and practically meaningful sequence of managerial priorities. The proposed framework distinguishes statistical importance, perceived performance and improvement urgency, thereby providing port managers with a transparent basis for allocating limited operational resources while extending port service-quality research toward a more actionable and outcome-oriented approach to prioritization.

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1. Introduction

Container-port customers do not experience service quality as an abstract managerial construct. They experience it through a sequence of operational events: a vessel is berthed or delayed, cargo-handling equipment is available or out of service, containers are moved accurately or exposed to error, and safety procedures either sustain or interrupt the flow of operations. For organizational customers, these events are commercially consequential because they affect schedule reliability, inland coordination, inventory exposure, contractual performance and the quality of service delivered to downstream clients. Cargo-handling quality is therefore not merely a technical feature of terminal operations; it forms part of the value proposition through which a port retains business relationships.

A substantial body of port research has established that customers evaluate ports through multiple dimensions of service quality. Evidence from Singapore, Korea, Vietnam, Tanzania, West Africa, Nigeria, Kuwait and Gulf-region seaports shows that port users assess service through combinations of responsiveness, reliability, resources, process quality, security and operational performance [1–9]. Although these studies differ in their geographical settings, stakeholder groups and measurement designs, they converge on a central point: port service quality becomes meaningful when it is translated into outcomes that customers can observe and incorporate into their commercial decisions.

This customer-outcome perspective has increasingly extended beyond satisfaction alone. Port security and service quality have been examined in relation to both satisfaction and loyalty, while recent container-port research has connected alternative configurations of service conditions with satisfaction, customer loyalty and referral intention [10–12]. Related research in liner shipping similarly associates service characteristics and digital service quality with customer satisfaction and e-loyalty [13, 14]. At terminal level, digital adoption and service quality have also been examined in relation to strategic alliances and longer-term business sustainability [15]. Collectively, this literature supports the view that future cooperation is shaped not merely by an overall impression of a port, but by repeated evidence that its operating system can provide dependable and commercially usable service.

The strategic relevance of operational quality has intensified as ports adopt smart technologies, integrated information systems and new forms of process automation. Smart-port frameworks and reviews emphasize the growing role of digital connectivity, real-time information, data-driven coordination and technology-enabled operational control [16–18]. Empirical research has further examined how process optimization, smart-port design, post-pandemic success factors, ICT innovation and port integration relate to operational efficiency and service performance [19–23]. These developments expand the range of interventions available to port managers, but they do not remove the need for prioritization. On the contrary, technological development increases the number of possible investments, while budgets, maintenance capacity, workforce capability and managerial attention remain limited.

The practical difficulty is that operational efficiency, service quality and customer value do not necessarily improve together. Higher technical efficiency does not automatically produce a higher perceived service level [24], and aggregate performance scores may conceal the operational mechanisms through which customers experience delay, equipment unreliability, handling error or disruption. Terminal performance has therefore been examined through configurational models, data mining, simulation, equipment-efficiency assessment, dynamic efficiency analysis and international benchmarking [25–31]. Although this research demonstrates the multidimensional character of terminal performance, it also reveals a managerial gap: operational indicators must be translated into an ordered set of customer-relevant improvement priorities.

Existing prioritization studies provide an important foundation for addressing this gap. Port and terminal researchers have used multi-criteria decision-making, fuzzy approaches and importance-performance analysis to evaluate intangible resources, assess service quality, rank terminal operators, identify terminal requirements and examine port or terminal choice [32–38]. Other studies show that terminal choice, port attractiveness and port competitiveness are influenced by combinations of service, infrastructure, operational and strategic attributes from the perspectives of shipping companies and other port users [39–42]. However, these streams have not fully resolved a narrower question faced by cargo-handling managers: when the objective is to protect B2B customer continuance intention, which operational-quality dimensions should be improved first, and which should be protected because they already perform comparatively well but remain strategically important? This question is particularly important because the four dimensions examined in this study have distinct operational meanings. Speed affects vessel turnaround, berth use, cargo flow and inland synchronization. Accuracy limits rehandling, misplacement, documentation errors and cargo-related claims. Safety protects personnel, assets and operational continuity. Equipment readiness determines whether installed capacity is actually available during the operating window in which customers require it. Research on

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operational risk, dangerous-goods handling and port infrastructure safety confirms that service continuity depends on the effective control of uncertainty, hazardous conditions and infrastructure vulnerability [43–45]. Nevertheless, the existence of operational risk does not by itself show how organizational customers weight each dimension when deciding whether to continue, expand or prefer a commercial relationship with a port. Importantly, the present study does not claim that speed, accuracy, safety, or equipment readiness are theoretically novel dimensions of port service quality, nor does it assume an a priori hierarchy among them. These dimensions represent established and managerially actionable facets of cargo-handling performance. The conceptual proposition is deliberately more limited: organizational customers repeatedly observe these operational conditions and may use them as signals when forming a forward-looking judgement about continued commercial cooperation. Accordingly, the study expects each dimension to be positively associated with reported continuance intention, whereas the relative strength of those associations is treated as context-dependent and is estimated empirically. Thus, any finding that speed is more important than safety, or that equipment readiness is more important than accuracy, is an empirical result in this setting rather than a universal theoretical ordering. The conceptual link between operational quality and continuance intention is consistent with the broader service-quality–behavioral-intentions literature, which connects customers' evaluations of service performance with intentions concerning continued patronage and relationship maintenance [46]. It is also consistent with continuance research that distinguishes a future-oriented intention to continue from evaluations of current or past experience [47]. In the present B2B port context, these perspectives are used to justify the expected association between experienced operational quality and continuance intention; they are not used to claim temporal or causal effects that cannot be established with cross-sectional data.

The present article addresses this problem by combining dimension-level regression, relative-importance analysis and importance-performance analysis. Rather than asking only whether cargo-handling operational quality predicts B2B customer continuance intention, it examines how speed, accuracy/error reduction, operational safety and equipment availability/readiness should be ranked when managerial resources are constrained. The empirical setting is Imam Khomeini Port, where organizational customers interact directly with container loading and unloading operations. The setting therefore allows the analysis to focus on the operational encounters through which port service quality becomes visible to business users.

The contribution of this article therefore does not lie in proposing new cargo-handling quality dimensions. Rather, it lies in how established dimensions are connected to a specific future-oriented B2B outcome and translated into managerial priorities. First, the study reframes cargo-handling quality as an outcome-specific resource-allocation problem rather than solely as a service-assessment or prediction problem. Second, it distinguishes three quantities that are often conflated in prioritization exercises: statistical importance relative to a specified customer outcome, current perceived performance, and resulting improvement urgency. Third, it develops a transparent procedure for combining outcome-derived relative importance with remaining performance gaps while preserving the distinction between discretionary improvement priorities and non-negotiable safety, accuracy, engineering, and regulatory requirements.

2. Literature Review and Analytical Positioning

2.1 Container-port operational quality and B2B customer continuance intention

Port service quality is inherently multidimensional. Studies have conceptualized and measured it through different combinations of operational resources, responsiveness, reliability, process effectiveness, security, management quality and customer-facing outcomes [1, 2, 6, 8, 32]. Comparative, national and terminal-level investigations further show that the relative salience of these dimensions can differ across ports, countries and stakeholder groups [4, 5, 7, 9]. Such variation is important because organizational customers do not assess a port in isolation. They evaluate its performance against contractual requirements, alternative gateways, previous service experiences and the reliability expectations of their own supply chains.

Within this broader service construct, cargo handling is the operational core through which customers encounter port performance. The speed of loading and unloading influences berth occupation, vessel turnaround, yard flow and inland handover. Accuracy affects container identification, placement, documentation integrity and the avoidance of rehandling. Safety influences the likelihood of incidents, damage and operational stoppages, while equipment readiness determines whether a terminal can convert its nominal or installed capacity into usable service at the required time. Research on terminal process optimization, operational performance, equipment reliability and equipment efficiency reinforces the importance of these mechanisms [19, 28, 30, 31].

Operational quality also interacts with the changing technological architecture of ports. Smart-port design, digital adoption, ICT innovation and integrated port

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systems can improve visibility, coordination and decision support, but their ultimate value depends on whether they strengthen the service actually experienced by port users [15, 16, 20, 22, 23]. Reviews of smart-port research similarly indicate that digital transformation should be evaluated in relation to operational efficiency, sustainability and service performance rather than technology adoption alone [17, 18]. In the present study, technology is therefore relevant insofar as it improves four customer-visible operational conditions: timely cargo movement, accurate handling, safe execution and equipment availability.

B2B customer continuance intention is treated in this study as a distinct future-oriented relational intention rather than as a synonym for satisfaction, loyalty, or port attractiveness. Satisfaction primarily evaluates the favorability of a customer's current or previous service experience, whereas loyalty is a broader construct that may include attitudinal preference and repeated patronage, and port attractiveness concerns the comparative appeal of a port relative to available alternatives. Continuance intention is narrower and explicitly prospective: it captures whether an organizational customer states that it intends to maintain, expand, or prefer an existing commercial relationship in the future. This distinction changes the interpretation of operational quality in the present study. Speed, accuracy, safety, and equipment readiness are not ranked according to how strongly they contribute to general satisfaction or attractiveness; they are ranked according to their statistical association with a stated intention concerning future cooperation. This conceptualization is consistent with broader continuance research that distinguishes continuance from initial adoption or contemporaneous satisfaction [47], while port and shipping studies demonstrate the relevance of service quality to satisfaction, loyalty, referral intention, and related behavioral outcomes [3, 10–14].

This distinction is important. An organizational customer may report acceptable satisfaction with a recent service encounter while remaining unwilling to deepen or continue the relationship if delays, equipment failures, handling errors or operational uncertainty threaten its wider logistics commitments. Conversely, a port may receive a relatively favorable performance rating on a particular dimension that still requires protection because it remains central to customers' willingness to continue the relationship. The relationship between technical efficiency and perceived service level is not necessarily direct or automatic [24]. An analysis of continuance intention must therefore move beyond average service ratings and identify the specific operational dimensions carrying the greatest strategic weight.

2.2 From broad service quality to actionable operational levers

Broad service-quality frameworks are valuable because they represent the port experience as a system rather than as a single productivity measure. The ROPMIS framework, national and regional port assessments, and studies of logistics service quality demonstrate that customers form evaluations from multiple tangible and intangible service attributes [2, 3, 6, 8]. Configurational evidence further indicates that favorable customer outcomes may arise from different combinations of service conditions rather than from one universally dominant attribute [11]. This systems perspective is theoretically useful, but it can be difficult to translate into a specific terminal-level sequence of interventions. Cargo-handling managers operate at a more focused level of decision-making. They must determine whether the next improvement cycle should reduce vessel and cargo-handling time, strengthen error controls, reinforce safety discipline, or increase the availability and reliability of cranes, yard machinery and supporting equipment. Each intervention requires different resources, competencies and implementation periods. Equipment interventions may involve preventive maintenance, spare-parts availability, replacement planning and downtime escalation. Speed improvements may require process redesign, labor coordination, berth-yard synchronization or improved information exchange. Accuracy improvements may depend on documentation quality, digital visibility and operating discipline. Safety improvements may require better detection capabilities, infrastructure controls, risk assessment and procedural compliance [31, 43–45].

The need for sharper prioritization is also evident in the port-choice and competitiveness literature. Shipping lines and other organizational users assess ports in terms of service quality, operational performance, connectivity, cost, infrastructure and strategic attractiveness [39–42]. Fuzzy and multi-criteria terminal-choice models similarly demonstrate that users weigh several criteria simultaneously when evaluating alternatives [38]. These studies clarify why operational quality matters competitively, but an assessment of overall attractiveness does not automatically reveal which cargo-handling dimension should receive immediate managerial attention.

The operational-performance literature reaches a similar conclusion from a different analytical direction. DEA, DEA–Tobit, simulation, data-mining and configurational studies provide valuable assessments of terminal efficiency and the conditions associated with stronger operational performance [20, 25–29]. Nevertheless, efficiency benchmarking is not equivalent to customer-priority analysis. A terminal may improve a technical performance indicator without materially changing the service attributes that influence

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customers' future cooperation. The observed tension between technical efficiency and service level reinforces the need to connect operational metrics with customer-valued outcomes [24].

Digitalization makes this distinction even more important. Smart-port initiatives, ICT-based innovation, integration within shipping alliances and digital service platforms can strengthen information exchange, visibility and coordination [14, 16, 22, 23]. However, technology should not become an end in itself. Its managerial value lies in its capacity to reduce delay, prevent error, protect safety, improve equipment readiness and strengthen customers' confidence in continued cooperation. The present study consequently adopts an operationally bounded interpretation of port service quality by isolating four dimensions that cargo-handling managers can directly monitor and influence.

2.3 Importance-performance and relative-importance logic

A defensible prioritization framework must distinguish three questions that are frequently conflated. First, how strongly is each operational-quality dimension associated with B2B customer continuance intention? Second, how well is each dimension currently performing from the customer's perspective? Third, where does the combination of strategic importance and remaining performance gap create the greatest need for managerial action? Each question requires a different form of evidence.

Importance-performance analysis is useful because it places strategic importance and perceived performance within the same decision framework. Port studies have applied IPA and related approaches to the assessment of service quality, dedicated-terminal requirements and port-selection factors [33, 36, 37]. Its managerial appeal lies in its ability to distinguish attributes that should be maintained from those requiring improvement. However, the resulting priorities depend substantially on how importance is estimated. Directly stated importance may be affected by response tendencies and limited discrimination between attributes, while rankings based only on mean performance may over-prioritize weak dimensions that have a comparatively limited relationship with the outcome being protected.

Multi-criteria and fuzzy decision-making methods offer another route to weighting and ranking. These approaches have been used to evaluate intangible port resources, rank container-terminal operators, assess service quality and support terminal-choice decisions [32, 34, 35, 38]. They are especially valuable when managerial judgement, uncertainty and multiple heterogeneous criteria must be integrated. However, when customer survey data and a clearly specified behavioral outcome are available, importance can also be derived directly from the empirical relationships between each operational dimension and that outcome. The present article therefore combines regression evidence with a relative-importance decomposition. Standardized regression coefficients indicate the unique predictive contribution of each dimension while the other predictors are held constant. However, when predictors are positively correlated, coefficient-based rankings alone may not fully represent their respective contributions to the explained variance. The relative-importance procedure used in this study addresses this issue by combining each standardized regression coefficient with its zero-order correlation with continuance intention. The resulting values provide an interpretable allocation of explained variance among speed, accuracy/error reduction, operational safety and equipment readiness. The analytical components therefore serve different rather than redundant purposes. Multiple regression estimates the conditional association between each operational-quality dimension and reported continuance intention while the remaining dimensions are statistically controlled. Pratt decomposition then reallocates the model's explained variance across correlated predictors to obtain an outcome-derived measure of relative importance. IPA addresses a different question by placing this importance alongside customers' current performance evaluations. Finally, the action-priority score combines relative importance with the remaining performance gap to produce a decision-oriented ranking. Regression alone cannot identify where performance improvement is most needed, whereas performance scores alone cannot indicate which deficiencies are most strongly associated with the focal customer outcome. Their combination is therefore sequential and decision-driven rather than merely additive.

This approach also differs from conventional multi-criteria weighting. In AHP, fuzzy-MCDM and related port-choice models, weights commonly represent stated preferences, expert judgements, or trade-offs among multiple decision criteria. Here, relative importance is derived from the observed statistical relationship between each operational dimension and one explicitly defined outcome—B2B customer continuance intention. The resulting weights should therefore be interpreted as sample- and outcome-specific empirical importance shares, not as universal port-choice weights or intrinsic values of the four dimensions.

Performance is represented by customers' mean evaluations, transformed to a common 0–100 scale. The remaining performance gap is defined as the distance between the observed performance score and the maximum attainable score. The action-priority score subsequently combines relative importance with that performance gap. A dimension receives a high action priority when it is both strongly connected to

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continuance intention and still has substantial room for improvement.

This combined procedure prevents two common prioritization errors. The first is assuming that the lowest-performing dimension must automatically be the most urgent. A weak performance score indicates room for improvement, but it does not show how strongly that dimension influences the target customer outcome. The second error is treating a comparatively high-performing dimension as already resolved. A dimension may perform relatively well while still requiring protection or further investment because of its substantial strategic importance.

The framework extends the managerial value of previous port-ranking and IPA applications by connecting performance assessment to a specific B2B behavioral outcome [33, 36, 37]. It also complements broader port-service and terminal-choice research by converting customer evaluations into an explicit improvement sequence [6, 11, 38, 39]. The proposed priority ranking is not intended to replace statutory safety standards, engineering requirements or mandatory maintenance obligations. Rather, it provides an evidence-based basis for allocating discretionary managerial attention among operational dimensions that all remain necessary for reliable cargo-handling service.

2.4 Conceptual Framework and Research Questions

The reviewed literature establishes that port users evaluate multiple service dimensions, that technological and operational capabilities affect terminal performance, and that customer satisfaction, loyalty and future-oriented outcomes depend on the quality of service delivered. It also demonstrates that port choice, competitiveness and operational prioritization involve multiple criteria and cannot be inferred from technical efficiency alone. What remains insufficiently developed is a transparent method for ranking cargo-handling quality dimensions specifically in relation to B2B customer continuance intention. The conceptual framework therefore contains two distinct levels. At the substantive level, speed, accuracy/error reduction, operational safety, and equipment availability/readiness are treated as four customer-visible operational conditions that are expected to show positive associations with reported B2B continuance intention. No theoretical rank ordering among these dimensions is imposed. At the decision level, the observed associations are translated into relative-importance shares and then combined with current performance gaps to generate managerial priorities. Theory therefore motivates the inclusion and expected direction of the relationships, whereas the relative ordering of the dimensions is determined empirically in the study context.

Accordingly, the study addresses the following research questions:

RQ1. Which cargo-handling operational-quality dimensions carry the strongest relative importance for B2B customer continuance intention?

RQ2. Which cargo-handling operational-quality dimensions become the highest action priorities after their relative importance is combined with perceived performance gaps?

RQ1 is addressed through dimension-level multiple regression followed by Pratt relative-importance decomposition, allowing the study to estimate how the four dimensions divide the model's explained variance. RQ2 is addressed by combining these relative-importance shares with normalized performance gaps through the importance–performance and action-priority procedures. This explicit mapping ensures that each analytical step answers a distinct part of the research problem. Figure 1 shows conceptual and analytical framework linking cargo-handling operational-quality dimensions, reported B2B customer continuance intention, and action priority.

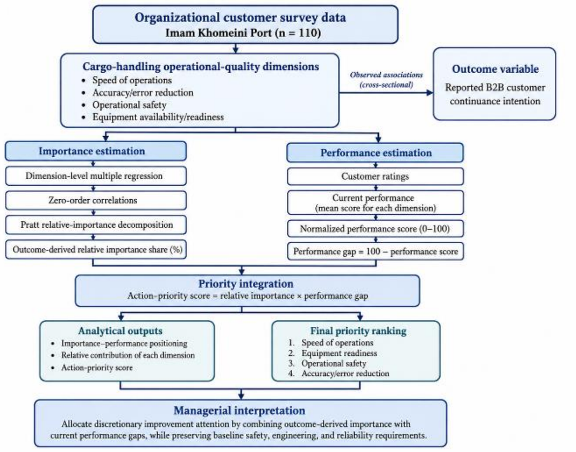

Figure 1. Conceptual and analytical framework linking cargo-handling operational-quality dimensions, reported B2B customer continuance intention, and action priority.

3. Methodology

3.1 Research design, sample and setting

The study used a cross-sectional quantitative survey design. The unit of analysis was the organizational customer of container cargo-handling services at Imam Khomeini Port. Eligible respondents were managers, operations specialists, logistics experts, commercial representatives or other informed personnel whose work required direct interaction with container loading and unloading operations.

Data were collected between 1 March 2026 and 31 May 2026. A total of 145 questionnaires were distributed through direct field contact and secure electronic delivery. Of these, 124 were returned. After removing nine incomplete questionnaires and five questionnaires with uniform response patterns, 110 valid questionnaires remained for analysis. The usable

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response rate was 75.9%, and the valid-response rate among returned forms was 88.7%.

Table 1. The data screening process and the sample formation used in the analysis.

Stage	Number	Percent
Questionnaires distributed	145	100.0
Distributed through field contact	92	63.4
Distributed electronically	53	36.6
Questionnaires returned	124	85.5
Incomplete questionnaires removed	9	6.2
Uniform-response questionnaires removed	5	3.4
Valid questionnaires retained	110	75.9
Valid-response rate among returned forms	110/124	88.7

The valid sample was composed of 84 male respondents (76.4%) and 26 female respondents (23.6%). Most respondents had more than three years of cooperation with the port: 22 respondents reported less than three years, 44 reported three to six years, and 44 reported more than six years. In terms of education, 32 respondents held a bachelor's degree, 64 held a master's degree, and 14 held a doctorate. The organizational profile included shipping companies, maritime transport companies, logistics companies, port operators, importers/exporters and government/other organizations. The design is observational and cross-sectional. Consequently, the analyses estimate contemporaneous associations among respondents reported operational-quality perceptions and their reported continuance intentions; they do not identify temporal ordering or causal effects. References to "importance" throughout the article therefore denote relative statistical importance within the fitted model rather than the causal effect of changing an operational dimension.

3.2 Measures

The questionnaire used a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Cargo-handling operational quality was measured through four two-item dimensions: speed of operations, accuracy/error reduction, operational safety and equipment availability/readiness. B2B continuance intention was measured through six items capturing future cooperation, potential increase in cooperation, preference over alternative ports and long-term cooperation desirability. Operational-quality perceptions and continuance intention were measured within the same survey wave. Continuance intention is therefore a forward-looking stated intention reported contemporaneously with the operational-quality measures, not a subsequently observed retention outcome.

The instrument was reviewed by ten academic and port-industry experts, following the logic of content-validity assessment [48, 49]. The retained 14-item instrument achieved an overall CVR of 0.80 and a CVI of 0.91. Internal consistency and validity diagnostics were then examined before the priority analysis [50–54].

Table 2. The measurement evidence for the constructs used in the article.

Construct	Items	Loading range	Cronbach alpha	CR	AVE
Speed of operations	2	0.86-0.89	0.82	0.87	0.77
Accuracy/error reduction	2	0.84-0.87	0.80	0.85	0.74
Operational safety	2	0.85-0.88	0.81	0.86	0.76
Equipment readiness	2	0.88-0.90	0.84	0.88	0.79
Continuance intention	6	0.73-0.83	0.86	0.89	0.58

3.3 Analytical strategy

The analysis proceeded in four steps. First, construct scores were calculated by averaging the relevant items. Second, mean performance scores were converted from the five-point Likert scale to a 0-100 performance scale. Third, dimension-level regression and Pratt relative-importance decomposition were used to estimate each dimension's contribution to explained variance in continuance intention. Fourth, an action-priority score was calculated by combining relative importance with the remaining performance gap. The action-priority score is intended as a transparent decision index, not as an estimate of the causal return from intervention. Its linear form provides an interpretable ranking under the observed pattern of associations and performance gaps. It does not assume that an equivalent increase in each dimension would generate an equivalent behavioral response. Potential nonlinear, threshold, and asymmetric relationships are therefore treated as an explicit boundary of the present analysis and are revisited in the limitations section.

The measurement and prioritization procedures were based on the following equations.

$$X\_c = (1 / m) \times \Sigma X\_j \quad (1)$$

$$P\_j = [(M\_j - 1) / 4] \times 100 \quad (2)$$

$$G\_j = 100 - P\_j \quad (3)$$

$$r\_jy = \Sigma[(x\_ij - \bar{x}\_j)(y\_i - \bar{y})] / \sqrt{\Sigma(x\_ij - \bar{x}\_j)^2 \times \Sigma(y\_i - \bar{y})^2} \quad (4)$$

$$CI\_i = \beta\_0 + \beta\_1SPD\_i + \beta\_2ACC\_i + \beta\_3SAF\_i + \beta\_4EQP\_i + \varepsilon\_i \quad (5)$$

$$RI\_j = \beta\_j \times r\_jy \quad (6)$$

$$RIS\_j = [RI\_j / \Sigma RI\_j] \times 100 \quad (7)$$

$$APS\_j = RI\_j \times G\_j \quad (8)$$

$$NPS\_j = [APS\_j / \Sigma APS\_j] \times 100 \quad (9)$$

$$f^2 = R^2 / (1 - R^2) \quad (10)$$

In these equations, X_c is the construct score, m is the number of items in the construct, P_j is the normalized performance score for dimension j, M_j is the observed mean score, G_j is the performance gap, r_jy is the

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zero-order correlation between dimension j and continuance intention, CI_i is continuance intention for respondent i, SPD is speed of operations, ACC is accuracy/error reduction, SAF is operational safety, EQP is equipment availability/readiness, β_j is the standardized regression coefficient, ε_i is the random error term, RI_j is the Pratt relative-importance contribution, RIS_j is the relative-importance share, APS_j is the action-priority score, NPS_j is the normalized priority share, and f^2 is Cohen's effect size. All statistical analyses were conducted using IBM SPSS Statistics version 26.0. Spreadsheet calculations were used only to verify composite scores, relative-importance calculations and priority-index arithmetic. For the robustness checks, gender was dummy-coded, education was coded as an ordered educational-level variable, and cooperation duration was coded as an ordered relationship-duration variable. Organization type was retained only as a sample-profile variable because it represents a nominal classification and should not be entered as a single linear covariate.

3.4 Bias control and statistical adequacy

Because all variables were measured through a single survey instrument, common method bias was treated as a methodological risk. Procedurally, responses were anonymous, respondents were informed that there were no right or wrong answers, and operational-quality items were separated from continuance-intention items. Statistically, Harman's single-factor test showed that the first unrotated factor explained 38.6% of the total variance, and full collinearity VIF values ranged from 1.51 to 2.08. These results suggest that common method bias was unlikely to fully explain the observed relationships, although it cannot be ruled out completely in a cross-sectional survey design.

Exploratory factor analysis supported factorability of the item set: KMO = 0.846; Bartlett's test of sphericity, $\chi^2(91) = 842.36$, $p < 0.001$; total variance explained = 76.8%. A Promax rotation check retained the same five-factor structure, with factor correlations ranging from 0.22 to 0.54, minimum primary loading of 0.70 and maximum secondary loading of 0.32.

4. Results

4.1 Construct performance and baseline associations

Table 3 reports the observed mean scores, normalized performance scores and zero-order associations with continuance intention. Equipment readiness had the highest performance score, while accuracy/error reduction had the lowest. Speed had the strongest bivariate association with continuance intention.

Table 3. Descriptive statistics, normalized performance scores, performance gaps, and zero-order correlations with B2B customer continuance intention.

Dimension	Mean	SD	Performance score	Performance gap	r with continuance
Speed of operations	3.82	0.76	70.50	29.50	0.66
Accuracy/error reduction	3.65	0.83	66.25	33.75	0.55
Operational safety	3.74	0.80	68.50	31.50	0.56
Equipment readiness	3.90	0.73	72.50	27.50	0.60

The pattern already shows why a prioritization model is useful. Accuracy/error reduction had the largest performance gap, but speed and equipment readiness had stronger relationships with continuance intention. The managerial question is therefore not only which dimension performs lowest, but which dimension should receive priority after both importance and performance are considered.

4.2 Dimension-level associations and relative importance

Table 4 shows the dimension-level regression results and the corresponding Pratt relative-importance decomposition. The four dimensions explained 59.5% of the variance in B2B continuance intention, with an adjusted R^2 of 0.580. All four dimensions were statistically significant, but their weights differed.

Table 4. Dimension-level multiple regression results and Pratt relative-importance decomposition for B2B customer continuance intention.

Predictor	B	SE	β	t	p-value	r	Relative contribution	Importance share (%)
Speed of operations	0.30	0.07	0.32	4.29	<0.001	0.66	0.211	35.4
Accuracy/error reduction	0.15	0.06	0.18	2.50	0.014	0.55	0.099	16.6
Operational safety	0.18	0.07	0.20	2.57	0.012	0.56	0.112	18.8
Equipment readiness	0.28	0.07	0.29	4.00	<0.001	0.60	0.174	29.2

The Pratt contributions sum to the model R^2 within rounding because each contribution combines a predictor's standardized coefficient with its zero-order association with continuance intention. Speed accounted for the largest relative share of explained variance, followed by equipment readiness. Safety and accuracy/error reduction contributed meaningfully, but their relative shares were smaller.

4.3 Importance-performance positioning

Figure 2 plots each dimension by its normalized performance score and relative-importance share. The horizontal reference line represents equal-share importance across four dimensions (25%), and the vertical reference line represents the average performance score across the four dimensions.

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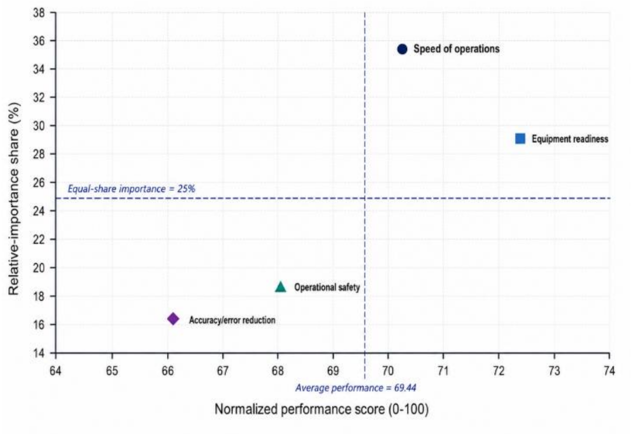

Figure 2. Importance-performance position of cargo-handling operational-quality dimensions.

In conventional IPA terminology, the high-importance/low-performance quadrant is interpreted as "concentrate here," the high-importance/high-performance quadrant as "keep up the good work," the low-importance/low-performance quadrant as "low priority," and the low-importance/high-performance quadrant as "possible overkill" [55]. In the present analysis, these labels are used descriptively rather than as the final decision rule because importance is derived statistically from a specific outcome and the subsequent action-priority score also incorporates the magnitude of the remaining performance gap.

Using the stated reference lines, speed and equipment readiness fall in the high-importance/high-performance ("keep up the good work") quadrant, whereas operational safety and accuracy/error reduction fall in the low-importance/low-performance ("low priority") quadrant. These conventional IPA labels should not be interpreted as implying that safety or accuracy can be neglected. They describe relative positioning within the four-dimension portfolio; mandatory safety, engineering, and reliability requirements remain outside the discretionary priority ranking. The action-priority score is subsequently used to obtain a more granular ordering within this portfolio.

4.4 Action-priority score

Table 5 combines relative importance with the remaining performance gap. This produces an action-priority score and a normalized priority share. The final ranking is speed, equipment readiness, operational safety and accuracy/error reduction.

Table 5. Action-priority scores, normalized priority shares, and final ranking of cargo-handling operational-quality dimensions.

Dimension	Performance	Gap	Relative contribution	Importance share (%)	Action-priority score	Priority share (%)	Rank
Speed of operations	70.50	29.50	0.211	35.4	6.22	34.8	1
Equipment readiness	72.50	27.50	0.174	29.2	4.78	26.8	2
Operational safety	68.50	31.50	0.112	18.8	3.52	19.7	3
Accuracy/error reduction	66.25	33.75	0.099	16.6	3.33	18.7	4

The performance gap equals 100 minus the performance score. The action-priority score is calculated as RI_j × G_j. Priority share normalizes the action-priority scores across the four dimensions and sums to 100%.

The ranking confirms that speed is the first managerial priority. It has the highest importance and still leaves a meaningful performance gap. Equipment readiness is the second priority because it combines high performance with high strategic importance; it should not be treated as "solved" merely because customers rated it more favorably than the other dimensions. Safety and accuracy require targeted improvement, but their role is better interpreted as relationship protection and operational discipline rather than as the primary differentiators of continuance intention.

Figure 3 shows the normalized action-priority share for each dimension.

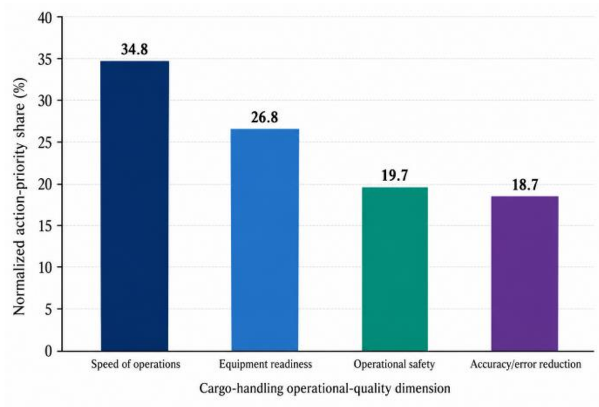

Figure 3. Normalized action-priority share after combining importance and performance gap.

4.5 Sensitivity and robustness checks

Table 6 summarizes sensitivity and robustness checks used to assess whether the priority pattern depended on a single specification or indicator.

Table 6. Sensitivity and robustness checks for the dimension-level regression model and priority-ranking results.

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Check	Result	Interpretation
Main dimension-level model	$R^2 = 0.595$; adjusted $R^2 = 0.580$; $F(4,105) = 38.57$; $p < 0.001$	The four dimensions jointly account for 59.5% of the observed variance in reported continuance intention in this sample.
Multicollinearity	VIF range = 1.51-1.73	No serious collinearity problem among the four dimensions.
Residual diagnostics	Shapiro-Wilk p = 0.094; Breusch-Pagan $\chi^2(4) = 5.84$, p = 0.211	No severe residual normality or heteroscedasticity concern.
Influential cases	Maximum standardized residual = 2.41; maximum Cook's distance = 0.083; maximum leverage = 0.086	No extreme influence problem.
Control robustness	Gender model: $R^2 = 0.598$, adjusted $R^2 = 0.579$; education model: $R^2 = 0.601$, adjusted $R^2 = 0.577$; cooperation-duration model: $R^2 = 0.631$, adjusted $R^2 = 0.607$	The priority pattern remains stable after respondent-level controls, and cooperation duration adds explanatory value.
Rank convergence	Top two dimensions are speed and equipment readiness across β, r, Pratt share and action-priority score.	The managerial ranking is not driven by a single indicator.

5. Discussion

This study examined how four dimensions of cargo-handling operational quality—speed of operations, accuracy/error reduction, operational safety and equipment availability/readiness—contribute to B2B customer continuance intention in container-port services and how they should be prioritized when both strategic importance and current performance are considered. The findings confirm that organizational customers do not evaluate cargo-handling quality as a uniform set of operational attributes. All four dimensions were positively associated with continuance intention, but their relative contributions and managerial priorities differed substantially.

Taken together, the four dimensions explained 59.5% of the variance in B2B customer continuance intention. This level of explanatory power indicates that future cooperation decisions are strongly connected to customers' direct experience of cargo-handling operations. The result is consistent with the broader port service-quality literature, which shows that reliability, responsiveness, operational resources, security and process performance shape customer satisfaction, loyalty and port evaluation [1–3, 6, 8, 10–12]. The present findings extend this literature by demonstrating that the four operational dimensions do not contribute equally to a forward-looking B2B outcome.

5.1 Operational speed as the dimension most strongly associated with continuance intention

Operational speed showed the strongest adjusted statistical association with reported continuance intention and emerged as the first action priority. It had the largest standardized regression coefficient, the strongest zero-order correlation with continuance intention, the largest Pratt relative-importance share and the highest action-priority score. The consistency of this ranking across several indicators reduces the likelihood that the conclusion is an artefact of a single analytical measure.

This finding is operationally and commercially plausible. Time losses in container handling are highly visible to organizational customers because their effects extend beyond the terminal boundary. Delays in loading, unloading, berth access or yard transfer can disrupt vessel schedules, increase truck waiting time, weaken inland transport coordination, raise demurrage and detention exposure and affect delivery commitments to downstream customers. For shipping companies, freight forwarders, cargo owners and logistics providers, port time is therefore not merely an internal productivity statistic. It becomes part of their own service reliability and cost structure.

Previous studies have shown that customers assess ports partly through responsiveness, timeliness, process efficiency and the reliability of service delivery [2, 3, 6, 7, 9]. Research on terminal choice and port competitiveness similarly indicates that operational efficiency and service dependability influence how shipping lines and other users evaluate port alternatives [38–42]. The current result adds a more specific interpretation: among the cargo-handling dimensions examined, time performance showed the strongest association with reported intentions about future cooperation among the four operational dimensions examined in this sample.

The prominence of speed should not be interpreted as support for maximizing throughput at any cost. Operational acceleration that undermines safety, accuracy or equipment condition would be unsustainable and could ultimately weaken customer trust. Rather, the result points to the importance of removing avoidable delay, improving coordination and protecting the continuity of cargo flow. The strategic objective is reliable speed, not uncontrolled speed.

5.2 Equipment readiness as a high-performing but strategically critical capability

Equipment availability/readiness ranked second in both relative importance and the final action-priority sequence. This is a notable finding because equipment readiness also received the highest performance score among the four dimensions. A conventional performance-gap interpretation might therefore classify it as a lower-priority area. The present analysis shows why that conclusion would be misleading.

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Equipment readiness carries substantial strategic importance because terminal assets create value only when they are available, functioning and appropriately deployed during the customer's actual operating window. The ownership of cranes, yard equipment, tractors or handling systems does not guarantee service capability. Customers experience equipment capacity through real-time availability, operating reliability, recovery from breakdowns and the ability of the terminal to maintain workflow during peak or disrupted periods.

This interpretation is supported by research showing that process optimization, technology adoption, equipment reliability and equipment efficiency materially affect terminal operations [19, 20, 28, 30, 31]. Smart-port and digitalization studies also emphasize that technology creates operational value only when it improves coordination, visibility, decision-making and service execution [15, 16, 18, 21–23].

The implication is that equipment readiness should be treated as a capability that must be protected even when customers currently rate it favorably. Its relatively strong performance does not indicate that the problem has been solved. Instead, it suggests that current readiness contributes meaningfully to customer confidence and should not be allowed to deteriorate. In operational practice, lower equipment availability may also coincide with slower cargo-handling performance, creating the possibility of compounded service-reliability problems; the present cross-sectional data, however, do not estimate that temporal pathway directly.

5.3 Safety and accuracy as stabilizing and trust-protection dimensions

Operational safety and accuracy/error reduction were both statistically significant but ranked below speed and equipment readiness in relative importance and action priority. Their smaller relative shares must be interpreted carefully. They do not imply that safety or accuracy is optional, nor that managers should reduce investment in these areas. Rather, the results suggest that these dimensions function primarily as stabilizing or threshold conditions in the customer relationship.

When safety and accuracy are maintained at an acceptable level, they may be less visible as sources of competitive differentiation than time performance or equipment readiness. Customers may regard safe and accurate handling as basic expectations of a professional terminal. However, when these conditions fail, their consequences can be immediate and severe. Safety incidents can lead to injury, cargo damage, operational suspension, legal exposure and reputational loss. Handling and documentation errors can result in misrouting, rehandling, customer claims, delivery failure and loss of trust.

Research on port security, dangerous-goods handling, infrastructure safety and operational risk supports this interpretation [10, 43–45]. These studies demonstrate that safety, security and operational control are integral to service continuity and customer confidence. The current findings add that their average contribution to continuance intention may be lower than that of speed and equipment readiness under normal conditions, while the consequences of failure remain disproportionately large.

This interpretation is consistent with established asymmetric service-quality logic. The Kano model distinguishes "must-be" attributes, whose absence can generate substantial dissatisfaction while performance above an acceptable level may yield limited incremental differentiation, from performance attributes whose evaluations vary more continuously with perceived quality [56]. Related research on penalty–reward asymmetry likewise shows that attribute-level performance can have asymmetric relationships with overall customer evaluations and cautions against assuming that conventional importance–performance relationships are uniformly linear [57]. Safety and accuracy are not formally classified as Kano "must-be" factors in the present study because no nonlinear or asymmetric model was estimated. Rather, these perspectives provide a theoretically grounded interpretation of why comparatively modest average linear importance estimates can coexist with potentially severe consequences when safety or accuracy falls below acceptable levels.

The observed pattern is therefore consistent with an asymmetric managerial interpretation, although asymmetry itself is not directly tested by the present linear model. Higher speed and readiness may be more visible as sources of positive differentiation, whereas deficiencies in safety and accuracy may carry disproportionately serious operational and relational consequences. Their role is less about creating an incremental advantage and more about protecting the relationship from breakdown. This distinction helps explain why a purely coefficient-based or mean-based ranking is insufficient for operational decision-making.

5.4 Why the lowest-performing dimension was not the first priority

One of the most important findings is that accuracy/error reduction had the lowest performance score and the largest raw performance gap, yet it did not become the first action priority. Once its performance gap was weighted by relative importance, it ranked fourth. This outcome demonstrates the central value of the study's analytical framework.

Many improvement programmes begin by identifying the lowest mean score and treating it as the most urgent problem. That logic is intuitive but incomplete. A low

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score shows that customers perceive room for improvement; it does not indicate how strongly the dimension is associated with the strategic outcome under consideration. Conversely, a relatively high-performing dimension may still deserve substantial managerial attention if its relationship with the target outcome is strong.

Previous port studies have used importance–performance analysis, fuzzy methods and multi-criteria techniques to identify service priorities, rank terminal operators and assess port-selection factors [32–38]. The present study advances this line of research by combining performance gaps with a relative-importance measure directly derived from the statistical relationship between each dimension and B2B customer continuance intention.

The resulting ranking therefore answers a more precise managerial question. It does not ask only where performance is weakest. It asks where improvement is most likely to protect the outcome that managers value: the customer's intention to continue cooperation. In the present setting, speed has a smaller raw gap than accuracy but a much stronger strategic relationship with continuance intention. It consequently remains the first action priority.

5.5 Customer continuance intention as an operationally grounded B2B outcome

The findings also clarify the nature of continuance intention in port services. Existing research commonly examines customer satisfaction, loyalty, recommendation or port attractiveness [3, 10–14, 41]. These outcomes are important, but continuance intention captures a more explicit future-oriented judgement about whether an organizational customer expects to maintain, expand or prefer a commercial relationship.

In B2B port settings, this judgement is unlikely to be based on a single transaction. It reflects accumulated experience with whether the terminal can support the customer's schedules, cost commitments and downstream service obligations. The strong explanatory role of cargo-handling quality therefore indicates that continuance intention is operationally grounded. Reported continuance intention was most strongly associated with respondents' evaluations of timely operations and equipment readiness, alongside positive associations for safe handling and accuracy.

The findings should nevertheless be interpreted as associations rather than causal effects. The cross-sectional design does not establish that changing one dimension will automatically produce a proportional change in future cooperation. Continuance intention may also be influenced by tariffs, port location, connectivity, contractual arrangements, regulatory conditions and the availability of alternative ports. Even so, the stability of the priority sequence across the reported analyses suggests that the four operational dimensions represent a meaningful and actionable component of customers' future-oriented evaluations.

6. Conceptual and Analytical Contributions

This study does not propose new cargo-handling quality constructs or a universal theory according to which speed should dominate safety, accuracy, or equipment readiness. Its contribution is narrower and more specific. Conceptually, it connects established customer-visible operational dimensions with a distinct future-oriented B2B outcome. Consistent with service-quality–behavioral-intentions and continuance logic, the four dimensions are treated as operational conditions that may be associated with reported willingness to maintain or expand a commercial relationship [46, 47]. Their relative ordering is deliberately not specified a priori and is instead estimated empirically.

Second, the study distinguishes three quantities that are often treated as interchangeable in operational-priority research: outcome-derived statistical importance, current perceived performance, and improvement urgency. Multiple regression and Pratt decomposition address the first quantity, normalized customer evaluations represent the second, and the action-priority score combines them for the third. The methodological contribution therefore lies in the sequencing of these analytical functions rather than in treating regression and IPA as alternative explanations of the same phenomenon.

Third, the framework extends conventional port importance–performance applications by deriving importance from one explicitly specified B2B outcome rather than from stated importance or expert judgement alone. This allows a dimension with a comparatively weak performance score to be distinguished from a dimension with a stronger outcome-specific association and a meaningful remaining gap. The resulting ranking is not a causal estimate of the benefits of intervention and does not override statutory safety, engineering, or maintenance requirements. It is an outcome-specific decision aid for allocating discretionary managerial attention under resource constraints.

Finally, the findings illustrate why technical performance, perceived service quality, and managerial priority should not be treated as equivalent concepts. A high-performing dimension may still warrant protection when it carries substantial outcome-specific importance, whereas a lower-performing dimension may not automatically become the first discretionary improvement priority. This distinction provides a more precise analytical basis for translating customer-perceived operational quality into port-management decisions.

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7. Managerial Implications

7.1 Manage speed as a customer-facing continuance priority

Operational speed should be monitored as a strategic customer-facing performance metric because it showed the strongest association with reported continuance intention in the present sample. Port and terminal managers should establish a focused time-performance dashboard covering vessel waiting time, berth delay, loading and unloading cycle time, crane moves per hour, yard-transfer delay, truck turnaround time and avoidable stoppage duration.

These indicators should be disaggregated by vessel, shift, equipment type, customer group and operating stage. Aggregate monthly averages can conceal recurring bottlenecks. Managers need to identify where delay begins, how it propagates through the system and which customers are most affected.

Time-performance targets should also be connected to customer-facing service commitments. Customers should be able to see whether operational improvements reduce uncertainty in their own planning. Transparent reporting of turnaround performance, delay causes, and corrective actions may help support customer confidence and should be evaluated alongside subsequent customer-feedback data.

7.2 Protect equipment readiness despite its favorable current performance

Equipment readiness should be managed as a customer-facing service promise. The comparatively high-performance score recorded in this study must not create complacency because readiness was the second most important dimension for continuance intention.

Managers should monitor availability, utilization, mean time between failures, mean time to repair and downtime by equipment class and operating shift. Preventive and condition-based maintenance schedules should be coordinated with vessel and yard plans so that maintenance activity does not create avoidable operational constraints.

Critical spare parts should be classified according to operational consequences rather than purchase value alone. Escalation procedures should specify how quickly breakdowns must be reported, diagnosed and resolved. Contingency capacity should be identified for equipment whose failure could stop or materially slow cargo-handling operations.

Equipment indicators should also be linked to customer-impact measures. For example, a crane breakdown should not be reported only as mechanical downtime; its consequences for vessel delay, truck queues, yard congestion and customer service should also be recorded. This creates a clearer connection between asset management and commercial performance.

7.3 Treat safety and accuracy as non-negotiable trust protections

Safety and accuracy should not be weakened merely because they ranked below speed and equipment readiness in the action-priority analysis. They remain essential conditions of reliable port service.

For safety, managers should strengthen leading indicators rather than relying only on incident counts. Relevant measures include near-miss frequency, corrective-action closure time, safety-observation quality, procedural compliance, equipment isolation performance and recurring hazard patterns. Safety reviews should consider not only regulatory compliance but also how incidents and unsafe conditions affect service continuity and customer confidence.

For accuracy, managers should track misplacement, rehandling, documentation mismatch, container-identification error, cargo claim frequency and yard-location discrepancies. Root-cause analysis should distinguish between human error, system failure, communication breakdown and process design weakness.

Digital verification, standardized handover procedures and exception alerts can reduce avoidable errors. However, technology should support—not replace—operational discipline and accountability. The objective is to prevent low-frequency but high-consequence failures that can damage customer trust disproportionately.

7.4 Allocate improvement resources through a portfolio logic

Managers should avoid treating the priority ranking as a justification for investing only in the top-ranked dimension. The results support a portfolio approach.

Speed and equipment readiness require the largest share of discretionary improvement attention because they combine high importance with meaningful remaining gaps. Safety and accuracy require continued baseline investment because they protect operations from severe failure. The appropriate allocation is therefore not “speed instead of safety” or “equipment instead of accuracy.” It is a differentiated strategy in which each dimension receives attention consistent with its customer importance and operational risk.

The action-priority score should be recalculated periodically rather than treated as a permanent ranking. In practice, a terminal could incorporate the four operational-quality dimensions into an annual or semi-annual B2B customer-feedback cycle and display the resulting performance scores, relative-importance shares, and action-priority scores on a service-quality dashboard. Reassessment could also be triggered after

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major operational changes. For example, following a crane-renewal or preventive-maintenance programme, the next customer survey could be used to determine whether equipment readiness has shifted from an improvement priority toward a maintenance priority. Similar reassessment would be appropriate after major changes in traffic composition, implementation of new digital systems, or recurrent safety or accuracy incidents. In this way, the framework functions as a recurring decision-support process rather than a one-time ranking exercise.

7.5 Combine customer perceptions with operational evidence

Customer survey results should be integrated with objective terminal data. A perceived delay problem should be examined alongside vessel turnaround, crane productivity, queue length and stoppage records. A perceived equipment-readiness problem should be tested against availability and failure data. Accuracy and safety perceptions should be compared with claims, incidents, near misses and rehandling records.

Disagreement between perceptual and operational data should not be dismissed. It may reveal communication failures, uneven service across customer groups or problems that internal averages fail to capture. The purpose of combining the two forms of evidence is not to determine which is “correct,” but to obtain a fuller understanding of how operational performance is produced and experienced.

8. Limitations and Future Research

This study has several limitations that define the boundaries of its conclusions and provide directions for future research.

First, the cross-sectional design prevents causal inference. The study identifies associations between perceived cargo-handling quality and reported continuance intention at one point in time. It cannot establish that an improvement in operational speed or equipment readiness will necessarily cause a subsequent increase in actual customer retention. Longitudinal studies should measure operational-quality perceptions, continuance intention and realized customer behaviour across multiple periods. Such designs could test whether changes in perceived quality precede contract renewal, increased cargo volume or reduced customer switching.

Second, the study relies on perceptual survey data obtained from organizational respondents. This is appropriate because customer decisions are influenced by how service is experienced and interpreted. Nevertheless, perceptions may be affected by recent events, respondent role, organizational expectations and incomplete knowledge of terminal operations. Future studies should combine survey data with objective measures such as vessel waiting time, berth productivity, crane moves per hour, truck turnaround, equipment availability, downtime, rehandling rates, safety incidents and cargo claims.

Third, each operational-quality dimension was measured with two items. This concise structure supported field feasibility among busy organizational respondents and produced acceptable reliability and validity. However, two-item measures limit the breadth with which complex operational dimensions can be represented. Future studies could develop expanded scales covering berth coordination, yard congestion, gate operations, digital visibility, documentation accuracy, maintenance responsiveness, contingency capacity and communication during disruption.

Fourth, the study was conducted at one port. The findings therefore reflect the institutional, commercial and operational characteristics of Imam Khomeini Port. The observed priority sequence may differ in highly automated terminals, transshipment hubs, feeder ports, landlord-port systems or privately operated terminals. Multi-port studies should compare whether speed and equipment readiness remain the dominant continuance-intention levers across different governance structures, cargo profiles and levels of technological maturity.

Fifth, the valid sample contained 110 respondents and was not fully balanced across gender, organization type or duration of cooperation. This reflects the accessible population of informed organizational customers, but it limits the strength of subgroup comparisons. Future studies should use larger stratified samples to examine whether shipping companies, freight forwarders, importers, exporters, terminal operators and public organizations assign different weights to operational-quality dimensions.

Sixth, the analysis focused on four cargo-handling dimensions. Although these dimensions represent central aspects of operational quality, customer continuance intention may also be influenced by price, connectivity, customs procedures, digital information quality, contractual flexibility, complaint handling, port reputation and the availability of alternative gateways. Future research should evaluate whether the present dimensions retain their importance when broader commercial and institutional variables are included.

Seventh, the action-priority score is based on a linear combination of relative importance and performance gap. This provides a transparent and interpretable ranking, but it assumes that the effect of improvement is proportional and that the dimensions do not have nonlinear thresholds or asymmetric effects. Future studies could explicitly test nonlinear importance–performance relationships, Kano-type threshold structures, penalty–reward asymmetry, and interaction effects [56, 57]. For example, safety and accuracy may have limited positive differentiation above an

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acceptable threshold but severe negative effects when performance falls below it.

Eighth, the study used Pratt-type relative-importance decomposition. Although appropriate for the present analysis, future research could compare the resulting rankings with dominance analysis, relative weight analysis, Shapley-value decomposition, PLS-SEM importance–performance map analysis and best–worst scaling. Convergence across methods would strengthen confidence in the priority sequence, while disagreement would reveal how analytical assumptions influence managerial recommendations.

Finally, the dependent variable was stated continuance intention rather than observed customer behavior. Intentions are valuable because they capture forward-looking evaluations, but they do not always translate directly into action. Future studies should link survey responses with actual renewal decisions, cargo-volume changes, customer tenure, switching behavior and share-of-business data. This would provide a stronger test of whether the identified operational priorities predict commercially meaningful outcomes over time.

Despite these limitations, the study provides a clear and usable contribution. It demonstrates that cargo-handling improvement should not be guided by performance gaps alone. A more defensible approach considers how strongly each dimension is connected to the customer outcome being protected, how well it currently performs and what operational risks arise if it deteriorates. In this setting, that logic places operational speed first, equipment readiness second and safety and accuracy as indispensable foundations of reliable service and continued B2B cooperation.

9. Conclusion

This study addressed a practical but underdeveloped question in container-port service management: when several cargo-handling dimensions have room for improvement, which should receive greater discretionary attention in relation to B2B customer continuance intention? Based on a cross-sectional survey of 110 organizational customers at Imam Khomeini Port, speed, accuracy/error reduction, operational safety, and equipment readiness jointly accounted for 59.5% of the observed variance in reported continuance intention. Operational speed had the largest relative-importance share, followed by equipment readiness, safety, and accuracy/error reduction.

The central finding is that the lowest-performing dimension is not necessarily the most urgent improvement priority. Accuracy/error reduction received the lowest performance score and the largest raw performance gap, yet its smaller outcome-specific relative importance placed it below speed and equipment readiness in the action-priority ranking. At the same time, the ranking must not be read as "speed instead of safety" or "readiness instead of accuracy." Safety and accuracy remain non-negotiable operational protections; the ranking concerns the allocation of discretionary improvement attention after such baseline obligations are respected.

The study's main contribution is therefore analytical rather than causal: it distinguishes outcome-derived statistical importance, current perceived performance, and improvement urgency within one transparent framework. Because operational-quality perceptions and continuance intention were measured contemporaneously, the findings represent associations in this specific port setting and do not establish that changing a dimension will cause subsequent customer retention. Longitudinal, multi-port research combining customer perceptions with observed operational and commercial outcomes is needed to test whether the priority structure persists over time. Used with this limitation in mind, the framework provides managers with a practical and repeatable basis for deciding where limited improvement resources may warrant the greatest attention.

Declarations

Ethics approval and consent to participate.

The study involved an anonymous survey of representatives of organizational customers and did not collect sensitive personal data. Under the applicable institutional procedures, formal ethics committee approval was not required for this type of research. Participation was entirely voluntary. All respondents were informed of the purpose of the study and provided informed consent before completing the questionnaire. Responses were collected anonymously, treated confidentially and used exclusively for academic research purposes.

Data availability.

The underlying survey data are not publicly available because they contain confidential responses provided by organizational participants. All findings are reported in aggregated form to protect respondent and organizational confidentiality. A limited anonymized dataset may be made available by the corresponding author upon reasonable request, subject to appropriate confidentiality and data-protection restrictions.

Reproducibility materials.

The anonymized codebook, construct-scoring procedures, calculation rules and statistical analysis syntax used in this study may be made available by the corresponding author upon reasonable request, subject to confidentiality and data-sharing restrictions.

Conflict of interest.

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