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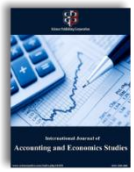

Integrating Value Chain Analysis and Resource-Based View for Enhancing Port Competitiveness: A Case Study of Pelindo IV Regional Makassar

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Abstract

This study aims to develop a strategic framework for enhancing the competitiveness of port services by integrating Value Chain Analysis (VCA) and the Resource-Based View (RBV). This research adopts a qualitative case study approach, focusing on PT Pelabuhan Indonesia (Pelindo) IV Regional Makassar, a key player in the maritime logistics sector of Eastern Indonesia. Data were collected through in-depth interviews with key personnel from port operators, shipping companies, and freight forwarders, supplemented by document analysis and archival records. The Delphi method was employed to gather expert consensus on critical factors influencing port competitiveness. The findings reveal that integrating VCA and RBV provides a comprehensive model for identifying and leveraging sources of competitive advantage. The VCA identifies primary and support activities crucial for value creation, such as efficient operational processes and technological infrastructure. Concurrently, the RBV framework helps in recognizing valuable, rare, inimitable, and non-substitutable (VRIN) resources and capabilities, including strategic location, skilled human resources, and established stakeholder networks. The integrated model demonstrates that sustainable competitive advantage is achieved by aligning operational value-creating activities with unique internal resources. This study contributes to the literature by offering a synthesized framework and providing practical recommendations for port authorities to enhance their strategic planning and operational efficiency in a competitive global market. Statistical analysis of the Delphi survey results provides empirical validation for the identified factors. Notably, the analysis also highlights cost efficiency implications of these strategies, linking operational improvements to better financial performance.

Keywords: *Port Competitiveness; Value Chain Analysis; Resource-Based View; Port Management; Delphi Method; Statistical Analysis*

1. Introduction

Ports serve as vital arteries in the global economy, facilitating international trade and acting as critical nodes in complex supply chains (Notteboom et al., 2022). Their efficiency and competitiveness are paramount for national economic development, particularly for archipelagic nations like Indonesia, where maritime connectivity is fundamental for equitable growth and resource distribution (Mandasari et al., 2017). PT Pelabuhan Indonesia (Pelindo) IV Regional Makassar, situated in the strategic maritime corridor of Eastern Indonesia, exemplifies a port operating within a dynamic and competitive environment, facing both unique challenges and significant opportunities.
Traditional strategic management approaches often analyze competitive advantage through a singular lens, such as market positioning or operational efficiency. However, such perspectives frequently overlook the intricate interplay between a firm's internal capabilities and its external activities. This paper argues for a more holistic and robust framework that integrates two powerful strategic management theories: Michael Porter's Value Chain Analysis (VCA) (Porter, 1985) and the Resource-Based View (RBV) (Barney, 1991). It is imperative to note that augmenting the competitiveness of ports yields not only operational advantages but also substantial financial implications – heightened efficiency results in reductions in costs and enhancements in financial performance, thereby aligning the examination with essential accounting principles related to cost control and profitability (Homayouni et al., 2025; Tagawa et al., 2025).
VCA provides a systematic way to disaggregate a firm into its primary and support activities, allowing for a detailed examination of where value is created and where cost efficiencies or differentiation opportunities lie (Porter, 1985). Conversely, RBV posits that sustainable competitive advantage stems from a firm's unique bundle of internal resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). While both theories have been extensively applied across various industries, their integrated application, particularly within the specific and complex context of port management, remains an area requiring deeper exploration. Previous research has touched upon elements of VCA or RBV in port studies (Baştuğ et al., 2020; Gordon et al., 2005), but a comprehensive framework that synergistically combines them, supported by empirical data, is less common.

This study aims to bridge the existing research gap by developing and applying an integrated Value Chain Analysis–Resource-Based View (VCA-RBV) framework to assess the competitiveness of Pelindo IV Regional Makassar. It focuses on identifying the core value chain activities and the critical resources that underpin their effective implementation, while exploring how the integration of these two approaches offers a more comprehensive perspective on port competitiveness. Empirical insights, supported by statistical analysis of expert evaluations, reveal the factors that drive Pelindo IV Regional Makassar's competitive advantage. The study also provides practical recommendations for port authorities and policymakers to strengthen strategic planning and operational efficiency in the global maritime sector. By addressing these aims, the paper not only enriches the academic discourse with a synthesized theoretical framework but also delivers actionable guidance for practitioners, particularly in developing countries with extensive maritime territories where port development plays a vital role in economic integration and growth. Furthermore, through a comprehensive examination of efficiency improvements and financial implications related to strategic initiatives, this research clearly corresponds with an accounting perspective on port competitiveness, highlighting how operational enhancements can facilitate cost savings and enhanced financial outcomes (Fontoura Andriotti et al., 2025).

2. Literature Review

2.1 The Role of Ports in Global Supply Chains and Competitiveness

Ports are more than mere transit points; they are complex logistical hubs that connect sea and land transportation, facilitating the flow of goods and services across continents (Notteboom et al., 2022). Their strategic importance has grown with the increasing globalization of trade and the rise of integrated supply chains. Port competitiveness is a multifaceted concept, encompassing factors such as efficiency, connectivity, service quality, cost-effectiveness, and the ability to adapt to technological advancements and environmental regulations (De Martino, 2021; Haezendonck et al., 2000). In the context of Indonesia, an archipelagic nation, ports are fundamental to national connectivity and economic distribution (Mandasari et al., 2017). The competitive landscape for ports is intensifying, driven by factors such as the emergence of mega-ships, the development of new trade routes, and increasing demands for faster and more reliable logistics services (Laksmana et al., 2020). Recent empirical inquiries emphasize these characteristics: for instance, a comprehensive worldwide study has identified cost efficiency, hinterland connectivity, and technological capability as vital components impacting port competitiveness across different economies (Mdanat et al., 2024). Furthermore, the digitalization of ports has emerged as an essential element, as the incorporation of advanced technologies (e.g., AI, IoT, big data analytics) can markedly improve operational efficiency and the overall competitiveness of ports (Koritarov & Dimitrakiev, 2024). Ports that effectively implement digital transformation and innovation are likely to enhance turnaround times and service quality, consequently reinforcing their standing within global supply chains (Tsvetkova et al., 2024).

2.2 Value Chain Analysis (VCA) in Port Operations

Michael Porter's Value Chain Analysis (VCA) is a strategic tool that disaggregates a firm's activities into primary and support functions to identify sources of competitive advantage (Porter, 1985). For a port, understanding its value chain involves mapping out all activities that contribute to delivering its services and creating value for its customers (shipping lines, cargo owners, logistics providers).

Primary Activities in Port Management:

1. Inbound Logistics: This involves receiving and managing the flow of vessels and cargo into the port. Key activities include vessel scheduling, pilotage, tug services, and initial cargo reception. Efficiency in this stage directly impacts vessel turnaround time and overall port throughput (Acciaro, 2015).
2. Operations: This is the core of port activity, encompassing cargo handling (loading, unloading, transshipment), warehousing, container stacking, and intermodal transfer. Modern equipment, efficient layout, and streamlined processes are crucial for optimizing operations (Yang et al., 2009).
3. Outbound Logistics: This refers to the activities involved in delivering cargo from the port to its final destination, including cargo release, customs clearance, and land transportation coordination. Effective outbound logistics ensures timely and cost-efficient delivery, enhancing customer satisfaction (Hussein & Song, 2024).
4. Marketing & Sales: Ports engage in marketing to attract shipping lines and cargo. This includes promoting port services, negotiating contracts, and building strong customer relationships. A port's reputation for reliability and efficiency is a significant marketing asset (Notteboom et al., 2022)
5. Service: Post-transaction activities such as maintenance of port facilities, customer support, and addressing operational issues are vital for long-term customer retention and building loyalty. High-quality service can differentiate a port in a competitive market (Rungtusanatham et al., 2003).

Support Activities in Port Management:

1. Firm Infrastructure: This includes general management, strategic planning, finance, legal, and quality management systems. Effective infrastructure ensures smooth overall port operations and compliance with regulations (Hamid, 2018).
2. Human Resource Management: Recruiting, training, developing, and compensating a skilled workforce are critical. Port operations require specialized skills, and continuous training ensures adaptability to new technologies and operational demands (Haezendonck et al., 2001).
3. Technology Development: Investment in and adoption of new technologies, such as Terminal Operating Systems (TOS), port community systems (PCS), automation, and digitalization, are essential for enhancing efficiency, transparency, and connectivity within the port ecosystem (Xie, 2023).
4. Procurement: This involves the purchasing of inputs, equipment, and services necessary for port operations. Efficient procurement can lead to cost savings and ensure the availability of critical resources (Madhani, 2012).

Through a comprehensive analysis of these core and ancillary activities, Value Chain Analysis (VCA) facilitates port managers in precisely pinpointing areas where value is generated and costs are incurred, thereby revealing potential pathways for improvement or differentiation. Contemporary studies substantiate the efficacy of VCA within port environments: Wan et al. (2024) demonstrated that a systematic reinvestment across various segments of a port's value chain (including ancillary, fundamental, and external activities) in accordance with China's Free Trade Zone policy resulted in substantial gains in operational efficiency and optimization of port profitability. Such research affirms that the optimization of the value chain—through judicious investment in operational processes, broadened service offerings, and fortified core competencies—contributes directly to a port's competitive edge and financial viability.

2.3 Resource-Based View (RBV) and Port Competitiveness

The Resource-Based View (RBV) asserts that a firm's sustainable competitive advantage is rooted in its unique bundle of internal resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN) (Barney, 1991). In the context of port management, these resources can be tangible or intangible:

1. Tangible Resources: These are physical assets that can be easily identified and measured. For ports, this includes deep-water access, modern cranes, extensive terminal areas, efficient intermodal connections (rail, road), and advanced IT infrastructure (Cho & Kim, 2015). While tangible resources are often necessary for port operations, their imitability can limit their ability to provide sustained competitive advantage unless combined with other unique elements.
2. Intangible Resources: These are non-physical assets that are often more difficult to imitate and thus can be a stronger source of sustainable competitive advantage. Examples in the port context include a highly skilled and experienced workforce, strong brand reputation, established relationships and networks with shipping lines, logistics providers, and government agencies, proprietary operational knowledge, and a strong organizational culture that fosters innovation and efficiency (Hoskisson et al., 2018; Lantang, 2024). A strategic location, while a physical attribute, can also be considered an inimitable resource due to its unique geographical advantages (Aslamiyah, 2024).

For a resource to confer a sustainable competitive advantage, it must meet the VRIN criteria:

1. Valuable: The resource must enable the port to implement strategies that improve its efficiency or effectiveness, or exploit opportunities and neutralize threats.
2. Rare: The resource must not be possessed by a large number of current or potential competitors.
3. Inimitable: The resource must be difficult or costly for other ports to obtain or develop.
4. Non-substitutable: There must be no strategically equivalent valuable resources that are themselves not rare or inimitable (Barney, 1991).

When examining port management, the Resource-Based View (RBV) emphasizes the importance for managers to discern the intrinsic strengths that differentiate their port from comparable facilities. Take, for example, a port's unique geographical position that can be a VRIN asset if it allows entry to essential shipping routes that rivals struggle to replicate. In a similar vein, a port's human capital—encompassing the operational acumen and innovative prowess of its workforce—can emerge as a pivotal determinant when it surpasses that of competing ports. Contemporary research grounded in RBV posits that ports that thoroughly assimilate their operations with their distinctive resources are inclined to attain superior performance outcomes. For example, Hussein and Song (2024) demonstrated that ports adopting supply chain integration strategies through an RBV lens were capable of augmenting cost efficiency and enhancing their financial and investment standing by capitalizing on internal competencies. This evidence underscores the fact that merely building up assets doesn't suffice; the real competitive leverage comes from how those assets are employed and interconnected to advance strategic objectives.

2.4 Integrating VCA and RBV for a Holistic Strategic Framework

The integration of VCA and RBV offers a powerful synergistic framework for strategic analysis (Raduan et al., 2009; Murcia et al., 2022). VCA helps in identifying *what* a port does to create value, while RBV explains *why* a port can perform those activities better or more uniquely than its competitors. The framework suggests that a port's ability to perform specific value chain activities efficiently and effectively is directly enabled or constrained by its available resources and capabilities. Conversely, the successful execution of value chain activities can lead to the development, enhancement, or leveraging of valuable resources.

This integrated perspective allows for a deeper understanding of how competitive advantage is built and sustained. For instance, a port might have state-of-the-art equipment (tangible resource), but its competitive advantage is truly realized when this equipment is operated by a highly skilled workforce (intangible resource) within an optimized cargo handling process (value chain activity) (Purnomo, 2021). The combination allows for both cost leadership through efficiency and differentiation through superior service quality.

Previous studies have highlighted the importance of combining these perspectives. For example, research on supply chain management has shown that integrating resources and activities leads to superior performance (Huo et al., 2016). In the port sector, this means understanding how unique resources, such as a strategic geographical location or advanced IT systems, enable the port to excel in primary activities like cargo handling or support activities like technology development, ultimately leading to enhanced competitiveness (Garrido Salsas et al., 2022). This integrated approach moves beyond a mere description of activities or a list of resources to a dynamic understanding of how they interact to create and sustain competitive advantage.

3. Conceptual Framework

This research proposes an integrated conceptual framework that combines the Resource-Based View (RBV) and Value Chain Analysis (VCA) to understand and enhance Port Competitiveness. The framework posits that a port's ability to achieve and sustain competitive advantage is a function of its unique internal resources and the efficiency and effectiveness with which these resources are utilized across its value-creating activities.

The integrated framework suggests a synergistic relationship between a port's resources (RBV) and its value chain activities (VCA). Resources enable and constrain the performance of value chain activities. For instance, advanced technological resources (RBV) can significantly enhance the efficiency of cargo handling operations (VCA). Conversely, the successful execution of value chain activities can lead to the development or enhancement of valuable resources. For example, efficient operations can build a strong brand reputation (intangible resource).

The framework proposes that sustainable port competitiveness is achieved when a port effectively leverages its unique and inimitable resources (identified through RBV) to optimize its primary and support activities (analyzed through VCA), thereby creating superior value for its customers and stakeholders. The statistical analysis, particularly from the Delphi method, will provide empirical evidence of how specific resources and activities contribute to perceived competitiveness, allowing for a quantitative assessment of these relationships. The conceptual framework is illustrated in Figure 1.

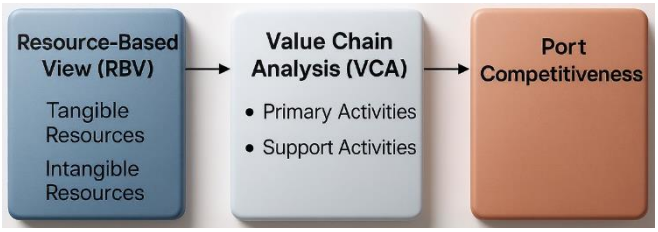

Fig. 1: Integrated Conceptual Framework of Port Competitiveness

4. Methodology

This study employed a qualitative, exploratory case study methodology, focusing on PT Pelabuhan Indonesia (Pelindo) IV Regional Makassar. This approach was chosen to gain an in-depth and holistic understanding of the complex interplay between strategic activities and internal resources within a real-world context, as advocated by Yin (2018) for contemporary phenomena within real-life contexts.

4.1 Research Design and Approach

The research design is primarily qualitative, utilizing an exploratory case study approach. This allows for a detailed investigation of the phenomenon of port competitiveness through the lens of VCA and RBV integration. The study aims to generate rich, descriptive data that can inform theoretical development and practical application. While the primary data collection is qualitative, the use of the Delphi method incorporates a quantitative element through the statistical analysis of expert consensus.

4.2 Participants and Data Collection

Primary data were collected through two main methods:

1. Qualitative Interviews and Documents: In-depth semi-structured interviews were conducted with key stakeholders from Pelindo IV Regional Makassar's operations, including port management, operations supervisors, and strategic planning personnel. Additional interviews involved external stakeholders such as representatives of shipping companies and freight forwarding firms that regularly use the port, as well as academics and regulators familiar with port industry dynamics. The interview protocol was designed to elicit detailed information regarding:

a. Identification of primary and support activities within the port's value chain.
b. Identification of key tangible and intangible resources possessed by Pelindo IV Regional Makassar.
c. Perceptions of factors contributing to and hindering port competitiveness.
d. Challenges and opportunities in the current maritime logistics landscape.

2. Delphi Method (Expert Survey): The Delphi method was employed to gather expert opinions and achieve consensus on critical factors influencing port competitiveness, particularly concerning the geographical conditions of Indonesia as an archipelago and the elements forming port competitive advantage. The Delphi panel consisted of a diverse group of experts, including:

a. Port Operators (Pelindo IV Regional Makassar)
b. Shipping Companies (Indonesia National Shipowners Association - INSA)
c. Freight Forwarders (Asosiasi Logistik dan Forwarder Indonesia - ALFI)
d. Academics specializing in maritime logistics and strategic management.
e. Regulators (Directorate General of Sea Transportation).

The Delphi process involved multiple rounds of questionnaires, with controlled feedback provided to participants after each round. This iterative process aimed to narrow the range of responses and achieve a high degree of consensus among the experts. The data collected from the Delphi rounds included quantitative ratings (mean and standard deviation) for various factors, allowing for statistical analysis of expert perceptions. Secondary data were also utilized to triangulate and validate the primary data. This included annual reports of Pelindo IV Regional Makassar, operational documents, industry reports, and relevant academic literature on port management, VCA, and RBV.

4.3 Data Analysis

1. Qualitative Analysis: Interview transcripts and documents were analyzed using thematic analysis (Braun & Clarke, 2006). Initial coding categorized information according to key themes corresponding to the research framework: e.g., references to value chain activities (operations, logistics, etc.), mentions of resources or capabilities (technology, human capital, etc.), and observations about competitive advantage or industry conditions. Codes were iteratively refined and grouped into higher-level themes reflecting how value chain activities and resources interact in practice. Patterns were identified, such as which resources were frequently cited as enabling certain activities effectively, or which activities were considered most critical for competitiveness. These qualitative insights provided narrative evidence for the interplay of VCA and RBV elements at Pelindo IV Regional Makassar.
2. Statistical Analysis of Delphi Data: The quantitative data from the Delphi survey (mean importance score and standard deviation for each factor within each stakeholder group) were analyzed using descriptive statistics. This allowed for identifying which factors were perceived as most important by the expert panel and assessing the degree of consensus for each factor (with lower standard deviation indicating higher consensus). Differences across stakeholder groups were also examined to see how perceptions varied between, for example, port operators and customers. The statistical analysis thus provided an empirical validation to complement the qualitative findings, highlighting convergences and divergences in expert opinions on what drives port competitiveness.

Integrating these strategies boosts the review process by weaving together profound qualitative insights with comprehensive quantitative assessments. The ensuing segment articulates the integrated findings: initially, it qualitatively clarifies the relationship between value chain activities and resources at Pelindo IV Regional Makassar, and subsequently, it quantitatively summarizes the expert consensus on pivotal factors influencing competitiveness.

5. Findings and Discussion

The analysis of data from Pelindo IV Regional Makassar, viewed through the integrated VCA-RBV lens and supported by the Delphi survey results, reveals several key insights into the drivers of port competitiveness. The findings are structured to first discuss the interplay between value chain activities and enabling resources, followed by a comprehensive analysis of the statistical perceptions of experts on critical factors.

5.1 Integrating Value Chain Activities with Key Resources

This study synthesizes empirical evidence from Pelindo IV Regional Makassar through an integrated Value Chain Analysis (VCA) and Resource-Based View (RBV) framework, complemented by Delphi survey validation. The analysis first explores how specific value chain activities are supported by distinct resources. Efficient loading and unloading depend not only on modern handling equipment but also on the skill of operational teams—highlighting that technological investments must be matched with targeted training. Similarly, effective outbound logistics are strengthened by long-term partnerships with trucking and rail companies, which provide coordination and reliability advantages. Customer service and marketing have been enhanced by the introduction of a Port Community System, which improves transparency, reduces documentation delays, and becomes a selling point for clients. Human resource management emerges as a cross-cutting driver of competitiveness; continuous training and a culture of innovation empower employees to adapt quickly, thereby amplifying the effectiveness of multiple value chain stages.

The findings also emphasize the importance of aligning operational activities with Pelindo IV Regional Makassar's strategic location. As a centrally located hub in Eastern Indonesia, the port benefits from a natural advantage that must be leveraged through effective scheduling and feeder networks. Realizing this potential requires harmonizing location-based benefits with optimized operations, demonstrating the interdependence of VCA and RBV perspectives. The study identifies gaps where resources and activities are not fully aligned, particularly in technological infrastructure. Interviews and Delphi results indicate that, despite improvements, the port's capabilities in automation and data analytics are still limited. Addressing these deficiencies will require investment in digital infrastructure and technical skills to support data-driven decision-making. Overall, the case analysis concludes that Pelindo IV's competitive advantage depends on the interplay between operational capabilities and unique resources. Sustainable competitiveness arises only when essential value chain activities are effectively executed and underpinned by distinctive resources. This dual perspective, underscored by quantitative survey evidence, reinforces the theoretical integration of VCA and RBV and guides strategic priorities for future improvements.

5.2 Expert Perceptions and Statistical Insights from Delphi Survey

The Delphi survey results provide quantitative validation for the importance of various factors influencing port competitiveness, as perceived by a diverse panel of experts. The comprehensive statistical analysis reveals significant patterns in expert perceptions and consensus levels across different stakeholder groups. Table 1 summarizes the mean importance scores (on a 1–6 scale) assigned to each factor by the five stakeholder groups, along with the standard deviations which indicate consensus (lower standard deviation = higher consensus).

Table 1: Delphi Survey Results – Mean Importance Scores (± Standard Deviation)

Competitiveness Factor	Pelindo IV Regional Makassar (Port Operators)	Shipping Companies	Freight Forwarders	Academics	Regulators
Geographical Factors	5.44 (±0.527)	5.33 (±0.707)	5.00 (±0.000)	6.00 (±0.000)	6.00 (±0.000)
RBV Overall Perception	5.00 (±0.601)	5.11 (±0.782)	5.00 (±0.689)	6.00 (±0.000)	6.00 (±0.000)
RBV – Human Resources	5.11 (±0.782)	5.33 (±0.707)	5.00 (±0.577)	6.00 (±0.000)	6.00 (±0.000)
RBV – Technology/ Infrastructure	4.78 (±0.833)	5.00 (±0.816)	5.11 (±0.601)	6.00 (±0.000)	6.00 (±0.000)
Competitive Advantage Elements	2.67 (±1.054)	2.00 (±0.707)	2.33 (±0.816)	2.00 (±0.000)	2.00 (±0.000)

Note: Scores range from 1 (least important) to 6 (most important). Standard deviations in parentheses indicate consensus (0.0 denotes perfect consensus among experts in that group). "Competitive Advantage Elements" refers to conceptual strategic advantage constructs (like overall competitive strength or abstract notions of advantage) included in the Delphi survey.

The data in Table 1 reveal several insights:

1. Geographical Factors: This factor received the highest importance ratings across all stakeholder groups, with mean scores ranging from 5.00 to a perfect 6.00. Academics and Regulators exhibit unanimous agreement on the critical importance of Indonesia's geographic conditions for port competitiveness (6.00 ± 0.000). Operational stakeholders (Pelindo IV Regional Makassar and industry players) also rate geography very highly (Pelindo IV Regional Makassar: 5.44; Shipping: 5.33), albeit with minor variability (standard deviation up to ~0.7). These results underscore a shared belief that Pelindo IV Regional Makassar's archipelagic context – including its inter-island connectivity and central location – is a foundational competitive asset. Qualitative comments from the Delphi panel emphasized factors such as strategic location, natural deep-water harbor, and coverage of Eastern Indonesia as irreplaceable advantages. This finding strongly aligns with the RBV framework, where strategic location is considered a valuable and inimitable resource (Aslamiyah, 2024). Indeed, the unique geography of Indonesia makes location-based advantages fundamental competitive factors that cannot be easily replicated by competitors.
2. RBV-Related Factors: The survey included overall RBV perception and specific key resource categories (Human Resources and Technology/Infrastructure). These factors all garnered high importance scores, generally in the 5.0–6.0 range, indicating broad agreement on the significance of internal resources for competitiveness. However, there are interesting variations across stakeholder groups:

a. RBV Overall: Academics and Regulators again show perfect consensus at the maximum rating (6.00 ± 0.000), reflecting theoretical and policy recognition of the importance of internal capabilities. Operational stakeholders Pelindo IV Regional Makassar, Shipping, Freight) rate RBV factors around 5.0–5.1 with moderate consensus (SD ~0.6–0.8). This suggests that while practitioners agree internal resources are important, there is some variation in how they view specific internal strengths or perhaps in how well Pelindo IV Regional Makassar currently leverages them.

b. Human Resources: This sub-factor receives particularly high ratings from Shipping Companies (5.33 ± 0.707). From the perspective of port users (shipping lines), the quality of port personnel – in operations, customer service, problem-solving – is critically important. All groups rate human resources above 5.0, reinforcing that human capital is seen as a key driver of performance. Again, academics and regulators give it the highest possible importance with full consensus. These findings echo the case study evidence that a skilled and adaptive workforce is a core competitive asset for Pelindo IV Regional Makassar.
c. Technology/Infrastructure: There is a notable internal divergence here. Pelindo IV Regional Makassar's own representatives give the lowest mean score for this factor (4.78) and exhibit the highest variability (SD 0.833) among themselves. This could indicate internal acknowledgement of technology gaps or differing opinions within Pelindo IV Regional Makassar about the sufficiency of current technological capabilities. Other stakeholders (Shipping, Freight) rate this factor slightly higher (~5.0–5.1), while Academics/Regulators again insist on its high importance (6.00). The mixed views suggest that, in practice, Pelindo IV Regional Makassar may not yet fully capitalize on technology as a strength – a point consistent with interview feedback about the need for further digitalization. Nonetheless, all groups consider technology and infrastructure at least moderately to highly important, aligning with global trends that ports must invest in modern infrastructure and digital systems to stay competitive (Xie, 2023; Tsvetkova et al., 2024).

3. Competitive Advantage Elements: These were theoretical constructs included in the survey (for example, panelists were asked to rate the importance of having a clear competitive strategy or unique value proposition, etc.). The analysis reveals significantly lower mean scores for these elements (ranging roughly 2.0 to 2.67) compared to the concrete factors above. This suggests that while such constructs are recognized conceptually, experts do not view them as directly impactful unless they are supported by tangible factors. In practical terms, "competitive advantage" is seen as an outcome of doing well in the other areas (resources, operations, location) rather than a stand-alone item to pursue. The higher standard deviations among operational stakeholders (Pelindo IV Regional Makassar SD 1.054, Freight ~0.8) indicate diverse opinions on the relevance of abstract competitive advantage concepts in day-to-day operations. Interestingly, Academics and Regulators also rated these elements low (around 2.0) but with consensus, implying a shared view that these notions, while academically discussed, are less immediately critical than concrete factors like resources or geography. Essentially, experts agree that talking about competitive advantage in general is less useful than focusing on its components.

Overall, the Delphi results provide robust empirical evidence for the importance of both internal resources (RBV) and value-creating activities (VCA-related factors like operations enabled by geography) in port competitiveness. The high level of consensus on geographical factors, combined with strong recognition of RBV elements, underscores the validity of the integrated VCA-RBV framework proposed in this study. At the same time, the variations in perception among different stakeholder groups highlight the need for a multi-faceted approach to port management that considers the diverse perspectives of all actors in the port ecosystem. For example, port authorities might prioritize infrastructure investment, while shipping lines emphasize human service quality – a successful strategy must address both.

To complement the quantitative analysis presented in Table 1, Figures 2 and 3 provide a more comprehensive visualization of the perceptions of various stakeholder groups regarding the factors influencing the competitiveness of Pelindo IV Regional Makassar. These visualizations enrich our understanding of how each factor is evaluated and the extent of consensus among experts.

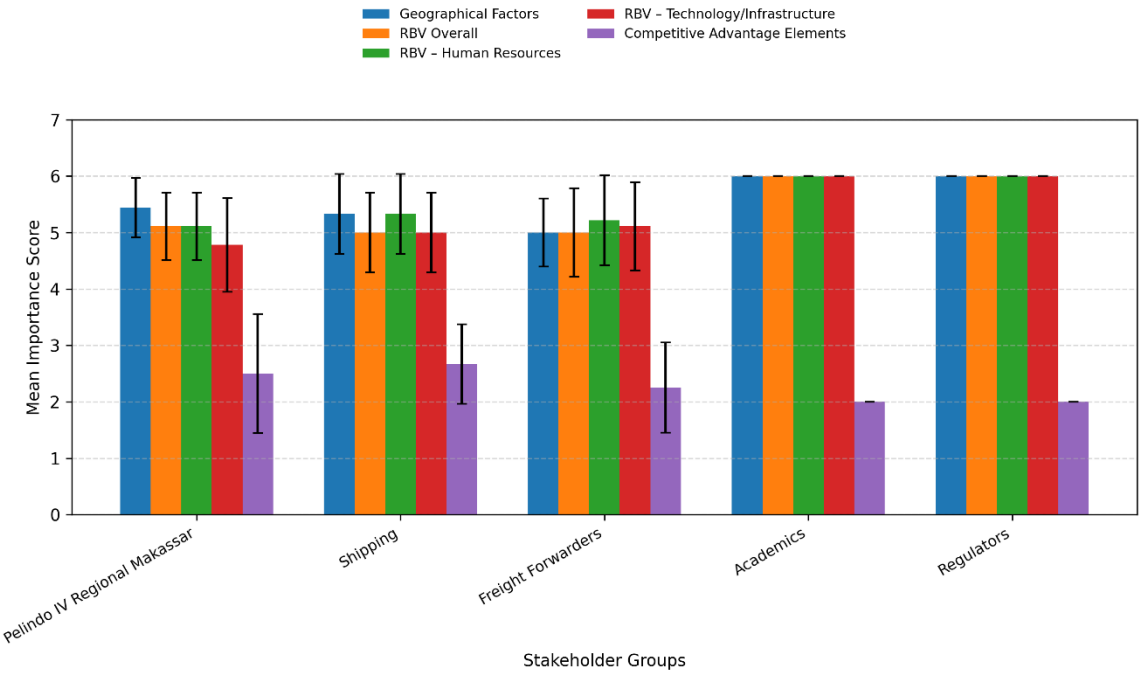

Fig. 2: Mean important scores and standard deviations for Delphi survey factors across stakeholder groups

Figure 2 presents the mean importance scores given by five key stakeholder groups—Pelindo IV Regional Makassar, Shipping Companies, Freight Forwarders, Academics, and Regulators—for various elements of port competitiveness. These scores are measured on a scale of 1 to 6, where higher values indicate a greater level of importance. Standard deviation bars on each bar represent the standard deviation, reflecting the level of consensus within that group (a smaller standard deviation indicates higher consensus).

From Figure 2, it is evident that Geographical Factors consistently receive the highest importance scores across almost all groups, underscoring the universal recognition of strategic location as a fundamental asset. Academics and Regulators show very high consensus (standard deviations close to zero) and maximum scores for most factors, reflecting their holistic view on the importance of each element. In contrast, operational groups such as Pelindo IV Regional Makassar, Shipping Companies, and Freight Forwarders show greater variability in scores and standard deviations, indicating that their perceptions may be more focused on aspects that directly affect their operations and business interests. For example, although RBV – Human Resources is highly rated by all parties, Pelindo IV Regional Makassar shows a higher standard deviation for RBV – Technology/Infrastructure, which may reflect internal discussions or challenges in implementing technology (Martínez-Moya et al., 2025).

Complementing Figure 2, Figure 3 provides a more intuitive visualization of the perception profiles and the level of consensus among stakeholder groups for the same factors. Each radial axis represents one of the port competitiveness factors (Geographical Factors, RBV Overall, RBV - Human Resources, RBV - Technology/Infrastructure, and Competitive Advantage Elements). The distance from the center to the point on each axis indicates the mean importance score given by the respective stakeholder group. The further the point from the center, the higher its importance score. The polygon shape formed by each stakeholder group provides a visual representation of their priority profiles.

This radar chart clearly shows that the profiles of Academics and Regulators are almost identical and form a large polygonal area, confirming that they have very aligned views and assign almost equal weight to all factors as determinants of port competitiveness. This contrasts with the profiles of Pelindo IV Regional Makassar, Shipping Companies, and Freight Forwarders, which show more varied polygon shapes. This variation indicates that while there is similarity in the assessment of key factors, there are differences in the relative emphasis on each element. For example, the profile of Shipping Companies might show a slightly higher emphasis on aspects related to operational efficiency and services, while Freight Forwarders might place more emphasis on connectivity and infrastructure. These differences are consistent with the roles and priorities of each group within the port ecosystem.

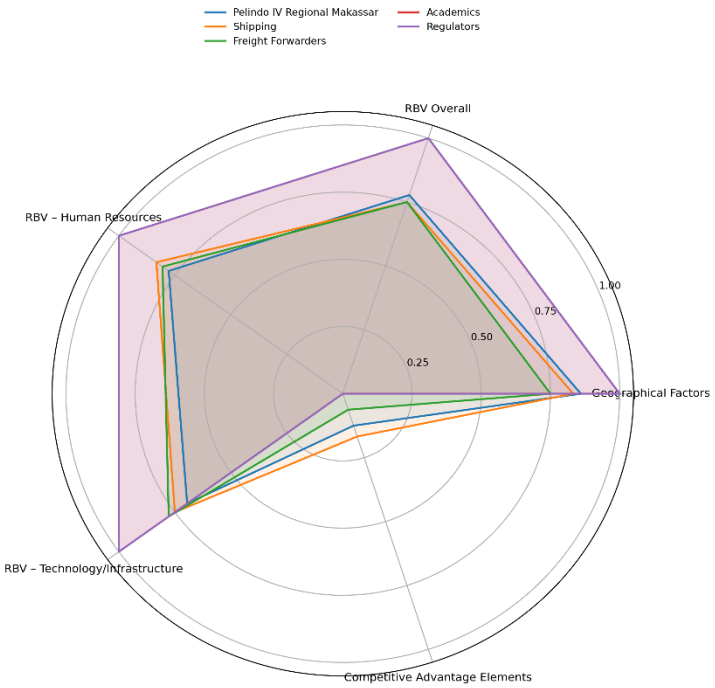

Fig. 3: Radar chart of normalized stakeholder perceptions (0–1 scale)

In summary, Figures 2 and 3 collectively provide a comprehensive understanding of how various stakeholders interpret the factors that affect the competitiveness of Pelindo IV Regional Makassar. This information is essential for the creation of more informed strategies, thereby enabling port management to recognize areas of consensus for collaborative initiatives and areas of divergence that demand further discussion. This research, paired with the earlier explored Value Chain Analysis-Resource-Based View (VCA-RBV) framework deepens the grasp of how internal resources and value chain activities align to produce a long-term competitive advantage, with attention to the important multi-party viewpoints. The insights gained affirm the belief that port competitiveness is an intricate framework molded by both internal and external aspects, together with the diverse viewpoints of critical stakeholders.

5.3 Interpreting the Integrated Results

The combined qualitative and quantitative findings of this study paint a clear picture: the competitiveness of Pelindo IV Regional Makassar emerges not from isolated resources or activities, but from their synergistic interplay. Competitive advantage in this port is multifactorial – it is rooted in a strategic location and strong relationships (RBV) and realized through efficient, innovative operations and logistics (VCA).

1. Confirming Theoretical Integration: The empirical evidence supports the theoretical proposition that integrating VCA and RBV provides a deeper understanding of competitive advantage. The Delphi consensus on geography and resources confirms that neither an activity view alone nor a resource view alone is sufficient; rather, both perspectives are crucial. For instance, a valuable resource like a skilled workforce showed its relevance through high Delphi scores and case anecdotes, but its impact is truly seen when linked to activities like operations and customer service, where that skill is applied. This confirms the integrated model's assertion that *activities and resources must be aligned* to drive competitiveness.
2. Areas for Strategic Focus: The results also help prioritize strategic areas for Pelindo IV Regional Makassar. Geographical advantage is a given strength – the task is to leverage it fully (e.g., by improving connectivity and service to capitalize on location). Human resources are a critical asset that should continue to be developed (training, retention programs) as they directly influence service quality and efficiency. Technology and infrastructure emerged as an area of some concern, pointing to a need for further investment and internal consensus-building around digital strategy. Given that global port competitiveness increasingly depends on digital capabilities (Inkinen et al., 2019), Pelindo IV Regional Makassar must ensure it does not fall behind on this front.
3. Consensus vs. Divergence: The perfect consensus seen among academics and regulators on many factors suggests that the conceptual importance of these factors is well-understood in theory and policy. The more moderate consensus among practitioners reflects the complexities and trade-offs of implementation. For example, port managers (Pelindo IV Regional Makassar group) might recognize technology is important, but also know the constraints of budgets and legacy systems, hence a less enthusiastic rating. This divergence highlights the classic gap between knowing and doing – the study's integrated framework can serve as a guide to close that gap by explicitly linking what needs to be done (activities) with what one has (resources).

4. Link to Accounting/Financial Outcomes: Although the Delphi survey did not directly ask about financial performance, many factors relate to cost efficiency and revenue generation. High importance on operations and infrastructure implies a focus on efficiency (which affects costs), and emphasis on human resources and service suggests a focus on quality (which affects revenue via customer retention). The integrated approach adopted by Pelindo IV Regional Makassar can thus be seen as inherently tied to financial performance – improvements in these areas are likely to reduce operating costs and enhance the port's financial results. This connection is crucial for port authorities and aligns with an accounting perspective on competitiveness. Indeed, recent studies have recommended implementing robust costing systems and strategic cost management tools in ports to support decision-making and improve competitiveness (Fontoura Andriotti et al., 2025). Pelindo IV Regional Makassar's experience reinforces that understanding your value chain and resource base not only boosts competitive positioning but also yields insights into where cost efficiencies can be achieved and where to invest for the best returns.

In conclusion, the integrated analysis validates the usefulness of combining VCA and RBV to diagnose and enhance port competitiveness. Pelindo IV Regional Makassar has benefitted from this holistic view by identifying its key value activities and ensuring they are buttressed by strong resources.

6. Conclusion and Recommendations

6.1 Conclusion

This study successfully demonstrates the utility of integrating Value Chain Analysis (VCA) and the Resource-Based View (RBV) to analyze and enhance port competitiveness. The integrated framework, supported by both qualitative insights from industry practitioners and comprehensive quantitative analysis from a diverse panel of experts, provides a more robust and comprehensive tool for strategic analysis than either theory used in isolation. For Pelindo IV Regional Makassar, the key to sustainable competitive advantage lies in leveraging its unique resources—particularly its strategic geographical location, skilled workforce, and established networks—to perform its value chain activities more effectively and efficiently than its competitors.

The research confirms that while tangible resources like infrastructure are essential, it is the intangible resources, such as technological capabilities, human capital, and strong stakeholder relationships, that are more likely to provide sustainable competitive advantage due to their inimitability. The VCA helps to pinpoint exactly where in the port's operations these resources can be most effectively deployed to create value for customers. By aligning critical activities with internal strengths, Pelindo IV Regional Makassar has been able to address both cost efficiency and service quality, thereby improving its competitive position. Theoretically, this work advances VCA and RBV by illustrating their combined application in a port context. It extends VCA beyond a process-mapping tool to incorporate an internal resource lens, and it operationalizes RBV by linking specific resources to concrete activities. In doing so, the study contributes to strategic management theory, demonstrating how bridging the two perspectives yields a dynamic understanding of competitive advantage in ports.

The comprehensive statistical analysis of the Delphi survey results provides robust empirical validation for the importance of these factors. The high level of consensus among experts on the significance of geographical factors, combined with the recognition of RBV elements and competitive strength variables, underscores the relevance of the proposed integrated framework. The variations in perception among different stakeholder groups highlight that port competitiveness is multi-dimensional – a port must satisfy diverse expectations (operational efficiency, cost effectiveness, service quality, innovation) to be truly competitive. Overall, the study's findings reinforce the idea that ports succeed through a holistic strategy: excelling in key value chain activities while cultivating unique resources that competitors cannot easily replicate.

6.2 Recommendations

Based on the findings of this study, the following recommendations are proposed for port authorities – particularly Pelindo IV Regional Makassar – as well as for policymakers in the maritime sector:

1. Strategic Resource Development and Leverage

a. Focus on Intangibles: While continuing to invest in modern physical infrastructure (tangible resources), port authorities should place greater strategic emphasis on developing and nurturing intangible resources. This includes investing in continuous training and development for personnel, fostering a culture of innovation, and strengthening the port's brand reputation for reliability and efficiency. A skilled, innovative workforce and strong stakeholder relationships can yield efficiency gains and service improvements that are hard for competitors to copy.

b. Leverage Location: Actively market and capitalize on the strategic geographical location of Makassar as a key competitive advantage. This involves not only promoting the port's position and connectivity in marketing materials, but also developing the surrounding logistics ecosystem (feeder networks, distribution centers) to create a truly integrated and efficient hub for Eastern Indonesia. By fully leveraging its location, Pelindo IV Regional Makassar can attract more transit cargo and solidify its role in national maritime logistics.

2. Value Chain Optimization and Innovation

a. Data-Driven Analysis: Regularly conduct detailed analyses of the port's value chain to identify bottlenecks, inefficiencies, and opportunities for improvement. Utilize data analytics to monitor key performance indicators (KPIs) for all primary and support activities. By quantifying performance at each stage (e.g., average berth waiting time, cargo dwell time, truck turnaround time), management can prioritize interventions where they will have the most impact.

b. Embrace Technology: Continue to invest in and adopt new technologies to enhance operational efficiency, transparency, and agility. This includes expanding the use of Port Community Systems and terminal automation, exploring the potential of Internet of Things (IoT) devices and Artificial Intelligence for predictive maintenance and optimized cargo flow, and further digitalizing customer-facing processes (e.g., online billing, real-time tracking for clients). Modern digital infrastructure not only improves efficiency but also provides data that can drive further strategic decisions. Embracing port digitalization is increasingly becoming a prerequisite for competitiveness.

c. Green and Sustainable Practices: Integrate sustainability into the value chain. Investing in environmentally friendly technologies and practices (such as electrified handling equipment, shore power for vessels, and waste reduction programs) can reduce the port's environmental impact and create a new source of differentiation and competitive advantage, as global shipping and trade stakeholders place growing importance on sustainability.

3. Strengthening Stakeholder Collaboration

a. Build Strategic Alliances: Proactively build and strengthen strategic alliances with key stakeholders like major shipping lines, freight forwarders, and other logistics providers. These relationships are valuable intangible resources that can lead to increased cargo volumes, preferential service arrangements, and improved integration of services. For example, partnering with shipping lines on schedule co-ordination or with logistics firms on co-located warehousing can create mutual efficiencies and lock-in business.
b. Engage with Regulators and Academia: Maintain close dialogue with government regulators and academic institutions. Alignment with regulators ensures that the port's development plans and operations adhere to and inform national policy (e.g., Indonesia's maritime highway initiative), potentially unlocking supportive policies or funding. Collaboration with academic researchers can provide access to cutting-edge ideas (such as new optimization models or sustainability practices) and objective performance evaluations. Such engagements keep the port at the forefront of industry knowledge and policy trends.

4. Fostering Dynamic Capabilities

In a rapidly changing global market, the ability to adapt and reconfigure resources and activities is crucial. Port authorities should foster dynamic capabilities by encouraging a culture of continuous learning, promoting cross-functional collaboration, and developing agile strategic planning processes that can respond quickly to new challenges and opportunities. For instance, establishing a cross-department innovation task force or running scenario-planning exercises can help the port anticipate and react to changes like shifts in trade patterns or technological disruptions. By becoming more agile, Pelindo IV Regional Makassar can maintain its competitive edge even as external conditions evolve.

6.3 Managerial and Policy Implications

The findings and recommendations of this study have several implications. For port management, they highlight the importance of balanced investment: not focusing solely on hard infrastructure, but also on human capital, technology adoption, and relationship-building. Managers should view their port as an integrated system where operations, resources, and strategy intersect. Tools like the VCA-RBV framework can be adopted by other ports as a diagnostic template to evaluate their own strengths and weaknesses – essentially serving as a checklist to ensure no critical area is overlooked. The clear message is that ports must excel both operationally (doing things right) and strategically (doing the right things with the right assets). By following the recommendations, Pelindo IV Regional Makassar and similar ports can improve not only their competitive standing but also their financial outcomes, through cost savings from efficiency and revenue gains from better service and expanded networks.

For policymakers, especially in developing maritime economies, the study underscores how port competitiveness ties into broader economic goals. Investments in ports should be accompanied by initiatives to develop human resources (through education and training programs in logistics and port management) and to promote digital innovation in the maritime sector. Policies could encourage ports to adopt greener technologies and to collaborate (rather than compete excessively) through regional port networks, recognizing that a well-integrated port system benefits the national economy. The Indonesian government's emphasis on a "maritime highway" for connectivity is well supported by our findings – it should continue supporting infrastructure upgrades at strategic hubs like Makassar, but also consider soft infrastructure (training centers, research grants for port innovation, platforms for port-community data sharing) to amplify the effectiveness of those investments.

7. Limitations and Future Research

This study, while providing valuable insights, has some limitations. As a single case study focusing on Pelindo IV Regional Makassar, the findings are context-specific and may not be directly generalizable to all ports – particularly those in different countries or with different scales of operation. The integrated framework itself, however, is broadly applicable. Port managers at other ports can adapt this VCA-RBV framework to evaluate their own operations, identifying unique resources and aligning them with key value chain activities in their specific context. Future research should apply this framework to a larger and more diverse sample of ports (e.g., comparing major gateway ports with smaller regional ports) to test its generalizability and refine the model. Cross-case analyses could reveal additional factors or modify the relative importance of certain resources in different scenarios.

Additionally, the study's reliance on expert opinion through the Delphi method, while robust for consensus-building, carries the possibility of bias if the expert panel is not fully representative. We mitigated this by including a range of stakeholders, but future research could incorporate quantitative performance data (e.g., throughput statistics, financial metrics) to correlate with the identified factors, strengthening the empirical support for the framework. A longitudinal study would also be valuable – observing Pelindo IV Regional Makassar or other ports over time as they implement strategic changes. Such a study could provide insights into how the interplay between resources and activities evolves and how ports adapt to changing competitive landscapes (for example, shifts in trade routes or the advent of new technologies). Further quantitative research using methods like structural equation modeling (SEM) could rigorously test causal relationships between internal resources, value chain improvements, and performance outcomes across multiple cases.

Another promising avenue is to explore dynamic capabilities more deeply in the port context – essentially extending RBV to examine how ports develop the ability to reconfigure resources and activities in response to change. As hinted in our recommendations, dynamic capabilities may differentiate ports that continue to thrive in turbulent times from those that stagnate. Integrating dynamic capability theory with VCA-RBV could be an insightful next step for theory development.

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