

Understanding Stakeholder Coordination in Maritime Logistics: A Qualitative Multiple Case Study of Makassar Port, Indonesia

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ABSTRACT: Maritime logistics plays a strategic role in international trade by integrating organizations responsible for vessel operations, cargo handling, customs clearance, inland transportation, and information management. As port operations grow more complex, effective stakeholder coordination has become essential for operational efficiency and supply chain performance. However, qualitative evidence on how coordination operates within emerging-economy ports, particularly Indonesia, remains limited. This study examines coordination practices among maritime logistics stakeholders at Makassar Port, identifies facilitating and constraining factors, and develops a conceptual understanding of stakeholder coordination. A qualitative multiple case study was conducted at Makassar Port between March and June 2025, using semi-structured interviews with eleven purposively selected stakeholders spanning the Port Authority, terminal operator, shipping company, freight forwarder, trucking company, customs office, and other agencies, supplemented by observations and document analysis, and analyzed through thematic coding. Findings show coordination as a multidimensional process combining formal governance, digital systems, and interpersonal collaboration. Communication, trust, real-time information sharing, and digital integration facilitate coordination, while schedule disruptions, congestion, fragmented systems, and regulatory complexity constrain it. Proposed strategies include strengthening the Port Community System, improving platform interoperability, and building stakeholder capacity. The study concludes that coordination is a strategic capability shaped by technology, relationships, and governance, offering theoretical and practical implications for Indonesian maritime logistics systems.

Keywords: Maritime Logistics, Stakeholder Coordination, Collaborative Governance, Port Community System, Qualitative Multiple Case Study, Makassar Port, Indonesia.



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INTRODUCTION

Maritime logistics plays a pivotal role in facilitating global trade by connecting production centers, distribution networks, and international markets through efficient maritime transportation systems. More than a transport function, maritime logistics represents an integrated network of

shipping companies, port authorities, terminal operators, freight forwarders, customs agencies, quarantine authorities, inland transport providers, and cargo owners whose activities must be synchronized to ensure seamless cargo movement. As international trade continues to expand and supply chains become increasingly interconnected, ports have evolved from traditional cargo handling facilities into complex logistics hubs that require intensive coordination among multiple stakeholders. Consequently, the effectiveness of stakeholder coordination has become a critical determinant of operational efficiency, service quality, and supply chain resilience within modern port ecosystems.

The increasing complexity of maritime logistics has been accelerated by globalization, larger vessel capacities, just-in-time supply chain strategies, and rapid digital transformation (Iman et al., 2022). These developments have significantly increased the interdependence among organizations operating within port communities. Contemporary ports no longer function as isolated infrastructure assets but rather as collaborative logistics platforms where public institutions and private organizations must coordinate operational activities, exchange information, and jointly resolve disruptions. Previous studies consistently demonstrate that effective stakeholder coordination improves operational efficiency, enhances service reliability, and strengthens overall supply chain performance by reducing process fragmentation and improving information visibility (Behdani et al., 2020; Gracia et al., 2022; Tijan et al., 2021; Venkatesh et al., 2020). These findings suggest that coordination is no longer an auxiliary management function but a strategic capability that directly influences the competitiveness of maritime logistics systems.

Coordination within port operations requires collaboration among diverse stakeholders whose objectives, responsibilities, and institutional arrangements often differ considerably. Port authorities regulate and supervise port activities, terminal operators manage cargo handling operations, shipping companies coordinate vessel movements, freight forwarders organize logistics services, trucking companies provide inland transportation, while customs and quarantine agencies ensure regulatory compliance. Exporters and importers, as cargo owners, depend on the timely interaction of these organizations to minimize delays and logistics costs. Because each stakeholder performs specialized functions while remaining operationally interdependent, coordination failures occurring at any point within the logistics chain may propagate throughout the entire port system. Consequently, both formal governance arrangements and informal communication mechanisms are essential to maintaining synchronized operational processes and efficient cargo flows.

Recent developments in digital transformation have further reshaped coordination practices within maritime logistics. The adoption of digital technologies, particularly the Port Community System (PCS), has enabled ports to centralize operational information, facilitate secure information exchange, and integrate business processes across multiple organizations. PCS serves as a neutral digital platform through which shipping lines, terminal operators, customs authorities, freight forwarders, logistics providers, and other stakeholders exchange operational data in real time. Existing studies indicate that PCS implementation enhances transparency, reduces paper-based administrative procedures, accelerates information sharing, and supports synchronized decision-making among port actors (Caldeirinha et al., 2022; Notteboom et al., 2020). Beyond improving

operational efficiency, PCS also contributes to greater supply chain visibility and more effective coordination between maritime and hinterland logistics activities.

Nevertheless, digital transformation alone cannot guarantee effective coordination. Emerging evidence suggests that technological platforms must be supported by appropriate governance structures, organizational trust, and collaborative relationships among stakeholders. The implementation of PCS requires clear institutional arrangements governing data ownership, interoperability, information security, and stakeholder responsibilities. Longitudinal research on port collaboration demonstrates that digital coordination evolves through formal and informal governance mechanisms, requiring continuous adaptation of institutional arrangements as collaboration matures (Chandra & Hillegersberg, 2022). Likewise, studies on blockchain-enabled logistics platforms, digital twins, and cybersecurity emphasize that successful digital transformation depends not only on technological capabilities but also on governance quality, stakeholder commitment, and inter-organizational collaboration (Saha et al., 2023; Sarkar et al., 2022). These findings reinforce the view that stakeholder coordination is fundamentally a socio-technical phenomenon in which technological infrastructure and organizational relationships are mutually reinforcing.

Organizational and institutional factors further shape the effectiveness of stakeholder coordination within maritime logistics (Ghalehtemouri et al., 2025; Lin et al., 2021). The governance model adopted by a port whether landlord, private-service, or hybrid influences the distribution of authority, operational autonomy, and coordination responsibilities among participating organizations (Behdani et al., 2020; Gracia et al., 2022). Institutional conditions such as regulatory consistency, policy stability, and reform momentum also affect collaboration by creating either enabling or constraining environments for coordinated decision-making. At the organizational level, trust, leadership, learning orientation, communication quality, and innovation culture significantly influence stakeholders' willingness to collaborate and adopt digital technologies (Alamouh et al., 2023; Sakita et al., 2024). Furthermore, principal-agent relationships among government agencies, port authorities, and private operators may create governance tensions that hinder effective coordination if institutional roles and responsibilities are not clearly defined (Valonienė et al., 2024). Collectively, these studies demonstrate that coordination effectiveness depends upon the interaction between technological infrastructure, governance mechanisms, organizational culture, and institutional context.

Although stakeholder coordination has attracted growing scholarly attention, important empirical gaps remain. Much of the existing literature has focused on ports in Europe and other developed economies, where governance structures, digital infrastructure, and institutional maturity differ considerably from those found in developing countries. Research conducted in emerging economies indicates that coordination is frequently constrained by institutional complexity, fragmented governance arrangements, limited stakeholder awareness, insufficient benchmarking practices, and varying levels of digital readiness (Bottalico, 2020; Gerlitz & Meyer, 2021; Othman et al., 2022). Studies also highlight that effective coordination requires stronger cross-sector collaboration, greater investment in digital platforms, and continuous organizational capacity building. These findings suggest that lessons derived from developed-country contexts cannot be

assumed to apply directly to emerging maritime logistics systems, where institutional and operational environments are substantially different.

Within Southeast Asia and Indonesia, qualitative evidence regarding stakeholder coordination remains particularly limited despite the region's strategic importance in global maritime trade. Existing studies have largely concentrated on infrastructure development, operational efficiency, or technological implementation, while relatively few have examined how coordination actually occurs among multiple stakeholders operating within complex port environments. Scholars have called for more context-specific qualitative investigations that explore the interactions between governance arrangements, digital transformation, organizational trust, and stakeholder collaboration in rapidly developing port systems (Panahi et al., 2020; Saha et al., 2023). Additional gaps concern the evolution of governance mechanisms throughout the lifecycle of inter-organizational collaboration, the management of data ownership and cybersecurity within digital platforms, and the social dimensions of coordination involving labor organizations, local communities, and sustainability initiatives (Kalaidjian et al., 2022; Loubet & Serry, 2022). Addressing these gaps is essential for developing contextually relevant knowledge capable of informing both academic theory and practical policy within Southeast Asian maritime logistics.

Against this background, Makassar Port provides an appropriate empirical setting for investigating stakeholder coordination in an emerging maritime logistics context. As the principal logistics hub serving Eastern Indonesia, Makassar Port connects major domestic and international shipping routes linking Sulawesi, Kalimantan, Maluku, Papua, and Nusa Tenggara. The port accommodates interactions among numerous public and private organizations, including the Port Authority (KSOP), terminal operators, shipping companies, freight forwarders, EMKL companies, trucking operators, customs, quarantine agencies, exporters, importers, and the Port Community System administrator. Daily operations require continuous coordination concerning vessel scheduling, cargo handling, documentation processing, customs clearance, inspection activities, trucking arrangements, and digital information exchange. Consequently, Makassar Port offers a rich setting for examining how coordination practices are implemented, what factors facilitate collaboration, which barriers hinder operational effectiveness, and how coordination can be strengthened through organizational and technological improvements.

Accordingly, this study aims to explore coordination practices among maritime logistics stakeholders at Makassar Port using a qualitative multiple case study approach. Specifically, the study seeks to (1) examine how stakeholders coordinate operational activities, (2) identify factors facilitating effective coordination, (3) investigate barriers that hinder coordination within port logistics operations, and (4) develop a conceptual understanding of stakeholder coordination in maritime logistics. The study is expected to contribute theoretically by extending stakeholder coordination and collaborative governance literature through evidence from an emerging economy, practically by providing recommendations for port operators, logistics companies, and regulatory agencies, and from a policy perspective by supporting the development of integrated, digitally enabled, and collaborative port governance capable of improving operational efficiency and strengthening Indonesia's maritime logistics competitiveness (Emerson & Nabatchi, n.d.).

METHOD

Research Design

This study employed a qualitative research approach using a multiple case study design to investigate stakeholder coordination practices in maritime logistics at Makassar Port, South Sulawesi, Indonesia. A qualitative approach was selected because stakeholder coordination represents a complex social and organizational phenomenon involving interactions among multiple autonomous organizations with different institutional responsibilities, operational objectives, and governance arrangements. Understanding how these stakeholders coordinate daily operational activities requires in-depth exploration of participants' experiences, perceptions, and interactions within their natural operational context rather than the measurement of predefined variables.

The multiple case study design was considered appropriate because it enables researchers to investigate contemporary phenomena within real-life settings while capturing contextual differences among stakeholder groups. Maritime logistics coordination involves port authorities, terminal operators, shipping companies, freight forwarders, trucking companies, customs authorities, quarantine agencies, exporters, importers, and digital platform providers whose collaborative relationships evolve through formal governance structures and informal communication networks. Previous studies have shown that qualitative case studies are particularly suitable for examining governance mechanisms, trust development, digital transformation, and inter-organizational coordination within port communities because they reveal dynamic relationships that cannot be adequately explained using quantitative methods alone (Chandra & Hillegersberg, 2022; Tijan et al., 2021).

The study was guided by Stakeholder Coordination Theory, Supply Chain Coordination Theory, and Collaborative Governance Theory (Noor et al., 2022). These theoretical perspectives provided an analytical framework for examining how communication, trust, information sharing, governance arrangements, and digital technologies influence coordination effectiveness among maritime logistics stakeholders. The research also adopted an inductive orientation, allowing conceptual insights to emerge from empirical evidence while remaining theoretically informed.

Research Setting

The research was conducted at Makassar Port, South Sulawesi, Indonesia, between March and June 2025. Makassar Port was selected purposively because it functions as the principal maritime logistics hub serving Eastern Indonesia and connects major domestic shipping routes linking Sulawesi, Kalimantan, Maluku, Papua, and Nusa Tenggara. The port accommodates numerous public and private organizations responsible for vessel operations, cargo handling, customs clearance, quarantine inspection, inland transportation, and digital information management.

The complexity of operational activities and the diversity of participating organizations make Makassar Port an appropriate empirical setting for examining stakeholder coordination in maritime logistics. Furthermore, the port has implemented digital information systems, including the Port Community System (PCS), while continuing to rely on extensive inter-organizational collaboration, making it suitable for investigating both technological and organizational dimensions of coordination.

Participant Selection

Purposive sampling was employed to identify participants possessing direct knowledge and practical experience of coordination within port logistics operations. This sampling strategy is appropriate for qualitative case study research because it allows the selection of information-rich participants capable of providing detailed insights into the phenomenon under investigation.

Eleven key stakeholders representing major organizations within Makassar Port participated in the study. They included a Port Operation Manager from the container terminal, a Head of Operations from the Makassar Port Authority (KSOP), a Shipping Operations Manager, a Freight Forwarding Manager, an EMKL Manager, a Trucking Coordinator, a Customs Officer, a Quarantine Officer, an Export Manager, an Import Logistics Manager, and a Port Community System Administrator. Collectively, these participants represented the principal public and private actors involved in vessel scheduling, cargo handling, customs clearance, quarantine inspection, documentation processing, inland transportation, and digital information exchange.

Participant selection continued until sufficient thematic richness was achieved and additional interviews produced limited new insights into stakeholder coordination practices.

Data Collection

Data were collected through semi-structured interviews, field observations, and document analysis to obtain a comprehensive understanding of stakeholder coordination.

Semi-structured interviews served as the primary source of data because they enabled participants to describe operational experiences while allowing the researcher to explore emerging issues through follow-up questions. Interview questions were organized around four research questions concerning coordination practices, facilitating factors, coordination barriers, and improvement strategies. Each interview lasted approximately 45–90 minutes and was conducted in Bahasa Indonesia at participants' workplaces or other mutually agreed locations. With participants' consent, interviews were audio-recorded and subsequently transcribed verbatim for analysis.

Field observations complemented interview data by documenting coordination meetings, operational activities, communication patterns, documentation procedures, and interactions among stakeholders within the port environment. Observational notes provided contextual information that assisted in interpreting interview findings and identifying coordination practices that might not have been explicitly articulated during interviews.

Document analysis was also undertaken to strengthen data triangulation. Relevant documents included operational procedures, port regulations, organizational reports, coordination meeting records, and publicly available materials relating to the Port Community System and maritime logistics operations. Documentary evidence provided additional contextual information regarding governance structures, operational procedures, and digital coordination mechanisms.

Combining multiple data sources enabled a richer understanding of stakeholder coordination while improving the credibility and completeness of the findings.

Data Analysis

Data analysis followed a thematic analysis approach supported by open coding, axial coding, and selective coding. Thematic analysis was selected because it provides a systematic and flexible method for identifying, organizing, and interpreting patterns within qualitative data and has been widely applied in logistics and maritime research (Butt et al., 2020; Thakkar, 2024).

The analysis began with familiarization, during which interview transcripts, field notes, and documentary materials were read repeatedly to gain an overall understanding of the data.

During the open coding stage, meaningful statements relating to stakeholder coordination were identified and assigned initial descriptive codes. Examples included "daily operational meetings," "schedule synchronization," "Port Community System," "communication," "trust," "documentation errors," "port congestion," and "real-time information sharing."

The axial coding stage examined relationships among these initial codes by grouping them into broader conceptual categories. Four principal categories emerged: coordination practices, facilitating factors, coordination barriers, and improvement strategies. Relationships among categories were continuously refined through comparison across participants representing different stakeholder organizations.

The final stage, selective coding, integrated these categories into an overarching conceptual explanation of stakeholder coordination. The core category identified was effective stakeholder coordination, which was influenced by communication, trust, digital integration, collaborative governance, and organizational commitment while being constrained by operational, technological, and institutional barriers. This analytical process enabled the development of a conceptual framework explaining stakeholder coordination within maritime logistics.

Throughout the analytical process, coding decisions were reviewed iteratively to ensure consistency and conceptual coherence. Comparisons across stakeholder groups enabled identification of both shared perceptions and context-specific experiences, strengthening the explanatory power of the findings.

Trustworthiness of the Study

To enhance methodological rigor, the study adopted the trustworthiness framework comprising credibility, transferability, dependability, and confirmability.

Credibility was strengthened through methodological triangulation by integrating interview data, field observations, and documentary evidence. Source triangulation was achieved by interviewing participants from eleven different stakeholder organizations representing both public and private sectors. Member checking was conducted by discussing preliminary interpretations with selected participants to ensure that findings accurately reflected their experiences. These strategies are widely recommended for strengthening qualitative research credibility (Nyirenda et al., 2020).

Transferability was enhanced through rich descriptions of the research context, including the governance structure of Makassar Port, participant characteristics, operational processes, and institutional environment. Detailed contextual reporting enables readers to evaluate the applicability of the findings to other ports or maritime logistics settings (Chandra & Hillegersberg, 2022; Dimakis et al., 2025; Wang & Zhen, 2025).

Dependability was supported by maintaining a systematic audit trail documenting research procedures, interview protocols, coding decisions, and analytical development throughout the study. Comprehensive documentation allows other researchers to understand how conclusions were reached and increases the transparency of the research process.

Confirmability was strengthened through reflexive practice and transparent documentation of analytical decisions. The researcher continuously evaluated potential biases and ensured that interpretations were grounded in empirical evidence rather than personal assumptions. Coding procedures, theme development, and conceptual interpretations were consistently linked to participant narratives and supporting documentary evidence.

Ethical Considerations

The study adhered to established ethical principles governing qualitative research. Prior to participation, all informants received an explanation of the study objectives, interview procedures, voluntary nature of participation, and intended use of the research findings. Written or verbal informed consent was obtained before interviews commenced.

Participants were assured that their identities would remain confidential. Consequently, pseudonymous identification codes (I1–I11) were used throughout the analysis and reporting. Audio recordings, interview transcripts, and research documents were securely stored and used solely for academic purposes. Participants retained the right to withdraw from the study at any stage without consequence.

By integrating a qualitative multiple case study design, purposive participant selection, multiple data sources, systematic thematic analysis, and rigorous trustworthiness procedures, this methodology provides a robust foundation for examining stakeholder coordination practices in maritime logistics and for developing a contextually grounded conceptual understanding of coordination within Makassar Port.

RESULT AND DISCUSSION

Coordination Practices among Maritime Logistics Stakeholders

The analysis identified stakeholder coordination as a continuous operational process involving both formal organizational mechanisms and informal interpersonal communication. Participants consistently described coordination as essential for synchronizing vessel arrivals, berth allocation, cargo handling, documentation, inspection, container release, and inland transportation. Although each organization performed a specialized role, the effectiveness of port operations depended on how well information and decisions were aligned across organizational boundaries.

The findings revealed that coordination at Makassar Port was not managed through a single mechanism. Instead, it emerged from the interaction of daily operational meetings, Port Community System utilization, schedule synchronization, document exchange, direct communication, and cross-agency problem-solving. This pattern reflects evidence from previous port studies indicating that daily coordination is shaped by formal governance structures, shared information platforms, and relational mechanisms that facilitate adaptation to operational uncertainty (Behdani et al., 2020; Gracia et al., 2022).

Daily Operational Coordination

Daily operational coordination was one of the most visible practices identified in the interviews. The terminal operator and port authority reported that coordination was conducted through routine briefings, operational meetings, and direct communication with shipping companies, freight forwarders, EMKL companies, trucking operators, customs, and quarantine authorities.

The Port Operation Manager explained:

“Operational coordination is conducted every day through the Port Community System, operational briefings, and direct communication with shipping companies, trucking operators, and EMKL so that loading and unloading schedules can proceed according to plan.” (I1)

The port authority also emphasized its role in organizing inter-agency coordination:

“KSOP facilitates coordination among institutions through coordination meetings and operational supervision within the port.” (I2)

These findings indicate that daily coordination involves both centralized supervision and decentralized interaction among operational actors. The port authority provides an institutional framework for coordination, while operational stakeholders communicate directly to respond to real-time conditions. Similar findings have been reported in the literature, where port authorities and formal governance arrangements define roles, responsibilities, and performance expectations that guide day-to-day port activities (Behdani et al., 2020; Gracia et al., 2022).

Routine meetings also functioned as spaces for joint planning and problem-solving. Participants explained that vessel schedules, berth readiness, cargo handling plans, inspection requirements, and trucking availability were discussed to minimize operational conflict. These findings correspond with prior research showing that regular meetings, standardized data exchange, and joint planning processes reduce information asymmetry and improve synchronization among port actors (Chandra & Hillegersberg, 2022).

Vessel and Berth Schedule Synchronization

Coordination between shipping companies and terminal operators was primarily focused on vessel arrival times, berth availability, and loading and unloading schedules. The Shipping Operations Manager stated:

“We continuously coordinate with the terminal regarding berthing schedules, berth readiness, and estimated loading and unloading times.” (I3)

The terminal operator similarly noted that changes in estimated vessel arrival times required immediate operational adjustments. These adjustments affected crane allocation, labor scheduling, yard planning, and trucking activities. Schedule synchronization was therefore not a one-time planning activity but an ongoing process requiring frequent information updates.

The findings show that vessel-related coordination was highly time-sensitive. When vessels were delayed due to weather conditions or disruptions at previous ports, stakeholders were required to revise their schedules. This form of operational interdependence supports previous research emphasizing that shared information platforms and coordinated planning are necessary for synchronizing berth planning, vessel movements, and cargo release processes (Notteboom et al., 2020; Tijan et al., 2021).

Documentation and Cargo Release Coordination

Document coordination emerged as another major operational practice. Freight forwarders and EMKL companies served as intermediaries between cargo owners, shipping companies, terminal operators, trucking companies, customs, and quarantine agencies. Their role involved ensuring that shipping documents, customs declarations, cargo release documents, and inspection requirements were completed in the correct sequence.

The Freight Forwarding Manager explained:

“We act as the link between exporters, importers, shipping companies, terminals, and trucking companies, so almost every process requires coordination.” (I4)

The EMKL Manager added:

“Coordination is mainly carried out for container release and trucking readiness.” (I5)

These statements indicate that document coordination was closely linked to physical cargo movement. Containers could not be released unless administrative, customs, terminal, and transportation requirements were completed. Consequently, incomplete or inconsistent documents often caused operational delays.

Formal electronic systems supported document processing, particularly for customs clearance. The Customs Officer stated:

“Coordination is carried out through the electronic customs system and direct communication whenever documents require clarification.” (I7)

The findings demonstrate that formal digital systems were important, but direct communication remained necessary when data were incomplete, inconsistent, or required interpretation. This combination of digital and interpersonal coordination reflects prior research showing that PCS, single-window systems, and electronic data interchange provide formal structures for process integration but continue to depend on organizational interaction and problem-solving (Caldeirinha et al., 2022; Tijan et al., 2021).

Customs and Quarantine Coordination

Coordination with government inspection agencies represented an important component of cargo clearance. Customs activities were mainly conducted through electronic systems, whereas quarantine coordination involved the scheduling of commodity inspections and certification procedures.

The Quarantine Officer explained:

“We coordinate with customs, the terminal, and exporters for the inspection of commodities requiring quarantine certification.” (I8)

The findings indicate that inspection-related coordination required advance information about cargo type, arrival schedules, documentation readiness, and inspection locations. Certain commodities required additional examination, which could extend service time and affect cargo release schedules.

This result suggests that coordination between regulatory agencies and logistics providers must begin before cargo arrival. Early coordination enables inspection agencies to allocate personnel, prepare documentation, and synchronize inspection schedules with terminal operations. The evidence is consistent with research highlighting the importance of regulatory harmonization and single-window initiatives for reducing administrative barriers and improving coordination across public and private actors (Saha et al., 2023).

Trucking and Inland Transport Coordination

Trucking coordination involved communication among terminal operators, EMKL companies, freight forwarders, and trucking providers. The Trucking Coordinator reported:

“We receive container pickup schedule information from the terminal and EMKL to arrange the fleet.” (I6)

The effectiveness of trucking operations depended on accurate information regarding container readiness, gate access, and terminal congestion. When information was delayed or inaccurate, trucks could arrive before containers were ready, increasing waiting time and contributing to congestion around the port.

The findings show that inland transport coordination was closely connected to terminal and documentation processes. Trucking operators could not independently determine pickup times because their schedules depended on container release status and gate conditions. Therefore, coordination required integrated information across maritime and hinterland operations. This result supports previous research emphasizing the importance of shared data and joint planning for improving hinterland connectivity and port-related freight flows (Behdani et al., 2020; Notteboom et al., 2020).

Port Community System as a Coordination Platform

The Port Community System emerged as a central digital mechanism supporting stakeholder coordination (Teßmann & Elbert, 2022). The PCS Administrator stated:

“Most coordination is currently conducted through PCS, which connects various port stakeholders.” (I11)

Participants explained that PCS enabled stakeholders to access operational information, exchange data, monitor service status, and coordinate documentation. The terminal operator also used PCS to communicate daily schedules and operational changes. Through the platform, stakeholders could obtain information without relying exclusively on paper documents or separate communication channels.

However, PCS did not eliminate the need for direct communication. Participants continued to use telephone calls, messaging applications, face-to-face meetings, and informal discussions, particularly when urgent operational decisions were required. The findings therefore suggest that PCS functioned as an enabling platform rather than a complete substitute for human interaction.

This result is consistent with the literature describing PCS as a neutral digital platform that centralizes data and supports coordination among public and private stakeholders (Caldeirinha et al., 2022; Tijan et al., 2021). It also reflects the argument that PCS-enabled collaboration requires ongoing governance arrangements, trust, and shared responsibility for data management (Chandra & Hillegersberg, 2022).

Formal and Informal Coordination Mechanisms

The findings demonstrate that stakeholder coordination relied on a combination of formal and informal mechanisms. Formal mechanisms included operational meetings, standard operating procedures, regulatory systems, electronic customs services, PCS, official schedules, and documented responsibilities. These mechanisms established predictable structures for information exchange and operational decision-making.

Informal mechanisms included direct phone calls, personal messaging, trust-based communication, and rapid problem-solving among individuals from different organizations. Such mechanisms were especially important when vessel schedules changed, documents required urgent correction, or terminal congestion required immediate adjustment.

Participants indicated that established working relationships often accelerated problem resolution. The EMKL Manager noted that long-term professional relationships made coordination easier, while the terminal operator emphasized open communication and mutual trust.

This finding aligns with previous studies showing that relational norms including trust, flexibility, information sharing, and solidarity complement formal governance mechanisms in port logistics (Lin et al., 2021; Mubder, 2023). Informal coordination enabled stakeholders to adapt quickly to operational contingencies that could not always be managed through formal procedures alone.

Facilitating Factors of Effective Coordination

The second major theme concerned factors that facilitated coordination. Communication, trust, real-time information, digital integration, stakeholder commitment, and clear responsibilities were repeatedly identified by participants.

Communication was the most consistently emphasized factor. Participants explained that rapid and accurate information enabled stakeholders to adjust schedules and allocate resources. The Port Operation Manager stated that open communication and real-time information made coordination more effective. Similarly, the Shipping Operations Manager emphasized the importance of timely operational information from the terminal.

Trust was also important because stakeholders frequently depended on information supplied by other organizations. Long-term working relationships reduced hesitation and enabled problems to be addressed more quickly. Digital integration further improved coordination by increasing transparency and reducing repeated data entry.

The Customs Officer explained that electronic service integration accelerated customs clearance, while the PCS Administrator emphasized that data standardization and digital information exchange improved coordination transparency. These findings reinforce prior studies showing that coordination effectiveness depends on both technological infrastructure and relational capabilities (Chandra & Hillegrasberg, 2022; Tijan et al., 2021).

Coordination Barriers

Participants identified operational, technological, administrative, and institutional barriers. Vessel schedule changes were a recurring problem because delays affected berth allocation, terminal planning, cargo delivery, and export schedules. Port and road congestion also disrupted cargo movement and increased vehicle waiting times.

Fragmented information systems created additional difficulties because not all organizations used compatible platforms. The Freight Forwarding Manager reported that differences between company systems made data synchronization less effective. Network disruptions and uneven PCS adoption also limited the benefits of digital coordination.

Administrative barriers included incomplete documents, data errors, and regulatory changes. These problems delayed cargo release and required additional clarification among freight forwarders, customs, cargo owners, and terminal operators. Inspection requirements for certain commodities further extended service times.

The findings indicate that coordination barriers were interconnected. A vessel delay could alter terminal planning, increase congestion, affect inspection schedules, and disrupt trucking arrangements. This interdependence demonstrates that coordination problems cannot be addressed independently.

Improvement Strategies

Participants proposed several strategies to improve coordination. The most common recommendations were greater system integration, real-time information sharing, PCS enhancement, routine coordination meetings, digital documentation, early planning, and stakeholder capacity building.

The PCS Administrator recommended stronger interoperability and user training so that all stakeholders could use the system effectively. The Trucking Coordinator proposed slot-based vehicle scheduling to reduce queues, while the Import Logistics Manager recommended a digital dashboard for real-time container monitoring.

Participants also emphasized that technological improvement should be supported by collaborative governance. The port authority highlighted the need for stronger cross-agency coordination and integrated services. These findings suggest that operational efficiency requires both digital transformation and institutional cooperation.

Overall, the results demonstrate that coordination at Makassar Port is produced through an integrated combination of governance structures, digital platforms, routine interaction, and relational practices. Formal systems provide structure and accountability, while informal communication enables rapid adaptation to operational uncertainty. Effective coordination therefore depends on the interaction of technological, organizational, and institutional mechanisms rather than on any single coordination tool.

The findings demonstrate that coordination among maritime logistics stakeholders at Makassar Port is a multidimensional process shaped by formal governance arrangements, digital

infrastructure, organizational trust, and continuous interpersonal communication. Daily coordination was carried out through operational meetings, schedule synchronization, document exchange, regulatory coordination, and the use of the Port Community System. These findings support stakeholder coordination theory, which emphasizes that interdependent organizations must align their activities, share information, and manage conflicting interests to achieve collective operational outcomes. In the context of port logistics, no single stakeholder is capable of completing the cargo movement process independently. Shipping companies depend on terminal operators for berth and handling services, terminal operators depend on accurate vessel and cargo information, customs and quarantine agencies depend on complete documentation, and trucking operators depend on the timely release of containers. Coordination therefore emerges from the management of interdependence among organizations whose functions are operationally connected but institutionally separate.

Stakeholder coordination theory helps explain why communication, trust, and information sharing were identified as central facilitating factors. Participants repeatedly emphasized that timely information allowed them to adjust vessel schedules, cargo handling plans, inspection arrangements, and trucking activities. Trust reduced hesitation in acting on information provided by other organizations and supported rapid problem-solving when unexpected disruptions occurred. These relational factors complement formal coordination mechanisms by allowing stakeholders to respond flexibly to situations that cannot be fully anticipated through standard operating procedures. This finding is consistent with research showing that relational norms, including trust, flexibility, solidarity, and information sharing, strengthen inter-organizational coordination in logistics networks.

Collaborative governance also provides an appropriate explanation for the coordination practices observed at Makassar Port. Port operations involve both public institutions and private organizations whose authority, objectives, and accountability structures differ. KSOP, customs, and quarantine agencies perform regulatory and supervisory functions, while terminal operators, shipping companies, freight forwarders, EMKL companies, and trucking firms pursue commercial and operational objectives. Despite these differences, stakeholders must jointly manage vessel movements, cargo release, inspection, and inland transport. Collaborative governance explains how such actors coordinate through dialogue, shared procedures, institutional forums, and negotiated responsibilities rather than through hierarchical control alone. The routine coordination meetings reported by participants functioned as collaborative spaces in which operational priorities were aligned and problems were addressed collectively. This supports previous studies showing that port authorities and network administrative organizations play an important role in maintaining coordination across complex port communities (Chandra & Hillegersberg, 2022; Gracia et al., 2022).

The findings also reveal that digital coordination and collaborative governance are mutually dependent. The Port Community System improved information visibility, reduced reliance on paper-based procedures, and facilitated the exchange of operational data. However, participants continued to rely on telephone calls, messaging applications, and face-to-face interaction when urgent clarification or rapid adaptation was required. This suggests that digital platforms do not replace governance relationships but instead operate within them. PCS effectiveness depends on

data quality, system interoperability, clear ownership arrangements, stakeholder participation, and trust in shared information. These findings reinforce the argument that digital transformation in ports is a socio-technical process involving both technology and inter-organizational governance (Chandra & Hillegrersberg, 2022; Tijan et al., 2021).

Several similarities can be identified between coordination practices at Makassar Port and those reported in developed-economy ports. In both contexts, coordination relies on port authorities, shared digital platforms, standardized procedures, joint planning, and formal information exchange. The use of PCS, electronic customs systems, operational meetings, and schedule synchronization at Makassar Port reflects practices observed in European ports such as Rotterdam and Valencia, where digital platforms are central to data exchange and port-community coordination (Caldeirinha et al., 2022; Notteboom et al., 2020). In both developed and emerging-economy contexts, informal communication also remains important because operational uncertainty requires rapid adjustment and cross-organizational problem-solving.

However, important differences are also evident. Developed ports generally operate within more mature digital ecosystems characterized by higher interoperability, stable governance arrangements, and broader system adoption. At Makassar Port, participants identified fragmented information systems, uneven digital participation, documentation errors, network disruptions, and inconsistent real-time data as continuing barriers. These conditions reflect challenges commonly reported in emerging economies, where digital transformation is constrained by institutional complexity, limited capacity, stakeholder awareness gaps, and incomplete system integration (Sakita et al., 2024; Venkatesh et al., 2020). Consequently, coordination in Makassar depends more heavily on informal communication and individual relationships to compensate for limitations in formal systems. This does not indicate the absence of institutional coordination, but rather a hybrid coordination environment in which formal and informal practices operate simultaneously.

The qualitative findings contribute to maritime logistics and supply chain coordination theory by illustrating coordination as an evolving process rather than a fixed organizational arrangement. Existing theories often emphasize structural alignment, information sharing, and incentive coordination, but the present findings show that effective port coordination also depends on continuous adaptation to disruptions. Vessel delays, port congestion, regulatory changes, incomplete documents, and road traffic conditions created cascading effects across the logistics system. Stakeholders were required to reinterpret information, renegotiate schedules, and adjust operational decisions in real time. This suggests that coordination capability should be understood as the capacity to align planned activities while also adapting collectively to unexpected events.

The study further contributes by integrating technological, relational, and institutional dimensions within a single explanatory framework. Communication and trust represent the relational dimension; PCS and electronic systems represent the technological dimension; and port authority leadership, regulatory procedures, and collaborative meetings represent the institutional dimension. Effective coordination emerges when these dimensions reinforce one another. Digital systems improve visibility, but their value is limited without trust and accurate data. Formal governance establishes accountability, but it may be insufficient without informal communication. Relational coordination supports flexibility, but it requires institutional structures to sustain

consistency and fairness. This integrated perspective extends coordination theory by demonstrating that operational efficiency is not produced by technology, governance, or relationships independently, but by their interaction.

The findings generate several managerial implications. Port managers should prioritize system interoperability so that operational data can be exchanged across terminals, shipping companies, customs, quarantine agencies, freight forwarders, and inland transport providers. Real-time dashboards, integrated container tracking, and standardized data formats could reduce uncertainty and repeated information entry. Routine coordination meetings should also be institutionalized, particularly during periods of congestion, schedule disruption, or regulatory change. In addition, stakeholder training is necessary to ensure consistent use of PCS and other digital platforms. Managers should not treat coordination solely as a technological issue; they should also invest in relationship building, communication protocols, and joint problem-solving mechanisms.

From a policy perspective, the findings indicate the need for stronger collaborative governance and clearer data-governance arrangements (Zadek & Radovich, n.d.). Port authorities and relevant government agencies should define responsibilities for data ownership, system maintenance, cybersecurity, and information quality. Policies supporting digital integration should be accompanied by capacity-building programs for smaller logistics firms that may have limited technological resources. Regulatory agencies should also improve procedural harmonization to reduce duplication between customs, quarantine, terminal, and shipping documentation. The introduction of truck appointment systems and coordinated gate management could reduce vehicle queues and improve hinterland connectivity.

Overall, the study shows that effective stakeholder coordination at Makassar Port depends on a hybrid model combining formal governance, digital platforms, and informal relational practices. This combination enables stakeholders to manage interdependence, respond to operational variability, and sustain cargo flows despite institutional and technological constraints. The findings therefore position coordination as a dynamic, collaborative, and socio-technical capability that is fundamental to improving operational efficiency and port performance in emerging-economy contexts.

CONCLUSION

This study examined stakeholder coordination practices among maritime logistics actors at Makassar Port using a qualitative multiple case study approach. The findings demonstrate that effective coordination within port operations is a multidimensional and collaborative process that integrates formal governance mechanisms, digital information systems, and interpersonal relationships among diverse public and private stakeholders. Coordination extends beyond operational communication to encompass continuous synchronization of vessel scheduling, cargo handling, customs and quarantine clearance, documentation processing, container release, and inland transportation. These interconnected activities require stakeholders to share timely information, jointly solve operational problems, and continuously adapt to dynamic port conditions.

The study identified four major findings. First, stakeholder coordination is primarily implemented through routine operational meetings, schedule synchronization, documentation management, cross-agency communication, and the utilization of the Port Community System (PCS). These formal coordination mechanisms provide a structured framework for aligning operational activities and facilitating information exchange among shipping companies, terminal operators, freight forwarders, customs authorities, quarantine agencies, trucking companies, exporters, importers, and port authorities. Nevertheless, formal mechanisms alone are insufficient. Informal communication, interpersonal trust, and collaborative problem-solving remain essential for responding quickly to operational disruptions such as vessel delays, documentation inconsistencies, and congestion.

Second, several factors facilitate effective stakeholder coordination. Communication quality, organizational trust, real-time information sharing, stakeholder commitment, standardized operational procedures, and digital integration emerged as the most influential enablers. Among these, communication and trust form the foundation of successful collaboration by enabling stakeholders to coordinate decisions, reduce uncertainty, and respond collectively to changing operational conditions. The Port Community System further strengthens coordination by improving information visibility, supporting data integration, and reducing reliance on paper-based administrative processes. However, digital platforms function most effectively when supported by collaborative governance, institutional commitment, and shared responsibility for maintaining accurate and reliable information.

Third, the study identified several barriers that continue to constrain coordination effectiveness. Vessel schedule changes, port congestion, fragmented information systems, documentation errors, regulatory complexity, road traffic congestion, and occasional network disruptions frequently interrupt cargo flows and reduce operational efficiency. These barriers are highly interconnected; a disruption occurring within one stakeholder organization often generates cascading impacts across multiple organizations throughout the logistics chain. Consequently, coordination challenges cannot be addressed independently but require integrated responses involving all relevant stakeholders.

Fourth, participants proposed several practical strategies for strengthening stakeholder coordination. These include improving interoperability among digital information systems, enhancing the Port Community System, expanding real-time operational information sharing, institutionalizing regular cross-agency coordination meetings, implementing integrated truck appointment systems, strengthening stakeholder training and digital capability, and reinforcing collaborative governance across public and private organizations. Collectively, these recommendations emphasize that technological investment should be accompanied by organizational development, institutional collaboration, and continuous communication among stakeholders.

The study makes several important theoretical contributions to maritime logistics and supply chain management literature. It extends stakeholder coordination theory by demonstrating that coordination within maritime logistics should be understood as a dynamic socio-technical capability rather than a static organizational arrangement. Effective coordination results from the

interaction of three complementary dimensions: relational factors, including communication and trust; technological factors, including digital integration and the Port Community System; and institutional factors, including governance structures, regulatory frameworks, and collaborative decision-making processes. By integrating these dimensions into a unified conceptual explanation, the study contributes to a more comprehensive understanding of how stakeholder coordination supports operational efficiency within complex port environments.

The research also contributes to collaborative governance literature by illustrating how public institutions and private organizations jointly manage operational interdependence through formal governance mechanisms while simultaneously relying on informal relationships to address uncertainty and operational variability. The findings demonstrate that successful digital transformation within ports depends not only on technological capability but also on governance quality, stakeholder participation, organizational trust, and institutional cooperation. These insights provide empirical evidence from an emerging economy, thereby enriching a body of literature that has traditionally focused on ports in developed countries.

From a practical perspective, the findings provide guidance for port authorities, terminal operators, shipping companies, logistics providers, and government agencies seeking to improve operational performance. Managers should prioritize digital interoperability, standardized information exchange, and collaborative governance while simultaneously strengthening communication practices and stakeholder relationships. Policymakers should continue supporting integrated digital platforms, harmonized regulatory procedures, cybersecurity governance, and institutional capacity-building initiatives that encourage collaboration across the maritime logistics ecosystem.

Although the study provides valuable insights into stakeholder coordination at Makassar Port, several limitations should be acknowledged. The research was conducted within a single port environment using a qualitative approach involving eleven key informants. While this design enabled an in-depth understanding of coordination processes, the findings are context-specific and should not be generalized without careful consideration of differences in governance structures, institutional environments, and digital maturity across other ports. Future research could adopt comparative multiple-port studies involving ports in different regions of Indonesia or Southeast Asia to examine similarities and differences in stakeholder coordination practices. Mixed-methods approaches incorporating quantitative performance indicators may also complement qualitative findings by examining the relationship between coordination capability and measurable operational outcomes. Additional research investigating emerging technologies such as blockchain, artificial intelligence, digital twins, and integrated logistics platforms may further expand understanding of digital coordination within maritime logistics.

In conclusion, this study demonstrates that stakeholder coordination constitutes a strategic capability that underpins operational efficiency, service reliability, and supply chain integration within modern port operations. Effective coordination cannot be achieved solely through advanced technology or formal governance arrangements. Rather, it requires the continuous interaction of collaborative governance, digital integration, organizational trust, communication, and shared commitment among diverse stakeholders. Strengthening these dimensions will enhance

the resilience, competitiveness, and sustainability of Makassar Port while providing valuable lessons for other emerging-economy ports seeking to improve maritime logistics performance.

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