Bhinneka: Journal of Social Sciences and Contemporary Studies
Volume: 1, Nomor: 2, (2026), Juni: 60 - 70
Website: https://ejournal.ojs-lppm.com/index.php/Bhinneka/article/view/551
E-ISSN: xxxx-xxxx

DIGITAL INTEGRATION, INTER-ORGANIZATIONAL TRUST, AND OPERATIONAL EFFICIENCY IN INDONESIAN LOGISTICS: A QUALITATIVE LITERATURE-BASED ANALYSIS

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Info Artikel
Received: *03 Juni 2026*
Revised : *12 Juni 2026*
Accepted: *21 Juni 2026*
Published: *30 Juni 2026*

Keywords: *digital integration; inter-organizational trust; logistics efficiency; port operations.*

Abstract

The logistics industry plays a strategic role in supporting national economic activity, international trade, and the distribution of goods across geographically dispersed regions. In Indonesia, the complexity of logistics operations is influenced by port congestion, fragmented information systems, regulatory requirements, operational risks, and the need for effective coordination among logistics stakeholders. Digital transformation has increasingly been adopted to improve information visibility, process integration, operational efficiency, and service reliability. However, technological adoption alone does not automatically create an integrated logistics ecosystem. Inter-organizational trust, regulatory alignment, information sharing, and operational safety are also important factors in determining the effectiveness of logistics networks. This study aims to examine the relationship between digital integration, inter-organizational trust, regulatory alignment, operational safety, and logistics efficiency in the Indonesian logistics sector. A qualitative literature-based research design was employed by reviewing academic publications, government documents, and relevant institutional reports concerning logistics management, port operations, digital transformation, supply chain collaboration, and inter-organizational relationships. The findings indicate that digital integration can improve logistics visibility, information accuracy, coordination, traceability, and process transparency. Nevertheless, its effectiveness depends on interoperability among systems, organizational readiness, data governance, regulatory consistency, and stakeholder cooperation. The analysis further indicates that trust functions as an important relational mechanism that encourages information sharing and collaborative problem-solving among logistics actors. Operational safety also contributes to efficiency because disruptions, accidents, and inadequate safety practices can generate delays and additional operational costs. The study concludes that sustainable logistics competitiveness requires an integrated approach combining digital capability, regulatory coordination, organizational trust, and safety-oriented operational management.

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Publisher: Lembaga Penerbit Penelitian Multidisipliner

INTRODUCTION

Logistics has become an essential component of economic development because it connects producers, distributors, ports, warehouses, transportation providers, and consumers through the movement of goods and information. In an archipelagic country such as Indonesia, logistics management is particularly important because geographical dispersion creates additional challenges related to transportation connectivity, port operations, distribution time, and coordination among organizations. The quality of logistics services therefore influences not only individual company performance but also the competitiveness of the wider national economy.

The logistics sector has experienced significant transformation as organizations increasingly adopt digital technologies to manage transportation, warehousing, documentation, tracking, and communication. Digital systems can provide real-time information, reduce repetitive administrative processes, improve cargo visibility, and support faster decision-making. The World Bank's Logistics Performance Index emphasizes dimensions such as customs efficiency, infrastructure, international shipments, logistics competence, tracking and tracing, and timeliness as important components of logistics performance. Indonesia's logistics performance therefore depends on the ability of different actors to coordinate these dimensions effectively (Ratnasari et al., 2026).

In Indonesia, the development of the National Logistics Ecosystem (NLE) represents an important policy direction toward more integrated logistics management. The NLE is designed to align the flow of goods and documents through cooperation between government institutions and private-sector actors, data exchange, process simplification, elimination of duplication, and information technology integration. Its implementation covers government services, transportation, shipping, port services, warehousing, payment systems, and spatial arrangements (Barata, 2026).

Port operations represent an important part of this transformation. Ports function as critical nodes connecting maritime transportation with inland logistics networks. Activities such as vessel arrival, cargo handling, customs clearance, truck movements, documentation, warehousing, and cargo delivery involve multiple organizations. Consequently, inefficiency in one activity can affect the performance of other activities throughout the logistics chain (BRATA et al., 2023).

Operational efficiency is also closely associated with safety. Logistics activities involve transportation equipment, cargo handling, trucks, warehouses, port machinery, and human operators. Weak safety management may lead to disruptions, delays, equipment damage, and additional costs. Therefore, safety should not be considered only as a compliance issue but also as a component of

operational performance and supply chain resilience (Barata et al., 2022).

Another important factor is inter-organizational trust. Logistics operations require organizations to exchange information, coordinate schedules, fulfill contractual commitments, and respond to unexpected disruptions. Trust can reduce uncertainty and facilitate cooperation because organizations are more willing to share information and coordinate activities when they perceive their partners as reliable and competent. Previous research has demonstrated relationships between inter-organizational trust, information integration, cooperation, and supply chain performance.

The increasing convergence between regulation and information technology also changes the way logistics organizations interact with government agencies and business partners. Digital platforms can simplify regulatory processes, but the benefits of digitalization depend on whether regulations, organizational procedures, and technological systems are sufficiently aligned.

Based on these considerations, this study examines how digital integration, inter-organizational trust, regulatory alignment, and operational safety interact in supporting logistics efficiency in Indonesia. Unlike studies that focus on a single company or a single operational indicator, this study adopts an integrated perspective that connects technological, institutional, relational, and operational dimensions of logistics management.

RESEARCH METHOD

Research Design

This study employed a qualitative literature-based research design. The approach was selected because the objective was to synthesize existing knowledge regarding digital integration, inter-organizational trust, regulatory alignment, operational safety, and logistics efficiency rather than to measure the performance of a particular company.

A literature-based qualitative approach allows different perspectives from academic research, government policies, and institutional publications to be compared and synthesized. The analysis focused particularly on the Indonesian logistics context while also incorporating international literature on supply chain management and inter-organizational relationships.

Data Sources

The study used secondary sources consisting of:

1. peer-reviewed journal articles concerning logistics management, supply chain integration, trust, digital transformation, port operations, and operational performance;
2. Indonesian government documents concerning logistics policies and digital logistics systems;

3. institutional reports concerning logistics performance;
4. publications concerning port logistics and information technology; and
5. relevant conceptual and empirical studies on supply chain collaboration.

Particular attention was given to literature addressing information integration, inter-organizational trust, digital logistics platforms, port efficiency, and regulatory coordination.

Data Analysis

The data were analyzed through thematic analysis. First, relevant information was extracted from the selected literature. Second, recurring concepts were identified and grouped into themes. Third, relationships between themes were examined to construct an integrated interpretation.

Five major analytical themes were established:

1. digital information integration;
2. inter-organizational trust;
3. regulatory alignment;
4. operational safety; and
5. logistics efficiency and competitiveness.

The findings were subsequently synthesized to explain how these dimensions interact within the logistics ecosystem.

RESULTS

Digital Integration as a Driver of Logistics Efficiency

The literature indicates that digital integration can improve logistics efficiency by increasing the availability and timeliness of information. Traditional logistics processes often involve multiple documents, organizations, communication channels, and approval stages. When information is fragmented, organizations may repeatedly enter or verify the same data, increasing the possibility of delays and errors.

Integrated digital systems can reduce such fragmentation by allowing different stakeholders to access relevant information through connected platforms. Technologies such as electronic data interchange, terminal operating systems, tracking systems, automated gates, digital documentation, and integrated logistics platforms can increase operational visibility.

Digital integration is particularly important in port environments. Port operations involve shipping companies, terminal operators, customs authorities, transportation providers, freight forwarders, warehouses, and other service providers. An integrated information environment can

support coordination among these actors and reduce information gaps.

However, the literature also indicates that digital transformation does not automatically guarantee efficiency. Different organizations may use different platforms, data formats, operating procedures, and technological capabilities. Consequently, interoperability becomes an important requirement for achieving meaningful integration.

Inter-Organizational Trust and Information Sharing

The second major finding concerns the role of trust in logistics relationships. Logistics operations require organizations to depend on one another. A transportation provider depends on accurate shipment information, a warehouse requires reliable delivery schedules, a port operator requires timely documentation, and customers depend on service providers to fulfill commitments.

Trust facilitates these interactions by reducing uncertainty. When organizations consider their partners reliable and competent, they are more willing to share operational information, coordinate activities, and develop long-term cooperation.

Trust can be divided conceptually into cognitive and relational dimensions. Cognitive trust is associated with perceptions of competence, reliability, consistency, and performance. Relational trust is associated with interpersonal relationships, communication, mutual respect, and accumulated interaction.

The literature suggests that trust develops progressively through repeated successful interactions. Consistent performance, transparent communication, responsiveness, and fulfillment of commitments can strengthen trust. Conversely, inaccurate information, repeated delays, poor communication, and failure to meet agreements may weaken trust.

Therefore, digital systems and trust should not be treated as separate issues. A digital platform may provide the infrastructure for information exchange, but organizational trust determines how effectively stakeholders use and respond to that information.

Regulatory Alignment and Digital Logistics

The third finding concerns the relationship between regulation and technology. Logistics operations are influenced by customs procedures, transportation requirements, port regulations, licensing, documentation, and other institutional requirements. If different regulatory procedures are poorly coordinated, companies may face repeated documentation and administrative delays.

The development of integrated logistics systems in Indonesia demonstrates an attempt to address this issue. The NLE approach emphasizes process simplification, information exchange, collaboration between government and private actors, and integration of existing logistics systems.

Regulatory alignment therefore has two dimensions. The first is consistency between regulations issued by different institutions. The second is consistency between regulatory requirements and the digital systems used to implement them.

Digitalization becomes more effective when organizations can submit information once and allow the relevant institutions to use the same validated information. Such integration can reduce repetition and improve transparency.

Nevertheless, regulatory convergence requires continuous institutional coordination. Changes in regulations may require modifications to information systems, organizational procedures, and employee competencies. Thus, technological integration should be accompanied by regulatory and organizational adaptation.

Operational Safety and Logistics Performance

The analysis also demonstrates that safety is closely connected with logistics efficiency. Logistics activities involve multiple operational hazards, particularly in ports, transportation, warehouses, and cargo-handling facilities.

Safety failures can produce direct and indirect consequences. Direct consequences may involve equipment damage, operational interruption, or injury. Indirect consequences include delays, rescheduling, additional costs, reduced service reliability, and reputational effects.

Safety-oriented logistics management therefore contributes to efficiency by reducing operational disruptions. Digital technology can further support safety through vehicle identification, tracking systems, monitoring technologies, automated gates, real-time alerts, and digital records.

However, technology cannot replace organizational safety culture. Employees must understand operational procedures, equipment limitations, emergency responses, and responsibilities. Consequently, technology, human capability, and organizational procedures must operate as an integrated system.

An Integrated Logistics Efficiency Framework

Based on the thematic analysis, the study identifies four major dimensions influencing logistics efficiency:

Digital Integration → Information Visibility → Coordination → Operational Efficiency

Inter-Organizational Trust → Information Sharing → Collaboration → Relationship Stability

Regulatory Alignment → Process Simplification → Compliance Efficiency → Reduced Administrative Friction

Safety Management → Operational Reliability → Reduced Disruption → Sustainable

Efficiency

These relationships are interconnected rather than independent. Digital integration increases information availability, but trust encourages organizations to share and act upon that information. Regulatory alignment creates institutional conditions for integrated processes, while safety management protects operational continuity.

Therefore, logistics competitiveness should be understood as the combined outcome of technological capability, institutional coordination, relational quality, and operational reliability.

DISCUSSION

Digitalization Requires Organizational Integration

The findings confirm that digital transformation should not be interpreted simply as the implementation of new software or digital equipment. Its effectiveness depends on the degree to which technology is integrated into organizational processes.

For example, a tracking system may provide real-time shipment information, but the information has limited value if other organizations cannot access it or if employees do not use the information in operational decisions. Similarly, an electronic documentation system may reduce paperwork, but its benefits are constrained if different institutions continue to request similar information through separate channels.

This finding is consistent with research showing that logistics information integration can support cooperation and supply chain performance. Information integration becomes particularly valuable when organizations face uncertainty and need rapid coordination.

Therefore, organizations should focus on interoperability, common data standards, system compatibility, employee capability, and clear responsibilities rather than simply increasing the number of digital tools.

Trust as a Complement to Technology

An important implication of this study is that technology and trust should be developed simultaneously.

Digital systems can increase transparency by creating electronic records and improving visibility. However, organizations still need confidence that partners will use information appropriately, fulfill their responsibilities, and respond to unexpected problems.

Trust is particularly important when logistics relationships involve information that is commercially sensitive or operationally important. Without sufficient trust, organizations may limit

information sharing even when technological infrastructure is available.

Previous research has found that inter-organizational trust can contribute to supply chain performance and can interact with the structure of interdependence among supply chain organizations. Other studies have linked trust and logistics information integration with partner cooperation.

Thus, logistics organizations should develop trust through consistent service performance, transparent communication, clear agreements, timely responses, and mechanisms for resolving disputes.

Regulatory Convergence as an Institutional Foundation

The findings also indicate that regulatory convergence provides an important institutional foundation for logistics digitalization.

In a complex logistics environment, a company may interact with numerous government institutions and private organizations. If every institution requires separate processes and information, digitalization may only transfer administrative work from paper to electronic systems without fundamentally improving efficiency.

Regulatory convergence seeks to address this problem by coordinating procedures and reducing duplication. Indonesia's NLE initiative reflects this approach by connecting government services with private logistics platforms and emphasizing data exchange and process simplification.

The implication is that logistics competitiveness depends not only on the capabilities of individual companies but also on the quality of the institutional environment in which they operate.

Safety as an Efficiency Variable

Safety is frequently discussed as a compliance or occupational issue. However, the findings of this study indicate that safety should also be considered a logistics performance variable.

An unsafe operation may generate interruptions that affect delivery schedules and customer service. For example, operational disruptions involving trucks, cargo handling, warehouses, or port equipment can create delays that propagate throughout the supply chain.

Consequently, investment in safety can have an efficiency dimension. Safety procedures, employee training, equipment maintenance, digital monitoring, and operational controls can reduce the probability of disruptions.

This perspective is particularly relevant for port logistics, where numerous organizations operate within interconnected physical spaces. The smoother the coordination between safety management and operational management, the greater the potential for reliable logistics performance.

Implications for Logistics Competitiveness

The literature suggests that logistics competitiveness should not be measured exclusively by transportation cost or delivery speed. A competitive logistics ecosystem also requires reliability, transparency, adaptability, information visibility, regulatory efficiency, and safety.

The World Bank's logistics framework similarly recognizes multiple dimensions of logistics performance, including customs, infrastructure, international shipments, logistics competence, tracking and tracing, and timeliness.

Accordingly, companies seeking greater competitiveness should consider a multidimensional strategy. Digital systems should improve information visibility; organizational practices should build trust; regulatory processes should be aligned; and safety management should protect operational continuity.

The interaction among these factors creates a more resilient logistics system than relying on any individual factor.

CONCLUSIONS

This study examined the relationship between digital integration, inter-organizational trust, regulatory alignment, operational safety, and logistics efficiency in the Indonesian logistics sector through a qualitative literature-based analysis.

The findings indicate that digital integration can improve information visibility, process transparency, coordination, tracking, and operational decision-making. However, technology alone is insufficient to produce an efficient logistics ecosystem. Its effectiveness depends on interoperability, organizational readiness, data governance, and the ability of stakeholders to coordinate their activities.

Inter-organizational trust represents another important component of logistics performance. Trust encourages information sharing, cooperation, commitment, and collaborative problem-solving. It is developed through reliable performance, transparent communication, responsiveness, and consistent fulfillment of agreements.

Regulatory alignment also plays an important role because fragmented regulatory procedures can reduce the benefits of digitalization. Integrated approaches such as the National Logistics Ecosystem demonstrate the importance of connecting government procedures, private logistics services, information systems, and payment mechanisms.

Operational safety should likewise be considered an integral component of logistics efficiency.

Effective safety management can reduce operational disruptions, protect continuity, and support reliable service delivery.

Overall, the study proposes that sustainable logistics competitiveness in Indonesia requires the simultaneous development of four interconnected capabilities: digital integration, inter-organizational trust, regulatory alignment, and operational safety. Future empirical research could test this framework using surveys, interviews, or quantitative performance data from ports, freight forwarders, transportation companies, warehouses, and other logistics service providers.

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