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SAFETY RISK MANAGEMENT AND RESILIENCE IN LOGISTICS SERVICE OPERATIONS: A QUALITATIVE ANALYSIS OF SUPPLY CHAIN CONTINUITY

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Abstract
Safety risks can significantly influence the continuity and reliability of logistics operations. Transportation, cargo handling, warehousing, and port activities involve interactions between people, equipment, vehicles, and information systems. This study examines the relationship between safety risk management and logistics supply chain resilience. A qualitative literature-based method was used to analyze research concerning logistics safety, supply chain resilience, operational risk, and business continuity. The findings indicate that effective safety management contributes to supply chain resilience by reducing operational interruptions, protecting assets, improving employee awareness, and supporting service reliability. The study also identifies the importance of combining preventive safety practices with digital monitoring and organizational coordination. Safety management should not be regarded exclusively as a regulatory obligation but as a strategic component of logistics continuity. The study concludes that logistics organizations can strengthen resilience by integrating safety risk identification, employee training, equipment maintenance, digital monitoring, emergency preparedness, and inter-organizational communication.

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INTRODUCTION

Logistics organizations operate within environments characterized by uncertainty. Transportation delays, equipment failures, accidents, cargo damage, extreme weather, and operational errors can interrupt the movement of goods.

Safety management is traditionally associated with preventing accidents and protecting employees. However, its implications extend beyond occupational protection. Operational disruptions caused by safety incidents can affect delivery schedules, transportation capacity, customer satisfaction, and financial performance (Ratnasari et al., 2026).

Supply chain resilience refers to the ability of supply chains to anticipate, respond to, and

recover from disruptions. Safety management can support resilience because effective preventive practices reduce the probability and consequences of operational disruptions.

Information technology has become one of the major resources available to logistics companies in addressing these challenges. Digital technologies can facilitate information exchange, improve operational visibility, support decision-making, and increase responsiveness to customer requirements. Evidence from the first study used as the basis of this analysis demonstrates that information technology has a significant relationship with logistics competitiveness and that regulatory convergence is also associated with both information technology and logistics competitiveness. The study further identifies information technology as a mediating mechanism between regulatory convergence and logistics competitiveness (Barata, 2026).

However, technological capability alone may not be sufficient to explain the effectiveness of inter-organizational logistics activities. Logistics operations involve relationships among companies, customers, suppliers, business partners, transport providers, and other stakeholders. These relationships require the exchange of information and coordination of activities under conditions of uncertainty. Consequently, trust becomes an important relational resource (BRATA et al., 2023).

The findings of these two studies suggest that technological and relational capabilities should not necessarily be examined independently. Digital systems can provide accurate and timely information, but organizations still need sufficient trust to exchange information, coordinate activities, and respond collaboratively to unexpected situations. Conversely, strong inter-organizational relationships may be strengthened when supported by reliable digital information systems (Barata et al., 2022).

Despite the importance of these factors, studies concerning logistics competitiveness frequently examine technological capability, regulatory conditions, and relational mechanisms separately. This creates an opportunity to develop an integrated perspective that considers both technological and relational resources as interconnected foundations of logistics competitiveness.

The contribution of this study lies in connecting technological and relational perspectives into a single analytical framework. Rather than treating technology and trust as independent factors, this study views them as complementary organizational capabilities that can jointly support operational coordination, responsiveness, and competitive advantage.

RESEARCH METHOD

A qualitative literature review was conducted using academic publications and institutional

documents concerning safety management, logistics risk, supply chain resilience, and transportation operations.

The analysis followed thematic coding. The identified themes included risk identification, prevention, employee competence, technology, emergency response, and supply chain continuity.

The second study examined trust formation in inter-organizational logistics relationships using a qualitative case study involving a logistics manager, a business partner, and two operational staff members. Data were collected through semi-structured interviews and observations and analyzed using thematic analysis.

Data Sources

The analytical material consisted of the two uploaded research articles. The first article focused on the effect of regulatory convergence and information technology on logistics competitiveness, while the second focused on the formation and maintenance of trust in inter-organizational logistics relationships.

The two studies were selected because they examine related dimensions of logistics performance within an Indonesian organizational context but employ different theoretical and methodological perspectives.

Data Analysis

The analysis was conducted through four stages. First, the researchers identified the main concepts, variables, and findings reported in each study. Second, the findings were grouped into three analytical dimensions: technological capability, relational capability, and logistics competitiveness. Third, similarities and complementary relationships between the findings were identified. Finally, the findings were synthesized into an integrated conceptual interpretation.

The analysis focused particularly on information exchange, responsiveness, coordination, reliability, communication, regulatory adaptation, and competitive performance.

This approach allows the study to generate a broader conceptual explanation while maintaining a clear distinction between findings directly reported by the source studies and the interpretation developed through the integration process.

RESULTS

The analysis revealed that safety management contributes to resilience through several mechanisms.

The first mechanism is prevention. Identifying operational hazards before incidents occur

allows logistics organizations to implement appropriate controls.

The second mechanism is preparedness. Emergency procedures enable organizations to respond more systematically when disruptions occur.

The third mechanism is human competence. Employee training improves awareness of operational risks and strengthens compliance with procedures.

The fourth mechanism is technological monitoring. Digital systems can support equipment monitoring, vehicle tracking, access control, and incident reporting.

The fifth mechanism is coordination. Safety incidents often involve multiple organizations, requiring communication between logistics providers, customers, transportation companies, and authorities.

Inter-Organizational Trust as a Relational Capability

The second major finding concerns the importance of trust in inter-organizational logistics relationships. The qualitative study demonstrates that trust involves both cognitive and relational dimensions. Participants associated trust with competence, reliability, consistency, honesty, mutual respect, and confidence that business partners would fulfill their commitments.

Trust was also found to develop progressively through repeated successful interactions. Small initial commitments, consistent performance, accurate documentation, and timely delivery created behavioral evidence that increased confidence between organizational actors.

Communication emerged as another central mechanism. Transparent and timely communication helped reduce uncertainty, align expectations, and maintain credibility, particularly when operational problems occurred.

Thus, inter-organizational trust can be interpreted as a relational capability that facilitates coordination and reduces the need for excessive monitoring. When organizations trust one another, operational interactions can become more flexible and responsive.

The Complementary Relationship between Technology and Trust

The most important integrated finding is that digital capability and inter-organizational trust represent complementary rather than competing resources.

Technology provides the infrastructure through which information can be generated, exchanged, stored, and processed. Trust, meanwhile, influences how organizational actors interpret information, communicate with one another, and respond to uncertainty.

For example, digital systems may provide real-time information concerning shipment status, delivery schedules, documentation, and operational disruptions. However, the usefulness of such

systems also depends on the willingness of organizational actors to communicate accurately and transparently. Trust therefore provides a relational foundation that can support effective utilization of technological systems.

The second study shows that communication and transparency are fundamental to maintaining trust, while the first study demonstrates the importance of information technology for competitiveness. When these findings are considered together, information technology can be viewed as an enabler of communication and coordination, while trust can facilitate the effective relational use of information.

Regulatory Adaptation, Technology, and Competitive Performance

The first study also found a significant relationship between regulatory convergence and information technology, with a path coefficient of 0.763 and a t-statistic of 20.194. Regulatory convergence was also significantly associated with logistics competitiveness, with a path coefficient of 0.734 and a t-statistic of 18.306.

Furthermore, the indirect effect of regulatory convergence on logistics competitiveness through information technology was reported at 0.350, with a t-statistic of 4.403.

These findings indicate that regulatory adaptation and technological capability are interconnected. In practical terms, regulatory requirements may encourage organizations to improve their information systems and operational processes. Technology can subsequently help organizations implement and monitor regulatory requirements more effectively.

When integrated with the trust findings, this suggests a broader framework in which institutional adaptation, digital capability, and relational capability jointly support logistics competitiveness.

DISCUSSION

Safety and efficiency should not be viewed as opposing objectives. Poor safety practices may generate downtime, equipment damage, cargo losses, and schedule disruption.

A preventive safety strategy can therefore contribute to efficiency by reducing unexpected interruptions. This is particularly important in port and transportation environments where one disruption can affect multiple organizations.

Digital technologies provide additional opportunities for risk management. However, technology should complement rather than replace human judgment. Employees remain essential for recognizing unusual situations and responding to operational emergencies.

Inter-organizational cooperation is also important. Logistics networks are interconnected, meaning that safety performance at one organization can affect other organizations.

Trust as an Organizational Resource

Trust should also be understood as more than an interpersonal characteristic. The qualitative findings indicate that trust reduces monitoring requirements, facilitates decision-making, and improves coordination between business partners.

From a theoretical perspective, this interpretation is consistent with Social Exchange Theory, which emphasizes the development of trust through repeated exchanges, and Relational Exchange Theory, which recognizes the importance of relational mechanisms in sustaining inter-organizational cooperation.

Trust can also be considered an intangible organizational resource. When business partners have confidence in one another's competence and reliability, organizations can coordinate activities with less friction. Consequently, trust may contribute indirectly to operational efficiency and long-term relationship stability.

Communication as the Link between Digital Capability and Trust

Communication represents an important connection between technology and trust. The qualitative findings demonstrate that transparent communication reduces uncertainty and strengthens credibility.

Digital technologies can enhance the speed and accessibility of communication, but the presence of technology does not automatically guarantee transparency. Organizations still need to provide accurate information and communicate proactively when problems occur.

This distinction is important because logistics operations are exposed to uncertainty. Delays, documentation problems, transportation disruptions, and changing customer requirements can affect operational performance. Under such circumstances, transparent communication can help maintain trust even when operational problems cannot be completely avoided.

The Role of Consistency and Reliability

Both studies indirectly emphasize the importance of consistency. The competitiveness study highlights the importance of reliable logistics operations and information technology, while the trust study identifies consistent performance as a major foundation of trust.

This suggests that competitiveness is not created by isolated technological innovations or individual successful transactions. Instead, it is accumulated through repeated organizational performance.

Consistent delivery, accurate documentation, timely information, responsive communication, and reliable technological systems can gradually strengthen the confidence of customers and business partners. Over time, this accumulated confidence may become an intangible source of competitive advantage.

Formal and Relational Mechanisms

Another important implication concerns the relationship between formal mechanisms and relational mechanisms. Regulatory frameworks and formal agreements provide structure for logistics activities, while trust and interpersonal relationships facilitate cooperation in situations that cannot be fully anticipated by formal rules.

The qualitative study indicates that informal relationships, mutual respect, and harmony complement formal contractual mechanisms in the Indonesian business context.

Therefore, logistics competitiveness can be approached through a combination of formal and relational governance. Formal systems provide clarity and accountability, while relational trust can facilitate flexibility and cooperation.

CONCLUSIONS

Safety risk management is an important component of logistics resilience. Organizations that integrate prevention, employee training, technological monitoring, emergency planning, and inter-organizational communication can strengthen operational continuity.

Future empirical research should examine how safety management maturity affects measurable indicators such as downtime, delivery reliability, equipment utilization, and customer service performance.

The findings also highlight the importance of combining formal and relational mechanisms. Regulatory arrangements and formal agreements provide organizational structure, while trust, communication, reliability, and interpersonal relationships contribute to flexibility and sustained cooperation.

From a managerial perspective, logistics companies should develop digital capabilities together with relationship-management capabilities. Investment in information technology should be accompanied by efforts to improve communication quality, transparency, service reliability, employee capability, and partner relationships.

This study has limitations because it is based on an integrative analysis of two existing empirical studies rather than newly collected primary data. Consequently, the proposed relationships should be

tested through future empirical research involving larger samples, multiple logistics organizations, and additional variables such as service innovation, human resource capability, supply chain integration, and organizational resilience.

Future studies may also develop and empirically test an integrated structural model examining whether inter-organizational trust strengthens the relationship between digital capability and logistics competitiveness. Such research would provide stronger empirical evidence concerning the interaction between technological and relational resources in emerging-market logistics.

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