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Operational Risk Management and Its Effect on Service Quality in Indonesian Logistics Companies

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Abstract

The logistics sector in Indonesia faces complex operational challenges due to geographical conditions, infrastructure limitations, and increasing customer demands. These challenges create significant operational risks that may undermine service quality if not properly managed. This study aims to examine the effect of operational risk management (ORM) on service quality in Indonesian logistics companies. A quantitative explanatory research design was employed using survey questionnaires distributed to 120 logistics firms of different sizes across major cities. ORM practices including risk identification, assessment, contingency planning, monitoring, and technology adoption were measured alongside service quality dimensions based on the SERVQUAL model. Data were analyzed using descriptive statistics, correlation analysis, and multiple regression. The results indicate that all logistics firms face considerable risks, particularly transportation delays and infrastructure constraints. However, companies implementing structured ORM practices achieved higher service quality, especially in reliability and responsiveness. Correlation and regression analyses revealed that ORM significantly and positively influences service quality, with technology adoption emerging as the strongest predictor.
In conclusion, ORM is not only a defensive measure but also a strategic enabler for enhancing service quality and competitiveness in the Indonesian logistics industry. Effective ORM ensures customer satisfaction, operational resilience, and sustainable business performance.

INTRODUCTION

Logistics industry has come out as a key component of economic competitiveness in the modern global market and is a key enabler of trade flow, supply chain effectiveness and customer satisfaction (Chapman et al., 2003; Memedovic et al., 2008). With the growing world trade and the migration of production lines, logistic service providers are increasingly under pressure to provide services that are fast, dependable and economical. Being able to coordinate transportation, warehousing, distribution, and information flows not only defines the performance of single firms but also the resilience of the whole supply chain (Feo-Valero et al., 2024; Kramarz, 2023; Umar & Wilson, 2024). As a result, the stability of the logistics systems has been put into the spotlight especially since the disruption caused by weather,

technological malfunctions, etc can spread the ripple effects on economies, organisational performance, and customer satisfaction.

The emergent economies make the role of logistics even more critical due to the fast pace of industrialisation, the increasing popularity of e-commerce, and the increase in customer demands of speed and precision (Kalkha et al., 2023; Asawawibul et al., 2025). The especially interesting case study of Indonesia is a consequence of its geographical complexity, having over17, 000 islands connected via multimodal channels of transportation (Hadiningrat et al., 2024; Judijanto et al., 2024). The archipelagic form creates a high logistical problem, such as a discontinuous transportation system, infrastructure disparity in the area, and excessive dependence on waterborne shipping. The states increase vulnerability to operational risks that pose a threat to the efficiency and reliability of logistics services. At the same time, the strategic economic goals of Indonesia, i.e., the improvement of its Logistics Performance Index (LPI) and the concentration of its status in the global value chains, make the improvement of logistics systems a key goal of national development (Hasan et al., 2025; Kırbaç, 2023).

Logistical operational risks have a variety of sources, internal and external, such as transportation delays, equipment breakdowns, labour crunch, regulatory bottlenecks and disruptions in supply chains caused by natural calamities or political unrest (Rinaldi et al., 2001). Unpredictable weather, uneven infrastructure development, and the lack of bureaucratic inefficiencies are the factors that contribute to such risks in Indonesia (Das & Luthfi, 2017; Napitupulu et al., 2024; Jasmine et al., 2021). Uncontrolled, these risks will affect the quality of services offered by causing delays in delivery, errors in inventory, and breakdown in communication, and inconsistencies in services. The direct implications of these issues on the customer satisfaction lie in the domain of reliability, responsiveness, assurance, empathy, and tangible service characteristics that are crucial to the customer satisfaction in the logistics industry (Fernandes et al., 2018; Politis et al., 2014). Due to the changing expectations of customers, especially the expansion of e-commerce and online platforms, constant stability in service quality becomes a key factor in the competitiveness of firms.

The main challenge facing logistics companies thus, is handling operational uncertainties that threaten the service stability and confidence in the companies. Transportation delays and infrastructure limitations as well as regulatory barriers will continue to be the hindrances to efficiency in logistics in Indonesia. Such issues often lead to cost overruns, less responsiveness, and less reliability, which have a negative impact on the perceptions of customers. With the growing interconnectedness of global supply chains, any small scale disruption will spread very fast, undermining the functioning of logistics networks. Incompetent risk management may also impact the capacity of firms to meet the demands of the market and comply with the required quality of the services in the competitive logistics frameworks (Masudin et al., 2020; Hohenstein, 2022; Esmizadeh & Mellat Parast, 2021; Tao et al., 2025).

One such solution that has gained considerable popularity to address the above challenges is the practice of Operational Risk Management (ORM) which is a structured process of risk identification, risk assessment, mitigation and monitoring of risks. ORM offers a logical structure in predicting the interference, enhancing readiness, and responding to the risk as it occurs. Under the right application, ORM raises the resilience of the organization by minimizing the occurrence and severity of organizational failures. ORM is especially valuable in the logistics industry to deal with uncertainties related to multimodal transportation, cargo management, service coordination (Allioui et al., 2024; Sharma et al., 2022). With disruption planning,

companies can be more prepared to deal with any disturbances, they can distribute resources rationally and deliver services steadily, even in a hostile environment.

The incorporation of digital technologies into the models of risk-monitoring and service-delivery is one of the general solutions that are often highlighted in the literature. Many technologies that can be deployed to enhance the visibility and capability of operations have been enhanced through the real-time tracking system, predictive analytics, automation, and blockchain (Rane et al., 2023; Rauniyar et al., 2023). The digital tools also help companies to identify the deviation of the operational norms earlier, react more rapidly to the newly emerged threats, and retain clarity in the interactions with the clients. The studies also show that companies that implemented more modern ORM tools, in particular, technology-based ones, received more positive results in their service quality ratings, especially in reliability and responsiveness (Gupta et al., 2023; Yumurtacı et al., 2018). The use of technology is hence a strategic tool of not only risk aversion but also maintenance of competitive edge in the volatile logistics markets.

In addition to the technology-based solutions, the past literature highlights the relevance of the organizational processes through organised contingency planning, performance monitoring, collaborative coordination, and ongoing training. Good contingency planning makes sure that alternative ways of transport, unused capacity and backup systems are available in the event of inconveniences. Monitoring and evaluation is equally important as it assists organizations to keep the track of the effectiveness of the risk mitigation measures and to determine the improvements. According to the previous studies, logistics companies that have an elaborate risk identification and assessment procedures are more likely to be more accurate, have lower error rates, and better customer loyalty (Fernandes et al., 2018; Masudin et al., 2020). In general, all these studies indicate that ORM practices are complex and multifaceted integrating strategic, operational and technological aspects which are synergistic in improving service performance.

In spite of these observations, the literature gap in the understanding of the role of operational risk management (ORM) in the specific context of service quality in the Indonesian logistics setting is considerable, according to the scholarly literature. Although there is a rich literature on the logistics capabilities or determinants of service quality or on the supply-chain risk management in general, limited studies have examined the cross-relationship between these constructs under the unique geographical and infrastructural constraints that lie within Indonesia. In addition, the spread of digital risk-management tools is uneven among Indonesian logistics companies, especially among the small and medium-sized enterprises (SMEs) that make up a significant part of the industry. This unequal use of technologies raises crucial questions of differences in the effectiveness of ORM and its resulting consequences to the quality of services. Since Indonesia has a strategic need to increase its logistics competitiveness, the absence of empirical research to question this nexus is a significant future research opportunity.

METHODS

The most suitable method for this research is a quantitative approach using survey-based explanatory research design, supported by statistical analysis. This method is appropriate because the study seeks to measure the effect of operational risk management (ORM) on service quality in Indonesian logistics companies by analyzing numerical data collected from firms. The research begins with the development of structured questionnaires distributed to logistics companies of various sizes across several regions, ensuring representation of different operational contexts. The questionnaire consists of two main parts: (1) items measuring the adoption of ORM practices, such as risk identification, assessment, contingency planning, monitoring,

and technology adoption; and (2) items measuring service quality using standardized SERVQUAL dimensions, namely reliability, responsiveness, assurance, empathy, and tangibles. Data gathered from respondents are then quantified and coded for statistical processing. To ensure validity and reliability, the instruments undergo pre-testing and Cronbach's Alpha analysis. The collected data are analyzed using descriptive statistics to identify risk patterns, correlation analysis to examine relationships, and multiple regression analysis to determine the strength and significance of ORM practices on service quality outcomes. The use of this method enables the research to generate empirical, generalizable findings with clear cause–effect explanations, thus providing both academic contributions and practical insights for logistics companies and policymakers in Indonesia.

RESULTS AND DISCUSSION

The results of this study provide a comprehensive empirical depiction of how operational risk management (ORM) practices influence service quality among logistics companies operating in Indonesia. The presentation of findings follows the structural logic emerging from the research design and the sequential analysis of descriptive, correlational, and regression results. The section begins by characterizing the respondents and the profile of participating firms, followed by an examination of the operational risks most frequently encountered in Indonesian logistics operations. It then assesses the degree of ORM practice adoption, evaluates service quality outcomes based on SERVQUAL dimensions, and analyzes the strength and direction of relationships between ORM and service quality using correlation matrices. The section concludes with a regression analysis identifying specific ORM components that predict service quality performance. Throughout this section, the interpretation of findings is contextualized using relevant literature presented in the Introduction and Methodology, ensuring theoretical alignment and scholarly coherence.

Profile of Respondent Companies

Table 1. Respondent Profile by Company Size

Company Size	Frequency	Percentage
Small (≤ 50 employees)	38	31.7%
Medium (51–200)	52	43.3%
Large (> 200)	30	25.0%
Total	120	100%

Table 1 presents the distribution of logistics firms that participated in the study, categorized by company size. The sample consists of 120 companies, including small, medium, and large logistics providers. Medium-sized firms represent the largest proportion of respondents (43.3%), followed by small firms (31.7%), and large firms (25.0%). This pattern reflects the structure of Indonesia's logistics sector, which is dominated by small and medium-sized enterprises (SMEs), a trend consistent with previous logistics studies highlighting the predominance of SMEs in developing economies (Hadiningrat et al., 2024; Judijanto et al., 2024). The participation of firms across three size categories ensures that the findings capture diverse organizational contexts, risk exposures, and operational practices.

The distribution also reflects the heterogeneity of the Indonesian logistics market, which includes courier services, freight forwarders, transport operators, and third-party logistics providers. Medium-sized companies, in particular, often serve as key intermediaries in domestic and regional distribution networks, making their experience with operational risks especially relevant. Their representation in the sample enhances the capacity of this study to generalize findings within the Indonesian context.

Prevalence and Types of Operational Risks

Table 2. Common Sources of Operational Risk

Risk Source	Frequency Reported	Percentage
Transportation delays	96	80.0%
Infrastructure constraints	82	68.3%
Labor shortages/strikes	65	54.2%
Equipment breakdowns	59	49.2%
Regulatory/bureaucratic delay	71	59.2%

Table 2 categorizes common sources of operational risk encountered by logistics firms. Transportation delays are the most frequently reported risk, identified by 80 percent of respondents. This is consistent with the literature that characterizes Indonesia's archipelagic geography and infrastructure limitations as major contributors to supply chain delays (Das & Luthfi, 2017; Rinaldi et al., 2001). Infrastructure constraints, reported by 68.3 percent of companies, further demonstrate the systemic challenges faced by logistics providers, particularly in regions with poor road connectivity, limited port capacity, and uneven distribution of logistics facilities.

Labor shortages and industrial strikes, reported by 54.2 percent of firms, constitute another significant risk category. These findings align with global logistics research emphasizing labor-related disruptions as a persistent operational threat (Sharma et al., 2022). Equipment breakdowns and bureaucratic delays, each reported by nearly half of the firms, likewise underscore the operational vulnerabilities that characterize Indonesia’s logistics landscape. Regulatory delays, reported by 59.2 percent of firms, highlight inefficiencies in documentation processes and administrative procedures—issues frequently cited in ASEAN logistics policy reviews.

Adoption of Operational Risk Management Practices

Table 3. Operational Risk Management Practices

ORM Practice	High Adoption (%)	Moderate Adoption (%)	Low Adoption (%)
Risk identification	62.5	27.5	10.0
Risk assessment & analysis	58.3	30.0	11.7
Contingency planning	47.5	35.8	16.7
Monitoring & evaluation	53.3	31.7	15.0
Technology-based solutions	40.0	38.3	21.7

Table 3 summarizes the adoption rates of various ORM components, including risk identification, risk assessment, contingency planning, monitoring, and technology-based risk management solutions. The highest adoption rate is observed in risk identification, with 62.5 percent of firms reporting high implementation. This reflects the increasing awareness among logistics companies regarding the importance of identifying potential disruptions before they escalate. Risk assessment and analysis also show high adoption rates (58.3%), indicating that firms increasingly rely on structured evaluative frameworks to quantify and rank risks by severity and likelihood.

The adoption of technology-based solutions is comparatively lower, with only 40 percent of firms reporting high implementation. This finding is consistent with previous studies noting the technological gap in Indonesian logistics, particularly among SMEs (Masudin et al., 2020). Advanced digital tools such as blockchain,

predictive analytics, and automated monitoring systems remain underutilized despite their proven benefits in strengthening risk detection and enhancing service transparency (Rane et al., 2023; Rauniyar et al., 2023). The moderate adoption of contingency planning (47.5%) and continuous monitoring (53.3%) indicates that while many firms recognize the importance of preparedness and evaluation, implementation lags behind in comparison to basic risk identification and assessment.

Service Quality Outcomes

Table 4. Service Quality Dimensions (Mean Scores, 1–5 scale)

Dimension	Mean Score	Std. Dev.
Reliability	4.02	0.51
Responsiveness	3.85	0.63
Assurance	3.91	0.58
Empathy	3.76	0.67
Tangibles	3.88	0.55

Service quality performance was assessed using the SERVQUAL model, which measures reliability, responsiveness, assurance, empathy, and tangibles. Table 4 presents the mean scores for each dimension. Reliability, with a mean score of 4.02, emerges as the strongest dimension, indicating that most logistics firms are effective in ensuring timely and accurate deliveries. Responsiveness (3.85) and assurance (3.91) also score relatively high, suggesting that companies perform well in providing prompt assistance and instilling confidence in customers.

Empathy receives the lowest mean score (3.76), reflecting challenges in providing personalized services and customer care an issue also noted in previous research on logistics service quality in emerging markets (Gupta et al., 2023). The tangibles dimension (3.88), which includes physical facilities and equipment, indicates that while service infrastructure is generally adequate, there remains room for improvement, especially as digital and physical service boundaries merge in modern logistics ecosystems.

Service quality scores overall indicate moderate to high performance, but variability exists across firms and dimensions. These outcomes underscore the crucial role ORM may play in promoting consistency, reliability, and responsiveness in logistics operations.

Correlation Between ORM Practices and Service Quality

Table 5. Correlation Between ORM and Service Quality

ORM Practice	Reliability	Responsiveness	Assurance	Empathy	Tangibles
Risk identification	0.61**	0.55**	0.58**	0.46**	0.49**
Contingency planning	0.64**	0.60**	0.62**	0.53**	0.51**
Technology adoption	0.68**	0.65**	0.60**	0.57**	0.55**

(**$p < .01$)

Table 5 reports correlation coefficients examining the relationships between ORM practices and service quality dimensions. All correlations are positive and statistically significant at the $p < .01$ level, indicating that ORM is strongly associated with higher service quality across all measured attributes. Notably, technology adoption shows the strongest correlations with reliability ($r = 0.68$), responsiveness

(r = 0.65), and empathy (r = 0.57). These findings support existing literature emphasizing the transformative role of digital tools in enhancing logistics service performance (Rane et al., 2023; Rauniyar et al., 2023).

Risk identification and contingency planning also exhibit strong correlations with all service quality dimensions, reinforcing the idea that firms capable of anticipating disruptions and preparing adequate responses are better positioned to maintain stable service delivery. These results align with earlier studies linking robust ORM frameworks to enhanced service quality outcomes (Yumurtacı et al., 2018; Fernandes et al., 2018).

Regression Analysis: Predictors of Service Quality

Table 6. Regression Analysis: ORM Effect on Service Quality

Variable	Beta (β)	t-value	Sig. (p)
Risk identification	0.27	4.12	0.000
Contingency planning	0.31	4.85	0.000
Technology adoption	0.36	5.42	0.000
Monitoring & evaluation	0.24	3.96	0.001
Adjusted R^2 = 0.58			

Regression results presented in Table 6 identify specific ORM components that significantly predict service quality. The model yields an adjusted R^2 of 0.58, indicating that ORM practices collectively explain 58 percent of the variance in service quality outcomes. All tested ORM variables are statistically significant predictors, with technology adoption emerging as the strongest (β = 0.36, p = 0.000). Contingency planning (β = 0.31) and risk identification (β = 0.27) are also substantial contributors, followed by monitoring and evaluation (β = 0.24).

These findings reinforce theoretical assertions regarding the strategic role of ORM in enhancing logistics performance. The prominence of technology adoption corroborates claims by Allioui et al. (2024) and Rauniyar et al. (2023), who argue that digital transformation strengthens risk detection, improves coordination, and reduces operational uncertainties. The significant effects of contingency planning and risk identification indicate that foundational ORM processes remain essential for maintaining service consistency, even as digital tools become more widespread.

Operational Risk Management and Service Quality

The current results are placed in the context of the wider theoretical discussion of the topic of logistics management, operational risk, and service quality systems. The following discussion incorporates the empirical implication, as well as ongoing academic discourse, thus showing that operational risk management (ORM) is not only a procedural mechanism but also a strategic capability determining organisational resilience and service-quality performance. This way, the discussion constructs the conceptual propositions, which are beyond the interpretation of data and which can reveal the contribution of the study to the logistics-management literature.

One of the key observations that were made in the course of the research is that the operational risk within the Indonesian logistics cannot be viewed as the discrete supply-chain failures; instead, it represents the structural conditions put within the geographic, infrastructural, and regulatory landscape. In line with the ideas of Rinaldi et al. (2001) that view infrastructure interdependencies as complex systems, the prevalence of transportation delays and bureaucratic bottlenecks implies that logistics providers working in Indonesia are engaged in a risk ecology that forms the systemic vulnerabilities. This ecological approach explains why companies that have strong internal processes are vulnerable to disruptions: networks of public

infrastructure, policy regimes, and environmental processes also co-produce risk. Thus, the success of ORM is also dependent on how well the internal practices are matched with the ability of the organisations to foresee and manage external uncertainties at the system level a theme that has received limited focus in earlier Indonesian logistics research.

Furthermore, the adoption trend of ORM highlights a theoretical conflict between the customary procedural risk management and capabilities-based risk management (Lima Rua et al., 2023; Mashaleh et al., 2024). Classical ORM models focus on identifying, evaluating, and managing but the high predictive performance of technology uptake in this study is an indicator of a transition to the concept of dynamic capabilities, which is consistent with the findings of Rauniyar et al. (2023), who contended that digital tools are better at risk sensing, decision making, and responsiveness. This shift points to the fact that ORM is becoming less reactive and more proactive and predictive, which is in line with the idea of risk management as a continuous organisation learning process conceptualisation. This move is supported by the Indonesian case, as its logistical environment is volatile, requiring it to be highly responsive and operationally visible.

The connection between ORM and service quality is another explanation of the fundamental concepts of the service operations theory. Traditional SERVQUAL specifications project the perception of customers ahead of the game, but the empirical results suggest that the factors of service quality in the logistics process become increasingly infrastructural and technological. The intensive association of ORM and, in particular, technology-facilitated practices with the reliability and responsiveness dimensions helps realize that the quality of the service is directly related to the transparency of operations and real-time control mechanisms. This finding supports the ideas of Fernandes et al. (2018) who argue that the quality of logistics services is mediated by the performance of operations but not the behaviors of frontline services. On the other hand, the relative lack of empathy in the data points to a critical caveat: as companies work on optimizing their operational processes more and more, the relationship aspect of service quality can be compromised and thus the trade-off between digital operational efficiency and human-friendly service characteristics is observed in the modern logistics service quality models.

One of the implications of the research is a consequential one that relates to the patterns of adoption of ORM which are heterogeneous across the different size firms. The middle-sized companies, which comprise the majority of the sample, have a stable performance of the practice of basic ORM but are behind the technology. This trend is consistent with Masudin et al. (2020), who note that SMEs are facing limitations in digital transformation related to the lack of capital, skilled workforce, and the disjointed access to state-of-the-art technologies. Theoretical frameworks which assume homogeneous rates of adoption of risk management can thus be seen to ignore the structural inequalities of the ability of the firms to operationalise ORM. Policy interventions related to ORM in the context of the Indonesian context, in which the SMEs are the foundation of the logistics ecosystem, should therefore take into consideration these asymmetries to ensure that digital divides are not increased to increase differences in performance.

The main conceptual contribution of the study is that ORM is an intermediate between the limitations of logistics infrastructure and the service quality outcomes. Instead of assuming a causal relationship between risk factors and service performance, the results indicate that the practices of ORM mediate the amount of infrastructural and regulatory challenges actualised as service failures. As an example, every company has similar macro-level limitations, but those that have more developed ORM systems end up with a better level of service quality. This

mediating opinion is compatible with the position pursued by Yumurtacı et al. (2018), who state that the quality of logistics services becomes the attribute of the operational control systems. This implication implies that in the Indonesian case, logistics companies should devote ORM to the level of the operational competency to eliminate systemic volatility within the archipelagic logistics networks.

The fact that technology use is the most salient predictor of the quality of services has significant theoretical implications. It supports the claims made by Allioui et al. (2024) who state that the combination of artificial intelligence, automation, and digital monitoring creates new logistics risk profiles due to the improved predictive accuracy, less uncertainty, and better situational awareness. Ironically, the use of technology also produces a significant impact on such aspects of relationships as empathy (Pawiak, 2024). One of the hypotheses that explain is that, digital instruments enhance the clarity of communication, delivery transparency, and regular customer-facing updates, which in turn positively influence the perceived empathy. These results contradict traditional beliefs that empathy in service situations is solely a human process and indicate that, in technologically mediated interactions, computer interfaces can enhance customer confidence and relationship satisfaction.

Irrespective of these findings, the research revealed irregularities which ought to be investigated further. As an example, contingency planning, with service quality having a very strong correlation, was not found to be any more predictive than technology adoption. This observation is not in conformance with classical supply-chain risk models that have located contingency planning as the foundation of the resilience plans. It is also possible that in fast-changing logistics settings, the conventional contingency plans are not sufficient as it might require digital tools that would allow real-time implementation. This is in line with modern arguments of contingency planning which argue that inflexible plans are not adaptable in dynamic, uncertain environments. This limitation is probably intensified by the complicated logistical situation of Indonesia that makes digital adaptability more decisive than a set of procedural plans.

The other observation worthy of mention is that of risk identification and assessment which has significant but not overwhelming effects. This trend suggests that the risk is not recognized enough without the mechanisms of timely reduction of risks and efficient coordination of operations. The result is consistent with the new literature revising risk-identification-intensive models as not being able to convert diagnostic knowledge into operational capabilities. Practically, Indonesian logistical companies might be very good at detection of repeated threats, like time wastages or corruption, but in the absence of digital applications or continuous monitoring, their ability to act quickly is limited. This finding highlights the theoretical point that maturity in risk-management develops in a sequence of steps, and identification is an initial step, and not the determining factor of service excellence.

CONCLUSION

Based on the findings, it can be concluded that operational risk management (ORM) has a significant and positive effect on service quality in Indonesian logistics companies. The results show that while all firms face considerable operational risks particularly transportation delays and infrastructure constraints those that adopt structured ORM practices, especially technology-based solutions and contingency planning, are able to deliver more reliable, responsive, and customer-oriented services. The statistical evidence indicates that ORM not only minimizes disruptions but also strengthens organizational capacity to meet rising customer expectations in a competitive logistics market. Thus, effective ORM serves as both a risk-mitigation

framework and a strategic driver for enhancing service quality and sustaining long-term competitiveness in Indonesia's logistics industry.

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