



Effect of Supply Chain Risk Management on Operational Performance: A Case Study of Rwanda Medical Supply Ltd

Musema Divine Mukabugingo and Daniel Mburamatore
University of Kigali
Email: divinekeza15@gmail.com

Abstract: This study examined the effect of supply-side risks on operational performance at Rwanda Medical Supply Ltd. Specifically, it assessed the effect of supply-side risks on operational performance at Rwanda Medical Supply Ltd. The study employed a descriptive and correlational research design using both quantitative and qualitative approaches. The target population comprised 147 employees from procurement, logistics and transportation, warehouse management, finance, supply planning, and distribution departments. A census sampling technique was used to include all members of the target population. Data were collected using structured questionnaires and semi-structured interview guides and analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics, Pearson correlation analysis, regression analysis, and thematic analysis were used to analyze the data. The findings indicated that supply-side risks were significantly associated with operational performance at Rwanda Medical Supply Ltd. The findings further showed that supplier delays, poor supplier quality, dependence on few suppliers, supplier evaluation, and supplier disruptions were important supply-side risk factors affecting operational activities. Pearson correlation analysis revealed a positive and statistically significant relationship between supply-side risks and operational performance ($r = .631, p < .001$). The study concludes that effective management of supplier-related risks is important for maintaining reliable procurement, inventory management, timely delivery, and efficient distribution of medical supplies. The study recommends strengthening supplier monitoring and evaluation, diversifying suppliers, maintaining alternative sources of supply, and developing appropriate contingency measures to reduce supplier-related disruptions and improve operational performance at Rwanda Medical Supply Ltd.

Keywords: Supply-side risks; Supply chain risk management; Operational performance; Supplier management; Rwanda Medical Supply Ltd; Rwanda.

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1. Introduction

Supply chain risk management (SCRM) involves systematic identification, assessment, and mitigation of risks that could disrupt the smooth flow of goods, services, and information across a supply chain. Effective SCRM is critical to maintaining high operational performance, including efficiency, cost management, reliability, and service quality (Mwangi & Patel, 2021). In today's

interconnected global economy, disruptions such as natural disasters, geopolitical events, supplier failures, and pandemics can significantly affect supply chain performance. By implementing structured risk management practices, organizations can anticipate potential threats, prepare contingency plans, and ensure operational continuity, thereby reducing both financial and reputational losses. The adoption of SCRM has become not only a strategic advantage but also a necessary component

for sustaining organizational competitiveness in dynamic environments (Ortega & Singh, 2022).

Globally, organizations are increasingly recognizing the critical importance of SCRM in sustaining operational performance. Multinational companies often employ advanced risk monitoring systems, predictive analytics, and diversified sourcing strategies to mitigate risks (Kim & Roberts, 2021; Ferreira & Das, 2022). For instance, disruptions caused by the COVID-19 pandemic revealed weaknesses in global supply chains, resulting in shortages, delayed deliveries, and increased operational costs. Firms with well-structured SCRM practices, however, were able to adjust their operations rapidly, maintain production schedules, and uphold customer service standards. The global trend demonstrates that proactive management of supply chain risks can significantly improve operational efficiency and resilience, highlighting its strategic value in diverse industries (Adams & Chen, 2022).

In developed countries such as the United States, Germany, and Japan, supply chain risk management is highly integrated into operational strategies. Companies leverage digital tools, real-time monitoring, AI-based predictive models, and strategic inventory management to anticipate potential disruptions (Schmidt & Tan, 2021). For example, automotive manufacturers in Germany conduct frequent supplier audits and maintain flexible production lines to prevent operational stoppages. Similarly, pharmaceutical companies in the U.S. have established multiple sourcing agreements to ensure continuity in essential drug supply. The result is that organizations in these developed countries are better equipped to maintain high operational performance, even when unforeseen disruptions occur, illustrating the benefits of mature SCRM systems (Nguyen & O'Leary, 2022);

In Western Asia, countries like the United Arab Emirates, Saudi Arabia, and Qatar face distinct supply chain challenges, including political instability, fluctuating oil prices, and trade restrictions (Al-Mutairi & Farah, 2022). Organizations operating in this region are increasingly adopting sophisticated SCRM practices to safeguard operational performance. Many companies utilize advanced logistics tracking systems, supplier diversification strategies, and scenario planning to mitigate the effects of regional conflicts or border delays. For instance, UAE-based logistics and retail firms have implemented digital supply chain visibility platforms that enable real-time shipment tracking, ensuring timely deliveries and maintaining customer satisfaction. Effective SCRM in these countries has become a vital factor in sustaining operational efficiency and reducing vulnerability to regional risks (Najjar & Al-Khalid, 2022; Rahman & Zaki, 2023)

Northern countries, including Sweden, Finland, and Canada, face supply chain risks largely driven by extreme weather, geopolitical tensions, and labor market fluctuations (Larsen & Niemi, 2022). Organizations in these regions implement SCRM strategies, including climate risk modeling, digital monitoring, and flexible logistics planning, to ensure operational stability. For example, Nordic logistics companies use predictive weather analytics to prepare for snowstorms or flooding that could disrupt transportation networks. These proactive measures help organizations reduce operational downtime, maintain reliable delivery schedules, and minimize the financial impact of supply chain disruptions. The emphasis on predictive and adaptive risk management highlights how Northern countries maintain operational performance despite environmental uncertainties (Martin & O'Donnell, 2023).

In Africa, supply chains often face challenges stemming from limited infrastructure, political uncertainty, and uneven technology adoption (Okoye & Banda, 2021). Organizations that integrate SCRM practices, including risk mapping, contingency planning, and supplier audits, tend to achieve higher operational performance than those that do not. For example, large retailers and manufacturers in South Africa increasingly rely on digital risk-monitoring tools and inventory buffering to mitigate transportation delays and electricity outages. Even though SCRM adoption across the continent is still developing, firms that implement proactive risk management can reduce disruptions, maintain supply continuity, and improve service quality. These strategies demonstrate that SCRM can be a transformative factor for operational resilience across African supply chains (Okoye & Banda, 2021).

In Eastern Africa, countries such as Kenya, Tanzania, and Uganda face supply chain risks related to poor infrastructure, regulatory hurdles, and high transport costs (Kamau & Nshimiyimana, 2022). Firms operating in these regions increasingly adopt SCRM practices such as supplier evaluation, safety stock policies, and transport risk assessments to improve operational outcomes (Okoth & Byaruhanga, 2023). For example, Kenyan pharmaceutical distributors rely on digital inventory management systems and supplier risk evaluations to prevent stockouts and ensure timely delivery of essential medicines. By implementing these measures, organizations can reduce disruptions, enhance service reliability, and achieve operational efficiency, even in challenging logistical environments. SCRM adoption in Eastern Africa is thus a critical determinant of organizational performance (Teshome & Ochieng, 2023).

In Rwanda, supply chain risk management (SCRM) has become increasingly critical as the country's economy and industrial sectors expand, particularly in healthcare,

manufacturing, and retail (Uwase & Nkurunziza, 2022). Rwanda faces supply chain challenges, including limited local suppliers, inadequate transport infrastructure, logistical delays, regulatory bottlenecks, and regional trade disruptions (Habimana & Mukamana, 2021). Organizations operating in Rwanda have begun to recognize that proactive risk management through strategies such as supplier evaluation, contingency planning, inventory buffering, and monitoring of transportation risks is essential to maintain operational efficiency. SCRM practices in Rwanda are influenced by global best practices but must also be adapted to local conditions, including high dependency on imported goods, vulnerability to natural hazards, and fluctuations in regional trade policies (Uwizeyimana & Karangwa, 2022). Organizations implementing structured SCRM in Rwanda are better able to minimize disruptions, reduce operational costs, and improve service reliability, which is particularly vital in sectors such as healthcare, where delays can have serious consequences (Mugabo & Nyandwi, 2023).

Rwanda Medical Supply Ltd provides a practical example of how SCRM is applied in the country's healthcare supply chains (Nsengiyumva & Uwase, 2022). As a key national distributor of medical supplies, the company faces risks including supplier unreliability, transportation delays, and inventory shortages that could disrupt hospital operations nationwide. To mitigate these risks, Rwanda Medical Supply Ltd has adopted comprehensive SCRM practices, such as regular supplier audits, risk assessment tools, contingency stock policies, and enhanced supply chain visibility systems (Karangwa & Uwimana, 2022). These strategies have helped the company maintain operational performance by ensuring timely deliveries, minimizing stockouts, and optimizing inventory turnover. For instance, during regional transport disruptions, contingency stock and alternative supplier arrangements enabled the organization to continue supplying critical medicines to healthcare facilities without interruption (Habineza & Mukabayire, 2023).

1.2. Statement of the Problem

Rwanda's healthcare supply chain continues to experience challenges that can negatively affect operational performance. Essential medicines and medical supplies may not always be available when required, while supplier delays, inventory problems and inadequate supplier monitoring can contribute to operational inefficiencies. Stockouts and delays in the healthcare supply chain can result in treatment delays, increased emergency procurement costs and additional workload for health workers.

Several studies have examined supply chain management and performance in Rwanda, but relatively limited attention has been given to the specific relationship

between supply-side risks and operational performance within Rwanda's healthcare supply chain. Previous studies have considered supplier audits, inventory monitoring, information sharing and supply chain partnerships, but there remains a need for organization-specific evidence on how supplier-related risks affect operational performance at Rwanda Medical Supply Ltd.

The problem is particularly important because Rwanda Medical Supply Ltd depends on reliable suppliers to ensure the availability and timely distribution of medicines and medical equipment. Supplier delays may increase lead times, poor supplier quality may lead to product rejection and returns, dependence on a limited number of suppliers may increase vulnerability to disruptions, and supplier interruptions may affect the timely delivery of medical supplies.

1.3. Objective of the Study

1.3.1. General Objective

The general objective of the study was to examine the effect of supply-side risks on operational performance at Rwanda Medical Supply Ltd.

1.3.2. Specific Objective

i. To assess the effect of supply-side risks on operational performance at Rwanda Medical Supply Ltd.

2. Literature Review

This section reviews literature related to supply-side risks and operational performance. It focuses on the concepts underlying the study, the theoretical perspective explaining the relationship between supplier risks and operational performance, and empirical evidence from previous studies.

2.1.1 Supply Chain Risk Management

Supply chain risk management (SCRM) refers to the structured approach organizations use to identify, evaluate, and control risks that may disrupt the smooth flow of goods, services, information, and financial resources across supply chain networks (Wieland, 2021). Modern supply chains operate in highly interconnected environments involving suppliers, manufacturers, distributors, and customers, making them vulnerable to uncertainties such as supplier failures, transportation disruptions, market volatility, and geopolitical shifts. As global supply chains continue to expand and become more complex, organizations increasingly recognize the importance of proactive risk management practices to maintain operational continuity and protect overall performance (Ivanov, Dolgui, & Sokolov, 2022).

Effective supply chain risk management involves several systematic activities including risk identification, risk assessment, risk mitigation, and continuous monitoring of supply chain operations (Ivanov & Dolgui, 2023). Risk identification focuses on recognizing potential disruptions within supply chain activities, while risk assessment evaluates the probability and impact of those disruptions on organizational performance. Organizations then develop mitigation strategies, such as supplier diversification, flexible logistics systems, strategic inventory management, and digital supply chain technologies, to enhance visibility and responsiveness. These practices help organizations improve resilience and respond quickly to unexpected disruptions while maintaining stable operational performance (Ho, Zheng, Yildiz, & Talluri, 2025).

In the healthcare sector, supply chain risk management plays a particularly critical role because disruptions can directly affect the availability of essential medicines and medical equipment required for patient care (Queiroz, Ivanov, Dolgui, & Fosso Wamba, 2022). Inefficient management of supply chain risks may lead to procurement delays, medical supply shortages, and increased operational costs within healthcare institutions. Conversely, organizations that implement strong SCRM strategies are better positioned to maintain reliable supply systems, ensure timely distribution of healthcare products, and improve operational efficiency. Therefore, effective supply chain risk management is increasingly viewed as a strategic tool to strengthen supply chain resilience and enhance operational performance across healthcare organizations and other sectors (Choi, Rogers, & Vakil, 2024).

2.1.2. Supply-Side Risks

Supply-side risks refer to uncertainties and disruptions originating from suppliers that may affect the availability, quality, or timely delivery of goods and services within the supply chain (Smith & Turner, 2023). In modern supply chains, organizations rely heavily on suppliers for raw materials, components, and finished products, making supplier reliability a critical factor for operational stability. However, suppliers may face challenges such as production delays, quality issues, financial instability, or political disruptions that can disrupt the supply of essential materials. As supply chains expand globally, organizations are increasingly exposed to these risks, which can significantly affect operational performance if not managed effectively (Allison & Patel, 2024).

Supply-side risks can occur in various forms, including late deliveries, inconsistent product quality, supply shortages, and dependence on a limited number of suppliers. When suppliers fail to meet delivery schedules or quality

standards, organizations may experience production stoppages, increased procurement costs, and inventory imbalances. These challenges can result in delayed service delivery, reduced customer satisfaction, and lower operational efficiency. To mitigate such risks, organizations often implement strategies such as supplier diversification, regular supplier performance evaluations, and strategic partnerships to ensure a reliable and stable supply of materials (Lopez, & Ali, 2023).

In healthcare supply chains, supply-side risks are particularly critical because they directly impact the availability of essential medicines, vaccines, and medical equipment required for patient care (Kumar & Hassan, 2023). Interruptions in the supply of pharmaceutical products may lead to stockouts in hospitals and health centers, compromising timely healthcare delivery and patient outcomes. Effective management of supply-side risks, therefore, requires healthcare organizations to strengthen supplier relationships, improve procurement planning, and develop contingency sourcing strategies. By applying these measures, healthcare organizations can enhance supply chain resilience and maintain consistent operational performance despite supplier-related uncertainties (Miller & Ahmed, 2024).

2.1.3. Operational Performance

Operational performance refers to the efficiency and effectiveness with which an organization executes its core activities, including procurement, production, inventory management, and distribution, to achieve organizational goals and meet stakeholder expectations (Hoffmann & Krüger, 2023). It represents an organization's ability to deliver products and services on time, maintain quality standards, manage costs, and optimize resource use. In supply chain management, operational performance is critical because it directly determines an organization's competitiveness, customer satisfaction, and overall service reliability. High operational performance indicates that an organization can respond effectively to market demands and supply chain uncertainties while maintaining productivity and reducing waste (Larsen & Voss, 2024).

Operational performance is typically assessed using a combination of key performance indicators, including delivery reliability, order fulfillment rate, inventory turnover, production efficiency, and service quality (Fischer & Håkansson, 2023). Supply chain risks including supply-side disruptions, financial instability, logistical challenges, and demand fluctuations can negatively influence these indicators, leading to delayed deliveries, increased costs, inventory imbalances, and reduced service quality. Organizations that actively implement risk management strategies, process optimization, and technology-enabled monitoring are better positioned to mitigate the effects of disruptions. Such practices help

maintain operational stability, enhance responsiveness to unforeseen events, and improve overall efficiency across the supply chain (Schneider & Meyer, 2023; Baumann & Richter, 2024).

In healthcare supply chains, operational performance is particularly critical because it directly affects the availability of essential medicines, vaccines, and medical equipment that are necessary for effective patient care (Klein & Dubois, 2024). Delays, stockouts, or inefficiencies in supply chain operations can compromise treatment schedules, reduce patient satisfaction, and potentially endanger lives. To ensure high operational performance, healthcare organizations employ strategies such as advanced inventory management systems, real-time monitoring of supply flows, risk mitigation planning, and strong coordination with suppliers and health facilities. Additionally, organizations increasingly adopt digital tools such as supply chain analytics, automated procurement systems, and predictive forecasting to anticipate disruptions and optimize resource allocation. By implementing these measures, healthcare organizations can ensure a continuous supply of medical products, improve operational efficiency, and maintain resilience against unexpected disruptions in the supply chain (Vogel & Nyström, 2024)

2.2. Theoretical Review

2.2.1. Contingency Theory

Contingency Theory was first introduced in organizational and management studies in the 1960s by scholars such as Fred Fiedler, who argued that there is no single best way to manage an organization (Oprah, 2022). Early research by Joan Woodward and Paul Lawrence, together with Jay Lorsch, further developed the theory by demonstrating that organizational structures and management practices must align with environmental conditions and operational contexts. Their studies showed that organizations performing in dynamic and uncertain environments require flexible structures and adaptive management systems. Over time, the theory has been widely applied in fields such as operations management, strategic management, and supply chain management to explain how organizations adjust their strategies to environmental uncertainties (Bergström & Vogel, 2023).

Contingency Theory suggests that organizational effectiveness depends on the alignment between internal organizational practices and external environmental factors. According to this theory, organizations operate in environments characterized by uncertainties, including technological change, market volatility, infrastructure limitations, and supplier disruptions. Therefore, management strategies must be tailored to the organization's specific conditions rather than relying on

universal management approaches. In supply chain management, the theory implies that organizations must design flexible procurement systems, logistics strategies, and operational procedures that respond effectively to potential disruptions. By adopting contingency-based strategies, organizations can respond more effectively to unexpected risks and maintain stable operational processes even in complex environments (Falk & Lütke, 2024).

The relevance of Contingency Theory to this study lies in its ability to explain how organizations respond to supply-side, logistical, and infrastructure risks in supply chain operations. These risks often arise from external environmental factors such as supplier instability, transportation challenges, infrastructure limitations, or disruptions in distribution networks. According to the theory, organizations can improve operational performance by adopting strategies that match these environmental conditions, such as diversifying suppliers, improving logistics coordination, or developing alternative transportation routes. In the context of Rwanda Medical Supply Ltd., applying contingency-based supply chain risk management strategies will help the organization adapt to uncertainties in the healthcare supply chain and ensure consistent availability of medical supplies. Consequently, the theory provides a useful framework for understanding how managing supply-side and logistical risks can enhance operational performance in healthcare supply systems (Neumann & Bauer, 2023).

2.3. Empirical Literature

2.3.1. Supply-Side Risks and Operational Performance

Globally, supply-side risks have been recognized as a major challenge affecting operational performance across industries. A study by Hansen & Petrovic (2023) employed a survey-based quantitative method across 120 manufacturing firms in Europe to assess the effect of supplier disruptions on operational efficiency. The study found that delayed deliveries, inconsistent quality, and supplier failures significantly reduced production efficiency and increased operational costs. The researchers concluded that organizations that diversify suppliers and implement supplier performance monitoring achieve higher resilience and maintain operational continuity. They recommended adopting multi-supplier strategies and digital supplier monitoring systems to mitigate risks. The study identified a research gap in sector-specific applications of supply-side risk management, particularly in service and healthcare supply chains.

In China, supply-side risks have been extensively studied within the healthcare sector. Liang & Zhou (2024) conducted a mixed-methods study involving structured interviews with 40 hospital procurement managers and surveys of 200 healthcare suppliers. The findings revealed

that hospitals dependent on a small number of pharmaceutical suppliers experienced frequent stockouts, treatment delays, and higher operational costs. The study concluded that robust supplier relationship management and proactive contingency planning improved operational performance. Recommendations included establishing long-term contracts with multiple suppliers and using predictive analytics for demand forecasting. The study noted a gap in the evaluation of the effectiveness of supply-side risk mitigation tools in smaller regional hospitals, highlighting the need for further research.

In Germany, a quantitative study by Schmidt & Bauer (2023) analyzed 80 logistics and manufacturing companies using regression analysis to examine the relationship between supplier reliability and operational KPIs. Results showed that firms relying heavily on a single supplier experienced production stoppages during supplier failures, which negatively impacted delivery schedules and customer satisfaction. The researchers concluded that supplier diversification and rigorous supplier audits enhanced operational stability. They recommended integrating supplier risk assessment frameworks into strategic planning. The study identified a gap regarding the adoption of digital supply chain technologies for real-time monitoring, suggesting a focus for future research.

In Nigeria, supply-side risks have significant implications for operational performance in both manufacturing and healthcare. Okonkwo & Balogun (2024) conducted a case study approach on 10 pharmaceutical distribution companies, using interviews and internal performance records to assess supply disruptions. Findings revealed that frequent supplier delays, limited local suppliers, and import restrictions caused stock shortages and operational delays. The study concluded that strengthening supplier networks and improving procurement planning enhanced operational outcomes. Recommendations included adopting regional supplier partnerships and local sourcing strategies. A research gap was identified in the use of digital supplier management platforms in the Nigerian healthcare context, suggesting an area for future investigation.

In Senegal, Diop & Ndiaye (2023) examined supply-side risks in hospital supply chains using a cross-sectional survey of 50 health facilities and interviews with 30 suppliers. The study found that dependence on imported medical products and inconsistent supplier reliability led to frequent stockouts and treatment delays. The researchers concluded that operational performance could be improved through supplier evaluation, diversification, and capacity building. They recommended implementing supplier performance scorecards and contingency inventory strategies. A research gap was noted in the integration of risk management practices into national health policy

planning, an integration that could further enhance operational resilience.

In Rwanda, supply-side risks are particularly relevant for healthcare supply chains. Müller & Conti (2023) conducted a mixed-methods study involving 15 hospitals and 25 pharmaceutical suppliers, combining surveys, interviews, and performance data analysis. Results showed that limited local suppliers and delays in international procurement disrupted medical supply distribution, causing operational inefficiencies and stock shortages. The study concluded that implementing proactive supplier management, early warning systems, and diversified sourcing improved operational performance. Recommendations included strengthening supplier relationships, improving procurement planning, and adopting digital monitoring tools. The research gap identified the need for studies that assess how small and medium-sized healthcare facilities can implement SCRM strategies effectively, as most studies focus on large hospitals.

3. Methodology

This study employed a descriptive and correlational research design to assess the effect of supply-side risks on operational performance at Rwanda Medical Supply Ltd (RMS Ltd). Research design provides a structured framework for collecting, measuring, and analyzing data to address research objectives (Creswell, 2018). The descriptive design enabled the researcher to describe the existing supply-side risks, including supplier delays, poor supplier quality, dependence on few suppliers, supplier evaluation, and supplier disruptions. The correlational design was used to examine the strength and direction of the relationship between supply-side risks and operational performance. The study also adopted a mixed-methods approach by combining quantitative and qualitative information to provide a broader understanding of how supply-side risks influence operational performance at RMS Ltd. Pasted text

The target population consisted of 147 employees of Rwanda Medical Supply Ltd who were directly involved in supply chain operations. These employees were selected because they possessed relevant knowledge and experience concerning procurement, supply management, storage, planning, and distribution of medical supplies. Specifically, the population comprised 13 employees from the Procurement Department, 18 from Logistics and Transportation, 43 from Warehouse Management, 15 from Finance, 17 from Supply Planning, and 41 from Distribution. The inclusion of these departments enabled the study to obtain information from employees involved in activities that may be affected by supplier delays, quality problems, supplier dependence, and other supply-side risks. The population distribution was based on Rwanda

Medical Supply Ltd organizational records. Pasted text
Pasted text

The sample design provided a systematic approach for including relevant employees in the study. Since the target population of 147 employees was relatively small and manageable, the study adopted a census sampling design. A census approach involves including all members of the target population rather than selecting a smaller sample. Therefore, all 147 employees involved in supply chain operations at RMS Ltd were considered for participation in the study. This approach was appropriate because it allowed the researcher to obtain comprehensive views from employees working in procurement, logistics and transportation, warehouse management, finance, supply planning, and distribution, while minimizing sampling bias. Pasted text

The study used primary and secondary data sources. Primary data were collected directly from employees of RMS Ltd through structured questionnaires and semi-structured interviews. The questionnaire collected quantitative information concerning supply-side risks and operational performance, while interviews provided detailed explanations concerning supplier-related challenges and their effects on organizational operations. Secondary data were obtained from organizational documents, including procurement reports, inventory records, logistics performance reports, distribution records, and supply chain risk management policies. Relevant textbooks, academic studies, government publications, and other published materials concerning supply chain risk management and operational performance were also reviewed. Pasted text

The main data collection instruments were questionnaires and interview guides. The questionnaire consisted mainly of closed-ended questions measured using a Likert scale ranging from strongly disagree to strongly agree. Items relating to supply-side risks focused on supplier delays, poor supplier quality, dependence on few suppliers, supplier evaluation, and supplier disruptions, while operational performance was considered in terms of indicators such as delivery timeliness, order fulfillment, inventory accuracy, service reliability, and cost efficiency. Semi-structured interviews were conducted with selected key informants, including supply chain managers, logistics supervisors, and warehouse managers, to obtain detailed information that could complement the questionnaire responses. Documentary review was also used to obtain supporting information from relevant organizational records. Pasted text

A pilot study involving 14 respondents, representing approximately 10% of the target population of 147 employees, was planned to assess the clarity, relevance,

and feasibility of the research instruments. The respondents involved in the pilot study would not be included in the final data analysis. The validity of the instruments would be assessed through content validity, with the questionnaire and interview guide reviewed to ensure that the items adequately covered supply-side risks and operational performance. Reliability would be assessed using Cronbach's Alpha, with a coefficient of 0.70 or higher considered acceptable. Where weaknesses or unclear items were identified during pilot testing, the instruments would be revised before the main data collection process. Pasted text

Quantitative data were coded and analyzed using Statistical Package for Social Sciences (SPSS). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the responses concerning supply-side risks and operational performance. Pearson correlation analysis was used to determine the strength and direction of the relationship between supply-side risks and operational performance. Regression analysis was also used to determine the contribution of supply-side risks to operational performance within the overall supply chain risk management model. The study considered a p-value below 0.05 as statistically significant. Qualitative information obtained through semi-structured interviews was transcribed, coded, and analyzed thematically to identify common views concerning supplier-related risks and operational performance. Ethical considerations included informed consent, voluntary participation, confidentiality, anonymity, the right to withdraw, and secure handling of research data. Official permission would also be obtained from Rwanda Medical Supply Ltd before data collection.

4. Results and Discussion

4.1.1. Response Rate

The study targeted 147 respondents. Questionnaires were distributed to 145 employees, of whom 132 completed and returned the questionnaires. Two key informants participated in interviews.

Table 1. Response Rate

Response Rate	Frequency	Percentage (%)
Questionnaires Returned	132	91.0
Questionnaires Not Returned	13	9.0
Total Questionnaires Distributed	145	100.0
Interview Respondents	2	100.0
Total Targeted Sample	147	100.0

Source: Field Data (2026)

4.1.2. Descriptive Statistics of Supply-Side Risks

Table 4.3 presents respondents' perceptions regarding supply-side risks at Rwanda Medical Supply Ltd. A five-point Likert scale was used where 5 = Strongly Agree (SA), 4 = Agree (A), 3 = Neutral (N), 2 = Disagree (D), and 1 = Strongly Disagree (SD). This section addresses the first

objective of the study, which was to examine the effect of supply-side risks on the operational performance of Rwanda Medical Supply Ltd. The analysis focuses on respondents' perceptions regarding supplier delays, supplier quality, supplier dependency, supplier evaluation, and supplier disruptions, and how these aspects influence operational performance.

Table 2. Level of Agreement on Supply-Side Risks and Operational Performance

Views of Respondents	N	Mean	SD
Supplier delays negatively affect operational performance.	132	4.46	0.68
Poor supplier quality affects inventory management.	132	4.38	0.74
Dependence on few suppliers increases operational risks.	132	4.27	0.82
Supplier evaluation improves operational efficiency.	132	4.41	0.71
Supplier disruptions affect timely delivery of medical supplies.	132	4.33	0.76
Overall Mean	132	4.37	0.74

Source: Field Data (2026)

Table 2 presents respondents' perceptions regarding supply-side risks and operational performance at Rwanda Medical Supply Ltd. The findings indicate an overall mean score of 4.37 and a standard deviation of 0.74, implying that respondents generally strongly agreed that supply-side risks significantly influence operational performance. The relatively low standard deviation demonstrates that respondents held similar opinions regarding the influence of supplier-related risks on procurement efficiency, inventory management, and service delivery. These findings suggest that effective management of suppliers remains an important determinant of uninterrupted operations and efficient distribution of medical supplies throughout the country.

The statement "Supplier delays negatively affect operational performance" recorded the highest mean score ($M = 4.46$, $SD = 0.68$). This indicates that respondents strongly agreed that delays from suppliers directly affect procurement schedules, inventory availability, and timely delivery of medicines to healthcare facilities. The low standard deviation further indicates strong agreement among respondents. These findings imply that supplier delays interrupt the flow of essential medical commodities, increase lead times, and reduce the organization's ability to satisfy customer demand promptly.

Similarly, respondents strongly agreed that supplier evaluation improves operational efficiency ($M = 4.41$, $SD = 0.71$). This finding suggests that continuous evaluation of suppliers enables Rwanda Medical Supply Ltd to identify reliable suppliers, monitor supplier performance, and maintain high procurement standards. Regular supplier assessment also improves purchasing decisions, minimizes procurement risks, and strengthens supply chain reliability.

The findings further reveal that respondents strongly agreed that poor supplier quality affects inventory management ($M = 4.38$, $SD = 0.74$). This implies that poor-quality medical supplies contribute to stock rejection, product returns, increased operational costs, and reduced customer confidence. Maintaining supplier quality standards therefore remains essential for ensuring inventory accuracy and uninterrupted healthcare service delivery.

Respondents also agreed that supplier disruptions affect timely delivery of medical supplies ($M = 4.33$, $SD = 0.76$). These findings indicate that unexpected supplier interruptions reduce product availability and create distribution challenges that ultimately affect healthcare institutions depending on Rwanda Medical Supply Ltd for essential medicines and medical equipment. Effective contingency planning and supplier relationship

management are therefore important for minimizing these disruptions.

Although "Dependence on few suppliers increases operational risks" recorded the lowest mean score ($M = 4.27$, $SD = 0.82$), respondents still strongly agreed with the statement. This finding implies that relying on a limited number of suppliers exposes the organization to procurement uncertainty whenever suppliers experience production shortages, financial instability, transportation delays, or contractual challenges. Supplier diversification therefore remains an important strategy for strengthening operational resilience and ensuring continuity of supply.

Overall, the descriptive findings demonstrate that respondents strongly believe supply-side risks have a substantial influence on operational performance at Rwanda Medical Supply Ltd. The findings indicate that supplier delays, supplier quality, supplier evaluation, supplier disruptions, and supplier dependency all influence procurement efficiency, inventory management, and timely delivery of medical supplies. Consequently, effective supplier risk management contributes significantly to improved operational performance by ensuring continuous product availability, reducing supply interruptions, and strengthening healthcare service delivery.

The qualitative findings obtained from interviews with the Head of Supply Planning and the Distribution Manager further supported the quantitative results. Both respondents acknowledged that effective management of supplier-related risks plays a critical role in ensuring the continuous availability of medical supplies and improving operational performance at Rwanda Medical Supply Ltd.

The Head of Supply Planning explained that supplier performance is continuously monitored to minimize procurement disruptions and maintain adequate stock levels. The respondent stated:

"Supplier reliability is very important in our operations because any delay affects procurement schedules and the timely availability of medicines. We therefore conduct regular supplier performance evaluations to ensure that only suppliers who consistently meet delivery schedules, quality standards, and contractual requirements continue working with the organization."

The respondent further noted that supplier evaluation enables the organization to identify potential weaknesses early and implement corrective actions before supply chain disruptions occur.

Similarly, the Distribution Manager emphasized that supplier diversification has significantly strengthened the organization's ability to maintain uninterrupted distribution of medical supplies to healthcare facilities across the country. According to the respondent:

"Depending on one supplier exposes the organization to unnecessary risks. We work with several approved suppliers so that whenever one supplier experiences delays or shortages, another supplier is able to supply the required products without interrupting service delivery."

The respondent further explained that maintaining strong relationships with suppliers enhances communication, improves coordination during emergencies, and enables the organization to respond quickly to unexpected supply chain disruptions.

The interview findings also revealed that supplier quality remains a major concern because poor-quality medical products increase inspection costs, delay product distribution, and sometimes require products to be returned to suppliers. Both respondents agreed that supplier quality management has contributed significantly to improving inventory accuracy, reducing procurement losses, and maintaining customer confidence in the organization.

Overall, the qualitative findings demonstrate that effective supplier evaluation, supplier diversification, continuous supplier monitoring, and strong supplier relationships are among the major strategies employed by Rwanda Medical Supply Ltd to minimize supply-side risks and improve operational performance. These findings complement the quantitative results by illustrating how supply-side risk management practices contribute to uninterrupted procurement, efficient inventory management, and timely delivery of medical supplies.

The findings of this study indicate that supply-side risks significantly influence the operational performance of Rwanda Medical Supply Ltd. Respondents strongly agreed that supplier delays, poor supplier quality, dependence on a limited number of suppliers, supplier disruptions, and supplier evaluation directly affect procurement efficiency, inventory management, and the timely distribution of medical supplies. These findings imply that organizations capable of effectively managing supplier-related risks are more likely to achieve improved operational efficiency, maintain continuous product availability, and deliver quality healthcare services.

The findings are consistent with previous empirical studies reviewed in Chapter Two. For example, Christopher (2023) observed that supplier reliability is a major

determinant of supply chain performance because delayed deliveries increase operational costs and interrupt organizational activities. Similarly, Tang (2022) reported that organizations implementing regular supplier performance evaluations experience fewer procurement disruptions, improved inventory management, and better operational performance. Likewise, Waters (2021) found that supplier diversification enhances organizational resilience by reducing dependence on individual suppliers and minimizing the impact of unexpected supply chain disruptions.

The findings also agree with studies conducted in developing countries, which reported that organizations maintaining strategic supplier relationships are better positioned to respond to supply chain uncertainties, improve procurement efficiency, and sustain service delivery. These studies emphasized that continuous supplier monitoring and quality assurance significantly reduce operational risks while improving customer satisfaction and organizational performance.

The findings are further supported by the Supply Chain Risk Management Theory, which guided this study. The theory emphasizes that organizations should continuously identify, assess, monitor, and mitigate risks occurring throughout the supply chain to improve operational resilience and organizational performance. Within the context of Rwanda Medical Supply Ltd, supplier evaluation, supplier diversification, supplier quality management, and continuous supplier monitoring represent proactive risk management practices that reduce procurement uncertainty and improve operational efficiency. The findings therefore support the central proposition of the theory that effective management of supply chain risks strengthens organizational resilience and enhances operational performance.

4.1.3. Correlation Analysis

Pearson correlation analysis was used to examine the strength and direction of the relationship between supply-side risks and operational performance.

Table 3. Correlation between Supply-Side Risks and Operational Performance

	Supply-Side Risks	Operational Performance
Supply-Side Risks	1	.631**
Sig. (2-tailed)	—	.000
N	132	132
Operational Performance	.631**	1
Sig. (2-tailed)	.000	—
N	132	132

Source: Field Data (2026)

Note: **. Correlation is significant at the 0.01 level (2-tailed).

The findings indicate a positive and statistically significant relationship between supply-side risks and operational performance at Rwanda Medical Supply Ltd. The Pearson correlation coefficient was $r = .631$, with $p = .000$, based on 132 respondents. The positive correlation indicates that higher levels of effective management of supply-side risks are associated with better operational performance. The statistically significant p-value, which is below the 0.05 significance level, provides evidence against the null hypothesis that there is no significant relationship between supply-side risks and operational performance.

However, correlation by itself does not establish causation.

4.1.4. Regression Evidence

The original thesis used a multiple regression model containing four dimensions of supply chain risk management. Therefore, its model summary cannot appropriately be presented as a simple regression model for supply-side risks alone. Nevertheless, the coefficient results provide evidence regarding the independent contribution of supply-side risks when the other three risk dimensions are considered simultaneously.

Table 4. Regression Coefficient for Supply-Side Risks in the Full Thesis Model

Model	B	Std. Error	Beta	t	Sig.
Constant	-.211	.314	—	-.672	.503
Supply-Side Risks (X1)	.520	.092	.535	5.669	.000

Source: Field Data (2026)

The coefficient results indicate that supply-side risks had a positive and statistically significant contribution to operational performance. The standardized beta coefficient was $\beta = .535$, with $t = 5.669$ and $p = .000$. The overall thesis

regression model reported $R = .745$ and $R^2 = .555$, showing that the four dimensions jointly explained 55.5% of the variation in operational performance. This figure should

not be interpreted as the percentage explained by supply-side risks alone.

4.2. Discussion of Findings

The findings indicate that supply-side risks are significantly associated with operational performance at Rwanda Medical Supply Ltd. Respondents generally recognized supplier delays, poor supplier quality, dependence on limited suppliers, supplier evaluation, and supplier disruptions as important factors affecting the organization's operations. These findings suggest that effective management of suppliers is important for maintaining reliable procurement, inventory management, and distribution of medical supplies. The findings further indicate that weaknesses in supplier performance can create operational challenges for RMS Ltd.

Supplier delays and supplier evaluation emerged as particularly important aspects of supply-side risk management. Delays in the delivery of medical supplies can increase lead times, create shortages, and affect the timely distribution of products to healthcare facilities. At the same time, regular supplier evaluation enables RMS Ltd to assess supplier reliability, quality, compliance, and delivery performance. This finding is consistent with Hansen and Petrovic (2023), who reported that supplier delays and failures can reduce operational efficiency and increase operational costs. Therefore, effective supplier monitoring and evaluation can support more reliable supply chain operations.

The findings also demonstrate the importance of supplier quality, supplier disruptions, and supplier diversification. Poor-quality medical supplies may require rejection, replacement, or additional handling, which can increase operational difficulties and affect inventory management. Similarly, unexpected supplier disruptions may interfere with the continuous availability and timely delivery of medical products. Dependence on a limited number of suppliers can further increase vulnerability when one or more suppliers experience difficulties. These findings are consistent with Liang and Zhou (2024) and Schmidt and Bauer (2023), who emphasized the operational challenges associated with supplier disruptions and dependence on limited suppliers.

The findings are also supported by Contingency Theory, which emphasizes the need for organizations to adopt management practices that respond appropriately to changing environmental conditions and uncertainties. For RMS Ltd, supplier-related uncertainty requires appropriate strategies such as supplier monitoring, supplier diversification, alternative sourcing, and contingency planning. The significant relationship identified between supply-side risks and operational performance therefore suggests that managing supplier-related uncertainties is an

important part of maintaining effective operations. Overall, the findings support the first specific objective by demonstrating the relevance of supply-side risk management to operational performance at Rwanda Medical Supply Ltd.

5. Conclusion and Recommendations

5.1. Conclusion

The study concluded that supply-side risks are an important factor influencing operational performance at Rwanda Medical Supply Ltd. The findings showed that supplier delays, poor supplier quality, dependence on a limited number of suppliers, supplier evaluation, and supplier disruptions are relevant supply-side factors affecting the organization's operations. Effective management of these risks is therefore important for maintaining reliable procurement, inventory management, timely delivery, and efficient distribution of medical supplies. The study further concludes that strengthening supplier monitoring and evaluation, diversifying suppliers, maintaining alternative sources of supply, and developing appropriate contingency measures can help RMS Ltd manage supplier-related uncertainties and support improved operational performance.

5.2. Recommendations

Based on the findings of the study, the following recommendations are proposed to help Rwanda Medical Supply Ltd strengthen the management of supply-side risks and improve operational performance.

1. Rwanda Medical Supply Ltd should strengthen regular supplier evaluation using criteria such as delivery reliability, product quality, compliance with specifications and responsiveness. This can help identify suppliers that consistently meet organizational requirements.
2. The organization should reduce excessive dependence on the limited number of suppliers by developing alternative and qualified supplier sources. Supplier diversification can reduce vulnerability when one supplier experiences delays or other disruptions.
3. RMS Ltd should establish stronger systems for monitoring supplier performance, including delivery schedules, quality compliance and order fulfillment. Early identification of supplier problems can allow corrective action to be taken before disruptions affect operations.

References

- Adams, R., & Chen, L. (2022). Supply chain resilience and risk management in global industries. *Journal of Operations Management*, 45(3), 215–230. <https://doi.org/10.1016/j.jom.2022.05.003>
- Adams, R., & Chen, Y. (2022). Supply chain risk management and organizational resilience. *Journal of Global Operations*, 17(4), 234–250.
- Adebayo, S., & Lwanga, P. (2024). Financial risks and operational performance in healthcare supply chains. *African Journal of Management Studies*, 8(1), 101–119.
- Adom, D., & Tamba, S. (2023). Managing demand and planning risks in supply chains. *International Journal of Supply Chain Management*, 12(3), 45–62.
- Al-Hassan, R., & Moreau, S. (2025). Demand planning risks in healthcare supply chains: Evidence from Qatar. *Journal of Health Logistics*, 10(2), 56–72.
- Allison, M., & Patel, K. (2024). Supplier disruptions and risk mitigation strategies. *International Journal of Logistics Research*, 19(1), 15–31.
- Al-Mutairi, A., & Farah, N. (2022). Managing supply chain risks in Western Asia: Strategies and outcomes. *International Journal of Logistics Management*, 33(2), 101–119. <https://doi.org/10.1108/IJLM-12-2021-0487>
- Al-Mutairi, F., & Jensen, L. (2025). Financial constraints and operational performance in hospital supply chains. *Middle East Journal of Health Management*, 5(3), 33–49.
- Andersen, H., & Moreau, S. (2023). Balanced scorecard applications in supply chain management. *European Management Review*, 20(2), 87–105.
- Bauer, M., & Conti, F. (2024). Integrating risk management into the balanced scorecard framework. *Management Accounting Review*, 18(2), 66–83.
- Baumann, T., & Richter, P. (2024). Operational performance indicators in healthcare supply chains. *Journal of Operations and Logistics*, 15(4), 211–228.
- Bello, A., & Njoroge, J. (2024). Mitigating demand and planning risks in pharmaceutical supply chains. *African Journal of Supply Chain Management*, 6(1), 22–38.
- Bryman, A. (2020). *Social research methods* (5th ed.). Oxford University Press.
- Choi, T., Rogers, D., & Vakil, B. (2024). Strategic supply chain risk management in healthcare. *International Journal of Production Economics*, 280, 108458.
- Cohen, L., Manion, L., & Morrison, K. (2020). *Research methods in education* (8th ed.). Routledge.
- Creswell, J. W. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
- Diop, M., & Ndiaye, A. (2023). Supplier risks in hospital supply chains in Senegal. *West African Journal of Health Logistics*, 9(1), 12–27.
- El Idrissi, A., & Petrova, S. (2024). Infrastructure limitations and hospital operational performance in Morocco. *Journal of Global Health Logistics*, 11(3), 45–63.
- El-Khatib, F., & Rossi, M. (2026). Demand and planning risks in hospital operations. *Journal of Health Operations*, 12(2), 101–120.
- Falaye, O., & Nyarko, E. (2023). Logistical and infrastructure risks in African supply chains. *African Journal of Logistics*, 7(2), 55–72.
- Falk, J., & Lütke, R. (2024). Contingency theory in supply chain management: Concepts and applications. *Journal of Organizational Management*, 19(1), 15–33.
- Ferrari, P., & Holmström, J. (2025). Logistics risk management and hospital operational efficiency in Italy. *European Journal of Operations Management*, 16(2), 88–105.
- Ferreira, P., & Das, S. (2022). Impact of predictive analytics on supply chain efficiency. *Global Journal of Management Studies*, 9(1), 45–62.
- Fischer, K., & Håkansson, H. (2023). Operational performance measurement in supply chains.

- Gael, P. (2022). Logistics and infrastructure challenges in global supply chains. *Journal of Supply Chain Studies*, 14(4), 33–50.
- Habimana, J., & Mukamana, D. (2021). Challenges in Rwanda's healthcare supply chain: A case of medical supplies. *Rwanda Journal of Public Health*, 3(2), 12–27.
- Habineza, F., & Mukabayire, V. (2023). Risk mitigation in Rwandan healthcare supply chains: Evidence from Rwanda Medical Supply Ltd. *African Journal of Supply Chain Management*, 5(1), 33–49.
- Hansen, L., & Petrovic, S. (2023). Supplier disruptions and operational performance in European manufacturing. *International Journal of Production Research*, 61(5), 1445–1462.
- Harrison, K., & Salim, A. (2026). Demand planning and operational efficiency in healthcare supply chains. *Journal of Supply Chain Analytics*, 9(1), 22–40.
- Heller, R. (2022). *Secondary data analysis: Techniques and applications*. Routledge.
- Heller, T., & Brandt, C. (2023). Transaction cost theory in supply chain management. *Journal of Economic Behavior & Organization*, 210, 95–113.
- Ho, W., Zheng, T., Yildiz, H., & Talluri, S. (2025). Supply chain risk management: A systematic review. *International Journal of Production Economics*, 280, 108460.
- Hofstadter, L., & Larsen, B. (2024). Performance management frameworks in logistics. *European Journal of Business Management*, 15(2), 55–70.
- Ivanov, D., & Dolgui, A. (2023). Risk assessment and mitigation in complex supply chains. *International Journal of Production Research*, 61(14), 4567–4585.
- Ivanov, D., Dolgui, A., & Sokolov, B. (2022). Supply chain risk management in the digital era. *Computers & Industrial Engineering*, 165, 107967.
- Kamara, J., & Nsubuga, P. (2024). Financial risks and healthcare supply chain resilience. *African Health Logistics Journal*, 8(2), 45–62.
- Kamau, J., & Nshimiyimana, D. (2022). Supply chain risk management in East Africa. *Journal of African Logistics*, 6(1), 12–30.
- Kamau, J., & Nshimiyimana, P. (2022). Logistical risks and operational performance in East African supply chains. *East African Journal of Logistics*, 8(2), 77–95.
- Karangwa, M., & Uwimana, E. (2022). Information sharing and supply chain performance in Rwanda: Insights from the biomedical sector. *Rwanda Journal of Management Studies*, 4(1), 55–70.
- Kim, S., & Roberts, T. (2021). Advanced risk monitoring systems in multinational supply chains. *International Journal of Supply Chain Analysis*, 12(4), 211–227.
- Klein, M., & Dubois, P. (2024). Operational performance and healthcare supply chain efficiency. *Journal of Healthcare Operations Management*, 11(3), 101–121.
- Kumar, S., & Hassan, R. (2023). Supplier reliability and risk management in hospital supply chains. *International Journal of Healthcare Supply Chain*, 10(2), 33–50.
- Larsen, H., & Voss, S. (2024). Operational performance metrics in supply chains. *International Journal of Operations and Production Management*, 44(2), 115–135.
- Larsen, O., & Niemi, P. (2022). Environmental risks in Nordic supply chains. *Scandinavian Journal of Logistics*, 18(4), 67–85.
- Larsen, P., & Niemi, H. (2022). Supply chain risk management in Northern countries: A Nordic perspective. *Scandinavian Journal of Logistics*, 15(1), 90–105.
- Liang, Q., & Zhou, H. (2024). Supply-side risk management in Chinese hospitals. *Asia-Pacific Journal of Health Logistics*, 12(1), 22–41.
- Lopez, A., & Ali, M. (2023). Mitigating supplier risks in global supply chains. *Journal of International Logistics*, 17(3), 77–95.
- Martin, K., & O'Donnell, S. (2023). Adaptive strategies for operational performance under climate risk in northern supply chains. *International Journal of Operations & Production Management*, 43(2), 158–174.

- Martinez, L., & Sørensen, J. (2025). Logistics risks and operational performance in healthcare. *European Journal of Logistics Management*, 15(1), 44–63.
- Mensah, J., & Oba, A. (2023). Financial risk assessment in African supply chains. *African Journal of Operations Management*, 7(3), 45–63.
- Meyer, R., & Lütke, R. (2024). Transaction cost theory and supply chain efficiency. *Journal of Economic Management*, 19(2), 102–120.
- Miller, D., & Ahmed, S. (2024). Supplier risk mitigation in healthcare logistics. *International Journal of Health Logistics*, 11(2), 55–73.
- Mugabo, J., & Nyandwi, T. (2023). Effectiveness of supply chain risk management practices in Rwanda's healthcare sector. *Rwanda Journal of Health Administration*, 6(1), 21–36.
- Mugenda, O., & Mugenda, A. (2003). *Research methods: Quantitative and qualitative approaches*. ACTS Press.
- Müller, T., & Conti, F. (2023). Supply-side risks and operational performance in Rwandan hospitals. *Journal of African Health Supply Chains*, 9(2), 22–41.
- Mwangi, D., & Patel, R. (2021). Supply chain risk management and operational efficiency: A global review. *Journal of Business Logistics*, 42(3), 201–219.
- Najjar, F., & Al-Khalid, H. (2022). Digital visibility in logistics: Case studies from UAE supply chains. *Middle East Journal of Logistics & Transport*, 7(2), 44–60.
- Ndlovu, B., & Baguma, J. (2024). Logistics risk management in African healthcare supply chains. *African Journal of Health Logistics*, 10(1), 12–31.
- Neumann, K., & Bauer, S. (2023). Contingency theory applications in supply chain management. *Journal of Operations and Strategy*, 12(1), 33–50.
- Nguyen, T., & O'Leary, K. (2022). Predictive models for supply chain resilience in developed economies. *Journal of Industrial Engineering and Management*, 15(4), 321–338.
- Nielsen, L., & Petrovic, S. (2024). Resource-based view and operational performance in supply chains. *Strategic Management Journal*, 45(4), 211–230.
- Niyonsenga, F., & Habimana, D. (2026). Demand planning and operational performance in Rwandan hospitals. *Rwanda Journal of Healthcare Operations*, 8(2), 45–66.
- Niyonsenga, F., & Kabera, P. (2026). Financial risks and operational performance in Rwandan healthcare. *Rwanda Journal of Health Logistics*, 8(1), 35–55.
- Niyonsenga, F., & Rossi, M. (2025). Infrastructure risks and hospital operational efficiency in Rwanda. *East African Journal of Logistics*, 7(2), 56–78.
- Niyonzima, C., & Habineza, F. (2022). Stockouts and operational inefficiencies in Rwanda's health facilities. *Rwanda Medical Journal*, 79(2), 14–28.
- Nsengiyumva, J., & Uwase, A. (2022). Supply chain risk management practices in Rwandan medical distribution. *Rwanda Journal of Supply Chain Management*, 3(2), 65–82.
- Nshokeyinka, D. (2020). Risk identification and mitigation in organizational performance: Evidence from Rwanda. *International Journal of Management Studies*, 7(3), 145–160.
- Obeng, A., & Kiggundu, M. (2024). Healthcare logistics and infrastructure risk management. *International Journal of Health Supply Chains*, 10(3), 33–52.
- Okeke, P., & Balewa, J. (2023). Demand and planning risks in African supply chains. *African Journal of Operations Management*, 8(1), 22–40.
- Okoro, P., & Dubois, P. (2025). Demand planning risks and operational performance in Ghanaian hospitals. *Journal of African Health Logistics*, 9(3), 33–54.
- Okoro, P., & Kassa, T. (2023). Financial risk management in African supply chains. *International Journal of Logistics and Finance*, 12(2), 45–63.
- Okoth, C., & Byaruhanga, E. (2023). SCRM practices and operational performance in East African hospitals. *East African Journal of Supply Chain Management*, 6(2), 12–33.
- Okoth, J., & Byaruhanga, P. (2023). Operational performance in East African healthcare supply chains. *East African Journal of Health Logistics*, 9(1), 88–102.
- Okoye, P., & Banda, L. (2021). Supply chain challenges in

- Africa: Risk management perspectives. *African Journal of Business and Management*, 6(3), 50–66.
- Oliveira, M. (2022). Transaction cost considerations in supply chain governance. *Journal of Supply Chain Economics*, 8(3), 45–62.
- Ortega, R., & Singh, A. (2022). Strategic risk management in global supply chains. *Supply Chain Management Review*, 28(1), 12–29.
- Owour, R. (2019). The influence of supply chain risk management on operational performance: Evidence from Kenyan universities. *Journal of African Business*, 20(4), 410–428.
- Petrova, S., & Kovačić, L. (2024). Resource-based view applications in healthcare supply chains. *Strategic Operations Journal*, 14(1), 56–77.
- Pham, H., Testorelli, F., & Verbano, C. (2023). Measuring the impact of structured SCRM on operational outcomes. *Journal of Risk and Financial Management*, 16(2), 101.
- Pham, N., Testorelli, N., & Verbano, C. (2023). Supply chain risk management research: A review. *International Journal of Production Research*, 61(23), 7113–7135.
- Queiroz, M., Ivanov, D., Dolgui, A., & Fosso Wamba, S. (2022). Supply chain risk management in healthcare. *International Journal of Production Research*, 60(16), 5033–5050.
- Rahman, M., & Zaki, R. (2023). Supply chain risk mitigation strategies in the Middle East. *International Journal of Logistics Systems and Management*, 41(1), 23–42.
- Rossi, M., & Delgado, L. (2026). Financial risks and hospital operational efficiency. *Journal of Healthcare Management*, 13(1), 33–55.
- Rossi, M., & Dimitrov, N. (2024). RBV and operational performance in supply chains. *Journal of Strategic Management*, 18(3), 77–96.
- Rossi, M., & Moreau, S. (2024). Balanced scorecard in supply chain risk management. *European Journal of Operations Management*, 16(2), 112–129.
- Rwanda Medical Supply Ltd. (2024). *Organizational records*. Kigali, Rwanda.
- Schmidt, H., & Bauer, F. (2023). Supplier reliability and operational KPIs in German manufacturing. *European Journal of Logistics*, 19(4), 45–63.
- Schmidt, R., & Bensaid, M. (2024). Planning risks and operational performance in Russian hospitals. *International Journal of Healthcare Logistics*, 11(2), 22–41.
- Schneider, J., & Falk, R. (2023). Transaction cost theory in supply chain financial management. *Journal of Operations Finance*, 12(2), 44–62.
- Schneider, J., & Meyer, T. (2023). Operational efficiency in risk-aware supply chains. *Journal of Supply Chain Analytics*, 10(1), 12–33.
- Smith, L., & Turner, P. (2023). Supply-side risks in modern supply chains. *International Journal of Logistics Research*, 18(1), 15–31.
- Tanaka, H., & Lefebvre, J. (2024). Logistics and infrastructure risks in Japanese healthcare supply chains. *Asia-Pacific Journal of Health Logistics*, 12(3), 44–63.
- Tawiah, K., & Ssewanyana, S. (2024). Infrastructure risk management in East African supply chains. *Journal of African Logistics*, 7(1), 12–32.
- Teshome, A., & Ochieng, D. (2023). Adoption of supply chain risk management in East Africa: Evidence from the healthcare sector. *Journal of African Logistics*, 10(1), 31–47.
- Thabane, L., & Mutesi, P. (2024). Financial risk mitigation in African hospitals. *African Journal of Health Logistics*, 10(2), 22–41.
- Trochim, W., & Donnelly, J. P. (2019). *Research methods knowledge base* (3rd ed.). Cengage Learning.
- Uwase, F., & Nkurunziza, A. (2022). Supply chain risk management adoption in Rwanda: Trends and challenges. *Rwanda Journal of Business Management*, 5(2), 15–33.
- Uwimana, J., & Niyonkuru, B. (2021). Supplier audits and inventory monitoring in Rwandan healthcare supply chains. *Rwanda Journal of Health Logistics*, 2(1), 12–2

