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**The influence of supply chain reliability and supply chain relationships on perceived operational performance: Case study in the agrifood industry of Manado City, Indonesia**

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**Abstract:**

The agrifood sector plays a pivotal role in maintaining food security and driving economic development; implementing efficient supply chain management strategies is essential for optimizing operational performance. This research seeks to investigate the extent to which supply chain reliability and supply chain relationships influence perceived operational performance within the agrifood industry of Manado City. Employing a quantitative research design, this study explicitly targets businesses operating within the city's agrifood sector. Data were gathered through structured questionnaires based on well-established indicators corresponding to each variable. Multiple regression analysis was used to analyze the relationships between supply chain reliability and supply chain relationships as independent variables toward customer satisfaction, with operational efficiency, product quality and market responsiveness as dependent variables. The results highlight the significance of four fundamental factors: quality of shared information, perfect order fulfilment, product availability, and communication frequency, which enhance organizational performance across various operational dimensions.

**Keywords:**

supply chain reliability, relationships, perceived operational performance, agrifood industry.

## 1. Introduction

The agrifood industry plays a pivotal role in the economic development of many countries, with supply chain efficiency being a key determinant of competitiveness and sustainability. In Manado City, Indonesia, where agriculture and food processing are central to the local economy and regional development, understanding the factors that influence operational performance within this sector is critical. Previous research has predominantly focused on the broader aspects of supply chain management, such as logistics, cost efficiency, and inventory management (Ku et al., 2016). However, much of this literature has not adequately explored the specific dimensions of supply chain reliability and supply chain relationships and their direct impact on operational performance, particularly within the agrifood industry (Acar et al., 2017; Odongo et al., 2016). While supply chain reliability—the ability to deliver products on time and consistently meet quality standards—has been studied across various industries, its influence within the agrifood sector remains underexplored, especially in emerging markets like Indonesia. Similarly, the role of supply chain relationships, including collaboration, trust, communication, and information-sharing between partners, has been identified as a critical success factor in other industries but has not been sufficiently examined in the agrifood industry of developing regions (Devaraj et al., 2007).

Supply chain reliability and strong relationships between supply chain partners are key factors in improving operational performance, particularly in the agrifood industry. The smooth flow of goods and information is important in this sector (Panigrahi et al., 2024). Effective coordination between stakeholders, including farmers, suppliers, distributors and retailers, is crucial in ensuring that all supply chain components can operate harmoniously. Supply chain reliability contributes to on-time delivery, appropriate quantity, and consistent product quality, meeting customer expectations and reducing wastage (Imam, 2024). Building trust and collaboration among supply chain partners strengthens the operational framework through improved communication, better decision-making, and more effective conflict resolution. These factors are particularly important in the agrifood industry, which faces challenges such as managing perishable products, seasonal demand fluctuations and market instability (Matopoulos et al., 2007). High levels of reliability and solid supply chain relationships enable businesses to reduce risk, optimize inventory management, and respond quickly to changes in demand or supply conditions (Oyeyemi et al., 2024). The unique characteristics of the agrifood industry, such as short product life cycles, sensitivity to environmental factors, and the critical

need for food safety, demand efficient and flexible supply chains. Reliable process integration and close working relationships contribute to improved operational performance and support sustainability practices by reducing food loss and ensuring optimal resource utilization (Aungkulanon et al., 2024).

Manado City is one of Indonesia's key agribusiness centers, and is crucial in sustaining the nation's food supply chain. The city serves as a hub for agricultural production and distribution and acts as a vital link connecting local farmers, suppliers, and agribusinesses to regional and national markets. Its strategic geographical location and fertile agricultural lands enable cultivating a diverse range of crops, reinforcing its significance within Indonesia's agrifood sector. Moreover, Manado's position as a gateway to Eastern Indonesia further amplifies its role in facilitating the efficient movement of agricultural commodities, thereby strengthening the interconnected network of the country's food supply chain (Manakane et al., 2023). Despite its strategic importance, the agrifood supply chain in Manado City faces several challenges that hinder its optimal performance. These include fluctuating demand, insufficient logistics infrastructure, and inefficiencies in supply chain coordination, all of which contribute to operational bottlenecks and reduced efficiency in the sector (Naik & Suresh, 2018). Addressing these challenges is essential to unlocking the full potential of Manado's agrifood industry and ensuring its long-term sustainability. Consequently, research is needed to identify the key determinants of operational efficiency and customer satisfaction. A deeper understanding of these factors would provide valuable insights for agribusinesses seeking to refine their supply chain management practices, enhance competitiveness, and mitigate logistical constraints.

Additionally, such research could inform policy recommendations that support the sustainable development of Manado's agrifood supply chain. Given this context, the primary objective of this study is to examine the extent to which supply chain reliability (X1) and supply chain relationships (X2) influence perceived operational performance (Y) within Manado's agrifood industry. By analyzing these relationships, this research offers practical implications for industry practitioners and policymakers. A well-optimized supply chain is essential for meeting the agrifood sector's dynamic demands. Businesses can achieve greater efficiency, resilience, and overall performance by improving supply chain reliability and fostering strong collaborative relationships among stakeholders. Ultimately, the findings of this study are expected to contribute to the development of more robust supply chain strategies that enhance food security, promote economic growth, and support the sustainability of the agrifood industry

in Manado City. This study aims to address a strategic gap by investigating the interplay between supply chain reliability and supply chain relationships and their collective impact on perceived operational performance within the agrifood industry in Manado City. By focusing on these two dimensions—reliability and relationships—this research provides a novel perspective on how these factors influence the operational outcomes of agrifood SMEs, particularly in an emerging market context. The novelty of this study lies in its examination of these two critical dimensions within a localized, sector-specific framework, offering insights into how well-managed supply chain practices can lead to improved operational performance and, ultimately, greater competitiveness for agrifood businesses in Indonesia.

This research is also timely, as it addresses a pressing need for agrifood businesses in developing regions to enhance their supply chain strategies to cope with the market's growing demands. By exploring these under-researched aspects in the context of Manado City, the study contributes to the existing literature on supply chain management, offering theoretical and practical insights into the drivers of operational success in the agrifood industry.

## **2. Literature review**

Supply chain reliability is a fundamental aspect of supply chain management, representing the capability of a supply network to consistently adhere to promised specifications, ensure punctual deliveries, and uphold high product quality standards. As a key driver of operational excellence, a reliable supply chain fosters trust among stakeholders and enhances overall business efficiency. This is particularly crucial in industries such as agrifood, where the perishable nature of products and stringent delivery schedules necessitate a seamless, well-coordinated, and dependable supply chain system (Bueno-Solano et al., 2016). A high level of supply chain reliability significantly improves customer satisfaction and operational performance by minimizing disruptions, delays, and inefficiencies. For businesses, ensuring reliability is essential for meeting customer expectations and serves as a strategic advantage in highly competitive and dynamic markets. Moreover, reliability underpins establishing strong, long-term relationships with customers and supply chain partners by facilitating a smooth and predictable flow of goods and information (Khedr, 2024; Vaka, 2020).

According to Osman et al. (2023), the critical role of supply chain reliability is especially evident in the agrifood sector, given its distinct challenges such as the perishability of products, fluctuations in seasonal demand, and susceptibility to external factors like weather variability.

Establishing a resilient and dependable supply chain is essential for businesses to effectively manage these complexities, ensuring that fresh, high-quality products are delivered to consumers promptly and efficiently. Moreover, by minimizing waste and enhancing operational efficiency, a reliable supply chain contributes to increased profitability and aligns with broader sustainability goals. This alignment reflects the growing emphasis on resource conservation and adopting responsible business practices within the agrifood industry (Zecca & Rastorgueva, 2014).

Several key metrics are used to assess supply chain reliability, each vital in ensuring seamless operations and customer satisfaction. One of the primary indicators is perfect order fulfilment, which evaluates the percentage of orders delivered without errors—encompassing accurate quantities, timely delivery, and adherence to quality standards (Mishra & Sharma, 2014). Research by Taha et al. (2016) shows that a high perfect order fulfilment rate is directly linked to enhanced operational efficiency and improved customer experience. Another crucial measure is on-time delivery, which quantifies the percentage of shipments that arrive as scheduled. This metric is particularly significant in the agrifood sector, where delays can compromise product quality, shorten shelf life, and result in customer dissatisfaction. Similarly, the product availability rate serves as an essential indicator by assessing the percentage of time products are in stock and ready to meet customer demand (Wibowo & Sholeh, 2017). Maintaining a high availability rate minimizes stockouts, enhances responsiveness to market needs, and strengthens supply chain resilience (Zeng & Lu, 2021). Lastly, delivery delay frequency tracks delayed shipments over a specified period. Frequent delays can disrupt downstream supply chain activities, erode customer trust, and hinder overall business performance (Reklitis et al., 2021). By reducing delivery delays, companies can ensure smoother operations, strengthen stakeholder relationships, and enhance supply chain reliability (Bueno-Solano et al., 2016; Terenina et al., 2020).

Strong relationships among supply chain partners are fundamental to effective supply chain management, as they emphasize the critical roles of collaboration, trust, and communication. These relationships are essential for facilitating the seamless movement of goods, information, and resources across the supply chain, particularly in industries characterized by complex and dynamic operational environments, such as the agrifood sector (Camanzi et al., 2018). By fostering mutual understanding, joint problem-solving, and a collective commitment to shared objectives, well-established partnerships enhance overall supply chain performance, resilience,

and adaptability (Bakalo & Bogale, 2024; Taha et al., 2016). A high level of collaboration among supply chain partners enables better synchronization in planning and execution, leading to more efficient resource allocation and a cohesive approach to overcoming operational challenges. Additionally, trust among partners is pivotal in reducing uncertainty and strengthening cooperative efforts by fostering a sense of reliability and interdependence. Trust serves as the foundation for long-term partnerships and encourages stakeholders to invest in shared goals and innovative solutions without concerns over opportunistic behaviour (Nyamah et al., 2017). Consequently, cultivating strong, trust-based relationships within the supply chain is essential for ensuring sustainable growth, operational efficiency, and competitive advantage (Panahifar et al., 2018)

The frequency of communication plays a pivotal role in strengthening supply chain relationships by ensuring that all partners remain well-informed about ongoing operations and future strategic plans. Consistent and effective communication minimizes the risk of misunderstandings, enhances coordination, and enables a more agile response to market fluctuations or potential disruptions. Furthermore, the quality of shared information is a crucial factor in facilitating informed decision-making and optimizing operational processes. The timely and accurate data exchange fosters transparency among supply chain stakeholders, allowing them to anticipate potential challenges, identify emerging opportunities, and implement strategies that align with market demands. Collaborative engagement among producers, distributors, and retailers is essential for ensuring products are delivered efficiently while maintaining quality throughout the supply chain (Faruquee et al., 2021; Nguyen et al., 2021). Beyond that, perceived operational performance refers to the subjective assessment of a company's ability to achieve its operational objectives regarding effectiveness and efficiency. This evaluation reflects the perspectives of various stakeholders, including management, employees, and customers, regarding the organization's capacity to meet expectations and sustain competitiveness in the market.

Operational performance is a vital factor in determining a company's overall success, as it directly affects customer satisfaction, resource utilization, and the quality of products offered in the market. Existing literature highlights the importance of several key performance indicators—such as customer satisfaction, operational efficiency, product quality, and market responsiveness—as essential measures of organizational effectiveness (Souza & Brito, 2011; Hasan, 2013; Saryatmo & Sukhotu, 2021; Voss et al., 1997). Customer satisfaction is a core

indicator that evaluates the degree to which a company fulfils or exceeds customer expectations. High levels of satisfaction are not only instrumental in promoting customer loyalty but also in enhancing brand image and supporting market growth (Nobar & Rostamzadeh, 2018; Saryatmo & Sukhotu, 2021; Sutriani et al., 2024). Operational efficiency effectively utilises a company's resources—including labour, materials, and time—to achieve its goals. Increasing operational efficiency helps reduce waste, cut costs, and improve productivity, particularly in industries like agrifood, where product perishability and fluctuating demand present unique challenges (Geminarqi & Purnomo, 2023). Product quality is a key consideration that measures the consistency and compliance of products with predefined standards. High-quality products are essential for fostering customer trust and ensuring regulatory compliance, both critical for maintaining a competitive edge in the market. Finally, market responsiveness assesses a company's capacity to quickly adapt to changes in consumer demand or shifting market conditions. Responding promptly to these changes is crucial for sustaining profitability and maintaining high levels of customer satisfaction (Gurzawska, 2020).

### **3. Research methodology**

This research adopts a quantitative methodology, which facilitates the objective measurement of key variables and enables the analysis of relationships or correlations between them, thereby providing valuable insights into the research problem (Lim, 2024). The study focuses on agrifood businesses based in Manado City, a significant hub within Indonesia's agribusiness sector. To determine the appropriate sample size, the study follows the guidelines set by Mundfrom et al. (2005), which suggest that for multivariate analysis, the minimum sample size should be at least 10 times the number of variables under investigation (Pate et al., 2023). Given that the research model includes three variables, the minimum sample size was established at 30 respondents to ensure the robustness and reliability of the findings (Ghosh et al., 2022); however, a larger sample size was utilised to enhance the precision and generalizability of the results. In this study, the final sample size was 320 respondents, which ensures sufficient statistical power and a more reliable representation of the target population within the agrifood industry. A pilot study was conducted with 30 respondents prior to the main data collection. The pilot results were analyzed for internal consistency using Cronbach's alpha, which yielded a value of 0.85, indicating strong reliability of the instrument.

### 3.1 Data collection

Data was collected using structured questionnaires designed to measure each variable with well-established indicators. A stratified random sampling technique was employed to ensure a balanced and comprehensive representation of businesses from various operational scales and supply chain functions within the agrifood industry. This approach allowed for the capture of a diverse range of perspectives and experiences, reflecting the complexity and variability of the sector. The final sample consisted of 320 respondents, ensuring sufficient statistical power and a robust representation of different business types, including small, medium, and large enterprises across key segments of the agrifood value chain.

The questionnaires were distributed to supply chain managers, operations managers, or other relevant personnel within the targeted businesses to ensure that the responses reflected informed perspectives. The operational definitions and indicators for each variable are as follows:

**Table 1.** Variable, indicator and operational definitions

<b>Variables</b>	<b>Indicators</b>	<b>Operational Definitions</b>
<b>Supply Chain Reliability (X1)</b>	Perfect Order Fulfillment	Measures the percentage of error-free orders delivered to customers
	On-Time Delivery	Reflects the punctuality of deliveries as promised
	Product Availability	Indicates the percentage of time products are available to meet customer demand.
	Delivery Delay Frequency	Tracks the number of delayed shipments within a specified period.
<b>Supply Chain Relationships (X2)</b>	Collaboration Level	Assesses degree of joint planning and operations between supply chain partners
	Inter-Partner Trust	Evaluates the level of trust and reliability among supply chain collaborators
	Communication Frequency	Measures the frequency of communication regarding operational and strategic matters.
	Quality of Shared Information	Analyzes the accuracy, relevance, and timeliness of shared information between partners.
<b>Perceived Operational Performance (Y)</b>	Customer Satisfaction	Evaluates the degree to which customer expectations are met
	Operational Efficiency	Measures the effective utilization of resources in achieving operational goals
	Product Quality	Assesses the consistency and adherence of products to quality specifications
	Market Responsiveness	Reflects the ability to adapt quickly to changes in market demand

Sources: Authors, 2025

Supply chain reliability (X1) refers to the capacity of a supply chain system to consistently fulfil promised specifications, ensure timely deliveries, and maintain consistent product quality. This variable is of significant importance as it emphasizes the critical role of timely execution, product availability, and quality assurance, all of which are integral to a company's operational success. These factors are particularly vital in the agrifood sector, where the challenges of managing perishable goods and fluctuating seasonal demand exacerbate the complexity of supply chain operations (Wicaksono & Illés, 2022). In parallel, supply chain relationships (X2) encapsulate the quality of interactions and collaborations among key stakeholders within the supply chain, such as manufacturers, distributors, retailers, and customers. Establishing strong, trusting relationships is fundamental to maintaining a seamless flow of goods, information, and resources, enhancing operational efficiency (Matopoulos et al., 2007). The effectiveness of these relationships directly impacts the coordination and execution of supply chain operations, influencing overall operational performance. Perceived operational performance (Y), on the other hand, represents the subjective assessment of how effectively a company achieves its operational goals in terms of both efficiency and effectiveness. This evaluation is shaped by feedback from various stakeholders—including managers, employees, and customers—regarding the company's ability to meet expectations and maintain competitive advantage in the marketplace. Therefore, a company's operational performance is intricately linked to how it manages both supply chain reliability and supply chain relationships (Ramirez et al., 2021). Multiple regression analysis was employed to analyze the influence of these factors, allowing for the assessment of how the independent variables (X1 and X2) impact the dependent variable Y (Y1 and Y2). Multiple regression analysis was used to determine the influence of the independent variables X (X1 and X2) on the dependent variable Y (Y1 and Y2).

### **3.2 Data analytical approach**

The data collected in this study were analyzed using descriptive and inferential statistical techniques to examine the relationships between the independent variables (X) and dependent variables (Y) within the context of the agrifood industry. Descriptive statistics were first employed to summarize the respondent data, including measures such as means, standard deviations, and frequency distributions for each variable, helping to provide an overview of the sample's demographic profile and the distribution of responses. Inferential statistical methods such as correlation and multiple regression analyses were applied to explore the relationships between the variables. Correlation analysis was used to assess the strength and direction of the

relationships between the independent and dependent variables, while multiple regression analysis allowed for the evaluation of the influence of each independent variable on the dependent variables, identifying both direct and indirect effects and significant predictors of business performance within the sector. This analytical approach ensured a comprehensive evaluation of the research model, providing valuable insights into the factors influencing agrifood industry performance.

## 4. Results

### 4.1 Profile of respondents

Table 2 shows that based on the descriptive statistics of 320 respondents in the agrifood-themed survey, the majority appear to be male (mean = 1.3625, with a right-skewed distribution), indicating a gender imbalance favouring men. The average age (mean = 2.8156) suggests that most participants are in the younger to middle-age categories, with a slightly right-skewed and relatively flat distribution, implying age diversity but a concentration in the lower brackets. Regarding education level (mean = 1.9906), most respondents likely hold a diploma or undergraduate degree, with a right-skewed and platykurtic distribution, indicating a higher proportion of individuals with lower educational attainment. Job positions (mean = 1.6375) are concentrated in entry to mid-level roles, again showing a right-skewed and relatively flat distribution, which may reflect the hierarchical structure in agrifood-related employment. Lastly, work experience (mean = 1.9219) points to a workforce with relatively limited experience, with a nearly symmetrical distribution and slightly leptokurtic shape, suggesting a modest variation in years of service among respondents.

**Table 2.** Respondents profile

Statistics						
		Gender	Age	Education Level	Position	Work Experiences
N	Valid	320	320	320	320	320
	Missing	0	0	0	0	0
Mean		1.3625	2.8156	1.9906	1.6375	1.9219
Std. Deviation		0.48148	1.66479	1.15692	0.77166	0.51023
Skewness		0.575	0.304	0.715	0.726	-0.128

Std. Error of Skewness	0.136	0.136	0.136	0.136	0.136
Kurtosis	-1.680	-1.198	-1.024	-0.955	0.755
Std. Error of Kurtosis	0.272	0.272	0.272	0.272	0.272
Minimum	1.00	1.00	1.00	1.00	1.00

Sources: Authors' Data Processing, 2025

The respondents in this study exhibit a range of demographic and professional characteristics. In terms of gender, the sample includes both male and female participants, although the data reveals some gaps, necessitating further examination to determine the distribution between the genders. Regarding age, participants span various age groups, with the majority falling within the 20-40 age range, reflecting the prevalence of individuals in the productive workforce within this study. As for educational qualifications, most respondents possess a bachelor's degree (S1), though a portion holds lower educational levels, such as high school diplomas (SMA) or associate degrees (D3). In terms of occupational roles, a significant number of respondents are business owners or employees, providing diverse insights into the operational aspects of small and medium-sized enterprises (SMEs) analyzed in this research. Concerning work experience, most respondents have been employed for 1 to 10 years, indicating a sufficient level of practical knowledge to offer valuable perspectives on business management and supply chain operations. This demographic profile represents the typical conditions within SMEs in the study area.

The survey findings reveal that most respondents completed the questionnaire with varying responses across the different dimensions measured. In the Supply Chain Reliability dimension, most respondents reported relatively high scores, indicating that many SMEs in Manado exhibit strong reliability in fulfilling customer orders, ensuring timely deliveries, maintaining adequate product availability in warehouses, and minimizing delivery delays. This suggests that most SMEs in Manado have effectively managed to uphold both product quality and timely execution in their supply chain operations. Regarding the supply chain relationship dimension, a majority of respondents reported maintaining positive relationships with their supply chain partners. Many highlighted active collaboration with suppliers and distributors in operational planning, high trust among partners, and regular communication. However, some respondents noted that the frequency and accuracy of communication with supply chain partners could be improved, identifying a potential area for enhancement. In the perceived operational performance dimension, most respondents expressed that their customers were satisfied with the products

and services provided and that their companies could swiftly adapt to market demand shifts. Nonetheless, there were disparities in operational efficiency and product quality, with some respondents indicating the need to improve operational processes and maintain consistent product quality to meet the required standards. The findings of this study reveal diverse patterns across the independent variables (X1 and X2), which are measured through multiple indicators, as well as their relationship to the dependent variable (Y). Respondents provided consistently high ratings across most indicators, suggesting a generally positive perception of the measured factors. Data analysis was conducted to evaluate the influence of several independent variables on specific dependent variables. Based on the Frequencies table, the data shows that each variable has a valid count (N) of 320 with no missing values. The frequency distribution indicates that most respondents rated the variables within the medium to high range, such as perfect order fulfilment, on-time delivery, and product availability.

#### 4.2 Regression result

The regression results on customer satisfaction (Y1) in Table 1 show an R Square value of 0.594, indicating that 59.4% of the variation in customer satisfaction can be explained by the independent variables in the model. The significance value from the ANOVA test is 0.000 ( $p < 0.05$ ), indicating that the regression model is statistically significant. From the Coefficients table, the variables perfect order fulfilment ( $p = 0.015$ ), product availability ( $p = 0.032$ ), and quality of shared information ( $p = 0.077$ , close to significance), as shown in Table 3 positively affect customer satisfaction. Other variables, such as On-Time Delivery and delivery delay frequency, do not show significant effects ( $p > 0.05$ ), as shown in Table 4. This implies that customer satisfaction tends to increase with higher levels of order fulfilment, product availability, and the quality of shared information.

**Table 3.** Results of customer satisfaction regression model

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.771 <sup>a</sup>	.594	.531	.68698

*Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency*

*Sources: Authors' Data Processing, 2025*

**Table 4.** ANOVA Results of customer satisfaction regression model

**ANOVA<sup>a</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	35.264	8	4.408	9.340	.000 <sup>b</sup>
	Residual	24.069	51	.472		
	Total	59.333	59			

*Dependent Variable: Customer Satisfaction*

*Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency*

*Sources: Authors' Data Processing, 2025*

The regression analysis on operational efficiency (Y2) in Table 5 shows the R Square value of 0.598, which indicates that the model can explain 59.8% of the variation in operational efficiency. The ANOVA test's significance value is 0.000 ( $p < 0.05$ ), showing that the model is statistically significant overall. From the Coefficients table, the variable significantly affecting operational efficiency is the quality of shared information ( $p = 0.007$ ). This highlights that the quality of shared information between partners has the most dominant positive contribution to operational efficiency. Other variables, such as delivery delay frequency and collaboration level, do not show significant effects.

**Table 5.** Results of operational efficiency regression model

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.773 <sup>a</sup>	.598	.535	.58202

*Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency*

*Sources: Authors' Data Processing, 2025*

**Table 6.** ANOVA Results of operational efficiency regression model

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.707	8	3.213	9.486	.000 <sup>b</sup>
	Residual	17.276	51	.339		

	Total	42.983	59			
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*Dependent Variable: Operational Efficiency*

*Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency*

*Sources: Authors' Data Processing, 2025*

Regression analysis on product quality (Y3) in Table 7 shows the R Square values of 0.627, which indicates that the model explains 62.7% of the variation in product quality. The ANOVA test's significance value is 0.000 ( $p < 0.05$ ), confirming the model's statistical significance. The independent variables significantly influencing product quality include perfect order fulfilment ( $p = 0.048$ ) and communication frequency ( $p = 0.013$ ). This suggests that good order fulfilment and frequent partner communication positively contribute to improved product quality.

**Table 7.** Results of product quality regression model

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.792 <sup>a</sup>	.627	.568	.70385

*Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency*

*Sources: Authors' Data Processing, 2025*

**Table 8.** ANOVA Results of product quality regression model

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.468	8	5.308	10.716	.000 <sup>b</sup>
	Residual	25.265	51	.495		
	Total	67.733	59			

*Dependent Variable: Product Quality*

*Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency*

*Sources: Authors' Data Processing, 2025*

The regression model for market responsiveness (Y4) is statistically significant, with an R Square value of 0.642, indicating that the independent variables can explain 64.2% of the variation in market responsiveness. The findings reveal that Product Availability ( $p = 0.027$ ) and Communication Frequency ( $p = 0.038$ ) are the most significant drivers of market responsiveness. This implies that ensuring sufficient product availability and maintaining regular communication play a critical role in enabling organizations to respond effectively to changing market demands. Variables such as perfect order fulfilment and on-time delivery do not significantly impact market responsiveness ( $p > 0.05$ ). This suggests that while these factors contribute to other performance outcomes, they may not directly affect an organization's ability to respond quickly to market needs.

**Table 9.** Results of market responsiveness regression model

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.689 <sup>a</sup>	.475	.393	.85919

a. Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency

Sources: Authors' Data Processing, 2025

**Table 10.** ANOVA Results of market responsiveness regression model

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34.085	8	4.261	5.772	.000 <sup>b</sup>
	Residual	37.648	51	.738		
	Total	71.733	59			

Dependent Variable: Market Responsiveness

Predictors: (Constant), Quality of Shared Information, Perfect Order Fulfillment, Product Availability, Collaboration Level, On-Time Delivery, Inter-Partner Trust, Communication Frequency, Delivery Delay Frequency

Sources: Authors' Data Processing, 2025

## 5. Discussion

The analysis results indicate that several independent variables significantly affect specific dependent variables. Overall, the quality of shared information, perfect order fulfilment, and communication frequency are the primary factors positively impacting various aspects of organizational performance, including customer satisfaction, operational efficiency, and product quality. These findings emphasize the importance of ensuring high-quality shared information, effective communication, and excellent order fulfilment to enhance company performance. The dimension of Supply Chain Reliability reflects the organization's ability to meet customer expectations through error-free operations, timely deliveries, sufficient product availability, and minimal delays. The results indicate high ratings for these items, suggesting that respondents perceive reliability as critical to operational success. Consistent fulfilment of orders and timely delivery (X1.1 and X1.2) are directly linked to customer satisfaction, which is captured by Y1 (customer satisfaction). When companies maintain a reliable supply chain, customers will likely develop trust and confidence in their ability to deliver value.

Additionally, reliable inventory management (X1.3) aligns with operational efficiency (Y2), as adequate stock levels minimize disruptions and reduce unnecessary resource consumption. Low instances of delivery delays (X1.4) are also crucial for enhancing responsiveness to market changes (Y4). The observed positive perceptions of X1 variables across respondents suggest that reliability in the supply chain contributes significantly to perceived operational performance. This relationship is grounded in theoretical models emphasizing that reliability enhances organizational agility and customer satisfaction, key drivers of operational excellence.

Supply chain relationships emphasise collaboration, trust, communication, and information-sharing between organizations and their supply chain partners to enhance overall operational efficiency. The high ratings for these indicators (X2.1 to X2.4) strongly suggest that respondents place considerable value on fostering robust relationships within their supply chains. For instance, collaboration with suppliers and distributors (X2.1) is essential in promoting seamless operational planning and alignment across different supply chain stages. This collaborative effort improves coordination and directly contributes to higher operational efficiency (Y2) by minimizing bottlenecks and optimizing resource allocation. Additionally, trust between supply chain partners (X2.2) is pivotal in reducing uncertainty and mitigating risks, encouraging more cooperative behaviours and reliable product quality and consistency (Y3). High levels of trust also empower partners to make timely decisions, resulting in smoother

operations and fewer disruptions. Routine and ongoing communication (X2.3) is crucial as it ensures all parties remain aligned with common goals, enabling faster responses to customer demands (Y4) and more readily to market fluctuations.

Furthermore, accurate and relevant information-sharing (X2.4) strengthens decision-making processes by providing access to real-time data, which in turn enhances both customer satisfaction (Y1) and operational efficiency (Y2) by ensuring that decisions are based on up-to-date, accurate information. These results underscore the importance of well-managed supply chain relationships in amplifying operational performance by improving synchronization, reducing lead times, and increasing responsiveness across the entire supply chain. The findings resonate with relational capital theories, which emphasize the value of strong partnerships and collaborative networks in achieving a sustainable competitive advantage.

A significant observation from the data is the complementary relationship between Supply Chain Reliability and Supply Chain Relationship in driving Perceived Operational Performance. Respondents who rated both supply chain reliability and supply chain relationships highly also tended to report superior perceived operational performance. This suggests a synergistic effect, wherein strong relational dynamics within the supply chain amplify reliable operational practices. For instance, the timely delivery of goods (X1.2) is not just a matter of internal logistical efficiency but is also heavily dependent on effective collaboration and communication (X2.1, X2.3) with suppliers and distributors. In addition, minimizing delays (X1.4) hinges on the accuracy and transparency of information-sharing (X2.4) between partners, which helps preempt potential issues before they arise. This synergy highlights the interconnected nature of operational performance, suggesting that it cannot be entirely attributed to internal processes alone but is contingent upon the strength of external relationships within the supply chain. Organizations that excel in reliable operations and strong relational dynamics are better positioned to deliver consistent product quality, swiftly respond to customer demands, and ultimately achieve higher customer satisfaction. Thus, the integration of these two dimensions—Supply Chain Reliability and Supply Chain Relationship—creates a solid foundation for sustainable operational success in competitive environments. The results provide important insights into how supply chain practices shape perceived operational performance in SMEs in Manado.

The findings highlight the critical roles of reliability and relationships in achieving operational excellence. Reliable supply chain practices enhance efficiency and responsiveness, while strong

relationships provide the trust, communication, and coordination needed to sustain these practices. The interplay between the two suggests that integrated approaches to supply chain management—where operational reliability is supported by relational strength—are essential for achieving high performance. This study also aligns with resource-based and relational theories of the firm, which argue that competitive advantage stems from leveraging both tangible (e.g., inventory systems) and intangible (e.g., trust, collaboration) assets. The findings emphasize the need for SMEs in Manado to focus on supply chain reliability and relationships to improve operational performance. Practical recommendations for improving supply chain performance include investing in supply chain infrastructure, ensuring accurate inventory management systems and optimizing logistics operations to maintain reliability. Strengthening partnerships is equally important by building trust and fostering regular communication with suppliers and distributors, which can significantly enhance collaboration across the supply chain. Additionally, prioritizing data accuracy through information-sharing systems ensures that shared data remains relevant and precise and facilitates effective decision-making. SMEs should also address existing gaps in their current practices by improving weak links within the supply chain or mitigating inconsistencies in performance perceptions.

Moreover, when these findings are examined in the context of existing international literature, they reveal both alignment and points of divergence with broader supply chain management research. Prior studies, such as those by Reklitis et al. (2021) and Nyamah et al. (2017), emphasize that supply chain agility and reliability are foundational to building resilient and responsive systems in a volatile global market. The high ratings of supply chain reliability indicators in this study resonate with these perspectives, underscoring that even within the context of SMEs in Manado—a developing region—global principles of supply chain excellence remain relevant. However, this study provides a more nuanced understanding by demonstrating how these reliability elements are not only operational imperatives but are also perceived by SMEs as critical determinants of customer satisfaction and responsiveness. This perception-driven insight extends the literature by highlighting the importance of subjective performance evaluations in resource-constrained environments.

Additionally, the observed synergistic effect between supply chain reliability and supply chain relationship confirms existing theories, such as the relational view, which posits that inter-organizational relationships are key enablers of competitive advantage (Odongo et al., 2016). The findings reinforce that operational effectiveness is not merely an outcome of internal

process optimization but is also contingent upon trust-based collaboration and information fluidity across organizational boundaries. Unlike studies focused on large enterprises in developed economies, this research suggests that SMEs operating in emerging markets derive amplified benefits from relational capabilities due to their greater dependence on external support and limited capacity to buffer disruptions internally. Furthermore, while international literature often treats information-sharing as a technical capability, the current study indicates that its perceived quality and contextual relevance play a pivotal role in shaping performance outcomes, particularly in small business ecosystems. Hence, the contribution of this study lies in its context-sensitive interpretation of global supply chain concepts, offering a grounded understanding of how SMEs in regions like Manado operationalize reliability and relational strategies under unique constraints. This underscores the need for future research to explore how localized interpretations of global best practices impact performance outcomes across economic and cultural settings.

## 6. Conclusion

The findings reveal that Perfect Order Fulfillment, Product Availability, and, to a lesser extent, Quality of Shared Information significantly shape customer satisfaction. These results highlight the importance of reliability and accessibility in meeting customer expectations. On the other hand, operational efficiency is primarily driven by the quality of shared information, which demonstrates the critical role of effective communication and data exchange in streamlining processes. Product quality is strongly influenced by Perfect Order Fulfillment and Communication Frequency, indicating that accurate order completion and consistent communication are essential for maintaining high standards. Similarly, market responsiveness is heavily impacted by product availability and communication frequency, emphasizing the importance of agility, adequate stock levels, and clear communication when responding to dynamic market demands.

The findings underscore the importance of four key drivers—Quality of Shared Information, Perfect Order Fulfillment, Product Availability, and Communication Frequency—in improving organizational performance across multiple dimensions. Interestingly, some variables, such as On-Time Delivery and Collaboration Level, do not directly impact the outcomes studied, suggesting the potential for indirect effects or moderating roles that warrant further investigation. These insights provide practical implications for organizations seeking to enhance supply chain performance and emphasize prioritizing critical factors while aligning

supply chain strategies with broader organizational goals. Future research could expand upon these findings by examining additional dimensions, such as adopting advanced technologies and external environmental influences, to develop a more comprehensive understanding of supply chain management.

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