An Analysis of Supply Chain Strategy and Integration Effects on Operational Performance of Micro, Small and Medium Enterprises (MSMEs) in Yogyakarta

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Abstract:

This study explored the impact of supply chain strategy and supply chain integration on the operational performance of SMEs in Yogyakarta. The research aims to analyze the influence of supply chain strategy and integration on operational performance as well as investigate the mediating role of supply chain integration in the relationship between supply chain strategy and operational performance. The study employs a quantitative approach, utilizing a survey methodology with a sample of 100 SMEs in Yogyakarta. Data analysis is conducted using Structural Equation Modeling (SEM) via SmartPLS v.3. The findings found that supply chain strategy has a significant positive effect on supply chain integration among Yogyakarta's SMEs. Furthermore, supply chain integration demonstrates a significant positive influence on the operational performance of these SMEs. Notably, the results indicate that supply chain integration positively mediates the relationship between supply chain strategy and operational performance, highlighting its crucial role in enhancing organizational outcomes.

Keywords: Operational Performance; Supply Chain Integration: Supply Chain Strategy.

1. Introduction

In the contemporary business landscape, achieving competitive advantage implies the implementation of appropriate organizational strategies. Supply chain strategy enables enterprises to generate value through diverse mechanisms, fundamentally redefining the supply chain's role from an operational tool to a legitimate strategic competitive asset (Madhani, 2020). The adoption of effective supply chain management is crucial for enhancing industrial competitiveness, as it significantly impacts organizational performance. Contemporary enterprises must prioritize supply chain considerations to ensure alignment with their broader business strategies (Heizer, 2015). Research by Udokporo et al. (2020) suggests that the integration of lean and agile approaches in supply chain strategy presents a viable solution for 21st-century business challenges. Lean supply chain management can be conceptualized as an organizational process integrating physical, informational, and financial flows from inception to completion. These integrated flows operate collaboratively to minimize costs and reduce waste, thereby more efficiently addressing customer requirements (VITASEK et al., 2005). The concept of agility incorporates customer value creation, change readiness, appreciation of human knowledge and skills, and the formation of virtual partnerships (Goldman et al., 1995). Agile supply chains encompass responsibility and adaptability in meeting customer needs while mitigating supply chain disruption risks (H. L. Lee, 2004). Extant literature indicates that supply chain strategies, particularly lean and agile approaches, significantly influence supply chain performance (Qrunfleh & Tarafdar, 2014). The implementation of lean and agile strategies necessitates both internal and external supply chain collaboration, potentially enhancing the operational performance of all supply chain partners. To achieve enhanced customer responsiveness, cost reduction, and performance improvement, organizations must develop robust supply chain strategies and technologies capable of optimizing internal and external operational processes. The key to improving organizational performance lies in developing integrated cross-functional activities within the enterprise and effectively connecting these with business partners, suppliers, and customers through appropriate supply chain strategies and technologies (Beheshti et al., 2014; Palazzo & Vollero, 2022).

Recent scholarship has emphasized the important role of integration in Supply Chain Management (SCM) as a key driver of enhanced organizational performance (Qi et al., 2017). Supply chain integration enables organizations to reconfigure their resources and capabilities, both internally and externally, to strengthen their

overall supply chain and improve long-term performance outcomes (Horvath, 2001; Huo, 2012). Among various integration types, internal integration demonstrates the most substantial impact on organizational performance. The implementation of supply chain integration yields numerous organizational benefits, encompassing enhanced productivity, reduced costs and lead times, improved practical efficiency, superior quality, fulfillment of business and customer order requirements, and enhanced competitive advantage and long-term performance (Huo, 2012; Soliman, 2015; li Zhao et al., 2013). Evidence suggests that supply chain integration incorporating suppliers and customers in the value creation process significantly enhances organizational performance (Beheshti et al., 2014; Tarifa Fernández, 2022; Tarifa-Fernandez & De Burgos-Jiménez, 2017). Effective organizations are characterized by their ability to connect internal processes with external processes through appropriate supply chain strategies and technologies, thereby achieving greater competitiveness and agility within their operational environment (Tarifa-Fernandez & De Burgos-Jiménez, 2017). The impact of supply chain integration on organizational performance has garnered significant attention from both academic researchers and industry practitioners (Flynn et al., 2010b; Frohlich, 2002; Orengo Serra & Sanchez-Jauregui, 2022). The prevailing assumption that higher integration levels correlate with improved organizational performance has been a primary driver of supply chain integration literature (Cannon et al., 2010; Rosenzweig, 2009). At strategic, operational, and technological levels, supply chain integration can assist organizations in addressing business challenges (Frohlich, 2002; Liu et al., 2010). However, empirical findings regarding the relationship between supply chain integration and performance remain inconsistent (M.-C. Huang et al., 2014). Some studies have failed to establish a clear correlation between supply chain integration and performance (Chen et al., 2007; Flynn et al., 2010b; Sezen, 2008), while others have demonstrated a positive linear relationship between these variables (Boon-itt & Paul, 2006; C. W. Lee et al., 2007; Mason et al., 2007).

Previous studies have demonstrated a significant correlation between supply chain strategies, supply chain integration, and organizational performance metrics. This empirical foundation has motivated an inquiry into the potential causal relationships between supply chain strategies, integration mechanisms, and operational performance outcomes. Specifically, this research examine the mediating role of supply chain integration in the relationship between supply chain strategy implementation and operational performance indicators. The primary objective of this investigation is to enhance our theoretical understanding of how the synergistic application of supply chain integration and strategic supply chain management can potentially optimize operational performance, with particular emphasis on Small and Medium-sized Enterprises (SMEs).

2. Literature Review

Supply Chain Strategy and Integration: A Theoretical Framework

Contemporary supply chain strategic management encompasses decision-making patterns that facilitate supply chain entities in aligning their objectives and operational goals to maintain competitive advantage in dynamic market environments (Qrunfleh & Tarafdar, 2014). The literature delineates two primary strategic orientations: responsive (agile) and efficient (lean). This dichotomous classification, originally proposed by Fisher (1997) and subsequently reinforced by Christopher and Towill (2001), is predicated on demand characteristics. In the context of 21st-century business paradigms, the integration of lean and agile methodologies in supply chain strategy appears to offer optimal operational outcomes. The lean management philosophy, characterized by the elimination of non-value-adding operations, enables organizations to critically evaluate and optimize their supply chain processes (Mistry, 2005). Conversely, agile strategies reflect an organizational commitment to rapid and effective customer responsiveness. Agility is conceptualized as a collaborative paradigm encompassing suppliers, customers, and manufacturers (Braunscheidel & Suresh, 2009). This agile supply chain framework facilitates expeditious demand identification and value creation through supplier-manufacturer collaboration. It is noteworthy that the successful implementation of both lean and agile strategies necessitates comprehensive internal and external integration across the supply chain network, potentially enhancing the operational performance of all participating entities (Serrador & Pinto, 2015).

In the context of rapidly evolving markets, agility is conceptualized as the capacity to modulate velocity, flexibility, innovation, and quality in order to deliver tailored products and services that meet customer demands (P.-Y. Huang et al., 2021). Within the framework of Industry 4.0 development, key components of lean production principles encompass value, value stream, process flow, pull, perfection, as well as human engagement and teamwork (Bauer et al., 2018). Agile strategies prioritize market sensitivity and expeditious customer response,

necessitating the integration of all organizational functions to achieve these objectives (Schmidt & Lyle, 2010). Internal integration, a form of supply chain integration, extends throughout the organization, linking the practical activities of internal functional units to facilitate mutual collaboration and synchronization in fulfilling customer requirements. Each organizational unit shares data pertaining to demand forecasts, inventory levels, and production schedules via management information systems (Kunnapapdeelert & Pitchayadejanant, 2021). Based on these findings, the following hypotheses are proposed:

H1: Supply chain strategy positively impacts supplier integration
H2: Supply chain strategy positively impacts customer integration
H3: Supply chain strategy positively impacts internal integration

Supply chain integration and operational performance

Supplier integration refers to the collaborative efforts between manufacturers and their suppliers (Schmidt & Lyle, 2010). Empirical research has demonstrated that information sharing and mutual decision-making with suppliers contribute to enhanced operational performance in terms of cost efficiency, delivery reliability, product quality, and operational flexibility (He et al., 2014; Roh et al., 2014; Wang & Zhuo, 2020; Yuik & Puvanasvaran, 2020). Operational performance is a multifaceted construct, encompassing dimensions beyond cost, quality, delivery, and flexibility (Shou et al., 2018). Qi et al. (2017) posit that augmenting supplier integration leads to improvements across these operational metrics. Customer integration, focusing on downstream operations, involves inter-organizational activity management that enables firms to leverage customer resources and information for organizational decision-making and process optimization. This engagement facilitates a more nuanced understanding of market demands (Shou et al., 2018). While some scholars have found no direct correlation between internal integration and operational performance (Gimenez & Ventura, 2005; Koufteros et al., 2005), others have identified positive associations, particularly in logistics service performance and process efficiency (Saeed et al., 2005; Stank, Keller, & Closs, 2001; Stank, Keller, & Daugherty, 2001). Internal integration can be conceptualized as a cross-functional strategy encompassing collaborative procurement, product design, manufacturing, warehousing, marketing, and distribution to satisfy customer requirements (Flynn et al., 2016; Morash et al., 1996). Based on these findings, the following hypotheses are proposed:

H4: Supplier integration positively impacts operational performance
H5: Customer integration positively impacts operational performance
H6: Internal integration positively impacts operational performance

Supply chain integration practices and behaviors are recognized as sources of competitive advantage

This research corroborates the positive effects of all integration dimensions on firms' operational performance, reinforcing various findings previously obtained by researchers in the field of supply chain integration (Alfalla-Luque et al., 2013; Flynn et al., 2010a; Van der Vaart et al., 2006; Wong et al., 2011). These results confirm the assumption that information sharing and collaboration with key customers and suppliers in business processes can enhance a company's operational performance. By effectively and efficiently combining integration across the supply chain network, firms can maintain their competitiveness in various capability domains (Narasimhan et al., 2010). Improved performance and production enhancements can be achieved through supply chain integration (Frohlich & Westbrook, 2001). Based on these findings, the following hypotheses are proposed:

H7: Supplier integration mediates the relationship between supply chain strategy and operational performance

H8: Customer integration mediates the relationship between supply chain strategy and operational performance

H9: Internal integration mediates the relationship between supply chain strategy and operational performance

3. Methods

This study employs a quantitative research methodology, which, according to Sujarweni (2014), generates findings through statistical methods or other quantification techniques. The research aims to test hypotheses regarding the influence of specific variables. Purposive sampling was utilized to select 100 respondents, with the sampling criteria focusing on Small and Medium Enterprises (SMEs) in Yogyakarta. Data collection was conducted via Google Form

questionnaires, designed to gather information on Supply Chain Integration and Operational Performance from the SME respondents. Data analysis was performed using Structural Equation Modeling (SEM) with Partial Least Squares (PLS) v3 software. The respondent profile analysis reveals that 50% of the SMEs operate in the culinary sector, 28% in fashion, and 22% in trade. Regarding business age, 47% of the SMEs have been operational for 1-3 years, 26% for 6 months to 1 year, 17% for 3-5 years, and 10% for more than 5 years. In terms of respondent positions, 71% are owners, 18% are managers, 10% are employees, and 1% hold other positions. Workforce size distribution shows 60% of SMEs employ 1-4 workers, 38% employ 5-19 workers, and 2% employ 20-99 workers. Business capital analysis indicates that 94% of SMEs have a maximum capital of 1 billion rupiah, 3% have up to 5 billion rupiah, and 3% have between 5-10 billion rupiah. Regarding annual revenue, 66% of SMEs earn less than 300 million rupiah, 33% earn between 300 million and 2.5 billion rupiah, and 1% earn between 2.5 billion and 50 billion rupiah.

Measurement Model

Hair (2009) proposes that the evaluation of measurement models involves assessing convergent validity, discriminant validity, and reliability. Convergent validity is evaluated by examining the Outer Loading of indicators and the Average Variance Extracted (AVE). The AVE value should reach at least 0.5, indicating an adequate level of convergent validity and demonstrating that a latent variable can explain more than half of the average variation in its indicators (Ghozali & Latan, 2015). Table 2 indicates that all construct indicators have AVE > 0.5, thus confirming the validity of this research.

Discriminant validity, as defined by Hair (2009), evaluates the extent to which a variable differs from other variables or constructs. A research instrument is considered reliable if its Cronbach's Alpha value exceeds 0.60 (Ghozali & Latan, 2015). When the Cronbach's Alpha value surpasses 0.60, the questionnaire items are deemed reliable. Hair (2009) posits that for composite reliability to be considered adequate, it should exceed 0.70, although values around 0.60 are still acceptable. This indicates that all variables in the study have met the composite reliability criteria and demonstrate high reliability, as their composite reliability values exceed 0.7.

Table 1. Validity and Reliability

Construct	Item	Outer Loading	AVE	Cronbach's Alpha	Composite Reallity
Supply Chain Strategy	X1.1	0.874	0.710	0.897	0.933
	X1.2	0.786			
	X1.3	0.832			
	X1.4	0.868			
	X1.5	0.850			
Internal Integration	X2.1	0.897	0.778	0.905	0.933
	X2.2	0.877			
	X2.3	0.903			
	X2.4	0.849			
Customer Integration	X3.1	0.850	0.738	0.911	0.934
	X3.2	0.855			
	X3.3	0.882			
	X3.4	0.861			
	X3.5	0.848			
Supply Integration	X4.1	0.831	0.710	0.931	0.946
	X4.2	0.892			
	X4.3	0.861			
	X4.4	0.850			
	X4.5	0.886			
	X4.6	0.855			
Operasional Performance	Y1	0.843	0.657	0.942	0.950
	Y2	0.825			
	Y3	0.834			
	Y4	0.838			
	Y5	0.777			

Y6	0.824
Y7	0.807
Y8	0.755
Y9	0.767
Y10	0.833

Source: Data Obtained 2024

Table 2. Fornell Larcker

|	Integrasi Internal	Integrasi Pelanggan	Integrasi Pemasok	Kinerja Operasional	Supply Chain Strategy
Internal Integration	0.882				
Customer Integration	0.494	0.859			
Supply Integration	0.716	0.620	0.863		
Operational Performance	0.686	0.690	0.716	0.811	
Supply Chain Strategy	0.651	0.661	0.673	0.717	0.843

Source: Data Obtained 2024

Hair (2009) elucidates that discriminant validity is measured using the Fornell-Larcker criterion. This criterion compares the square root of the Average Variance Extracted (AVE) values with the correlations between latent variables. To satisfy discriminant validity, the square root of each variable's AVE should exceed its correlation values with other variables. Table 2 demonstrates that all square root AVE values (Fornell-Larcker criterion) for each construct surpass the correlation values between that construct and other variables, thus confirming discriminant validity.

4. Findings and Discussion

Hair (2009) explicates that it is conducted by examining significance values, which indicate the influence between variables through bootstrapping. This procedure yields t-values (T-statistics) and p-values. If the t-value (T-statistic) exceeds the critical t-value (t-table), it can be inferred that the coefficient is statistically significant at a specific significance level. Hypothesis testing results can be observed in the estimate for path coefficients table. In this study, testing was performed using the bootstrapping procedure, as illustrated in Figure 1.

Figure 1: Path Coefficients Value

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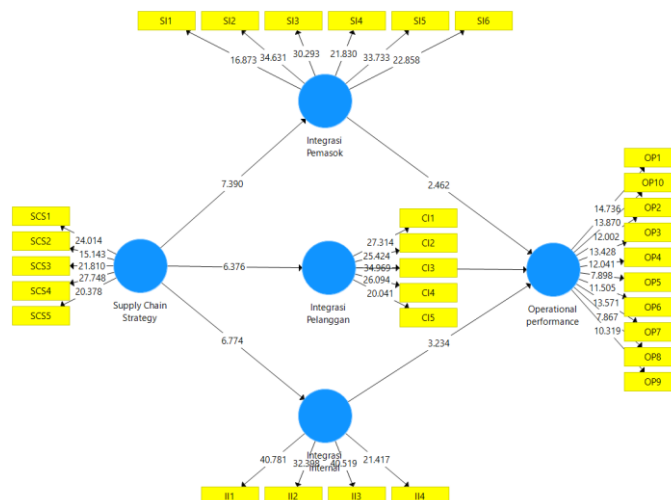
Tabel 3. Path Coefficients

	Standart Deviasi	T statistic (|O/STDEV|)	P-values	Description
Supply Chain Strategy -> Supply Integration	0.091	7.390	0.000	H1 Accepted
Supply Chain Strategy -> Customer Integration	0.104	6.376	0.000	H2 Accepted
Supply Chain Strategy -> Internal Integration	0.096	6.774	0.000	H3 Accepted
Supply Integration-> Operational performance	0.104	2.462	0.014	H4 Accepted
Customer Integration-> Operational performance	0.089	4.228	0.000	H5 Accepted
Internal Integration -> Operational performance	0.098	3.234	0.001	H6 Accepted

Sumber: Data diolah, 2024

Tabel 4. Mediasi

	Standart Deviasi	T statistic (|O/STDEV|)	P-values	Description
Supply Chain Strategy -> Supply Integration -> Operational performance	0.076	2.263	0.024	H7 Accepted
Supply Chain Strategy -> Customer Integration-> Operational performance	0.078	3.188	0.002	H8 Accepted
Supply Chain Strategy -> Internal Integration-> Operational performance	0.072	2.881	0.004	H9 Accepted

Supply Chain Strategic (SCS) dan Supply Chain Integration (SCI)

The research findings demonstrate significant positive relationships between supply chain strategy and various aspects of supply chain integration among SMEs in Yogyakarta. Specifically: Supply chain strategy exhibits a positive influence on supplier integration, with a P-value of 0.000, which is significant at the 0.05 level. The positive coefficient of 0.673 indicates a strong, positive relationship. Thus, H1 is accepted. Similarly, supply chain strategy positively impacts customer integration, evidenced by a P-value of 0.000 and a positive coefficient of 0.661. This significant relationship supports the acceptance of H2. The influence of supply chain strategy on internal integration is also positive and significant, with a P-value of 0.000 and a coefficient of 0.651. Consequently, H3 is accepted. These results align with previous research by Kunnapapdeelert & Pitchayadejanant (2021), highlighting the synergy between supply chain strategy and supplier integration. Lean strategies necessitate high supplier capabilities in information sharing, quality assurance, and Just-In-Time (JIT) delivery. Agile strategies emphasize rapid response to customer needs, requiring suppliers to be informed of rapidly changing situations. Supplier integration involves the utilization of information technology to amalgamate business elements between suppliers and manufacturers.This comprehensive positive impact of supply chain strategy on various integration aspects (supplier, customer, and internal) underscores the critical role of strategic supply chain management in enhancing overall supply chain integration for SMEs in Yogyakarta. These findings contribute to the understanding of how strategic supply chain decisions influence operational integration, potentially leading to improved performance and competitiveness in the SME sector.

Supply Chain Integration and Operational Performance

The research findings elucidate the positive relationships between various aspects of supply chain integration and operational performance among SMEs in Yogyakarta: Supplier integration demonstrates a positive influence on operational performance, with a P-value of 0.014, which is significant at the 0.05 level. The positive

coefficient of 0.256 indicates a moderate, positive relationship. Thus, H4 is accepted. Customer integration exhibits a stronger positive impact on operational performance, evidenced by a P-value of 0.000 and a positive coefficient of 0.375. This significant relationship supports the acceptance of H5. Internal integration also positively influences operational performance, with a P-value of 0.001 and a coefficient of 0.318. Consequently, H6 is accepted.

These results diverge from those of Kunnapapdeelert & Pitchayadejanant (2021), as this study finds significant positive relationships between external supply chain integration (both supplier and customer integration) and operational performance. For SMEs, numerous factors can influence the achievement of supplier integration. It is crucial for SMEs to possess reliable measurement tools to assess their performance. These tools should be precise, measurable, transferable, realistic, and time-bound. The study emphasizes that operational performance is not solely measured by cost, quality, delivery, and flexibility. Enhanced supplier integration contributes to improvements across these dimensions, including cost efficiency, delivery reliability, product quality, and operational flexibility. These findings underscore the importance of a holistic approach to supply chain integration for SMEs, highlighting how internal and external integration practices can significantly enhance operational performance. This research contributes valuable insights into the dynamics of supply chain management in the context of SMEs, potentially informing strategies for improving operational efficiency and competitiveness in this sector.

The Mediating Role of Supply Chain Integration in Strategic Supply Chain Relationships and Operational Performance

The empirical analysis reveals a statistically significant positive relationship between Supply Chain Strategy and operational performance, mediated by supplier integration ($p = 0.024$, $\beta = 0.173$), customer integration ($p = 0.002$, $\beta = 0.248$), and internal integration ($p = 0.004$, $\beta = 0.207$). These findings support hypotheses H7, H8, and H9, respectively, as all p-values are below the 0.05 threshold, indicating significant mediation effects. The positive coefficients suggest that each integration dimension positively mediates the relationship between Supply Chain Strategy and operational performance. This study corroborates the positive impact of all integration dimensions on a firm's operational performance, aligning with previous research in supply chain integration (Alfalla-Luque et al., 2013; Flynn et al., 2010b; Van der Vaart et al., 2006; Wong et al., 2011). These results substantiate the premise that information sharing and collaboration with key customers and suppliers in business processes can enhance a firm's operational performance. By effectively and efficiently integrating across the supply chain network, firms can maintain their competitiveness across various capability domains (Narasimhan & Kim, 2002).

5. Conclusion

The empirical findings of this study offer important insights not only for SMEs in Yogyakarta but also for a broader understanding of supply chain management (SCM) in various contexts. The positive relationship between supply chain strategy and integration highlights the critical role that strategic planning plays in facilitating operational processes. By adopting effective supply chain strategies, businesses can achieve smoother integration, which in turn improves overall operational performance. This is relevant not only to SMEs in specific regions but also to larger organizations and multinational enterprises seeking to optimize their supply chain operations.

Furthermore, the mediation effect of supply chain integration underscores the importance of operational efficiency in sustaining competitive advantage. Organizations aiming to improve performance can benefit from focusing on enhancing integration within their supply chains, making this finding applicable to industries beyond SMEs, including large-scale manufacturing and service-oriented businesses.

The study also suggests potential areas for future research. A larger and more diverse sample across various regions and industries could provide a more comprehensive understanding of the dynamic between supply chain strategy, integration, and performance. Additionally, exploring the impact of social, economic, and cultural contexts on SCM practices can contribute to a more nuanced perspective of supply chain strategies on a global scale, expanding the relevance of these findings to multinational and cross-cultural contexts. This broader outlook enriches the SCM field and encourages further exploration of how diverse factors influence supply chain effectiveness and business competitiveness.

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