

THE EFFECT OF SUPPLY CHAIN COLLABORATION ON SUPPLY CHAIN PERFORMANCE: THE MEDIATING ROLES OF SUPPLY CHAIN INNOVATION AND DIGITAL TRANSFORMATION IN MANUFACTURING COMPANIES IN THE GREATER JAKARTA AREA



Safira Ashya Azzahra¹
Universitas Trisakti, Jakarta, Indonesia
122012411023@std.trisakti.ac.id

Tri Wulandari Satitidjati Dewayana^{2*}
Universitas Trisakti, Jakarta, Indonesia
triwulandari_sd@trisakti.ac.id

Wahyuningsih Satosa³
Universitas Trisakti, Jakarta, Indonesia
wahyuningsih@trisakti.ac.id

Abstract

The increasing complexity of the business environment has encouraged manufacturing companies to view supply chain management as a strategic capability. Without appropriate internal processes, supply chain cooperation may not increase performance. This research examines how supply chain cooperation affects performance in Greater Jakarta manufacturing enterprises, using supply chain innovation and digital transformation as mediating factors. This quantitative explanatory study uses a cross-sectional survey of 313 supply chain workers. PLS-SEM was used to analyse data. Supply chain cooperation positively and significantly affects innovation and digital transformation, but not performance. This link is mediated by supply chain innovation and digital transformation, highlighting the importance of these two factors in sustainable supply chain performance.

Keywords: Supply Chain Collaboration, Supply Chain Innovation, Digital Information, Supply Chain Performance, Manufacturing Industry

INTRODUCTION

Manufacturing companies are increasingly required to manage supply chain operations within environments characterized by volatility, uncertainty, and intensifying competition. Frequent supply disruptions, pressure to maintain cost efficiency, and rising expectations for market responsiveness have shifted managerial attention toward the strategic role of supply chains in achieving organizational performance. Under these conditions, supply chain management extends beyond operational coordination and increasingly depends on integrated processes supported by collaboration across internal functions and external partners.

More study shows that supply chain performance is influenced by internal efficiency, collaborative connections, and digital technology adoption (Kim et al., 2024; Ning & Yao, 2023). Information sharing, shared planning, and coordinated decision-making increase operational dependability, responsiveness, and efficiency in complicated supply chain networks for industrial organisations.

In manufacturing firms located in developing countries, supply chain complexity continues to increase due to extensive supplier networks, demand volatility, and the need for timely and flexible production. In Indonesia, particularly in the Greater Jakarta Area region as the national industrial hub, manufacturing firms face additional challenges related to dense distribution networks and high competitive intensity. These conditions necessitate stronger supply chain collaboration to maintain production and distribution sustainability. Empirical evidence from manufacturing companies in Jabodetabek suggests that supply chain collaboration is a fundamental capability for sustaining operational continuity under environmental uncertainty, although its direct impact on supply chain performance is not always significant (Bhaskara et al., 2023).

Beyond the local empirical context, prior studies demonstrate that digitally-enabled supply chain collaboration improves transparency, accelerates information flow, and enhances operational coordination (Jing & Fan, 2024; Oubrahim et al., 2023). In manufacturing practice, particularly in developing economies, the implementation of collaboration and digital technologies often encounters varying levels of organizational readiness and coordination complexity. Consequently, collaboration does not always translate directly into improved supply chain performance. Several studies suggest that collaboration becomes more effective when it fosters supply chain innovation, such as process improvements and adaptive coordination mechanisms (Ali & Mahmood, 2024). Such innovation functions as an internal mechanism that bridges collaborative practices and performance improvement.

Digital transformation enables real-time data integration, visibility, and data-driven decision-making, improving supply chain performance (Kim et al., 2024; Yu et al., 2024). However, most prior studies remain focused on direct relationships among variables, while research that simultaneously positions supply chain innovation and digital transformation as mediating mechanisms remains limited, particularly within the environment of manufacturing companies in elaborating states.

Accordingly, this study proposes an integrative conceptual model to analyze the effect of supply chain collaboration on supply chain performance through the mediating roles of supply chain innovation and digital transformation in manufacturing companies located in the Greater Jakarta Area.

LITERATURE REVIEW

Supply Chain Management

Supply chain collaboration involves information interchange, coordinated planning, and integrated decision-making between internal corporate divisions and external supply chain partners like suppliers and consumers. Strategic collaboration helps firms enhance information quality, match operational goals, and minimise uncertainty in a changing business environment (Cho et al., 2025; Jum'a et al., 2025).

Manufacturing organisations benefit from supply chain cooperation in operational efficiency and demand responsiveness. Cross-functional and cross-organizational cooperation improves production and distribution coordination, improving supply chain performance, according to empirical research (Chen et al., 2023; Xu et al., 2024). However, collaboration does not always result in immediate performance improvements, especially when it is not supported by adequate internal mechanisms.

Supply Chain Innovation

Supply chain innovation is defined as a company's ability to collaboratively develop and implement updates to supply chain processes, working methods, and coordination mechanisms in order to improve flexibility, efficiency, and operational added value. Innovation in the supply chain includes process innovation, such as improvements in planning and distribution systems, as well as coordination innovation involving cross-functional and cross-organizational integration (Ali & Mahmood, 2024; Yu et al., 2024).

The literature suggests that supply chain innovation requires teamwork. Companies may expedite innovation and operational adaptation by collaborating with supply chain partners (Jum'a et al., 2025). Supply chain innovation also links cooperation to supply chain performance.

Digital Transformation

Digital transformation within supply chains can be understood as a strategic organizational effort to embed digital solutions into planning, production, and distribution processes in order to enhance information transparency, operational responsiveness, and the quality of managerial decision-making. Digital transformation involves changing company processes and organisational capacities as well as technology (Ning & Yao, 2023).

Digital transformation enables real-time information interchange and cross-functional system integration, improving supply chain cooperation (Kim et al., 2024; Oubrahim et al., 2023). Digital transformation also promotes supply chain collaboration, which boosts manufacturing company performance (Yu et al., 2024).

Supply Chain Performance

Supply chain performance measures the efficacy and efficiency of handling commodities, information, and products from upstream to downstream to satisfy customer demands quickly, reliably, and flexibly. Delivery accuracy, supply dependability, inventory efficiency, and demand responsiveness are markers of supply chain success (Gunawan et al., 2024; Salamah et al., 2024).

Empirical literature confirms that supply chain performance is influenced by the level of collaboration, innovation, and utilization of digital technology within an organization. Effective collaboration, when supported by supply chain innovation and digital transformation, enables manufacturing companies to achieve superior and sustainable supply chain performance (Jum'a et al., 2025; Kim et al., 2024).

RESEARCH METHOD

This quantitative explanatory research examined how supply chain cooperation affects performance, using innovation and digital transformation as mediating factors. In Greater Jakarta (Jabodetabek), Indonesia, supply chain managers and workers in manufacturing enterprises were surveyed cross-sectionally. A structured online questionnaire examined measure details on a five-point Likert scale.

Purposive sampling required responders to have one year of supply chain experience. Based on PLS-SEM criteria, the minimal sample size was five to ten observations per indicator (Hair et al., 2019). From 39 indicators, 313 valid answers were analysed, surpassing the minimum. The measurement model, structural model, and mediation effects were evaluated using PLS-SEM using SmartPLS software.

RESEARCH HYPOTHESES

Based on the theoretical framework and prior empirical evidence, the hypotheses of this study are proposed as follows:

Supply chain collaboration facilitates closer interaction among firms and their partners by supporting coordinated planning, information integration, and collective decision-making. Such interactions foster shared learning processes and enable access to inter-organizational knowledge, which in turn stimulates the development of innovative supply chain processes and products. Empirical evidence indicates that collaborative practices significantly strengthen supply chain innovation capabilities within manufacturing organizations (Ali & Mahmood, 2024; Feng et al., 2025; Yu et al., 2024).

H1: Supply chain collaboration positively affects supply chain innovation

Effective supply chain collaboration strengthens coordination across functional units and organizational boundaries, enhances the accuracy of shared information, and increases the ability of firms to respond promptly to demand fluctuations and supply-side disruptions. As a result, manufacturing companies can achieve higher levels of operational efficiency, more reliable delivery performance, and improved overall supply chain reliability. Empirical research consistently indicates that collaborative practices contribute positively to supply chain performance (Chen et al., 2023; Cho et al., 2025; Jum'a et al., 2025).

H2: Supply chain collaboration positively affects supply chain performance

Supply chain collaboration increases the interdependence among firms and their partners, thereby requiring higher levels of system integration, information transparency, and coordinated operational activities. Such collaborative conditions create a supportive environment for the adoption and effective utilization of digital technologies across supply chain processes. Empirical evidence indicates that collaborative practices play an important role in accelerating digital transformation initiatives within manufacturing organizations (Kim et al., 2024; Ning & Yao, 2023; Oubrahim et al., 2023).

H3: Supply chain collaboration positively affects digital transformation

Beyond its direct contribution to performance outcomes, supply chain collaboration also stimulates innovation within supply chain processes, which functions as an important pathway through which performance improvements are achieved. Innovations in coordination mechanisms and operational practices enhance a firm's flexibility, responsiveness, and efficiency in managing supply chain activities. Empirical research suggests that supply chain innovation serves as a mediating mechanism linking collaborative

practices with improved supply chain performance (Ali & Mahmood, 2024; Feng et al., 2025; Jum'a et al., 2025).

H4: Supply chain innovation mediates the effect of supply chain collaboration on supply chain performance

Digital transformation helps firms handle and use information better, boost supply chain transparency, and make quicker, more informed management decisions. Supply chain partners working together promote digital technology integration and utilisation, improving supply chain performance. According to empirical research, digital transformation mediates the link between supply chain cooperation and performance (Kim et al., 2024; Kyeremeh et al., 2025; Zhong et al., 2023).

H5: Digital transformation mediates the effect of supply chain collaboration on supply chain performance

The implementation of supply chain innovation allows firms to refine and adapt planning, production, and distribution activities in response to changing operational conditions. By introducing improved processes and coordination mechanisms, organizations can enhance cost efficiency, operational flexibility, and their ability to respond to market dynamics. Empirical studies consistently report that supply chain innovation contributes positively to supply chain performance within manufacturing contexts (Atieh & Abushaega, 2025; Barreto et al., 2024; Jum'a et al., 2025).

H6: Supply chain innovation positively affects supply chain performance

Digital transformation integrates data and processes across supply chain activities, promotes information flow transparency, and improves organisational coordination. Digital technology help organisations increase operational efficiency, delivery performance, and market responsiveness. Digital transformation improves industrial supply chain performance, according to research (He et al., 2024; Kyeremeh et al., 2025; Salamah et al., 2024).

H7: Digital transformation positively affects supply chain performance

Research Model

This study develops a conceptual framework that illustrates the role of supply chain collaboration in shaping supply chain performance, both directly and indirectly. The framework positions supply chain innovation and digital transformation as mediating mechanisms through which collaborative practices are translated into performance outcomes. The structure of the proposed model is illustrated in Figure 1.

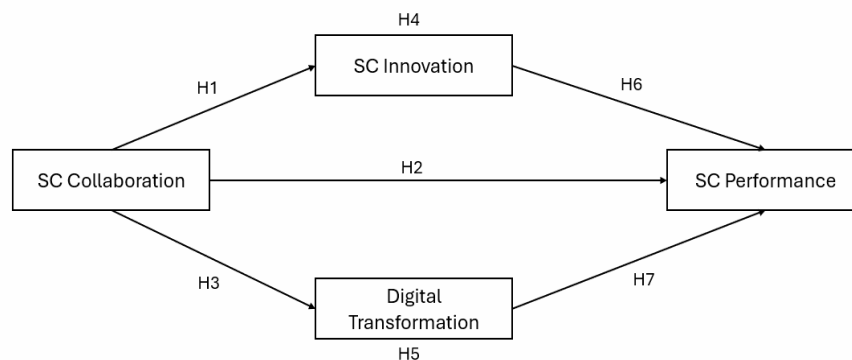


Figure 1.
Research Model

As depicted in the model, supply chain collaboration is hypothesized to exert a direct influence on supply chain performance, while also serving as a key antecedent of supply chain innovation and digital transformation. These two mediating constructs are expected to enhance the effectiveness of collaborative practices by strengthening process improvements, technological integration, and coordination across the supply chain. Through these mechanisms, collaboration contributes to improved supply chain performance within manufacturing firms.

RESULTS AND DISCUSSION

The majority of respondents were male (53.4%) and were within the productive age group of 31–40 years (46.3%). Most respondents held a bachelor’s degree (78.3%) and occupied supervisory (43.1%) and staff positions (41.2%), reflecting direct involvement in operational and coordination activities within the supply chain. In terms of tenure, respondents were predominantly in the 1–5 years (52.4%) and 6–10 years (30.0%) categories. This respondent profile supports the suitability of the sample for examining supply chain collaboration, innovation, digital transformation, and supply chain performance in manufacturing firms located in the Jabodetabek region.

Table 1.
Respondent Characteristics

Characteristics	Group	Frequency	Percent
Gender	Male	167	53.4
	Female	146	46.6
Age group	> 50 Years	14	4.5
	20–30 Years	96	30.7
	31–40 Years	145	46.3
	41–50 Years	58	18.5
Education level	Diploma (D3/D4)	42	13.4
	S2	7	2.2
	S1	245	78.3
	Senior High School	19	6.1
Job Position	Head of Division	29	9.3
	Manager	15	4.8
	Senior Manager	5	1.6
	Staff	129	41.2
	Supervisor	135	43.1
Length of Service	>15 Years	25	8.0
	1–5 Years	164	52.4
	11–15 Years	30	9.6
	6–10 Years	94	30.0

Table 2.
Descriptive Statistics

Variabel	Mean	Std. Deviation
Supply Chain Collaboration (X)	4.0064	0.47743
Supply Chain Innovation (M1)	3.9425	0.56895
Digital Transformation (M2)	4.0218	0.47335
Supply Chain Performance (Y)	3.9800	0.50894

The descriptive statistical results indicate that all research variables have mean values above 3 and standard deviations below 1. Supply Chain Collaboration recorded a mean of 4.0064 (SD = 0.47743), Supply Chain Innovation showed a mean of 3.9425 (SD = 0.56895), Digital Transformation exhibited the highest mean at 4.0218 (SD = 0.47335), and Supply Chain Performance achieved a mean of 3.9800 (SD = 0.50894). These findings reflect generally positive and consistent respondent perceptions and confirm the suitability of the data for further structural model analysis.

Validity Test Results

Convergent and discriminant validity tests were performed according to PLS-SEM criteria on the measurement model. All maintained indicators had outer loading values above the suggested level, confirming convergent validity and substantial correlations between indicators and latent components.

Table 3.
Average Variance Extracted (AVE)

Variabel	Average Variance Extracted
Digital Transformation (M2)	0,656
Supply Chain Collaboration (X)	0,552
Supply Chain Innovation (M1)	0,716
Supply Chain Performance (Y)	0,759

Source: Data processed using PLS-SEM, 2026.

Convergent validity was evaluated by examining the Average Variance Extracted (AVE) for each construct. The findings show that all latent variables exceeded the recommended threshold of 0.50, indicating satisfactory convergent validity. Digital Transformation (M2) reported an AVE of 0.656, while Supply Chain Collaboration (X) demonstrated an AVE of 0.552. In addition, Supply Chain Innovation (M1) achieved an AVE value of 0.716, and Supply Chain Performance (Y) recorded the highest AVE at 0.759. These values suggest that the latent constructs are able to explain a substantial proportion of variance in their respective indicators.

Discriminant validity was further verified using the Fornell–Larcker criterion, where the square root of each construct’s AVE outreached its correlations with different constructs in the model. All around, the results indicate that the dimension model exhibits acceptable validity and can be reliably advanced to the appraisal of the structural model.

Reliability Test Results

The dimension model was tested for reliability to ensure indicators represented their latent components consistently. Following Partial Least Squares–Structural Equation

Modelling (PLS-SEM) standards, Cronbach's alpha and Composite Reliability measured internal consistency reliability.

Table 4.
Reliability Test Results

Variabel	Cronbach's Alpha	ρ_A (rho_A)	Composite Reliability
Digital Transformation (M2)	0,952	0,953	0,958
Supply Chain Collaboration (X)	0,940	0,945	0,948
Supply Chain Innovation (M1)	0,943	0,945	0,953
Supply Chain Performance (Y)	0,894	0,896	0,926

Source: Data processed using PLS-SEM, 2026.

Supply Chain Collaboration, Innovation, Digital Transformation, and Performance all have Cronbach's alpha, rho_A, and composite reliability scores over 0.70, indicating internal consistency. These findings indicate that the indicators accurately reflect their latent variables, validating the measurement model for structural analysis.

Outer Model (Measurement Model) Results

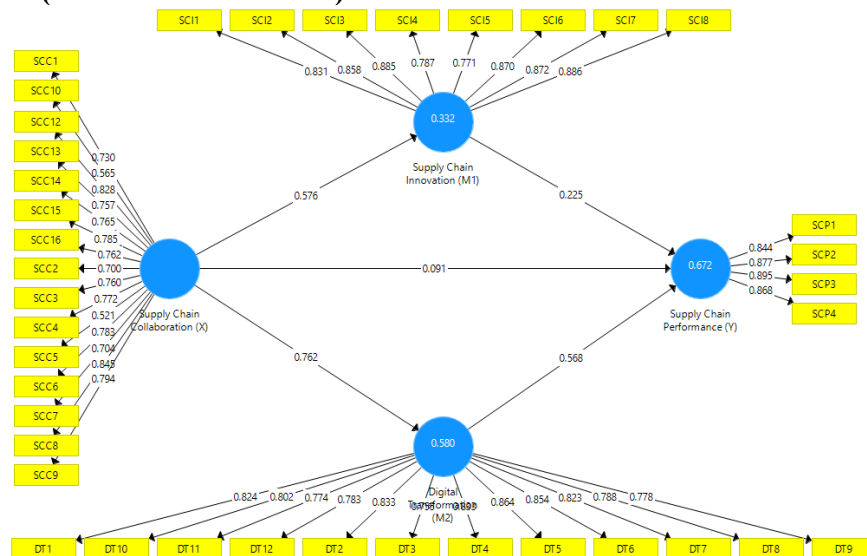


Figure 2.
Measurement Model (Outer Model)

Source: Data processed using PLS-SEM, 2026.

Inner Model (Structural Model) Results

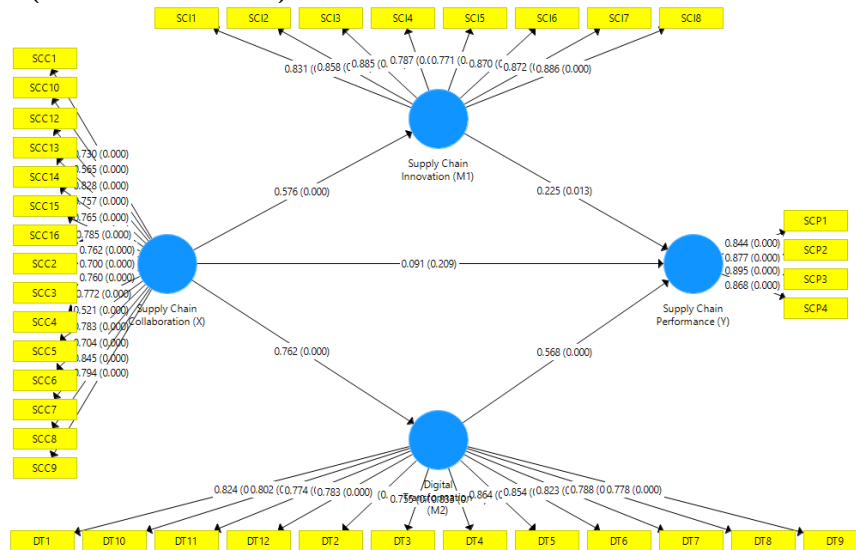


Figure 3.
Structural Model (Inner Model)

Source: Data processed using PLS-SEM, 2026.

Coefficient of Determination (R-Square) Results

Table 5.
R-Square Value

Variabel	R-square	R-square Adjusted
Digital Transformation (M2)	0,580	0,579
Supply Chain Innovation (M1)	0,332	0,330
Supply Chain Performance (Y)	0,672	0,669

Source: Data processed using PLS-SEM, 2026.

The R-square results show that Digital Transformation (M2) and Supply Chain Innovation (M1) achieve R² values of 0.580 and 0.332, indicating moderate predictive power, while Supply Chain Performance (Y) attains an R² value of 0.672, reflecting strong explanatory power. Overall, these findings indicate that the inclusion of Supply Chain Innovation and Digital Transformation enhances the model’s ability to explain variations in supply chain performance.

Predictive Relevance (Q²) Results

The predictive relevance of the structural model was examined using the Q² statistic derived from the blindfolding procedure in SmartPLS. This assessment was conducted to evaluate the extent to which the proposed model is capable of predicting the endogenous constructs included in the analysis.

The results show that all endogenous variables supply chain innovation, digital transformation, and supply chain performance, produced positive Q² values (Q² > 0). These outcomes indicate that the structural model possesses sufficient predictive relevance,

demonstrating that the exogenous constructs contribute meaningfully to explaining variance in the endogenous variables.

Goodness-of-Fit Results

PLS-SEM study advocated utilising the Standardised Root Mean Square Residual (SRMR) to evaluate model fit. The predicted SRMR value of 0.099 is below the cutoff value of 0.10, indicating that the model fits well.

The study model was evaluated using many global fit indicators. To evaluate the model's explanatory power and predictive capabilities, other metrics such as R², Q², and structural path coefficient statistical significance were also assessed.

Path Coefficients (Direct Effect) Results

Table 6.
Path Coefficients (Direct Effects)

	Original Sample	Mean	Std. Deviation	T-Statistics	P-Values	Result
(X) → (M1)	0,576	0,578	0,084	6,875	0,000	Supported
(X) → (Y)	0,091	0,088	0,072	1,257	0,209	Not Supported
(X) → (M2)	0,762	0,759	0,066	11,475	0,000	Supported
(M1) → (Y)	0,225	0,221	0,090	2,488	0,013	Supported
(M2) → (Y)	0,568	0,573	0,117	4,842	0,000	Supported

Source: Data processed using PLS-SEM, 2026.

The structural model shows that supply chain cooperation positively impacts innovation ($\beta = 0.576$, $p < 0.001$) and digital transformation ($\beta = 0.762$, $p < 0.001$). These results support H1 and H3. The study found no significant correlation between supply chain cooperation and performance ($\beta = 0.091$, $p = 0.209$), disproving H2.

Supply chain performance is positively influenced by supply chain innovation ($\beta = 0.225$, $p = 0.013$), confirming H6. Digital transformation results in a larger beneficial impact on supply chain performance ($\beta = 0.568$, $p < 0.001$), supporting H7. These findings show that supply chain collaboration's performance gains come via indirect paths like innovation and digital transformation.

Indirect Effects (Mediation) Hypothesis Testing

Table 7.
Path Coefficients (Indirect Effect)

	Original Sample	Mean	Std. Deviation	T-Statistics	P-Values	Result
(M1) → (X) → (Y)	0,130	0,128	0,056	2,316	0,021	Partial Mediation
(M2) → (X) → (Y)	0,433	0,435	0,096	4,498	0,000	Partial Mediation

Source: Data processed using PLS, 2026

The mediation study using PLS-SEM indicates that supply chain innovation mediates the association between cooperation and performance, as shown by the path coefficient ($\beta = 0.130$), t-value (2.316), and p-value (0.021). Digital transformation has a greater mediating

role, with a higher path coefficient ($\beta = 0.433$), t-value of 4.498, and significance level of $p < 0.001$. These results imply that supply chain cooperation improves performance outcomes by improving innovation capabilities and implementing digital transformation efforts.

H1. Supply Chain Collaboration and Supply Chain Innovation

The empirical findings establish that supply chain collaboration exerts a significant positive influence on supply chain innovation, therefore H1 is supported. This result indicates that closer interaction among internal functions and external supply chain partners facilitates the emergence of process improvements and the adoption of new operational practices within the supply chain. Through collaborative engagement, firms are able to draw upon partners' expertise, experiential knowledge, and operational insights, which accelerates the development of innovative supply chain solutions.

From a theoretical standpoint, this result aligns with the Resource-Based View (RBV), which conceptualizes collaboration as a strategic capability that enables firms to integrate and exploit complementary resources beyond organizational boundaries. Moreover, consistent with Information Processing Theory (IPT), intensified collaboration enhances a firm's ability to manage and interpret complex information flows, thereby creating conditions that support innovation. Within manufacturing companies operating in the Greater Jakarta region, where coordination demands are high and market conditions are dynamic, supply chain collaboration plays a crucial role in enabling adaptive and innovation-oriented responses.

H2. Supply Chain Collaboration and Supply Chain Performance

The empirical findings invalidate H2 because supply chain cooperation does not directly affect supply chain performance. This suggests that information exchange and inter-partner collaboration do not inherently boost operational effectiveness.

Conceptually, this result suggests that collaboration must first be transformed into more operational internal mechanisms in order to influence performance outcomes. In other words, collaboration functions as a strategic prerequisite rather than a standalone determinant of supply chain performance. This finding is particularly relevant in the context of manufacturing firms in the Greater Jakarta area, where operational complexity and dense distribution networks require supporting capabilities to fully realize the benefits of collaboration.

H3. Supply Chain Collaboration and Digital Transformation

The findings demonstrate that supply chain collaboration has a positive and significant effect on digital transformation, thus H3 is supported. This result confirms that intensive collaboration increases the need for system integration, data visibility, and cross-functional coordination, thereby encouraging firms to adopt digital technologies more systematically in supply chain activities.

From a theoretical perspective, this finding is consistent with Information Processing Theory, which emphasizes that increasing information complexity drives organizations to adopt more advanced structures and technologies. In the manufacturing context, strong collaborative relationships facilitate information system integration and real-time data exchange, thereby accelerating the digital transformation process. These results highlight collaboration as a critical foundation for successful digital transformation in supply chains.

H4. The Mediating Role of Supply Chain Innovation dalam Hubungan antara Supply Chain Collaboration dan Supply Chain Performance

The study shows that supply chain innovation mediates the connection between cooperation and performance, supporting H4. This shows that collaborative methods boost performance by allowing enterprises to innovate supply chain procedures, rather than through a direct performance effect.

Theoretically, supply chain innovation functions as an internal mechanism that operationalizes collaborative practices into improvements in efficiency, flexibility, and responsiveness. Collaboration fosters shared learning and knowledge exchange, while innovation enables the practical implementation of collaborative outcomes. In the context of manufacturing firms in the Greater Jakarta area, supply chain innovation becomes a critical means of adapting operational processes to demand uncertainty and supply disruptions.

H5. The Mediating Role of Digital Transformation dalam Hubungan antara Supply Chain Collaboration dan Supply Chain Performance

The empirical data supports H5 because digital transformation mediates supply chain cooperation and performance. This shows that collaborative methods boost performance by allowing organisations to use digital technology to improve supply chain integration, visibility, and decision-making.

Digital transformation enhances data visibility, accelerates information flows, and improves decision-making quality, allowing collaborative practices to be operationalized more effectively. Without digital support, the benefits of collaboration tend to remain at a coordination level. Conversely, digital transformation acts as an enabler that strengthens the value of collaboration. In the context of manufacturing firms in the Greater Jakarta area, characterized by high coordination and distribution complexity, digital transformation plays a crucial role in linking supply chain collaboration to improved operational performance.

H6. Supply Chain Innovation and Supply Chain Performance

The results show that supply chain innovation has a positive and significant effect on supply chain performance, therefore H6 is supported. This finding confirms that a firm's capability to implement process improvements, new working methods, and enhanced coordination mechanisms directly contributes to higher operational efficiency, flexibility, and supply chain responsiveness.

From a hypothetical perspective, this finding aligns with the dynamic capabilities view, which emphasizes a establishment's capacity to renew and reconfigure operational processes in response to changing environmental conditions. Within manufacturing settings, supply chain innovation strengthens firms' ability to adjust planning, production, and distribution activities more effectively, enabling quicker responses to market fluctuations. As a result, innovation-driven adjustments within the supply chain contribute directly to enhanced supply chain performance.

H7. Digital Transformation and Supply Chain Performance

The findings corroborate H7 that digital transformation improves supply chain performance. This suggests that strategic digital technology deployment improves supply chain performance. Digital transformation enhances process integration, increases information visibility, and supports data-driven decision-making. In manufacturing firms, these capabilities enable more efficient and adaptive supply chain management, which is reflected in improved delivery timeliness, supply reliability, and operational flexibility.

CONCLUSION

This research shows that supply chain cooperation improves manufacturing enterprises' supply chains by improving internal organisational processes. Cooperation between internal and external divisions improves firm coordination, improve the quality of information exchange, and create alignment in supply chain planning and decision-making. Accordingly, collaboration functions not only as an operational practice but also as a strategic foundation in increasingly complex supply chain management.

The results show that supply chain innovation and digital transformation bridge the impact of cooperation on performance. Supply chain innovation enables firms to translate collaborative practices into more adaptive process improvements and working methods, while digital transformation supports system integration, enhanced information visibility, and data-driven decision-making. These results indicate that collaboration alone is insufficient to generate sustainable supply chain performance without the support of innovation and the effective utilization of digital technologies.

From a practical perspective, the findings suggest that manufacturing firms in the Greater Jakarta area should ensure that supply chain collaboration initiatives extend beyond coordination efforts and are translated into implementable process innovation programs and strengthened digital systems. This research adds to supply chain management literature in emerging countries with significant environmental complexity and unpredictability by focussing on Greater Jakarta manufacturing enterprises.

The results emphasise the need for management to strategically combine supply chain cooperation with innovation and digital transformation. This research illuminates how supply chain cooperation may be deliberately used to increase performance sustainably.

REFERENCES

- Ali, A. A., & Mahmood, A. (2024). *How Do Supply Chain Integration and Product Innovation Capability Drive Sustainable Operational Performance ?* 1–20.
- Atieh, A. A., & Abushaega, M. M. (2025). *Achieving Supply Chain Sustainability Through Green Innovation : A Dynamic Capabilities-Based Approach in the Logistics Sector.* 1–20.
- Barreto, L. S., Freitas, V., & Paula, F. De. (2024). *Sustainable supply chain innovation and market performance : The role of sensing and innovation capabilities.* 14(January). <https://doi.org/10.1016/j.clrc.2024.100199>
- Bhaskara, M. C., Santosa, W., & Triwulandari, S. D. (2023). The Effect of Supply Chain Resilience and Collaboration on The Firm Performance: Moderating Effect of Uncertainty. *Global Research Review in Business and Economics*, 9(4), 158–164.
- Chen, L., Fu, Y., & Liu, Y. (2023). *The Impact of Logistics Corporate Social Responsibility on Supply Chain Performance : Using Supply Chain Collaboration as an Intermediary Variable.*
- Cho, S. K., Lee, P., & Jung, D. (2025). *Cultivating Risk-Response Capability : The Impact of Partner Compatibility and Supply Chain Collaboration.* 1–21.
- Feng, D., Wang, H., & Zhao, L. (2025). *Digital Technologies for Sustainable Supply Chain Performance : Source-Push and Value Chain-Pull Mechanisms.* 1–24.
- Gunawan, K., Siagian, H., Jiwa, Z., & Tarigan, H. (2024). *The impact of supply chain integration on operational performance with supply chain capability.* 12, 977–988. <https://doi.org/10.5267/j.uscm.2023.12.010>

- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., Black, W. C., & Anderson, R. E. (2019). *MULTIVARIATE DATA ANALYSIS Multivariate Data Analysis*.
- He, J., Id, M. F., & Fan, Y. (2024). *Digital transformation and supply chain efficiency improvement : An empirical study from a-share listed companies in China*. 1–21. <https://doi.org/10.1371/journal.pone.0302133>
- Isbahi, M. B., Zuana, M. M. M., & Toha, M. (2024). The Multi-Social Relation of the Cattle Industry in the Plaosan Subdistrict Animal Market of Magetan Regency. *Malacca: Journal of Management and Business Development*, 1(1), 31–46. <https://doi.org/10.69965/malacca.v1i1.51>
- Jing, H., & Fan, Y. (2024). *Digital Transformation , Supply Chain Integration and Supply Chain Performance : Evidence From Chinese Manufacturing Listed Firms*. September, 1–18. <https://doi.org/10.1177/21582440241281616>
- Jum'a, L., Alkhodary, D., & Mandahawi, N. (2025). *Supply Chain Collaboration , Innovation , and Sustainability Performance : Evidence from Manufacturing Firms in Jordan*. 1–21.
- Kim, J. W., Rhee, J. H., & Park, C. H. (2024). *How Does Digital Transformation Improve Supply Chain Performance : A Manufacturer ' s Perspective*. 1–16.
- Kyeremeh, E., Yamoah, E. E., & Yamoah, A. (2025). Enhancing pharmaceutical supply chain performance : the impact of technology integration , interorganizational trust , and collaboration in the digital age. *Future Business Journal*. <https://doi.org/10.1186/s43093-025-00538-2>
- Ning, L., & Yao, D. (2023). *The Impact of Digital Transformation on Supply Chain Capabilities and Supply Chain Competitive Performance*. 1–22.
- Oubrahim, I., Sefiani, N., & Happonen, A. (2023). *The Influence of Digital Transformation and Supply Chain Integration on Overall Sustainable Supply Chain Performance : An Empirical Analysis from Manufacturing Companies*.
- Salamah, E., Alzubi, A., & Yinal, A. (2024). *Unveiling the Impact of Digitalization on Supply Chain Performance in the Post-COVID-19 Era : The Mediating Role of Supply Chain Integration and Efficiency*.
- Xu, X., Wang, J., He, C., Jiang, X., & An, Q. (2024). *Sewage Treatment Equipment Supply Chain Collaboration and Resilience Improvement Path Analysis : Collaborative Decision-Making , Information Sharing , Risk Management*.
- Yu, Y., Zeng, H., & Zhang, M. (2024). *Digital transformation for supply chain collaborative innovation and market performance*.
- Zhong, J., Jia, F., Chen, X., Hong, Y., & Yu, Y. (2023). *Internal and external collaboration and supply chain performance : a fit approach*. 5567. <https://doi.org/10.1080/13675567.2022.2042226>