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THE EFFECT OF DIGITALIZATION ON FIRM PERFORMANCE WITH THE MEDIATION OF SUPPLY CHAIN PERFORMANCE AND SUPPLY CHAIN RESILIENCE FOR THE OIL INDUSTRY

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Abstract

This study analyzes the influence of digitalization on company performance by considering the mediating role of Supply Chain Performance (SCM) and Supply Chain Resilience (SCR) in the Indonesian fuel industry. Digitalization through the implementation of the Internet of Things (IoT), big data analytics, artificial intelligence (AI), and cloud computing is an important strategy for creating an efficient, responsive, and adaptive supply chain to disruption. The research method uses a quantitative approach with Partial Least Squares Structural Equation Modeling (PLS-SEM). Primary data were collected through questionnaires from respondents in fuel companies. The results show that digitalization has a significant positive effect on SCM and SCR, which in turn has a positive impact on firm performance. The influence of digitalization is also proven to indirectly improve performance through the mediation of SCM and SCR. These findings underscore the importance of digital transformation integrated with data-driven supply chain management strategies and operational resilience. This study provides a theoretical contribution by developing a comprehensive and practical conceptual model as a reference for fuel companies in designing effective and sustainable digitalization policies.

Keywords: Digitalization, Firm Performance, Supply Chain Performance, Supply Chain Resilience, Fuel Oil Industry

INTRODUCTION

The fuel oil (BBM) industry is a vital sector that serves as the backbone of the national economy, particularly in providing energy for the transportation, industrial, and power generation sectors. In Indonesia, the BBM industry's strategic role lies not only in its contribution to state revenue but also in ensuring a stable and sustainable energy supply. Dependence on a reliable fuel supply makes this sector highly sensitive to various risks, ranging from fluctuations in global oil prices, geopolitical dynamics, increasingly stringent environmental regulations, and complex logistics disruptions. This is exacerbated by the impact of the COVID-19 pandemic, which has exposed the weaknesses of conventional supply chain structures, raising the urgency of creating a more adaptive, resilient, and responsive supply chain system (Wang, Jie & Frederico, 2024).

In an era of global disruption and uncertainty, digitalization has become key to transforming industries worldwide, including strategic industries like fuel oil (BBM). Digital technologies such as the Internet of Things (IoT), big data analytics, artificial intelligence (AI), and cloud computing have revolutionized the way companies manage their operations and supply chains. This digital transformation is not just a trend, but an urgent need to ensure company efficiency, adaptability, and competitiveness amidst an increasingly complex and dynamic business environment (Hofmann & Rüsch, 2017). The BBM industry faces significant supply chain challenges. The complexity of processes spanning exploration, production, distribution, and refining, coupled with oil price volatility, stringent regulations, and environmental pressures, make supply chain efficiency and reliability crucial. In this context, digitalization offers a strategic solution by providing real-time visibility, automated data processing, and predictive capabilities to respond quickly to changes and disruptions (Ivanov & Dolgui, 2020).

Digitalization in the fuel industry has a significant impact on improving Supply Chain Performance. Digital technology enables companies to integrate internal and external processes more efficiently, optimize distribution and logistics, and improve coordination between business units. In the context of supply chain management, digitalization accelerates demand planning, inventory management, and mitigates operational risks that could disrupt the smooth distribution of fuel (Christopher & Holweg, 2017). This is crucial considering that delays or disruptions in fuel distribution can impact other vital sectors such as transportation and the manufacturing industry.

REVIEW OF LITERATURE

Supply Chain Digitalization

The application of digitalization in Supply Chain Performance has also been shown to increase supply chain resilience, particularly in the face of disruptions such as the COVID-19 pandemic, geopolitical conflicts, and global logistics disruptions. Research by Chowdhury et al. (2021) shows that companies that adopt digitalization strategies tend to have faster response and recovery capabilities than those that still rely on manual systems.

Supply Chain Agility

Supply Chain Agility (SCA) refers to the ability of a supply chain system to respond quickly, accurately, and efficiently to market changes and customer demand. In an increasingly dynamic and complex business context, SCA is crucial for dealing with

uncertainties such as demand fluctuations, supply disruptions, and regulatory changes. Research by Çetindaş et al. (2023) shows that SCA contributes significantly to company performance, especially in crises such as the COVID-19 pandemic, with demand stability being a key mediating factor. Supply Chain Agility not only emphasizes rapid response to change but also encompasses flexibility in managing the flow of goods and information from suppliers to end consumers.

Smart Supply Chain

Smart Supply Chain (SSC) is a concept that combines digital technology and automation to create an intelligent and adaptive supply chain. By leveraging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data, companies can improve visibility, predictability, and efficiency in their supply chain operations. These technologies enable real-time data collection and analysis that can be used to make better, faster, and more informed decisions at every stage of the supply chain (Hazen et al., 2016).

Company Performance

Company performance in the context of supply chain management can be measured using various parameters, including operational efficiency, on-time delivery, and product quality. As one of the underlying factors of company competitiveness, this performance is significantly influenced by how well an organization manages the flow of goods, information, and finances within the supply chain system. Supply chain digitization has been shown to make a significant positive contribution to improving company performance. By leveraging digital technology, companies can streamline operational processes, increase transparency, and accelerate more accurate decision-making.

Supply Chain Performance

Supply Chain Performance (SCP) refers to the extent to which the supply chain system is effective and efficient in meeting an organization's business objectives, such as improving service quality, reducing operational costs, delivering on time, and being flexible in responding to changing market demand. Supply chain performance is a crucial indicator for assessing the success of a company's logistics and operations strategy implementation, particularly in industrial sectors with high distribution complexity, such as the fuel industry.

Supply Chain Resilience

Supply Chain Resilience (SCR) is the ability of a supply chain system to quickly and effectively face, respond to, and recover from unexpected disruptions, and adapt to change to ensure operational continuity. Supply chain resilience is becoming increasingly important with the increasing complexity of globalization, market uncertainty, and external risks such as natural disasters, geopolitical crises, and pandemics. According to Zhao et al. (2023), SCR encompasses the ability to mitigate the negative impact of disruptions, maintain the continuity of logistics and production processes, and recover in a timely manner after disruptions.

RESEARCH METHOD

This study uses a quantitative explanatory approach to explain the causal relationship between the variables studied: supply chain digitalization, supply chain performance, supply chain resilience, and firm performance. The quantitative approach was chosen because it allows for systematic hypothesis testing through numerical data collection and statistical

analysis. This method is suitable for identifying the extent of digitalization's influence on firm performance, both directly and through the mediating mechanisms of supply chain performance and supply chain resilience.

Data collection was conducted by distributing closed-ended questionnaires to predetermined respondents using a purposive sampling technique. This questionnaire consisted of questions representing indicators of each research variable and was measured on a Likert scale of 1 to 5. The selected respondents were individuals who understood fuel use and had experience in implementing digitalization and supply chain management (Wang et al., 2023). To examine the relationship between variables, this study used the Structural Equation Modeling (SEM) method.

RESULTS AND DISCUSSION

Descriptive Statistics Results

Table 1.
Descriptive Statistics of Supply Chain Digitalization Variables

No	Code	Indicator	Mean		Std. Deviation
1	X1.1	My company uses an integrated information system in managing the supply chain. (X1.1)	4,220		0.460
2	X1.2	Data in the supply chain system can be accessed in real-time. (X1.2)	4,260		0.522
3	X1.3	We utilize digital technologies such as IoT, big data analytics, or AI in the supply chain. (X1.3)	4,030		0.608
4	X1.4	Decisions in our supply chain are based on accurate data analysis. (X1.4)	4,200		0.469
5	X1.5	Our logistics and distribution processes have been significantly digitalized. (X1.5)	4,180		0.623

Source: Data processed using SmartPLS

Supply chain digitalization is measured through five key indicators that reflect the extent to which companies have integrated digital technology into their supply chain processes. Based on the results of data processing, the average value (mean) of all indicators shows a high tendency, namely above 4 on a Likert scale of 1–5, which means that respondents generally agree with the statements asked. This indicates that the process of supply chain digitalization has been running significantly in the companies that are the object of the study. The indicator with the highest average value is X1.2, namely "Data in the supply chain system can be accessed in real time," with a mean of 4.260 and a standard deviation of 0.522.

Table 2.
Descriptive Statistics of Supply Chain Agility Variables

No	Code	Indicator	Mean	Std. Deviation
1	Y1.1	The ability of the supply chain to adapt to changes in market demand (Y1.1)	4,170	0.549
2	Y1.2	Technology adoption improves operational efficiency in agile supply chains. (Y1.2)	4,190	0.504
3	Y1.3	Assisting the mediation process in crisis situations. (Y1.3)	4,140	0.490
4	Y1.4	Integrate every element in the supply chain. (Y1.4	4,100	0.557
5	Y1.5	More adaptive in facing the external environment to increase competitiveness. (Y1.5)	4,180	0.590

Source: Data processed using SmartPLS

Supply Chain Agility (SCA) is measured through five main indicators that describe the extent to which a company is able to adapt to change, integrate technology, and respond to the dynamics of the business environment quickly and efficiently. The results of data processing show that all indicators have an average value (mean) above 4,000 on a Likert scale of 1–5, which indicates a high level of perception from respondents regarding agility capabilities in their company's supply chain. The indicator with the highest mean value is Y1.2, namely "Technology adoption improves operational efficiency in an agile supply chain" with an average of 4,190 and a standard deviation of 0.504.

Table 3.
Descriptive Statistics of Smart Supply Chain Variables

No	Code	Indicator	Mean	Std. Deviation
1	Y2.1	The supply chain is integrated effectively and adaptively. (Y2.1)	4,020	0.600
2	Y2.2	Companies can identify potential problems early and take preventive action. (Y2.2)	3,980	0.547
3	Y2.3	More accurate analysis of production planning, distribution, and marketing strategies. Y2.3)	3,990	0.592
4	Y2.4	Big data analysis enables more accurate planning of production, distribution, and marketing strategies. (Y2.4)	4,040	0.582
5	Y2.5	Reduce errors, reduce operational costs, and improve the quality of more efficient services. (Y2.5)	4,180	0.477

Source: Data processed using SmartPLS

Smart Supply Chain (SSC) is a digital transformation concept in supply chain systems that integrates technologies such as big data analytics, IoT, and AI to create visibility, efficiency, and predictive capabilities in decision-making. In this study, SSC is measured using five indicators that reflect the extent to which a company is able to build a smart, efficient, and responsive supply chain. Indicator Y2.5, namely "Reducing errors, reducing operational costs, and improving service quality more efficiently," has the highest average value, namely 4.180 with a standard deviation of 0.477. This finding indicates that the most tangible benefits of SSC implementation are felt in the aspects of cost efficiency, error reduction, and improving service quality, which are the main goals of digital transformation in the modern supply chain.

Table 4.
Descriptive Statistics of Supply Chain Performance Variables

No	Code	Indicator	Mean	Std. Deviation
1	Y3.1	Coordination between parts of the company's supply chain runs effectively. (Y4.1)	4.120	0.453
2	Y3.2	The company is able to manage inventory efficiently. Y4.2)	4,170	0.511
3	Y3.3	The product distribution and delivery process runs smoothly and on time. (Y4.3)	4.120	0.553
4	Y3.4	The company is able to predict customer demand accurately. (Y4.4)	4,100	0.520
5	Y3.5	Relationships with supply chain partners are managed strategically and sustainably. (Y4.5)	4,170	0.470

Source: Data processed using SmartPLS

Supply Chain Performance (SCP) is a key indicator of supply chain management success in achieving operational efficiency, distribution accuracy, and customer satisfaction. In this study, supply chain performance is measured through five key indicators reflecting coordination, inventory efficiency, distribution, demand forecast accuracy, and strategic relationships with supply chain partners. The two indicators with the highest mean values, namely Y3.2 ("The company is able to manage inventory efficiently") and Y3.5 ("Relationships with supply chain partners are managed strategically and sustainably"), recorded a mean of 4.170, with standard deviations of 0.511 and 0.470, respectively. These findings indicate that inventory management efficiency and the quality of partnerships in the supply chain have become key forces in driving sustainable logistics and operational performance.

Table 5.
Descriptive Statistics of Supply Chain Resilience Variables

No	Code	Indicator	Mean	Std. Deviation

1	Y4.1	The company has a system to identify potential disruptions in the supply chain (Y3.1)	3,990	0.608
2	Y4.2	We can restore operations quickly after a disruption occurs. (Y3.2)	4.120	0.621
3	Y4.3	Our supply chain is flexible in responding to sudden changes (Y3.3)	4.120	0.605
4	Y4.4	The company has alternative sources of raw materials and distribution channels. (Y2.4)	4,160	0.524
5	Y4.5	We actively conduct risk evaluation in supply chain operations Y3.5)	4,150	0.572

Source: Data processed using SmartPLS

Supply Chain Resilience (SCR) refers to an organization's ability to face, adapt to, and recover from various forms of disruption in the supply chain system, both internal and external. In an era full of uncertainty such as pandemics, natural disasters, technological disruptions, and geopolitical conflicts, supply chain resilience is a determining factor for business continuity. In this study, SCR was measured using five main indicators that reflect system resilience, response flexibility, and company readiness in facing logistics crises. The analysis results showed that all indicators obtained an average value (mean) above 3.9, indicating that companies in the fuel industry have built a fairly solid level of supply chain resilience.

Table 6.
Descriptive Statistics of Firm Performance Variables

No	Code	Indicator	Mean	Std. Deviation
1	Y5.1	The company's revenue has increased in recent years. (Y5.1)	4,140	0.400
2	Y5.2	The company's profitability level shows a positive trend. (Y5.2)	4,160	0.441
3	Y5.3	The company experienced increased operational efficiency. (Y5.3)	4,080	0.462
4	Y5.4	Customer satisfaction with our services and products is increasing. (Y5.4)	4,140	0.469
5	Y5.5	Our company is more competitive in the market than ever before. (Y5.5)	4,160	0.463

Source: Data processed using SmartPLS

Firm Performance reflects a company's success in achieving sustainable business goals, both financially and operationally, and in market perception. In this study, company performance (Y5) is measured based on five key indicators: revenue, profitability, efficiency, customer satisfaction, and market competitiveness. Descriptive analysis results show that all indicators have a mean value above 4,000, indicating a very positive perception from respondents of their company's performance in recent years. This underscores that the digital transformation and strengthening of supply chain management have significantly improved company performance overall.

Data Analysis

In Structural Equation Modeling Partial Least Squares (SEM-PLS)-based research, outer model analysis is conducted to evaluate construct validity and reliability. One form of testing conducted is convergent validity, which is to ensure that the indicators in a single latent variable truly reflect the same construct theoretically. According to Hair et al. (2019), convergent validity is considered achieved if each indicator has an outer loading value above 0.70, indicating that more than 50% of the indicator's variance can be explained by the construct it represents.

Based on the data processing results, all indicators in this study met the convergent validity criteria. In the Supply Chain Digitalization variable (X1), all indicators showed high loading factor values, ranging from 0.729 to 0.846. The highest value was achieved by the indicator for the use of integrated information systems (X1.1) at 0.846, indicating that digitalization is most strongly perceived in the form of an integrated information system between departments. Meanwhile, the indicator showing the use of technology such as IoT and big data analytics (X1.3) had the lowest value at 0.729, but still met the minimum validity requirements. This is consistent with the findings of Ivanov et al. (2019) who stated that technology integration in the supply chain is the main foundation for a company's digital transformation.

Table 8.
Hypothesis Test Results

Variables	Indicator	Loading Factor	Information
Digitalization	My company uses an integrated information system to manage its supply chain. (X1.1)	0.846	Valid
	Data in the supply chain system can be accessed in real-time. (X1.2)	0.831	
	We leverage digital technologies such as IoT, big data analytics, or AI in the supply chain. (X1.3)	0.729	
	Decisions in our supply chain are based on accurate data analysis. (X1.4)	0.733	
	Our logistics and distribution processes have been significantly digitized. (X1.5)	0.776	
Supply Chain Agility	The ability of the supply chain to adapt to changes in market demand. (Y1.1)	0.875	Valid
	Technology adoption improves operational efficiency in agile supply chains. (Y1.2)	0.730	

Variables	Indicator	Loading Factor	Information
	Assisting in the mediation process in crisis situations. (Y1.3)	0.882	
	Integrate every element in the supply chain (Y1.4)	0.722	
	More adaptive in facing the external environment to increase competitiveness (Y1.5)	0.779	
Smart Supply Chain	The supply chain is effectively and adaptively integrated. (Y2.1)	0.711	Valid
	Companies can identify potential problems early and take preventive action. (Y2.2)	0.757	
	Analysis of production planning, distribution, and marketing strategies is more accurate (Y2.3)	0.867	
	Big data analysis enables more accurate planning of production, distribution, and marketing strategies. (Y2.4)	0.862	
	Reduce errors, reduce operational costs, and improve the quality of more efficient services. (Y2.5)	0.735	
Supply Chain Performance	Coordination between parts of the company's supply chain runs effectively. (Y3.1)	0.841	Valid
	The company is able to manage inventory efficiently. (Y3.2)	0.780	
	The product distribution and delivery process runs smoothly and on time. (Y3.3)	0.758	
	The company is able to predict customer demand accurately. (Y3.4)	0.721	
	Relationships with supply chain partners are managed strategically and sustainably. (Y3.5)	0.724	
Supply Chain Resilience	The company has a system to identify potential disruptions in the supply chain. (Y4.1)	0.824	Valid
	We can restore operations quickly after a disruption occurs. (Y4.2)	0.715	
	Our supply chain is flexible in responding to sudden changes. . (Y4.3)	0.822	
	The company has alternative sources of raw materials and distribution channels. (Y4.4)	0.751	

Variables	Indicator	Loading Factor	Information
	We actively conduct risk evaluations in our supply chain operations. (Y4.5)	0.847	
Firm Performance	The company's revenue has increased in recent years. (Y5.1)	0.810	Valid
	The company's profitability level shows a positive trend. (Y5.2)	0.844	
	The company experienced increased operational efficiency (Y5.3)	0.782	
	Customer satisfaction with our services and products is increasing. (Y5.4)	0.767	
	Our company is more competitive in the market than ever before. (Y5.5)	0.879	

Source: Data processed using SmartPLS

Synthesis of Topic

H1 The Impact of Digitalization on Supply Chain Agility

Digitalization has been shown to significantly impact Supply Chain Agility. This means that the implementation of digital technology can increase the speed, flexibility, and adaptability of the supply chain in responding to market dynamics. This aligns with studies by Çetindaş et al. (2023) and Christopher (2000), which emphasize that digitalization supports agility in volatile market conditions.

The test results for the relationship between the variables of Digitalization and Supply Chain Agility show a t-statistic value of 9.991 with a p-value of 0.000. This p-value is well below the standard significance limit ($\alpha = 0.05$), indicating that this relationship is statistically significant. Thus, it can be concluded that digitalization has a positive and significant effect on supply chain agility.

H2 The Impact of Digitalization on Smart Supply Chain

Digitalization has a significant direct impact on smart supply chains. This means that the integration of technologies such as IoT, AI, and Big Data directly enhances the intelligence of supply chain systems. This finding aligns with the theories of Hazen et al. (2016) and Kamble et al. (2020).

The analysis of the impact of digitalization on the smart supply chain shows a highly statistically significant relationship, with a T-statistic of 23.298 and a P-value of 0.000. Both values convincingly exceed the significance threshold at the 95% and even 99% confidence levels, indicating that digitalization has a strong direct impact on the formation and strengthening of an intelligent supply chain system. A smart supply chain refers to a logistics and distribution system supported by advanced technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and Big Data Analytics, which enable automated, real-time, and predictive decision-making processes. This technological integration not only improves operational efficiency but also optimizes transparency, information accuracy, and cross-functional coordination within the supply chain. These findings reinforce the view of Hazen et al. (2016), who stated that the smart supply chain is a natural evolution of the digitalization of traditional logistics systems. Furthermore, Kamble et al. (2020) also emphasize that the comprehensive adoption of digital technology is an absolute prerequisite

for creating a supply chain that is adaptive, automated, and responsive to increasingly complex consumer demands. Therefore, these results confirm that the higher the level of digitalization implemented in a company's supply chain processes, the greater its ability to develop intelligent, predictive, and future-oriented efficiency systems.

H3 The Impact of Digitalization on Supply Chain Resilience

Digitalization also significantly impacts supply chain resilience. Technology helps companies detect, respond to, and recover from disruptions quickly. This finding is supported by Ivanov & Dolgui (2021) and Zhao et al. (2023), who emphasize digital twins and analytics in building resilience.

The results of the hypothesis test indicate that digitalization has a significant influence on supply chain resilience, with a T-statistic of 2.829 and a P-value of 0.005. Since the T-statistic is greater than 1.96 and the P-value is less than 0.05, it can be concluded that this relationship is statistically significant. This means that digitalization plays a crucial role in building a company's supply chain resilience in the face of various forms of disruption and uncertainty. In this context, digitalization includes the implementation of technologies such as IoT sensors, real-time monitoring systems, and predictive analytics that enable companies to detect potential risks early, make decisions quickly, and make operational adjustments adaptively. Resilience in the supply chain is essential to maintain business continuity, especially when facing crises such as pandemics, global market fluctuations, or logistics disruptions.

H4 The Impact of Digitalization on Supply Chain Performance

This is the most significant relationship in the model. The implementation of digitalization directly improves the effectiveness of Supply Chain Performance. This confirms that companies that utilize digital technology have greater capabilities in managing the integration of processes, distribution, and information (Choi et al., 2023).

The test results show that digitalization has a very significant influence on Supply Chain Performance, with a T-statistic value of 3.945 and a P-value of 0.000. This very high T-statistic value indicates that the influence of digitalization on supply chain management is not only significant but also very strong. Supply Chain Performance includes the process of coordinating and integrating logistics, production, distribution, and relationship management activities with suppliers and customers. With digitalization, these activities can be carried out more efficiently, transparently, and coordinated through technologies such as enterprise resource planning (ERP), blockchain, cloud-based collaboration platforms, and real-time data-based tracking systems.

H5 The Impact of Digitalization on Firm Performance

Digitalization has a strong direct impact on company performance. This indicates that digital investments in business processes and logistics directly improve efficiency, quality, and profitability. This is supported by Oliveira et al. (2023) and Frederico et al. (2020).

The results of the hypothesis test indicate that digitalization has a highly significant impact on firm performance, with a T-statistic of 2.505 and a P-value of 0.012. This value is well above the statistical significance limit, indicating that digitalization plays a significant role in improving overall firm performance. Firm performance, in this context, encompasses financial aspects such as profitability, operational efficiency, service quality, and market competitiveness.

H6 The Influence of Smart Supply Chain on Supply Chain Resilience.

The test results show that Smart Supply Chain does not significantly impact Supply Chain Resilience. The t-statistic value of 0.635 with a p-value of 0.525 is far above the significance level ($\alpha = 0.05$), while the path coefficient is only 0.097. This indicates that the implementation of the Smart Supply Chain concept has not been able to directly improve supply chain resilience in the companies in this study.

H7 The Influence of Supply Chain Agility on Supply Chain Performance

The research results prove that Supply Chain Agility has a positive and significant effect on Supply Chain Performance. A t-statistic of 4.405 with a p-value of 0.000 confirms that supply chain agility significantly contributes to improving a company's supply chain performance. The path coefficient of 0.448 indicates that the more agile a company is in managing its supply chain, the higher its performance in terms of coordination, efficiency, and collaboration.

H8 The Influence of Supply Chain Performance on Supply Chain Resilience

The results of the hypothesis testing indicate that Supply Chain Performance has a significant influence on Supply Chain Resilience. This is indicated by the T-statistic value of 4.605 and P-value of 0.000, which is clearly below the significance threshold of 0.05. This finding confirms that the higher the level of supply chain resilience a company has, the better the overall supply chain management. Supply Chain Resilience itself refers to a company's ability to anticipate, respond to, and recover from various sudden or prolonged disruptions, such as natural disasters, health crises, market volatility, or policy changes. When a company has a strong resilience system, the distribution, procurement, production, and customer service processes can remain stable even when facing unexpected situations.

H9 The Influence of Supply Chain Performance on Firm Performance

The results of the hypothesis testing indicate that Supply Chain Performance has a highly significant influence on Firm Performance. This is reflected in the T-statistic value of 5.854 and P-value of 0.000, which is far below the significance threshold of 0.05. This finding confirms that the higher the level of supply chain resilience a company has, the greater its contribution to achieving overall company performance. Supply Chain Resilience refers to a company's ability to withstand, adapt, and recover from various operational and market disruptions quickly and effectively. This capability directly supports the sustainability of business processes, supply stability, customer satisfaction, and the achievement of financial goals.

H10 The Impact of Supply Chain Resilience on Firm Performance

The results of the hypothesis testing indicate that Supply Chain Resilience has a significant influence on Firm Performance. A T-statistic of 2.280 with a P-value of 0.023 confirms that this relationship is statistically significant at the 95% confidence level. These findings indicate that effective and integrated supply chain management directly supports the achievement of better company performance. Strong Supply Chain Performance encompasses planning, procurement, production, distribution, and customer service activities carried out collaboratively with business partners and supported by the use of information technology.

H11 The Indirect Impact of Digitalization on Firm Performance Through Supply Chain Resilience

The results of the mediation path analysis indicate that the indirect effect of digitalization on firm performance through supply chain resilience (SCR) is statistically

significant, with a t-statistic of 2.076 and a p-value of 0.038. This indicates that digitalization not only has a direct impact but also contributes to firm performance by increasing supply chain resilience.

H12 The Indirect Effect of Digitalization on Firm Performance Through Supply Chain Performance

The table results show that digitalization has a significant indirect effect on company performance through the mediating role of supply chain management. This is evident from the T-Statistic value of 4.317, which far exceeds the critical limit, and the P-Value of 0.000, indicating a very high level of significance. In other words, digitalization indirectly improves company performance by first improving or optimizing the Supply Chain Performance process. The role of supply chain management as a mediator is crucial because digitalization provides technology and information systems that enable companies to automate, integrate data in real time, and communicate more effectively within the supply chain. This allows companies to reduce costs, accelerate distribution processes, and increase customer satisfaction, thus positively impacting overall company performance.

CONCLUSION

The results of the complex mediation pathway test indicate that the influence of digitalization on firm performance is largely indirect, through a combination of supply chain agility, supply chain performance, and supply chain resilience. This chain mediation pathway with a significant influence indicates that investment in digital transformation must be accompanied by strengthening managerial structures and an adaptive organizational culture to achieve optimal results. Overall, this study confirms that:

Digitalization has been shown to significantly impact Supply Chain Agility, Smart Supply Chain, Supply Chain Performance, and Supply Chain Resilience. This demonstrates that the adoption of digital technology provides responsiveness, operational flexibility, and resilience in the face of supply chain disruption in the fuel industry.

Supply Chain Agility and Smart Supply Chain significantly impact Supply Chain Performance and Supply Chain Resilience. This indicates that supply chain agility and intelligence are critical factors in improving operational efficiency and resilience.

Supply Chain Performance and Supply Chain Resilience significantly influence Firm Performance. This confirms that successful digitalization implementation requires strengthening management structures and supply chain resilience to achieve overall company performance improvements.

The impact of digitalization on firm performance is indirect, mediated by supply chain performance and supply chain resilience. This means that digitalization does not directly improve company performance, but rather through improvements to adaptive and resilient supply chain systems and processes.

A series of layered mediations, such as:

Digitalization→Supply Chain Performance→Firm Performance

Digitalization→Supply Chain Resilience→Firm Performance.

indicates the existence of a complex but statistically significant multilevel process.

Thus, the findings of this study provide strategic implications: companies seeking to sustainably improve performance in the digital era must prioritize integrating digitalization

with enhanced agility, supply chain management, and operational resilience. Digitalization efforts that are not supported by organizational readiness and robust managerial processes risk not having a significant impact on competitive advantage or profitability.

REFERENCES

Aghaei, M., Rahimi, N., & Tabrizi, S. (2025). Exploring LLM-based Frameworks for Supply Chain Optimization. [Exploratory study and model design].

Ahmed, R., Sadiq, M., & Khan, F. (2022). Smart Supply Chains and Their Impact on Operational Performance: A Pathway through Digitalization. International Journal of Production Economics, 250, 108581

Alfalla-Luque, R., Luján García, D.E., & Marin-Garcia, J.A. (2023). Supply chain agility and performance: evidence from a meta-analysis. International Journal of Operations & Production Management, 43(10), 1587–1633.

Ali, S.M., Paul, S.K., Chowdhury, P., & Moktadir, M.A. (2023). Impact of supply chain resilience on firm performance: The mediating role of operational efficiency. Sustainability, 15(4), 11892. https://doi.org/10.3390/su150411892

Alzoubi, H.M., & Yanamandra, R. (2023). The Moderating Role of Organizational Capability on the Relationship Between Supply Chain Digitalization and Business Performance. Benchmarking: An International Journal, 30(2), 556–577.

Asrol, M. (2024). Industry 4.0 Adoption in Supply Chain Operations. Systematic Literature Review of 525 articles.

Bag, S., Tiwari, S., Dhamija, P., & Chan, F.T.S. (2022). Building supply chain resilience through digital transformation: Empirical evidence from Indian manufacturing firms. International Journal of Production Research, 60(5), 1473–1494. https://doi.org/10.1080/00207543.2021.1950933

Beamon, B. M. (1999). "Measuring supply chain performance." International Journal of Operations & Production Management, 19(3), 275–292.

Ben-Daya, M., Hassini, E., & Bahroun, Z. (2019). Internet of Things and supply chain performance: A literature review. International Journal of Production Research, 57(15-16), 4719–4742. https://doi.org/10.1080/00207543.2017.1402140

Byrne, B. M. (2016). Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming (2nd ed.). Routledge.

Büyüközkan, G., & Göçer, F. (2018). Digital supply chain: Literature review and a proposed framework for future research. Computers in Industry, 97, 157–177. https://doi.org/10.1016/j.compind.2018.02.010

Çetindaş, A., Akben, İ., Özcan, C., Kanuşağı, İ., & Öztürk, O. (2023). The effect of supply chain agility on firm performance during COVID-19 pandemic: the mediating and moderating role of demand stability. Supply Chain Forum: An International Journal, 24(3), 307–318.

Chen, H., & Brintrup, A. (2025). Graph Neural Networks for Inter-Organizational Supply Chain Visibility. [Experimental study based on AI model & data simulation].

Chen, X., Wang, J., & Li, Q. (2023). Blockchain technology in supply chains: improving product quality and transparency. Supply chain performance: An International Journal, 28(1), 79–93.

Choi, T. M., Cheng, T. C. E., & Zhao, X. (2024). Agility and resilience in supply chain networks: The role of digital capabilities. Journal of Operations Management, 83, 1–14. https://doi.org/10.1016/j.jom.2023.102042

Chopra, S., & Sodhi, M.S. (2014). Reducing the risk of supply chain disruptions. MIT Sloan Management Review, 55(3), 73.

Chowdhury, P., Paul, S.K., Emperor, S., & Moktadir, M.A. (2021). COVID-19 pandemic related supply chain studies: A systematic review. Transportation Research Part E: Logistics and Transportation Review, 148, 102271.

Christopher, M. (2000). The Agile Supply Chain: Competing in Volatile Markets. Industrial Marketing Management, 29(1), 37–44.

Creswell, J. W. & J. David Creswell (2020). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (5th ed.). SAGE Publications.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, telephone, mail, and mixed-mode surveys: The tailored design method. Wiley.

Dube, A., Singh, R., & Goel, A. (2023). The Role of Digitalization in Supply Chain Performance: Real-Time Data and Visibility. Journal of Business Logistics, 44(4), 215-233.

Dubey, R., Bryde, D.J., Blome, C., Roubaud, D., & Giannakis, M. (2023). Facilitating firm performance through digital supply chain transformation: The mediating role of resilience. Technological Forecasting and Social Change, 190, 122373. https://doi.org/10.1016/j.techfore.2023.122373

Erika, E. (2025). The Influence of Digitalization on Supply Chain Performance Efficiency in Indonesia. Precision, 27(1), 2244. ISTN E-journal

Etikan, I., Musa, SA, & Alkassim, RS (2016). Comparison of convenience sampling and purposive sampling. American Journal of Theoretical and Applied Statistics, 5(1), 1–4.

Fahad, A. (2021). Smart supply chain and firm performance: the role of digital technologies. Emerald Insight. https://www.emerald.com/insight/1463-7154.html

Fauzi, F., Hadiguna, RA, & Suryadi, K. (2023). The effect of supply chain digitization on operational performance mediated by supply chain performance capabilities: A study in Indonesian railway logistics. International Journal of Supply chain performance, 12(1), 89–101.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Frederico, G.F., Garza-Reyes, J.A., Anosike, A., & Kumar, V. (2020). Supply chain 4.0: concepts, maturity and research agenda. Supply chain performance: An International Journal, 25(2), 262–282.

Freitag, M., Dalle, J., & Wortmann, F. (2020). Towards smart supply chain performance–concept and prototypical implementation. Procedia CIRP, 93, 510–515. https://doi.org/10.1016/j.procir.2020.04.093

Gauri, D.K. et al. (2021). Digital transformation and customer-centric supply chain. Journal of Business Research.

Gunasekaran, A., Papadopoulos, T., Dubey, R., Wamba, S.F., Childe, S.J., Hazen, B., & Akter, S. (2017). Big data and predictive analytics for supply chain and organizational

performance. Journal of Business Research, 70, 308–317. https://doi.org/10.1016/j.jbusres.2016.08.004

Gunasekaran, A., Patel, C., & McGaughey, R. E. (2004). "A framework for supply chain performance measurement." International Journal of Production Economics, 87(3), 333–347.

Ha, Y.-K., & Lee, C. (2024). Supply Chain Agility: Achieving Robustness and Logistics Performance. Journal of Distribution Science, 22(9), 65–72.

Hair, JF, Black, WC, Babin, BJ, & Anderson, RE (2022). Multivariate Data Analysis (8th ed.). Cengage Learning.

Hair, J.F., Hult, G.T.M., Ringle, C.M., & Sarstedt, M. (2021). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) (2nd ed.). SAGE Publications.

Han, J., Wang, Y., & Lin, X. (2022). The Role of Digital Technologies in Enhancing Supply Chain Agility: Evidence from Manufacturing Firms. International Journal of Operations & Production Management.

Hazen, B.T., Boone, C.A., Ezell, J.D., & Jones-Farmer, L.A. (2016). Data quality for data science, predictive analytics, and big data in supply chain performance: An introduction to the problem and suggestions for research and applications. International Journal of Production Economics, 154, 72–80.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. Advances in International Marketing, 20, 277–319.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modeling: Guidelines for determining model fit. Electronic Journal of Business Research Methods, 8(2), 53-60.

Ivanov, D., & Dolgui, A. (2021). A digital supply chain twin for managing the disruption risks and resilience in the era of industry 4.0. Production Planning & Control, 32(9), 775-788

Jahin, F., Rahman, T., & Hossain, M. (2023). AI for Supply Chain Risk Assessment and Performance Optimization. Systematic Literature Review of 1,439 articles.

Jiang, Z., Zhang, L., & Liu, X. (2023). Supply Chain Resilience and Risk Management: A Strategic Approach. International Journal of Risk and Contingency Management, 19(2), 99-114.

John W. Creswell, (2007). Qualitative Inquiry and Research Design: Choosing Among Five Approaches (5th ed.). SAGE Publications.

Jüttner, U. (2005). Supply Chain Risk Management: Understanding the Business Context. International Journal of Logistics Management, 16(1), 25–33

Kache, F., & Seuring, S. (2017). Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain performance. International Journal of Operations & Production Management, 37(1), 10–36. https://doi.org/10.1108/IJOPM-02-2015-0078

Kamble, S.S., Gunasekaran, A., & Arha, H. (2020). Sustainable Smart Supply chain performance: Literature Review and Research Directions. International Journal of Production Research, 58(2), 608–629.

Kane, G.C., Palmer, D., Phillips, A.N., Kiron, D., & Buckley, N. (2015). Strategy, not technology, drives digital transformation. MIT Sloan Management Review and Deloitte University Press.

Kuncorosidi, K., & Pamungkas, RA (2024). Systematic Literature Review: Supply Chain Digitalization for Future Disruption. Journal of Business, 12(2), 1–30. Journal of Business

Kwak, Y. H., Park, J., & Lee, H. (2023). Digital Transformation and Supply Chain Resilience: A Systematic Review and Future Research Agenda. Supply chain performance: An International Journal, 28(4), 395-410.

Lee, Y. (2021). Strategic supply chain performance and its effect on firm performance: A case study approach. Sustainability, 13(3), 1221. https://doi.org/10.3390/su13031221

Li, M., Chen, J., & Tang, C. (2023). Flexibility and Visibility as Key Drivers of Supply Chain Resilience: Evidence from Manufacturing Firms. Journal of Operations Management, 77(1), 45-60.

Li, X., & Sun, Y. (2022). Does Technology Readiness Enhance Supply Chain Digitalization and Firm Performance? Evidence from Chinese Manufacturing Firms. Journal of Business Research, 147, 433–443.

Li, X., Hou, J., & Tang, C. (2023). The impact of digital contract coordination on supply chain resilience and firm performance. Frontiers of Engineering Management, 10(1), 66–81. https://doi.org/10.1007/s42524-023-00214-2

Likert, R. (2020). A technique for the measurement of attitudes. Archives of Psychology, 22(140), 5-55.

Liu, C., Shang, Y., & Zhang, J. (2021). The impact of digital transformation on firm performance: Evidence from China's manufacturing sector. Technology in Society, 67, 101745. https://doi.org/10.1016/j.techsoc.2021.101745

Makudza, F., Jaravaza, D.C., Govha, T., Mukucha, P., & Saruchera, F. (2023). Enhancing supply chain agility through e-procurement in a volatile frontier market. Journal of Transport and Supply chain performance, 17, a847.

Munir, RI, Hanif, M., & Afzal, A. (2023). Supply chain risk management and firm performance: The mediating role of supply chain resilience. Journal of Risk and Financial Management, 16(4), 211. https://doi.org/10.3390/jrfm16040211

Munir, R., Ahmed, M., & Yusuf, H. (2023). Strategic Partnerships and Information Sharing for Enhancing Supply Chain Resilience: A Developing Country Perspective. Journal of Supply chain performance Science, 7(2), 33-49.

Nair, A., Dreyfus, D., & Thomas, A. (2021). Role of supply chain visibility in enhancing supply chain agility and resilience: Evidence from the healthcare sector. Journal of Business Logistics, 42(2), 187–210. https://doi.org/10.1111/jbl.12254

Nguyen, TH, Nguyen, HM, & Ho, T.T. (2022). Organizational Capabilities, Supply Chain Digitalization, and Firm Performance: A Moderated Model. Journal of Enterprise Information Management, 35(7), 1693–1714.

Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory (3rd ed.). McGraw-Hill.

Oliveira, CR, Rodrigues, LL, & Lima, MF (2023). Digital transformation in supply chain performance: impact on operational costs and performance. Journal of Business Research, 156, 289–299.

Patil, R., & Deshmukh, S. (2023). Leveraging Data Analytics for Building Supply Chain Resilience in the Post-Pandemic Era. Journal of Business Logistics, 44(1), 88-102.

Pereira, C.R., Silva, A.L., Tate, W.L., & Christopher, M. (2023). Enhancing supply chain resilience: The impact of agility and risk management capabilities. Supply chain performance: An International Journal, 28(1), 19–34. https://doi.org/10.1108/SCM-10-2022-0424

Pereira, C., Martinez, L., & Oliveira, P. (2023). Collaborative Supply chain performance: Benefits and Challenges. Supply chain performance: An International Journal, 28(6), 482-498.

Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. The International Journal of Logistics Management, 20(1), 124–143.

Queiroz, M.M., Telles, R., & Bonilla, S.H. (2020). Blockchain and supply chain performance integration: A systematic review of the literature. Supply chain performance: An International Journal, 25(2), 241–254. https://doi.org/10.1108/SCM-03-2018-0143

Rahman, M. M., Ferdous, J., & Ahmed, T. (2023). Supply Chain Agility as a Mediator in the Digitalization-Performance Nexus: An Empirical Study. Journal of Business Research.

Saeed, K., Malhotra, M., & Abdinnour, S. (2024). Enhancing supply chain agility through information systems artifacts and process standardization: an empirical assessment. Journal of Systems and Information Technology, 26(3), 337–362.

Schoenherr, T., & Speier-Pero, C. (2015). Data science, predictive analytics, and big data in supply chain performance: Current state and future potential. Journal of Business Logistics, 36(1), 120–132. https://doi.org/10.1111/jbl.12082

Sekaran, U., & Bougie, R. (2020). Research Methods for Business: A Skill-Building Approach (8th ed.). John Wiley & Sons.

Sharifi, H., & Zhang, Z. (2001). Agile manufacturing in practice—Application of a methodology. International Journal of Operations & Production Management, 21(5/6), 772–794.

Sharma, R., Dhir, A., & Talwar, S. (2023). Technology Readiness and Digital Transformation in Supply Chains: A Moderated Mediation Approach. Technological Forecasting and Social Change, 191, 122565.

Siagian, M., Pranoto, H., & Dewi, L. (2024). The Role of SCM in Improving Competitive Advantage of Indonesian SMEs. A quantitative survey of 150 SMEs in Central Java.

Sulistiowati, D. (2025). The Impact of Digitalization and Supply Chain Integration on Company Performance: A Supply Chain 4.0 Perspective. Diklatkerja.diklatkerja.com

Suriyanti, S., Serlin, S., Agustriyana, A., & Rahmini, M. (2025). The Effect of Supply Chain Digitalization on Operational Efficiency, On-Time Delivery, and Product Quality. Center of Economic Students Journal, 8(1), 1041.jurnal.fe.umi.ac.id

Tan, K. C. (2001). A Framework of Supply chain performance Literature. European Journal of Purchasing & Supply Management, 7(1), 39–48.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International Journal of Medical Education, 12, 53-55. https://doi.org/10.5116/ijme.5c8e.9e6f

Tukamuhabwa, B.R., Stevenson, M., Busby, J., & Zorzini, M. (2015). Supply chain resilience: definition, review and theoretical foundations for further study. International Journal of Production Research, 53(18), 5592–5623.

Wamba, S. F., & Queiroz, M. M. (2020). Big data analytics in supply chain performance: A review and bibliometric analysis. Computers & Industrial Engineering, 149, 106889. https://doi.org/10.1016/j.cie.2020.106889

Wang, M., & Wang, B. (2023). Supply chain agility as an antecedent of post-COVID-19 corporate sustainability. The International Journal of Logistics Management, 35(1), 281–303.

Wang, M., Jie, F., & Frederico, G.F. (2024). Measuring supply chain agility during the COVID-19 pandemic: Empirical evidence from UAE firms. International Journal of Agile Systems and Management, 17(1), 1–15.

Wu, J., & Liu, Z. (2023). Information Sharing and its Impact on Supply Chain Responsiveness. International Journal of Operations & Production Management, 43(1), 98-115.

Yusuf, Y.Y., Gunasekaran, A., Adeleye, E.O., & Sivayoganathan, K. (2004). Agile supply chain capabilities: Determinants of competitive objectives. European Journal of Operational Research, 159(2), 379–392.

Zhang, Q., Zhang, L., & Shi, Y. (2023). Artificial Intelligence in Supply chain performance: Trends, Applications, and Challenges. Journal of Manufacturing Technology Management, 34(2), 189-208.

Zhang, X., Huang, J., & Li, Y. (2022). Big data-driven supply chain performance: A review and future research directions. Technological Forecasting and Social Change, 174, 121214. https://doi.org/10.1016/j.techfore.2021.121214

Zhao, L., Hong, P., & Lau, AKW (2023). Digital supply chain transformation and firm performance: The mediating roles of supply chain resilience and supply chain performance. International Journal of Production Economics, 257, 108759. https://doi.org/10.1016/j.ijpe.2023.108759

Zhao, L., Wang, J., & Wang, H. (2023). Building Resilient Supply Chains in Uncertain Environments: A Capabilities-Based Perspective. International Journal of Production Economics, 258, 108764.