



THE IMPACT OF LOGISTICS MANAGEMENT PRACTICES ON OPERATIONAL PERFORMANCE: THE MEDIATING ROLE OF SUPPLY CHAIN RESILIENCE

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KEYWORDS	ABSTRACT
Logistics Management, Supply Chain Resilience	This paper explores how the operations of logistics management practices affect its performance and specifically whether the concepts of supply chain resilience play a mediating role. The study fills the gap in the knowledge on how various logistics functions play unequally to resilience and performance, particularly in developing economies such as Pakistan. The most important point is that when compared with classic logistics functions, those practices facilitated by technology and processes are more effective. An analytical cross-sectional, quantitative research design was used. Two hundred people were surveyed in the manufacturing, logistics, and other related industries. The research employed the Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS to evaluate the measurement and structural models such as reliability, validity and mediation effects. Findings suggest that IT adaptation ($\beta = 0.344$ $p < 0.001$), order process management ($\beta = 0.213$ $p < 0.05$) and inventory management ($\beta = 0.163$ $p < 0.05$) are significant factors affecting the resilience of supply chains whereas warehousing, transportation, and packaging are not significant. The operational performance is highly affected by supply chain resilience ($\beta = 0.859$, $p < 0.001$) with $R = 0.722$ and $R = 0.738$, which ascertains that the resilience has great explanatory power. This research has an added value of illustrating how resilience can be selective as a mediator and emphasizes the increasing significance of digital logistics in comparison with the traditional practices.
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Introduction

Background of the Study

The growing dynamic nature of international business environments has further enhanced the high value of the practice of logistics management in ensuring high performance in business

operations. According to Alkhatib and Momani (2023), logistics systems allow the company to stay competitive in the dynamic market, whereas Al Tera et al. (2024) believe that the contemporary logistics configurations can improve both operational efficiency and quality of services. In a similar perspective, Zvinowanda (2025) emphasizes that integration of logistics is important in terms of lowering operations expenses and enhancing responsiveness. The fact that the practices of logistics management including inventory, transportation and warehousing are key determinants of operational performance and long-term success of an organization is substantiated by earlier groundbreaking studies made by Green et al. (2008) and Ballou (2007).

Problem Statement

Although the logistics management practices have gained significant importance as important drivers of operational performance, most organizations especially in developing economies have been plagued by inefficiencies in the logistics operations leading to high costs, delays in the delivery, and low standards of services. Research shows that poor interconnection between logistics challenges, including inventory management, transportation and warehouse, are limiting the potential of firms to reach optimality in performance results (Alkhatib & Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). Moreover, the growing global upheavals, such as uncertainties in the supply chains and technological changes have revealed the susceptibility of conventional logistics infrastructures and underscored the necessity of more resilient supply chains (Negi & Jaiswal, 2025). Though previous studies have found the existence of the direct relationship between the logistics management practices and the operational performance, the little focus has been directed at the underlying mechanisms to explain the existence of this relationship especially at the level of the mediating factor in terms of supply chain resilience (Li et al., 2006; Christopher, 2016). This gap limits a thorough conception of the impact of logistics capabilities in the comfort of improvements in performance, which implies the need to conduct empirical inquiries into mediating consequences of supply chain resilience in the arrangements of logistics-performance connections.

Objectives of Study

- To test how logistics management practices (inventory management, warehousing, order process management, transportation, packaging, and IT adaptation) influence the supply chain resilience.
- To examine how supply chain resilience influences operations.
- To determine the immediate linkage between the practices of logistics management with operational performance.
- To examine the mediating position of supply chain resilience on the correlation among logistics management practices and operational performance.

- To deliver actionable knowledge that can guide organizations to improve operational performance by improving logistics practices and solid supply chain policies.

Research Questions

RQ1: What are the impacts of logistics management practices (inventory management, warehousing, order process management, transportation, packaging practices, and IT adaptation) on supply chain resilience?

RQ2: How has supply chain resilience affected operational performance?

RQ3: What is the direct relationship between logistics management practices and operational performance?

RQ4: Does provision chain resilience mediate a relation among logistic management methods and the operational performance?

Gap Analysis

Study analysis shows that there is an evident research gap, which involves the possibility to explore the underlying mechanisms of connecting the practices of logistics management with the operational performance, especially in the framework of developing countries such as that of Pakistan. Although, previous research has broadly conducted investigations on the direct impacts of the logistics like inventory, transportation and warehousing on the performance outputs, most of them fail to investigate how and in what routes these practices are transformed into the performance outputs. In particular, the mediating role of supply chain resilience is not thoroughly covered, and current literature does not have integrated empirical models to address direct and indirect relationships (Aljawazneh, 2025; Al Tera et al., 2024; Zvinowanda, 2025).

Literature Review

Theoretical Foundation

The paper is based on an organized theoretical framework to discuss how the practices of logistics management affect the performance of operations with the mediating effect of supply chain resilience. Organizations in a highly dynamic and uncertain business environment need theoretical viewpoints on how operational strategies evolve over time in the face of a dynamic environment. Recent research highlights that incorporation of logistics practices and resilience capabilities boost organizational adaptability and performance (Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). The significance of aligning organizational activities with environmental factors to produce the best performance results is also noted in previous bodies of work (Christopher, 2016; Ballou, 2007). Thus, the significant theory is Contingency

Theory that is backed by the theories of Dynamic Capabilities and Supply Chain Management.

Contingency Theory

The Contingency Theory is the key theoretical basis behind the current study, which posits that there is never a superior way to approach organizational processes, but the ability to do so effectively relies on designs that fit between internal processes and changes that occur in the external environment. Market fluctuations, disruptions, and technological advancements are some of the uncertainties that require congruence of logistics management practices in order to attain optimum performance in terms of this research. Recent research shows that organizations that adjust the logistics map depending on the environmental factors gain better performance and resilience (Aljawazneh, 2025; Negi and Jaiswal, 2025; Khan et al., 2024). Moreover, contingency-based strategies help to be flexible and responsive to disruptions and enhance the results of operations to firms (Zvinowanda, 2025). This is also supported by previous research that indicates that organizational performance largely relies on the strategy environment fit (Lawrence and Lorsch, 1967; Donaldson, 2001). In this way, the Contingency Theory gives a solid basis in explaining the relationship between the logistics practices and performance.

Dynamic Capabilities Theory

The first of the supporting theories is the Dynamic Capabilities Theory which theorizes that organizations respond to the changing environments by adapting, integrating and rearranging their resources. In this research, the concept of supply chain resilience is defined as a dynamic capability, which enables companies to act efficiently to disruptions and uncertainties. According to the latest publications, the adaptive capabilities of organizations help them to stay afloat and retain productivity even in unpredictable circumstances (Negi and Jaiswal, 2025; Aljawazneh, 2025; Khan et al., 2024). Moreover, dynamism capabilities are known to promote flexibility and innovation among the logistics activities (Zvinowanda, 2025). Prior studies also express the fact that dynamic capabilities are necessary in the long run competitive success and success of an organization (Teece et al., 1997; Eisenhardt and Martin, 2000). Thus, this theory justifies the mediation of supply chain resilience.

Supply Chain Management (SCM) Theory

The second theory that is supported is the Supply Chain Management (SCM) Theory that concentrates on the development of integration and coordination of supply chain operations in order to realise efficiency and performance. The practices that are at the heart of SCM are, logistics management practices since they guarantee the smooth movement of goods, information and resources along the supply chain. Recent research reveals that integrated logistics enhance coordination, responsiveness, and the quality of service (Alkhatib and Momani, 2023; Al Tera et al., 2024; Ahmed et al., 2023). Moreover, efficient integration of the supply chain is associated with improved resilience and performance (Zvinowanda, 2025). Prior research also reaffirms that integrated supply chain operations function greatly in enhancing performance and lowered

operational expenses (Mentzer et al., 2001; Cohen and Roussel, 2005). Therefore, the theory of SCM supplements the model suggested.

Empirical Study

The relationship between logistics management practices and operational performance is widely known to be of great cruciality in operational performance, although academic views towards this relationship have been inconsistent. Pro-side arguments point out that efficient logistics strategies like inventory management, warehousing, and transportation are characterized by the fact that these practices are highly efficient, effective, and cost-effective and aid in the delivery of services (Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). These papers underscore the fact that integrated logistics systems help organizations to rationalize operations and gain competitive edge. On the contrary, there is a group of researchers who hold the view that the logistics practices may not necessarily lead to better performance in a setting where uncertainty is high, and the infrastructure is weak (Khan et al., 2023; Ahmed and Qureshi, 2024). Previous researches also indicate that unless there are sufficient alignment and coordination, logistics activities might cause inefficiencies instead of improvements (Ballou, 2007; Green et al., 2008). Therefore, the connection between the logistics practices and performance is context-related.

Namely, the inventory management, the supporting literature reveals that an active inventory control system leads to better operational performance in terms of lowering holding cost or eliminating stockouts (Al Tera et al., 2024; Ahmed and Qureshi, 2024; Zvinowanda, 2025). The digital technologies used in the modern inventory systems in addition enhance better forecasting of demand and accuracy in decision making. Nevertheless, there are arguments that overemphasize on inventory reduction and subsequent strategies, including just-in-time (JIT), can make supply chains more susceptible to disruptions (Negi and Jaiswal, 2025; Khan et al., 2024). Past studies also emphasize that a lack of inventory planning can result in delays in production and inefficiencies in operations (Heizer & Render, 2006; Nyaberi and Mwangangi, 2014). As such, inventory management is vital but its performance is determined by contextual aspects like uncertainty in the demand and security in the supply chain.

Hypothesis Development

Inventory Management and Supply Chain Resilience

The importance of inventory management in making a supply chain resilient to disruptions is to assure supply of materials and minimize uncertainty caused by disruptions. According to recent research, the use of rich inventory systems that are assisted by digital technologies can enhance responsiveness and flexibility and allow firms to stay operational (Al Tera et al., 2024; Negi and Jaiswal, 2025; Zvinowanda, 2025). Sound inventory management enables organizations to deal with demand variability and reduce the risks that come about as a result of a supply shortfall. Previous studies further substantiate the fact that adequate inventory management plays a role in stability and flexibility of supply chains (Heizer and Render, 2006).

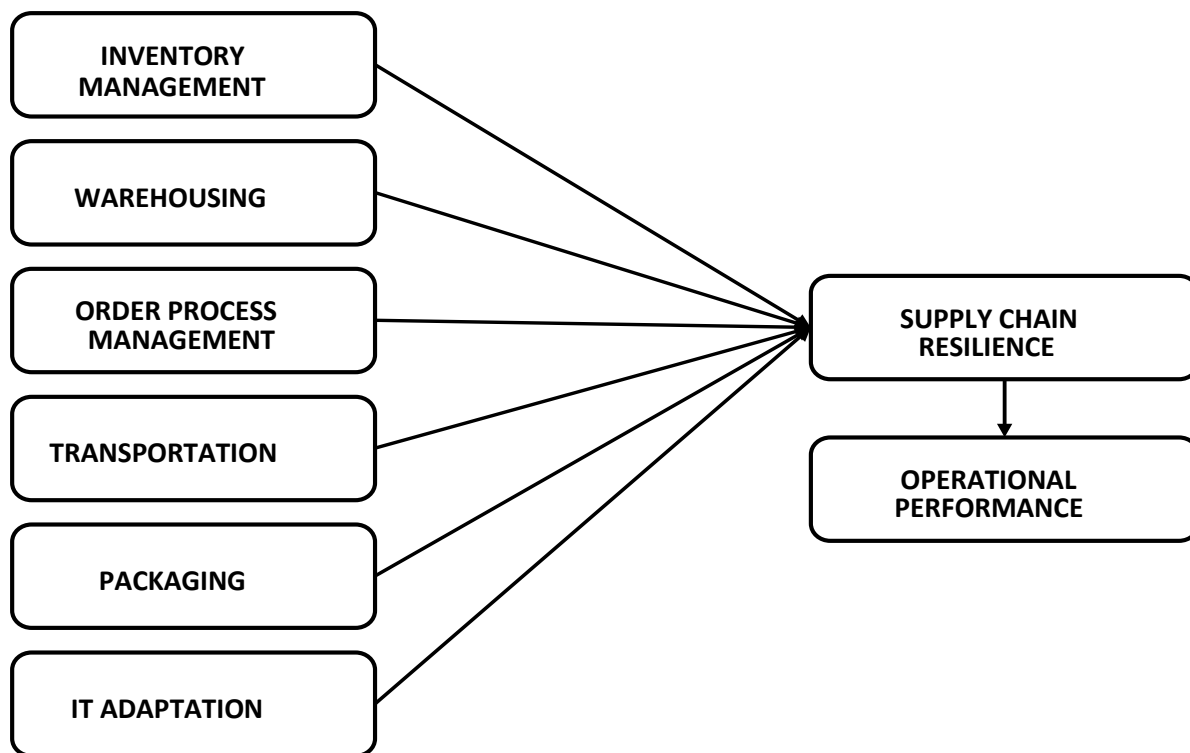


Figure 1 Conceptual Framework

Warehousing and Supply Chain Resilience

Warehousing plays a great part in supply chain resilience through the effective storage, distribution and availability of goods. An automation system and digital tracking of modern warehousing improve the efficiency of operations and allow a quick response to the disruptive events (Aljawazneh, 2024; Rahman et al., 2023; Siddiqui et al., 2024). Such systems can guarantee that the flow of materials is smooth and enhance the coordination among supply chain nodes. Previous studies also indicate that an apt warehousing helps in increasing the reliability and flexibility of supply chains (Bowersox et al., 2010).

Supply Chain Resilience and Order Process Management

Order process management helps the supply chain to be resilient, in that its proper system fulfills customer orders in time and in the right way. Efficiency in order processing systems enhances coordination among the supply chain partners as well as facilitates quick response by organizations to demand fluctuations (Negi & Jaiswal, 2025; Aljawazneh, 2025; Zvinowanda, 2025). Order tracking is real-time, and systems are integrated to enhance visibility and minimise uncertainty. Previous studies also emphasize that an efficient order management enhances supply chain responsiveness and stability (Croxtton, 2003).

H1: Inventory management contributes greatly to resilience in the supply chain.

H2: Warehousing positively affects the resilience of the supply chain.

H3: Supply chain resilience is positively influenced considerably by order process management.

Resilience of Transportation and Supply Chain

The transportation management is a crucial part in promoting the resilience of the supply chain since it ensures goods are promptly delivered in the supply chain network. Good transport systems also contribute to the reliability of the delivery process and allow organizations to react to the disruption promptly (Alkhatib and Momani, 2023; Raza et al., 2025; Hussain et al.,

2023). Digital transportation tools also improve efficiency of routes and minimize delays. Past studies also weigh in favor of the idea that transportation efficacy enhances the synchrony of the supply chain and its efficiency (Randall et al., 2010).

Resilience in Packaging and the Supply Chain

Packaging is very critical in enhancing the resilience in the supply chain, by providing defence to the products and keeping the products safe when it comes to handling and transportation. Recent innovations in packaging enhance durability and decrease the risk of product destruction, thus ensuring a reliable supply chain (Al Tera et al., 2024; Zvinowanda, 2025; Hussain et al., 2023). Efficient logistics can also be maintained via packaging as it simplifies storage and transportation. Previous studies affirm that packaging is the source of operational stability and safety of products (Vergheese et al., 2015; Zhou et al 2023).

IT Adaptation and Supply Chain Resilience

One of the enablement of the supply chain resilience is IT adaptation; it improves the visibility, coordination, and decision-making abilities. Innovative solutions like AI, blockchain, and realtime tracking systems can allow organizations to track their operations and react in an efficient way to disruption (Aljawazneh, 2024; Rahman et al., 2023; Siddiqui et al., 2024). Such systems enhance movement of information and minimize uncertainty within the supply chain networks.

H4: There is a substantial positive effect of transportation on resilience of supply chain.

H5: Packaging plays a very big positive role of supply chain resilience.

H6: IT adaptation positively affects supply chain resilience.

Methodology

Research Design

To address the research questions, the study will engage a quantitative research design to investigate the existence of a relationship between the practices of logistics management, supply chain resilience, and operational performance. In the sphere of supply chain and operations research, quantitative methods are popular in order to test hypotheses and prove causal relationships of variables with help of statistics. Recent papers point to the fact that quantitative designs yield strong and generalized results when applied to analyzing complicated models with many variables and mediating effects (Omoush, 2022; Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). Moreover, survey-based data collection facilitates scholars to obtain standard responses on a big sample. The prior research on methodology also proves the effectiveness of quantitative research to test the theoretical model and validate the empirical relationships (Hair et al., 2017; Sekaran and Bougie, 2016).

Research Approach

The rationale that led to the choice of a quantitative research approach in this study is that the study required empirical investigation into the relationships among the logistics management practices, supply chain resilience and operating performance based on measurable data. The quantitative approaches allow testing intricate models incorporating multiple variables and mediation impacts in a highly objective and precise manner. Recent research highlights that the quantitative design is especially beneficial in supply chain research to researchers to justify the theoretical framework and produce generalizable results (Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). Furthermore, it indicates that structured questionnaires can be used to collect data on a large sample using standardized and thus comparable data. This is also supported by previous studies that quantitative methods are appropriate to test hypotheses and validate models in management researches (Hair et al., 2017; Sekaran and Bougie, 2016).

PLS-SEM

Moreover, in this research, Partial Least Squares Structural Equation Modeling (PLS-SEM) is used as the main method of data analysis. PLS-SEM works well especially when we have complicated models with a number of independent variables and mediating relationships. Recent papers posit that PLS-SEM has been extensively applied to supply chain and logistical research, as it can process small to medium sample sizes and non-normal distributions of data (Al Tera et al., 2024; Zvinowanda, 2025; Negi and Jaiswal, 2025; Omoush, 2022). It enables the assessment of both measurement and structural models in parallel, which gives an in-depth view of reliability as well as cause-effect relationships. Previous studies also point out that PLS-SEM could prove to be useful in theory-making and prediction-driven research (Hair et al., 2017; Chin, 1998).

Mediation Analysis Design

Besides this, the research will consider a mediation analysis design to investigate the back effects of logistics management practices on operational performance via the supply chain resilience. By designing it in this way, the researcher is able to investigate both the direct relationships and the mechanisms behind them that give an insight into how performance outcomes are determined by logistics practices. Recent reports state that mediation analysis has emerged as an essential tool to reveal latent relationships and refine the theoretical knowledge in the research of supply chains (Aljawazneh, 2025; Khan et al., 2024; Raza et al., 2025). By implementing mediation analysis in the context of PLS-SEM, the analysis offers a more indepth analysis of the developed model. The former literature also verifies that mediation analysis is critical to testing indirect effects and proving theories (Baron and Kenny, 1986; Hayes, 2013).

Population

The data was obtained in this study based on the structured questionnaire that was disseminated to the professionals in logistics and organizations related to supply chain. Primary collection of data is highly embraced in the study of supply chains because it offers primary perspectives that offer first hand information about organizational practices and their performance results. According to recent researches, a data collection approach that is based on surveys allows the researcher to obtain consistent and valid answers among different respondents (Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025; Wei et al, 2026). The Likert-scale items were used to develop the questionnaire to assess the perception of the respondents in relation to logistics practices, resilience of the supply chain, and operational performance. In the studies of business and management research, the structured questionnaires are also evaluated to be beneficial in gathering quantitative data in previous studies (Sekaran and Bougie, 2016; Omoush, 2022;).

Demographic Profile

Table 1 Demographic Profile

Demographic Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	128	64.0
	Female	72	36.0
Age Group	21–30 Years	58	29.0
	31–40 Years	74	37.0
	41–50 Years	44	22.0
	Above 50 Years	24	12.0
Educational Qualification	Bachelor’s Degree	70	35.0
	Master’s Degree	104	52.0
	MS / MPhil	18	9.0

Professional Experience	Doctorate (PhD)	8	4.0
	Less than 5 Years	46	23.0
	5–10 Years	82	41.0
	11–15 Years	42	21.0
Organizational Role	More than 15 Years	30	15.0
	Technical / Operational Staff	68	34.0
	Team Leaders / Supervisors	56	28.0
	Middle-Level Management	48	24.0
Industry Type	Top / Senior Management	28	14.0
	Manufacturing Firms	92	46.0
	Logistics & Transportation	56	28.0
	Information Technology	30	15.0
	Other Sectors	22	11.0

The demographics analysis revealed that male respondents (64 percent of participants) participated more than females (36 percent), which implies that there was predominant participation by males. The age range varied between 31–40 years (37 percentage) and 21–30 (29 percentage) which indicated that the sample consisted of relatively young and career-oriented people. Education wise, there was a clear representation of well-educated respondents with a large percentage of respondents having a Master degree (52%), then came holders of a Bachelor degree (35%). In terms of professional experience, the largest proportion of respondents (41% of all) were experienced between 5–10 years, which is a moderate experience with the industry, and 23 percent had fewer years. At the organisational level, the majority of the respondents represented technical/operation (34%), supervisors (28%), and middle management (24 percent) in a way such that individuals across the different levels of hierarchy are represented. Lastly, manufacturing firms were the most common origin of the sample (46%), with a substantial presence of logistics and transportation (28%), meaning that the study mostly represents insights of core operational- and supply chain-related sectors.

Sampling

The study population will be employees of logistics, supply, operations, and other similar departments of organizations based in Pakistan. These are managers, supervisors and operational level staff with logistics applicability in terms of knowledge and experience. They used a purposive sampling method to ensure that those respondents who used supply chain activities directly were sampled, which guaranteed the appropriateness and precision of the data. Recent research shows that purposive sampling is suitable when it is necessary to cover certain domains of knowledge (Khan et al., 2024; Ahmed and Qureshi, 2024; Rahman et al., 2023). To determine the required sample size to conduct a PLS-SEM analysis, the size was set regarding the needs of the statistical power. Previous studies also confirm that non-probability sampling approaches are

appropriate when doing exploratory and theories-testing research (Hair et al., 2017; Saunders et al., 2019).

Measurement Instrument

Content and construct validity were variously measured through the adaptation of the measurement instrument based on the validated scales in past literature. Questions assessing logistics management practices, supply chain resilience, and operational performance were revised to align to the context of the study without affecting the original meaning. According to recent studies, indicating the validated instruments will increase the measurement accuracy and the comparability across the research (Rahman et al., 2023; Siddiqui et al., 2024; Ahmed and Qureshi, 2024). Also, incorporation of multi-item scales enhances the constructions reliability. The literature published previously also substantiates the idea that to make empirical research valid, instrument adaptation is necessary (Sekaran and Bougie, 2016; Malhotra, 2010).

Results and Discussion

The findings of this paper give a solid empirical support on the role of logistics management practices in supply chain resilience and operational performance. The findings indicate that not every logistics practice plays an equivalent role in resiliency, with the need to focus on particular operating capabilities being crucial. Specifically, digitally facilitated and processbased logistics systems have significant positive effects on supply chain resilience because IT adaptation, managing the order process, and inventory management showed significant positive effects on minimizing organizational responsiveness and adaptability in changing business conditions. The results align with the recent literature that highlights the importance of digital transformation and automated process integration to achieve supply chain agility and resilience (Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). Moreover, the earlier groundbreaking research studies also substantiate the thesis that synchronized logistics operations and effective inventory management are essential in the drive towards delivering excellent operational results (Ballou, 2007; Green et al., 2008).

Outer Loadings

Table 2 Outer Loadings

		Outer loadings Mean, STDEV, T values, p values				
		Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
IM1	<- INVENTORY _MANAGEMENT	0.890	0.890	0.019	46.924	0.000
IM2	<- INVENTORY _MANAGEMENT	0.915	0.914	0.013	71.815	0.000

IM3 <- INVENTORY _MANAGEMENT	0.902	0.903	0.016	57.058	0.000
ITA1 <- ITA ADAPTATION	0.878	0.877	0.017	52.565	0.000
ITA2 <- ITA ADAPTATION	0.901	0.901	0.014	63.534	0.000
ITA3 <- ITA ADAPTATION	0.858	0.857	0.022	38.622	0.000
OP1 <- OPERATIONAL _PERFORMANCE	0.924	0.923	0.012	75.094	0.000
OP2 <- OPERATIONAL _PERFORMANCE	0.948	0.947	0.008	117.941	0.000
OP3 <- OPERATIONAL _PERFORMANCE	0.919	0.919	0.014	67.709	0.000
OPM1 <- ORDER PROCESS MANAGEMENT	0.911	0.911	0.017	54.391	0.000
OPM2 <- ORDER PROCESS MANAGEMENT	0.934	0.934	0.010	97.558	0.000
OPM3 <- ORDER PROCESS MANAGEMENT	0.911	0.911	0.013	70.713	0.000
PAC1 <- PACKAGING	0.886	0.886	0.018	49.150	0.000
PAC2 <- PACKAGING	0.882	0.881	0.024	37.496	0.000
PAC3 <- PACKAGING	0.875	0.875	0.019	46.217	0.000
SCR1 <- SUPPLY CHAIN_RESILIENCE	0.938	0.938	0.009	102.321	0.000
SCR2 <- SUPPLY CHAIN_RESILIENCE	0.926	0.925	0.013	69.407	0.000
SCR3 <- SUPPLY CHAIN_RESILIENCE	0.916	0.916	0.012	75.916	0.000
TRA1 <- TRANSPORTATION	0.905	0.905	0.013	69.942	0.000
TRA2 <- TRANSPORTATION	0.890	0.890	0.016	56.034	0.000
TRA3 <- TRANSPORTATION	0.860	0.859	0.023	36.924	0.000
WH1 <- WAREHOUSING	0.870	0.871	0.018	49.243	0.000
WH2 <- WAREHOUSING	0.886	0.886	0.017	52.852	0.000
WH3 <- WAREHOUSING	0.837	0.834	0.031	27.038	0.000

The results of the outer loadings indicate that all the measurement indicators are strong in reliability and statistical significance. By factor, in particular, all loading of the factors measure between 0.837 and 0.948 which is above the recommended loading agent of 0.70, hence the reliability of the indicators. Also the T-statistics values are significantly greater than the critical value of 1.96, and all the p values are 0.000, this shows that each indicator has a significant

contribution towards its construct. Our values are also consistent with the standard deviation showing that the values have not significantly changed, with the relative level of the standard deviation (Sd) showing that there is not a lot of variability in the data. The quality of measurement is well supported, as the loadings of two of the constructs, operational performance and the supply chain resilience, are quite high. Altogether, the obtained results validate the fact that the measurement model is usable, valid, and reliable enough to carry out further analysis of structural models.

Reliability and Validity Analysis

Table 3 Reliability and Validity Analysis

Construct reliability and validity				
	Overview Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
INVENTORY MANAGEMENT	0.887	0.894	0.930	0.815
ITA ADAPTATION	0.853	0.855	0.911	0.773
OPERATIONAL PERFORMANCE	0.922	0.923	0.951	0.865
ORDER PROCESS MANAGEMENT	0.908	0.909	0.942	0.844
PACKAGING	0.856	0.857	0.912	0.776
SUPPLY CHAIN RESILIENCE	0.918	0.918	0.948	0.859
TRANSPORTATION	0.862	0.865	0.916	0.784
WAREHOUSING	0.832	0.840	0.899	0.747

Construct reliability and validity results show that all constructs in the study show good internal consistency and convergent validity. In particular, the alpha Cronbach values lie in the range of 0.832-0.922, which is more than the recommended value of 0.70, which ensures that there is acceptable reliability. In the same way, the value of composite reliability (rho a and rho c) of all constructs has a value that exceeds 0.80 implying that the measurement items show a high degree of reliability and consistency. Besides, the average variance extracted (AVE) is between 0.747 and 0.865, all above the minimum of 0.50 which is the appropriate measure of convergent validity. Operation performance and supply chain resilience are some of the constructs with a high degree of reliability and validity, which indicates strong quality of measurement. In general, these findings validate that the measurement model is robust and valid, and can be analyzed later to other structural models.

Discriminant Validity

Table 4 Discriminant Validity

Discriminant validity		Heterotrait-monotrait ratio (HTMT) ~ Matrix						
	Inventory Management	IT Adaption	Operational Performance	Order Process Management	Packaging	Supply Chain Resilience	Transportation	Warehousing
Inventory Management								
IT Adaption	0.823							
Operational Performance	0.794	0.877						
Order Process Management	0.903	0.786	0.785					
Packaging	0.832	0.969	0.806	0.813				
Supply Chain Resilience	0.829	0.892	0.934	0.819	0.857			
Transportation	0.936	0.956	0.844	0.864	0.958	0.869		
Warehousing	0.974	0.859	0.811	0.946	0.865	0.839	0.962	

The mixed evidence points out to the HTMT results including discriminant validity between the constructions. Although some of the values are lower than the recommended threshold of 0.90 like between inventory management and IT adaptation (0.823), operational performance and IT adaptation (0.785) implying that they do not have a problem, some of the relationships are higher than this threshold which may indicate a problem. It is important to note that the values of HTMT have been found to be high among packaging and IT adaptation (0.969), transportation and packaging (0.958), transportation and IT adaptation (0.956), warehousing and inventory management (0.974), warehousing and order process management (0.946), and transportation and inventory management (0.936). Also, the correlation between the supply chain resilience and the operational performance (0.934) are also above the threshold. The results indicate that not all constructs are differentiated enough, and they have an overlap in their conceptual specifications. Thus, the partial discriminant validity is obtained; however, constructs or indicators might need to be refined to enhances the uniqueness of the measurement model.

Fornell-Larcker Criterion

Table 5 Fornell-Larcker Criterion

		Fornell-Larcker criterion						
	Inventory Management	IT Adaption	Operational Performance	Order Process Management	Packaging	Supply Chain Resilience	Transportation	Warehousing
Inventory Management	0.903							

IT Adaption	0.720	0.879						
Operational Performance	0.721	0.780	0.930					
Order Process Management	0.811	0.693	0.719	0.919				
Packaging	0.724	0.829	0.717	0.717	0.881			
Supply Chain Resilience	0.753	0.790	0.859	0.748	0.760	0.927		
Transportation	0.820	0.823	0.754	0.766	0.824	0.774	0.885	
Warehousing	0.843	0.730	0.717	0.822	0.734	0.738	0.822	0.864

The results of the Fornell-Larcker criterion show that the discriminant validity is usually reached in relation to the constructs, because the square root of the AVE of a construct (the diagonal values) is more than the inter-constructs correlations. As an example, the diagonal value of inventory management (0.903), IT adaptation (0.879), operational performance (0.930), and supply chain resilience (0.927) are more than their correlations with the other constructs, which indicates sufficient distinctiveness. Nevertheless, some of the correlations like those between supply chain resilience (0.859) and operational performance (0.843) and warehousing and inventory management (0.843) are relatively elevated and show the hacking into but within acceptable ranges. On the whole, the findings uphold the existence of discriminant validity, indicating that each of the constructs is tested empirically, but there can be conceptual overlaps between related constructs.

Cross Loadings

Table 6 Cross Loadings

	Cross loadings							
	Inventory Management	IT Adaption	Operational Performance	Order Process Management	Packaging	Supply Chain Resilience	Transportation	Warehousing
IM1	0.890	0.606	0.599	0.709	0.654	0.600	0.713	0.750
IM2	0.915	0.653	0.657	0.722	0.656	0.719	0.741	0.766
IM3	0.902	0.685	0.689	0.763	0.653	0.709	0.766	0.767
ITA1	0.686	0.878	0.717	0.650	0.739	0.715	0.797	0.688
ITA2	0.638	0.901	0.712	0.589	0.737	0.712	0.733	0.635
ITA3	0.572	0.858	0.624	0.587	0.708	0.655	0.633	0.599
OP1	0.679	0.717	0.924	0.667	0.677	0.789	0.710	0.681
OP2	0.684	0.760	0.948	0.701	0.690	0.816	0.721	0.671
OP3	0.649	0.699	0.919	0.638	0.633	0.793	0.672	0.649

OP M1	0.738	0.609	0.631	0.911	0.634	0.668	0.665	0.770
OP M2	0.780	0.652	0.681	0.934	0.672	0.713	0.738	0.786
OP M3	0.716	0.647	0.668	0.911	0.670	0.679	0.707	0.710
PAC 1	0.660	0.757	0.660	0.653	0.886	0.701	0.772	0.665
PAC 2	0.650	0.718	0.626	0.632	0.882	0.647	0.730	0.672
PAC 3	0.604	0.713	0.607	0.609	0.875	0.658	0.673	0.601
SCR 1	0.734	0.744	0.793	0.741	0.697	0.938	0.746	0.712
SCR 2	0.675	0.723	0.778	0.660	0.733	0.926	0.697	0.662
SCR 3	0.683	0.729	0.816	0.677	0.684	0.916	0.707	0.677
TRA 1	0.770	0.760	0.712	0.738	0.741	0.723	0.905	0.795
TRA 2	0.719	0.729	0.631	0.682	0.734	0.676	0.890	0.717
TRA 3	0.687	0.694	0.656	0.611	0.714	0.653	0.860	0.667
WH 1	0.826	0.700	0.700	0.729	0.690	0.696	0.788	0.870
WH 2	0.712	0.621	0.622	0.698	0.623	0.647	0.698	0.886
WH 3	0.632	0.558	0.520	0.706	0.581	0.558	0.631	0.837

The results of the cross loadings tend to prove the sufficiency of the measurement model, because all indicators load most on the corresponding constructs than on other constructs, which provide indicator reliability and help to define discriminant validity. To illustrate, inventory management items (IM1–IM3) have the highest items on their own construct (0.890 to 0.915), IT adaptation items (0.858 to 0.901), operational performance items (0.919 to 0.948), and supply chain resilience items (0.916 to 0.938) are items with similarly high. Nevertheless, other cross-loadings are quite high, including those between more closely related constructs, like transportation, warehousing, and inventory management (e.g., IM items loading above 0.75 on warehousing and transportation), and IT adaptation and packaging. This is a sign of possible conceptual overlaps between these constructs. Nevertheless, because all indicators continue to load on their respective constructs highest, the overall measurement model exhibits strong levels of discriminant validity, but the high degree of cross-loadings indicates that some of the constructs can be very close to each other, and should be viewed with suspicion.

PLS SEM Bootstrapping

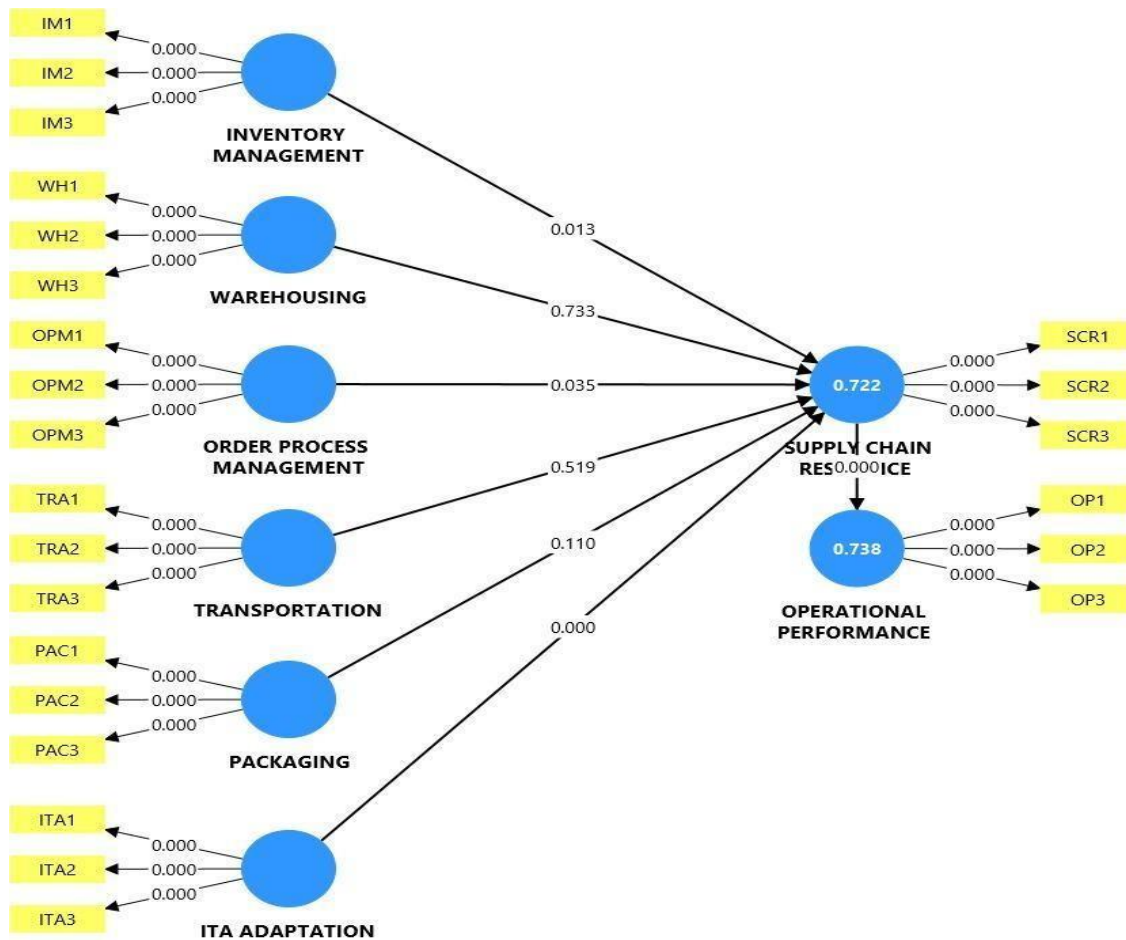


Figure 2 PLS SEM Bootstrapping

The results of the structural model show that the practices of logistics management have a significant impact on supply chain resilience to a different extent. No, in particular, IT adaptation has the most powerful and very significant impact ($p = 0.000$), then comes order process management ($p = 0.035$) and inventory management ($p = 0.013$) which significantly help to promote resilience. It indicates that the effective use of technology, efficient order management and effective inventory management are vital factors that can strengthen the capability of an organization to react to disruptions and uncertainties. Conversely, warehousing ($p = 0.733$), transportation ($p = 0.519$), and packaging ($p = 0.110$) were identified to be insignificant effects and it means that traditional logistics operations individually cannot be good choices to develop resilience without integration and technological assistance. In total, the explanatory power is

strong with the model only explaining 72.2% of the variance in supply chain resilience ($R^2 = 0.722$).

Hypothesis Testing

Table 7 Hypothesis Testing

	Path coefficients				
	Mean, STDEV, T values, p values				
	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
INVENTORY _MANAGEMENT -> SUPPLY CHAIN _RESILIENCE	0.163	0.157	0.065	2.486	0.013
ITA ADAPTATION -> SUPPLY CHAIN _RESILIENCE	0.344	0.344	0.068	5.060	0.000
ORDER PROCESS _MANAGEMENT -> SUPPLY CHAIN _RESILIENCE	0.213	0.207	0.101	2.108	0.035
PACKAGING -> SUPPLY CHAIN _RESILIENCE	0.134	0.140	0.084	1.601	0.110
SUPPLY CHAIN _RESILIENCE -> OPERATIONAL _PERFORMANCE	0.859	0.859	0.024	35.715	0.000
TRANSPORTATION -> SUPPLY CHAIN _RESILIENCE	0.063	0.067	0.098	0.645	0.519
WAREHOUSING -> SUPPLY CHAIN _RESILIENCE	0.025	0.026	0.072	0.342	0.733

The findings of the path coefficient show that the practices of logistics management influence supply chain resilience differently. The most impactful and most important predictor (0.344, $p = 0.000$) is IT adaptation, which shows that technological adherence is a critical factor in making organisations responsive and flexible. Likewise, there are also important positive effects of order process management ($\beta = 0.213$, $p=0.035$), and inventory management ($\beta = 0.163$, $p=0.013$), indicating that resilience has real positive influences of the coordination of the process and the good control over the inventory. However, the other factors such as packaging (0.134, 110), transportation ($\beta=0.063$, $p=0.519$), and warehousing ($\beta=0.025$, $p=0.733$), are not statistically significant and point out that traditional logistics operations are unlikely to yield resilience benefits independently of technological assistance and coordination.

Mediation Analysis

Table 8 Mediation Analysis

Specific indirect effects Mean, STDEV, T values, p values			Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
PACKAGING	->	SUPPLY	0.115	0.120	0.071	1.626	0.104
CHAIN_RESILIENCE	->	OPERATIONAL _PERFORMANCE					
TRANSPORTATION	->	SUPPLY	0.054	0.057	0.084	0.644	0.520
CHAIN_RESILIENCE	->	OPERATIONAL _PERFORMANCE					
WAREHOUSING	->	SUPPLY	0.021	0.023	0.062	0.341	0.733
CHAIN_RESILIENCE	->	OPERATIONAL _PERFORMANCE					
INVENTORY _MANAGEMENT	->	SUPPLY	0.140	0.135	0.056	2.477	0.013
CHAIN_RESILIENCE	->	OPERATIONAL _PERFORMANCE					
ITA ADAPTATION	->	SUPPLY	0.296	0.296	0.060	4.925	0.000
CHAIN_RESILIENCE	->	OPERATIONAL _PERFORMANCE					
ORDER PROCESS _MANAGEMENT	->	SUPPLY	0.183	0.178	0.087	2.104	0.036
CHAIN_RESILIENCE	->	OPERATIONAL _PERFORMANCE					

The results of the specific indirect effects show that supply chain resilience is a strong mediator of certain relationships among logistics management practices and operational performance. In particular, adaptation to IT ($\beta = 0.296$, $p = 0.000$), the management of the order process ($\beta = +0.183$, $p = 0.036$), and inventory management ($\beta = +0.140$, $p = 0.013$) have significant indirect effects, which confirms the hypotheses that these variables can increase the operational performance due to the mediating variable. On the other hand, the indirect effects in the bottleneckage (packaging) ($\beta = 0.115$, $p = 0.104$), transport ($\beta = 0.054$, $p = 0.520$) and warehouse ($\beta = 0.021$, $p = 0.733$) all show insignificance meaning that the implication of their effect on operational performance is not statistically significant. All these findings indicate that technology-based and process based logistics practices have a positive performance influence, mainly through initiatives in resilience building, but the traditional logistics functions is not significantly reflected in this model.

PLS SEM

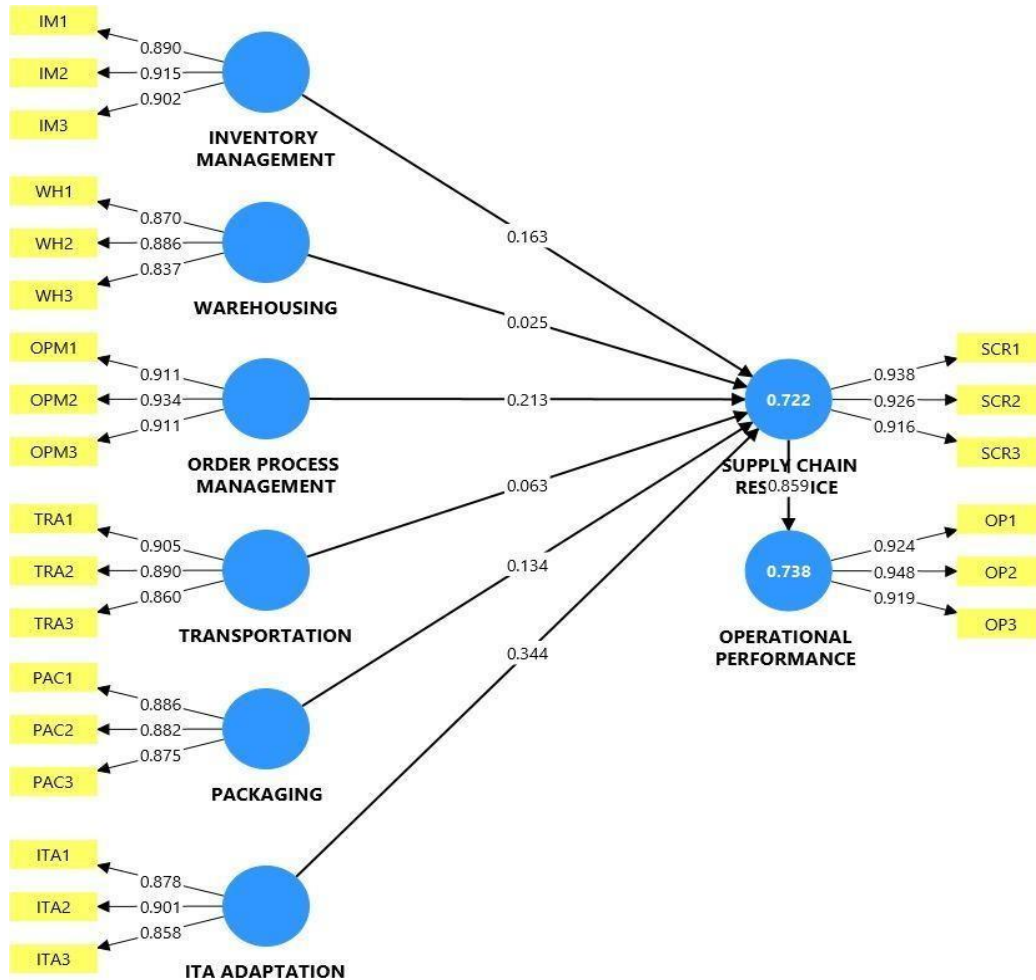


Figure 3 PLS SEM

The outcomes of the structural model suggest that practices of logistics management can affect supply chain resilience differently. The best positive predictor is IT adaptation ($r = 0.344$), which helps emphasize the importance of digital technologies to improve responsiveness and adaptability in supply chains. It is succeeded by order process management ($b = 0.213$) and inventory management ($b = 0.163$) both of which have moderate contributions to resilience. However, on the contrary, the impact of packaging (0.134), transportation (0.063) and warehousing (0.025) are weak indicating that traditional logistics functions by themselves might not be an important contributor to resilience unless they are integrated and supported by technology. There is also the high outer loading of the constructs in all cases indicating high reliability and validity of the model.

Model Fitness

Table 9 Model Fitness

	Model fit	
	Fit summary	
	Saturated model	Estimated model
SRMR	0.046	0.054
d_ ULS	0.644	0.883
d_ G	0.612	0.638
Chi-square	1356.313	1394.842
NFI	0.854	0.850

The results of the model fit shows that the proposed model has an acceptable level of fit. The saturated model (0.046) and the estimated model (0.054) both have a lower value than the recommended SRMR value of 0.08, indicating a good fit to the model. Also, the d ULS and d G are small indicating that there is not a great difference between the observed and estimated covariance matrices. The Chi-square values are quite high, but as the sample size is large, it is normal and it does not always mean that PLS-SEM is a poor fit. The values of NFI (0.854 and 0.850) are a little short of the optimal value 0.90 though still they signify a reasonable fit. On the whole, these outcomes indicate that the model is sufficiently calculated with the data and can be further interpreted and tested.

Discussion

The results of this study are valuable in terms of theoretical contributions as they supplement the current models in logistics and supply chain management by including resilience as a mediating force. The findings are based on Contingency Theory, Dynamic Capabilities Theory, and Supply Chain Management Theory and prove that not every logistics management practice can help supply chain resilience. In particular, IT adaptation, order process management, and the inventory hugely contribute to resilience, which is in line with recent studies highlighting that dynamic capabilities and technological alignment are crucial in uncertain settings (Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). These results support the hypothesis that to attain the best performance results, organizations need to align their internal operations with environmental uncertainties. But the minor impact of warehousing, transporting, and packing complicates the established theoretical assumptions, which take all the logistics operations in a more consistent manner to performance. It goes along with the recent research that hints at the context-specificity of the logistics practices effects and it is also determined by the practices of integration and adaptability (Khan et al., 2023; Ahmed and Qureshi, 2024). The previous grounding theories also represent the latter viewpoint; these other theories suggest that performance is contingent upon the strategic fit between the operational practices and the environmental conditions (Christopher, 2016; Ballou, 2007). This research, therefore, will help the

theory by illustrating that resilience is a selective mediator that reinforces the adaptive and technology-oriented logistics practices only.

On the literature viewpoint, the results of this study not only corroborate but also further complement empirical studies that have been done before and also provide opposing results. This effect of IT adaptation on supply chain resilience is also in line with more recent literature and findings indicating the importance of digital transformation, artificial intelligence, and realtime data systems in enhancing supply chain resilience and visibility (Aljawazneh, 2024; Rahman et al., 2023; Siddiqui et al., 2024). Equally, the benefits of both inventory management and order process management correspond, in the studies of the significance of process integration and operation coordination in resilience (Negi and Jaiswal, 2025; Khan et al., 2024; Ahmed et al., 2023). Previous researchers support this as well by stating that effective logistics integration and inventory management are performed, which results in better supplying the chain of performance (Croxtton, 2003; Bowersox et al., 2010). The negligible results on warehousing, transportation, and packaging are however, contrasted with the ramifications of some studies that suggest that these functions are important in determining performance of supply chains (Raza et al., 2025; Hussain et al., 2023). Such incongruity implies that conventional logistics might not be adequate on its own but should be complemented by the integration of technology and alignment with strategy. Moreover, there is also some previous literature that suggests that inefficiencies due to poorly managed logistics functions could be a result instead of an enhancement (Ballou, 2007; Christopher and Peck, 2004). Thus, this research paper adds to the body of knowledge by emphasizing the changing scope of the logistics in the contemporary supply chains.

Conclusion

This paper aimed to investigate the relationship between logistics management practices and the performance of operations, with the help of supply chain resilience as a mediating factor. The results allow concluding that not every logistics practice has an equal impact on the performance outcomes. In particular, adaptation of IT, order management, as well as inventory management proved as key predictors of supply chain resilience, whereas warehousing, transportation and packaging became irrelevant. These findings draw attention to the change in contemporary supply chains to technological and process-oriented logistic practices. Similar research findings underline the digital transformation and process integration as the major drivers of supply chain effectiveness (Alkhatib and Momani, 2023; Al Tera et al., 2024; Zvinowanda, 2025). The relevance of coordinated logistics systems to increase operational outcomes of businesses is also supported by prior underlying studies (Ballou, 2007; Green et al., 2008). Therefore, the analysis vindicates modern logistics performance as being increasingly reliant on adaptability and integration and not just on traditional functions.

Theoretically, the research will add to the current action of knowledge by encapsulating Contingency Theory, Dynamic Capabilities Theory and Supply Chain Management Theory to form a single theory. The findings show that supply chain resilience is a paramount mediating

factor between logistics practices and operational performance. This result empowers recent sources, which have found resilience to be one of the main abilities in dealing with uncertainty and attaining sustainable performance (Negi and Jaiswal, 2025; Aljawazneh, 2025; Khan et al., 2024). Yet, the negligible impacts of some of the logistics practices cast doubt on the conventional beliefs about a similar contribution of all logistics processes to the performance and indicate that their performance depends on the integration aspects and external considerations. The previous researches also point to the fact that the performance of the organization is determined by how consistent the strategy is with the environment (Christopher, 2016; Donaldson, 2001). Thus, the study enhances theoretical contributions by showing that resilience is selectiveness in the relationship between adaptive logistics practices and performance outcomes.

Future Research Direction

This research offers a basis of future studies by outlining how logistics practices management and resilience among supply chains will take a new role in determining the performance of operations. This research can be extended in future studies by adding more variables to it namely: organizational culture, leadership, environmental uncertainty, digital maturity, to explain more variation in performance outcomes. Recent studies indicate that combining behavioral and strategic attributes with logistics capabilities can offer a more holistic view of supply chain effectiveness (Alkhatib + Momani, 2023; Al Tera + others, 2024; Zvinowanda, 2025). Additionally, conditional effects can be analyzed in future studies by introducing moderating variables, including the firm size, industry type, and technological readiness. Previous research focuses on multi-theoretical approaches as well when describing intricate supply chain dynamics (Christopher, 2016; Teece et al., 1997). In this way, the theoretical enrichment and the increase in the empirical applicability of the conceptual framework will be brought to a higher level.

Although it has made contributions, this research has some shortcomings that leave the area of research open to inquiry in the future. To begin with, the research design is quantitative and cross-sectional and thus restricts the scope of being able to study how supply chain resilience is dynamic with time. Longitudinal designs can also be used in future studies to investigate the dynamics of resilience to disruptions and technological changes (Negi and Jaiswal, 2025; Khan et al., 2024; Ahmed and Qureshi, 2024). Second, the research raises on a definite theoretical framework which is Contingency Theory, Dynamic Capabilities Theory and Supply Chain Management Theory; other theoretical approaches like Resource- Based View (RBV) or Institutional Theory might have further contributions. Previous studies also indicate that the integration of more than two theoretical perspectives will lead to greater explanatory ability (Donaldson, 2001; Barney, 1991). Thus, the future research ought to take into consideration different methodological and theoretical methods to enhance the findings of the research.

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