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Logistics Capabilities, Supply Chain Performance and SMEs Sustainability: the moderating effect of Digital Technology

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Abstract
In today's dynamic business landscape, Small and Medium-sized Enterprises (SMEs) encounter growing challenges in achieving sustainability. Logistics capabilities and supply chain performance play a crucial role in the strategic operations of SMEs, making the adoption of digital technology increasingly vital. However, despite its acknowledged importance in logistics and supply chain management, there is a lack of detailed understanding regarding how digital technology specifically impacts the sustainability of SMEs. This gap highlights the need for focused research into its influence on logistics capabilities, supply chain performance, and overall sustainability. To address this, the study utilized an explanatory single cross-sectional survey method for data collection, employing a stratified sampling technique to draw a sample of 230 participants. The findings revealed that logistics capabilities positively and significantly influence supply chain performance and the sustainability of SMEs. Moreover, digital technology was found to positively moderate the relationship between logistics capabilities and supply chain performance, as well as the relationship between logistics capabilities and sustainability. Based on these findings, the study recommended that organizations adopt advanced data analytics tools to maximize the potential of supply chain data, implement Internet of Things (IoT) technologies for real-time monitoring and enhanced visibility, and utilize cloud-based collaboration platforms to ensure seamless communication and information sharing among supply chain partners.

Keywords: *Logistics Capabilities, Supply Chain Performance, Sustainability, Digital Technology*

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1.0 INTRODUCTION

Logistics capabilities involve managing various activities within the supply chain, with the integration of digital technology emerging as a crucial element in enhancing these processes. Technologies such as the Internet of Things (IoT), RFID, and real-time tracking systems enable SMEs to optimize inventory management, monitor transportation efficiency, and improve overall supply chain visibility (Gunasekaran et al., 2018). These advancements not only streamline logistics operations but also support data-driven decision-making, which is essential for addressing the unique challenges faced by SMEs. The incorporation of digital technologies has significantly transformed supply chain performance for SMEs. Blockchain technology, for example, enhances supply chain transparency and traceability, reducing risks and ensuring operational integrity (Ivanov & Dolgui, 2019).

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Additionally, cloud-based platforms and artificial intelligence improve forecasting accuracy, demand planning, and responsiveness to market fluctuations, thereby enhancing the performance of SMEs in managing their supply chains. Sustainability for SMEs now extends beyond environmental considerations to include economic and social aspects, with digital technology playing a critical role in achieving long-term sustainability. Tools such as data analytics and predictive modeling help SMEs optimize resource utilization, minimize waste, and adapt swiftly to market changes, supporting economic sustainability (Dangelico & Pontrandolfo, 2015).

Furthermore, the adoption of digital platforms facilitates collaboration and communication, promoting social responsibility and stakeholder engagement. Digital technology's role in linking logistics capabilities, supply chain performance, and SMEs' sustainability is multifaceted. These technologies enable SMEs to enhance logistics processes, improve supply chain visibility, and make more informed decisions. Real-time data provided by digital systems supports agile and adaptive supply chain management, which is crucial in navigating the challenges of a dynamic business environment (Christopher, 2016). Understanding how digital technology integrates into logistics and supply chain management is vital for SMEs aiming for sustainable growth.

This research seeks to uncover the specific ways in which digital technology impacts logistics capabilities, shapes supply chain performance, and contributes to sustainability. By examining these intersections, the study aims to provide practical recommendations for effectively leveraging digital tools. Focusing on SMEs from diverse industries, the research explores the adoption trends, challenges, and outcomes of digital technology implementation concerning sustainability. This highlights the evolving relationship between logistics capabilities, supply chain performance, and SMEs' sustainability, emphasizing digital technology's transformative potential. As SMEs navigate modern business complexities, integrating digital tools becomes essential for enhancing operational efficiency, performance outcomes, and long-term sustainability.

1.1 Problem Statement

In today's business landscape, Small and Medium-sized Enterprises (SMEs) face increasing challenges in achieving sustainability. Logistics capabilities and supply chain performance remain critical elements of their strategic operations, making the integration of digital technology indispensable. However, despite its recognized significance in logistics and supply chain management, there is a limited understanding of how digital technology specifically influences the sustainability of SMEs. The lack of comprehensive insights into the direct impact of digital tools on logistics capabilities, supply chain performance, and SME sustainability highlights the need for targeted research in this area. While existing literature acknowledges the importance of digital technology in logistics and supply chain management, there is limited focus on its role in advancing the sustainability of SMEs.

Most studies provide broad overviews rather than detailed analyses of specific digital tools and their contributions to logistics capabilities and supply chain performance within SMEs (Christopher, 2016). Current research also lacks a detailed understanding of how integrating digital technologies into logistics and supply chain processes affects the sustainability of SMEs, particularly in economic and environmental dimensions. Key questions, such as whether digital technologies bolster or hinder sustainability efforts, remain insufficiently addressed (Dangelico & Pontrandolfo, 2015). Furthermore, much of the existing literature offers generalized insights without accounting for the industry-specific nuances SMEs face. Different sectors encounter unique challenges and opportunities when adopting digital technologies, which can influence logistics capabilities, supply chain performance, and sustainability in diverse ways (Gunasekaran et al., 2018). Empirical studies examining the practical application of digital

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technologies within SMEs, especially regarding logistics and supply chain sustainability, are scarce.

The lack of empirical data limits the development of actionable strategies and recommendations for SMEs to harness digital tools effectively for sustained growth (Ivanov & Dolgui, 2019). As SMEs adapt to an increasingly digitized environment, there is a pressing need for research that offers practical insights to guide decision-making. Without a granular understanding of how digital technology impacts logistics capabilities, supply chain performance, and sustainability, SMEs risk missing opportunities to optimize their operations and ensure their long-term viability in a dynamic market. To address these gaps, a focused investigation is necessary to explore the intricate relationships between digital technology, logistics capabilities, supply chain performance, and SME sustainability. Such research will not only enrich academic knowledge but also provide practical solutions for SMEs to navigate digital transformation and enhance their sustainability.

2.0 MATERIALS AND METHODS

2.1 Capabilities perspective

Dynamic capabilities play a pivotal role in strategic management, allowing companies to adapt and respond to external changes effectively (Teece, Pisano, and Shuen, 1997). The dynamic capabilities framework underscores that a firm's success relies on its capacity to recognize environmental shifts, seize opportunities, and reorganize its resources and capabilities accordingly (Teece, 2007). In the context of supply chain management and digital transformation, dynamic capabilities prove to be highly significant. Given the rapid evolution of digital technologies and their transformative impact on the business landscape, firms that can adapt effectively are more likely to succeed.

For instance, companies equipped with dynamic capabilities in supply chain management are better positioned to embrace new technologies, optimize their supply chain processes, and promptly respond to changes in customer demand (Plekhanov, Franke, and Netland, 2022). Research indicates that firms with robust dynamic capabilities are more likely to achieve successful digital transformation (Foss and Saebi, 2016; Zott, Amit, and Massa, 2011). These firms leverage their existing resources and capabilities to create new digital capabilities, including big data analytics, AI, and blockchain, to enhance supply chain management and facilitate global expansion (Pourmorshed and Durst, 2022). Nevertheless, developing dynamic capabilities in digital transformation and supply chain management demands substantial effort. Research suggests that firms must cultivate a learning-oriented culture that encourages innovation and experimentation (March, 1991). This culture may necessitate organizational structure, process changes, and investments in employee training and development (Pourmorshed and Durst, 2022).

Firms must possess dynamic capabilities to achieve successful digital transformation and supply chain management. Strong dynamic capabilities empower firms to adapt to external changes, develop new digital capabilities, and leverage them for global expansion. However, building dynamic capabilities requires investments in processes, organizational culture, and employee development. In a systematic review of 264 articles on the Digital Transformation of Businesses, three major approaches to the phenomenon were identified in the literature: Supply Chain Management, Global Expansion, and Emerging Markets. This study focuses on applying dynamic capabilities theory in Supply Chain Management contexts related to Digital Transformation for facilitating the Global Expansion of Businesses from Emerging Markets. Dynamic capabilities theory has been the subject of several systematic reviews in various business contexts. Teece et al. (1997) conducted a seminal review of dynamic capabilities theory

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and its connection to strategic management. They identified key components and suggested that dynamic capabilities can help firms adapt to changing environments and maintain a competitive edge. Subsequent reviews have expanded upon this framework, examining the role of dynamic capabilities in innovation, internationalization, and other business processes (Teece, 2007; Pourmorshed and Durst, 2022).

2.2 Resource Based-View

As per the Resource-based View (RBV) theory, a firm's competitiveness stems from possessing resources that are valuable, rare, and difficult to substitute. Initially introduced by Wernerfelt (1984), the RBV theory focuses on an organization's capabilities and resources as fundamental drivers of its strategy and main contributors to profitability. Within supply chain and operations management research, RBV highlights the significance of resource allocation, autonomy, utilization imitability, and heterogeneity in developing capabilities for achieving a competitive advantage (Dubey, Bryde, et al., 2020; Hitt et al., 2016; Ketokivi, 2016). While RBV traditionally concentrates on internal firm resources for competitiveness, the collaborative capabilities of supply chain partners are often overlooked (Sheel & Nath, 2019).

To address this limitation, researchers introduced dynamic and relational extensions to the RBV. The dynamic extension underscores the integration of external and internal competencies in rapidly changing markets, crucial for maintaining competitiveness (Teece, 2007). The relational extension, on the other hand, emphasizes the relationships among supply chain partners (Lavie, 2006). According to Eckstein et al. (2015), agility and adaptability, considered dynamic capabilities, are triggered by the ability of supply chain partners to integrate their processes cohesively. Dynamic capabilities, as highlighted by Blome et al. (2013), provide a competitive edge by enabling firms to surpass their competitors. Transparency, identified as an intangible resource, plays a pivotal role in fostering supply chain alignment, adaptability, and agility. In summary, building on RBV, this study proposes associations between supply chain transparency, alignment, adaptability, and agility.

2.2.1 Contingency Theory

Contingency theory, rooted in organizational theory, underscores the need to tailor management approaches to suit diverse situations (Liang & Lu, 2013). Two key tenets of this theory are: (i) there is no universally optimal organizational structure or managerial method applicable to all firms, and (ii) the effectiveness of any managerial methods or organizational structures hinges on internal and external business environments and processes (Galbraith, 1973). Commonly applied to elucidate decision-making and organizational management within information systems (IS) contexts, contingency theory asserts that the alignment between technological benefits and the organization's business environment is crucial for managers when adopting technology (Liang & Lu, 2013; Reinking, 2012). Blockchain offers diverse advantages such as transparency, agility, trust, authenticity, security, cost reduction, and efficiency (Dutta et al., 2020; Wong et al., 2020).

However, the significance of these benefits varies across firms and depends on the internal and external organizational environments. For example, in a dynamic market, supply chain agility and the ability to swiftly respond to market changes and customer needs are more critical than in a stable market (Ashrafi et al., 2019; Chen, 2019). Hence, guided by contingency theory, this study posits that the impact of supply chain agility on the intention to adopt blockchain is contingent on market turbulence, indicating that market turbulence moderates the associations between agility and blockchain adoption. Transparency, another attribute of blockchain, can be a valuable source of competitive advantage contingent on the specific supply

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chain situation and complexity in which the firm operates (Dubey, Gunasekaran, et al., 2020; Zhu et al., 2018). Consequently, this study proposes transparency as an additional driver influencing the intention to adopt blockchain.

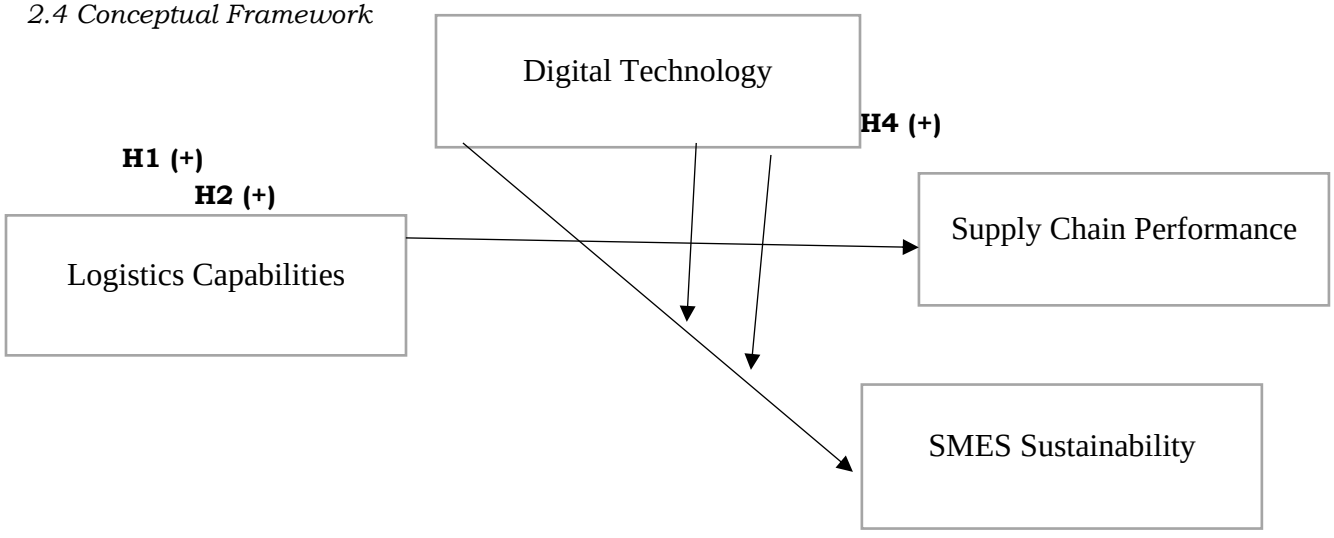
2.3 Empirical review

Numerous prior investigations have indicated a positive and noteworthy correlation between supply chain policy and logistics integration. Sutduean et al. (2019) observed that supply chain practices play a crucial role in facilitating both logistics capabilities and integration. The significance of Supply Chain Management (SCM) practices, including strategic partnerships with suppliers, customer relations, and information sharing, in driving logistics integration cannot be overstated. The literature underscores the essential nature of cooperation at all levels within a company and among supply chain entities for achieving integrated logistics capabilities. Reklitis et al. (2021) proposed that SCM practices such as cooperation, coordination, and communication are instrumental in fostering integrated logistics capabilities. Additionally, Basheer et al. (2019) found that effective logistics integration is realized through supply chain linkages.

Previous studies have also demonstrated a positive and significant impact of logistics capability on logistics integration. Biswas et al. (2020) highlight that integrated capabilities not only enable adaptation to the business environment but also shape it by responding to changes and opportunities. In the context of globalization and cross-border transactions, logistics capabilities are recognized for their role in successful integration. Alabdali and Salam (2022) assert that logistics personnel possess a unique ability to actively coordinate within the company and extend logistics externally, uniting customers and suppliers. Moreover, multiple studies have established a positive and significant connection between supply chain policy and competitive advantage.

According to Chang et al. (2022), SCM practices influence company performance and competitive advantage through factors such as price or cost, quality, delivery dependability, time to market, and product innovation. Strategic supplier partnerships, as highlighted in SCM practices, have been shown to enhance competitive advantage by improving supplier performance and reducing time to market. Biswas and Anand (2020) affirm a robust relationship between supply chain practices and competitive advantage. Recent research further emphasizes that SCM practices like buyer-supplier relations, information sharing, and customer relationship management impact various facets of competitive advantage.

2.4 Conceptual Framework



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2.4.1 Logistics Capabilities and Supply Chain Performance

The relationship between logistics capabilities and supply chain performance has been extensively explored in academic literature, shedding light on the crucial role logistics capabilities play in influencing overall supply chain effectiveness. Logistics capabilities refer to a firm's proficiency in managing various logistics activities, including transportation, distribution, inventory, and information flows (Biswas et al., 2020). These capabilities are considered essential for achieving competitive advantage and enhancing overall supply chain performance. Several studies have found a positive and significant relationship between logistics capabilities and supply chain performance.

For instance, Sutduean et al. (2019) observed that logistics practices contribute to enhanced logistics capabilities, which, in turn, positively affect supply chain performance. The ability to manage logistics activities efficiently and effectively, as highlighted by logistics capabilities, has been linked to improved overall supply chain performance (Biswas et al., 2020). Furthermore, supply chain linkages, facilitated by logistics capabilities, have been identified as contributors to effective logistics integration, ultimately impacting supply chain performance positively (Basheer et al., 2019).

The integrated capabilities not only help firms adapt to the business environment but also shape it through responses to changes and opportunities (Biswas et al., 2020). Literature consistently supports the notion that robust logistics capabilities are associated with improved supply chain performance, emphasizing the importance of investing in and enhancing logistics practices for overall supply chain success. This study hypothesizes that:

H1: positive relationship exists between logistics capabilities and supply chain performance.

2.4.2 Logistics Capabilities and SMES Sustainability

Logistics capabilities refer to a firm's ability to efficiently and effectively manage various aspects of logistics activities, including transportation, distribution, inventory management, and information flows (Biswas et al., 2020). On the other hand, sustainability in the context of SMEs involves integrating economic, environmental, and social dimensions into business practices to ensure long-term viability and positive societal impact. Several studies have explored the connection between logistics capabilities and sustainability in SMEs. For example, research suggests that the efficient management of logistics activities, encompassed by logistics capabilities, can contribute to cost reduction and resource optimization, positively impacting the economic dimension of sustainability (Basheer et al., 2019).

Efficient logistics processes can lead to lower total distribution costs, a critical factor for SMEs aiming to achieve economic sustainability (Biswas et al., 2020). Moreover, the ability to manage logistics activities with a focus on environmental considerations, such as the efficient transportation of goods, contributes to the environmental dimension of sustainability (Basheer et al., 2019). Sustainable logistics practices, driven by logistics capabilities, can help SMEs minimize their environmental footprint and adhere to environmentally responsible supply chain practices.

Additionally, logistics capabilities can influence the social dimension of sustainability by fostering positive relationships with stakeholders, including suppliers and customers. Effective logistics practices contribute to the creation of a transparent and trustworthy supply chain, which is crucial for building social capital and ensuring social responsibility (Biswas et al., 2020). Based on the arguments raised, it is hypothesizing that:

H2: there is a positive relationship between logistics capabilities and the sustainability of SMEs

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2.4.3 Moderating effect of Digital Technology on the relationship between Logistics Capabilities and Supply Chain Performance

The moderating effect of digital technology on the relationship between logistics capabilities and supply chain performance has become a subject of interest in contemporary research. Digital technology, including information technology and digital innovations, can significantly influence how logistics capabilities translate into enhanced supply chain performance. Several studies have explored the role of digital technology as a moderator in shaping the relationship between logistics capabilities and supply chain performance.

For instance, Biswas and Anand (2020) highlight the transformative impact of digital technology in augmenting logistics capabilities, enabling real-time monitoring, data analytics, and advanced communication within the supply chain. This integration of digital technology can act as a catalyst in leveraging logistics capabilities for superior supply chain performance. Basheer et al. (2019) suggest that the adoption of digital technologies, such as advanced tracking systems and data analytics, can enhance the efficiency and effectiveness of logistics capabilities. Digital tools contribute to better decision-making, optimization of routes, and improved visibility across the supply chain, ultimately influencing supply chain performance.

Moreover, the study by Alabdali and Salam (2022) emphasizes the role of digital technologies, particularly in the context of logistics capabilities within the supply chain. The authors argue that the integration of digital tools can strengthen logistics capabilities and, consequently, positively impact supply chain performance. Therefore, considering the moderating effect of digital technology, it can be inferred that the relationship between logistics capabilities and supply chain performance is contingent on the extent to which digital technologies are integrated into logistics processes. Digital technology acts as an enabler, enhancing the capabilities of logistics functions and, in turn, contributing to superior supply chain performance. This study hypothesizes that:

H3: digital technology moderates the relationship between logistics capabilities and supply chain performance

2.4.4 Moderating effect of digital technology on the relationship between Logistics Capabilities and SMES Sustainability

Digital technology can enhance the efficiency of logistics operations within SMEs. Through real-time tracking, predictive analytics, and automation, logistics capabilities can be optimized, leading to reduced resource consumption and improved sustainability (Biswas & Anand, 2020). Digital technologies contribute to greater visibility and transparency in supply chain processes. This transparency can positively impact sustainability efforts, allowing SMEs to trace and monitor their supply chain activities, ensuring adherence to environmental and ethical standards (Alabdali & Salam, 2022). Digital platforms enable better collaboration and communication among supply chain partners. Improved coordination can enhance logistics capabilities and, consequently, contribute to sustainable practices within SMEs (Basheer et al., 2019). The use of data analytics and digital tools facilitates data-driven decision-making. SMEs can leverage insights derived from logistics data to implement sustainable practices, optimize routes, and reduce environmental impacts (Biswas & Anand, 2020). This study proposes that:

H4: digital technology moderates the relationship between logistics capabilities and SMES sustainability

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3.0 METHODOLOGY

This research employed an explanatory single cross-sectional survey method for data collection from the respondents. Saunders et al. (2009) highlight that a researcher's chosen research philosophy encapsulates fundamental assumptions guiding their perspective on the world. It is intricately linked to the generation and comprehension of knowledge, representing a framework for interpreting and understanding the world. The study employed stratified sampling technique, as described by Cohen et al. (2007). Stratified sampling involves dividing the population into homogeneous groups, each containing subjects with similar characteristics. The study exclusively utilized primary data, collected through a self-administered questionnaire. The questionnaire, designed with reference to measures used by other researchers in similar studies, predominantly consisted of closed-ended questions.

4.0 RESULTS AND DISCUSSIONS

4.1 Validity and Reliability Tests

The reliability of a measurement tool is defined as its capacity to consistently gauge the phenomenon it is intended to assess, indicating test consistency. To validate the reliability of the measurement instrument employed in this study, the Cronbach's Alpha was utilized. Consequently, the data underwent reliability testing to verify the consistency of the measurement set. Reliability was operationalized as internal consistency and verified through the computation of Cronbach Alpha. A coefficient reliability of 0.70 or higher indicated the reliability of the instrument used (Cronbach, 2004). To analyze the data further, the researcher assessed the responses using the Kaiser-Meyer-Oklin test to ensure the sample was suitable for further analysis.

Table 4.1 Reliability of Measures using Cronbach's Alpha and Kaiser-Meyer-Olkin

Constructs	**Number of items**	**Cronbach's Alpha**	**KMO**
Digital Technology	11	.918	.620
Supply Chain Performance	18	.701	.705
Logistics Capability	10	.908	.741
Sustainability	17	.843	.732

The Digital Technology construct demonstrated high reliability with a Cronbach's Alpha of .918, encompassing 11 items. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy recorded at .620. Similarly, the Supply Chain Performance construct exhibited satisfactory reliability, featuring a Cronbach's Alpha of .701 across 18 items. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .705. The Logistics Capability construct displayed robust reliability, attaining a Cronbach's Alpha of .908 involving 10 items. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy registered at .741. The Sustainability construct displayed robust reliability, attaining a Cronbach's Alpha of .843 involving 17 items. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy registered at confirming the construct's reliability. All recorded Cronbach's Alpha values for the constructs were within and above the recommended threshold of 0.7, signifying strong internal consistency. Moreover, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy exceeded the threshold of 0.5 for each construct. Consequently, the constructs investigated in the study demonstrate high reliability.

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Table 4.2 Factor Loadings

Items	Loadings	Items	Loadings	Items	Loadings	Items	Loadings
TRC1.	.662	CS1.	.801	IN1.	.967	SS1.	.911
TRC2.	.708	CS2.	.795	IN2.	.960	SS2.	.863
TRC3.	.734	CS3.	.679	IN3.	.969	SS3.	.848
TRC4.	.720	CS4.	.925	TD1.	.922	SS4.	.861
TRC5.	.853	CS5.	.861	TD2.	.777	ES1.	.681
TRK1.	.874	CS6.	.794	TD3.	.789	ES2.	.830
TRK2.	.809	RR1.	.832	TD4.	.749	ES3.	.637
TRK3.	.872	RR2.	.733	TI1.	.834	ES4.	.835
RTI1.	.723	RR3.	.911	T12.	.380	ES5.	.960
RTI2.	.745	FF1.	.863	TI3.	.754	ENS1.	.969
RTI3.	.732	FF2.	.848			ENS2.	.922
		FF3.	.861			ENS3.	.777
		FF4.	.681			ENS4.	.789
		RP1.	.830			ENS5.	.749
		RP2.	.637			ENS6.	.834
		RP3.	.835			ENS7.	.380
		RP4.	.967			ENS8.	.754
		RP5.	.910				

Table 4.3 Correlations among the constructs

		DT	SCP	LC	SS
DT	Pearson Correlation	1	.007	.245**	.277**
	Sig. (2-tailed)		.940	.005	.001
	Sum of Squares and Cross-products	26.031	.185	7.108	7.846
	Covariance	.202	.001	.055	.061
	N	130	130	130	130
SCP	Pearson Correlation	.007	1	.477**	.504**
	Sig. (2-tailed)	.940		.000	.000
	Sum of Squares and Cross-products	.185	29.108	14.646	15.077
	Covariance	.001	.226	.114	.117
	N	130	130	130	130
LC	Pearson Correlation	.245**	.477**	1	.395**
	Sig. (2-tailed)	.005	.000		.000
	Sum of Squares and Cross-products	7.108	14.646	32.377	12.462
	Covariance	.055	.114	.251	.097
	N	130	130	130	130
SS	Pearson Correlation	.277**	.504**	-.395**	1
	Sig. (2-tailed)	.001	.000	.000	
	Sum of Squares and Cross-products	7.846	15.077	12.462	30.769
	Covariance	.061	.117	.097	.239
	N	130	130	130	130

. Correlation is significant at the 0.01 level (2-tailed).

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Note: DT= Digital Technology; SCP=Supply Chain Performance; LC= Logistics Capability; SS= Sustainability

The relationship between digital technology and supply chain performance, the Correlation Coefficients figures indicate that there is a very strong positive correlation (0.007) between digital technology and supply chain performance and it is not statistically significant ($p > 0.05$). The relationship between digital technology and logistics capability, the Correlation Coefficients figures indicate that there is a moderate positive correlation (0.245) between digital technology and logistics capability, and it is statistically significant at the 0.05 level. The relationship between digital technology and sustainability, the Correlation Coefficients figures indicate that there is a moderate positive correlation (0.277) between digital technology and sustainability, and it is statistically significant at the 0.01 level.

The relationship between supply chain performance and logistics capability, the Correlation Coefficients figures indicate that there is a positive correlation (0.477) between supply chain performance and logistics capability, and it is statistically significant at the 0.001 level. The relationship between supply chain performance and sustainability, the Correlation Coefficients figures indicate that there is a strong positive correlation (0.504) between supply chain performance and sustainability, and it is statistically significant at the 0.001 level. The relationship between logistics capability and sustainability, the Correlation Coefficients figures indicate that there is a strong weak positive correlation (0.395) between logistics capability and sustainability, and it is statistically significant at the 0.001 level.

4.2 Logistics capabilities and supply chain performance

The study examined the influence of logistics capability on supply chain performance in doing a simple linear regression was used and table 4.8 presents the results.

Table 4.4 Model Summary of influence of logistics capabilities on supply chain performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.252[a]	.063	.056	.482

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.008	1	2.008	8.646	.004[b]
	Residual	29.723	128	.232		
	Total	31.731	129			

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.460	.382		9.055	.000
	SCP	.249	.085	.252	2.940	.004

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The regression model suggests that logistics capabilities have a statistically significant influence on supply chain performance. The positive coefficient for (0.249) indicates that as logistics capabilities increase, supply chain performance tends to increase. However, it's important to note that the overall explanatory power of the model is relatively low (R Square = 0.063), indicating that other factors not included in the model may also influence supply chain performance.

4.3 Logistics capabilities and SMEs sustainability

The study further assessed the influence of logistics capability on SMEs sustainability and order establish the magnitude of the influence, a simple linear regression was employed and he table 4.9 presents the results.

Table 4.5 Model Summary logistics capabilities on SMEs sustainability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.286[a]	.082	.075	.432

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.129	1	2.129	11.402	.001[b]
	Residual	23.902	128	.187		
	Total	26.031	129			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.931	.360		16.490	.000
	SS	.262	.078	.286	3.377	.001

The R Square that represents the proportion of variance in the dependent variable that can be explained by the independent variable. The, R Square of 0.082, meaning that about 8.2% of the variance in SMEs sustainability is explained by logistics capabilities. The regression model suggests that logistics capabilities have a statistically significant impact on the sustainability of Small and Medium-sized Enterprises (SMEs). The positive coefficient for (0.262) indicates that as logistics capabilities increase, SMEs sustainability tends to increase.

4.4 Moderating effect of organizational culture

The study also examined the moderating role of digital technology on the relationship between logistics capability and supply chain performance and the table 4.11 presents the results.

Table 4.6 Moderating effect of Digital Technology

Model 3 Summary						
R	R-sq	MSE	F	df1	df2	p
.8084	.6535	.5299	154.0380	3.0000	245.0000	.0000
Int_1	coeff	se	t	p	LLCI	ULCI

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	.6181	.1445	4.2762	.0000	.3334	.9028

Source: Field Data, 2022

The moderating role of digital technology on the relationship between logistics capability and supply chain performance, the R Square establishes that digital technology can moderates the relationship between logistics capability and supply chain performance of about 65%. The Test(s) of highest order unconditional interaction(s): and Conditional effects of the focal predictor at values of the moderator(s): (se = .1445; t= 4.2762; p <0.0000) establish that digital technology positively and significantly moderates the relationship between logistics capability and supply chain performance.

4.5 Moderating effect of Digital Technology

The study also examined the moderating role of digital technology on the relationship between logistics capability and sustainability and the table 4.11 presents the results.

Table 4.7 Moderating effect of Digital Technology

Model 4 Summary						
R	R-sq	MSE	F	df1	df2	p
.7760	.6022	.6083	123.6344	3.0000	245.0000	.0000
Int_1	coeff	se	t	p	LLCI	ULCI
	.8369	.1454	5.7567	.0000	1.1233	.5506
Test(s) of highest order unconditional interaction(s):						

The moderating role of digital technology on the relationship between logistics capability and sustainability, the R Square establishes that digital technology can moderates the relationship between logistics capability and sustainability of about 60%. The Test(s) of highest order unconditional interaction(s): and Conditional effects of the focal predictor at values of the moderator(s): (se = .1454; t= 5.7567; p <0.0000) establish that digital technology positively and significantly moderates the relationship between logistics capability and sustainability.

Table 4.8 Hypothesis Testing and Findings

Hypothesis	**Relationship**	**Beta value**	**T value**	**P value**	**Supported**
H1	**LC -- > SCP**	.252	2.940	.004	Supported
H2	**LC -- > SS**	.286	3.377	.001	Supported
H3	**DT-- > LC *SCP**	.1445	4.2762	.0000	Supported
H4	**DT-- > LC* SS**	.1454	5.7567	.0000	Supported

4.6 Discussion of Results

The positive influence of logistics capabilities on supply chain performance has been a consistent and well-supported finding in academic literature. Logistics capabilities encompass a range of activities and competencies within an organization's supply chain, contributing to its overall efficiency and effectiveness. This discussion will highlight key aspects of this positive influence, drawing on relevant literature. Logistics capabilities play a pivotal role in enhancing operational efficiency within a supply chain. As noted by Christopher (2016), effective logistics management enables streamlined processes, minimizing delays and reducing lead times. This efficiency translates into improved supply chain performance, as products move seamlessly from production to distribution and finally to the end consumer. For instance, the ability to optimize

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transportation routes, manage inventory effectively, and implement advanced warehousing technologies contributes to overall operational excellence (Christopher, 2016; Chopra & Meindl, 2016).

The positive influence of logistics capabilities on the sustainability of Small and Medium-sized Enterprises (SMEs) is a crucial aspect that has gained attention in academic and practical discussions. This discussion will explore key dimensions of this positive impact, drawing on relevant literature to support the arguments. Effective logistics capabilities contribute to the sustainability of SMEs by enhancing resource efficiency and cost optimization. According to Carter and Rogers (2008), logistics capabilities, such as efficient inventory management and transportation, enable SMEs to minimize waste and reduce operational costs. This optimization is a fundamental aspect of sustainability, aligning with the economic pillar of the triple bottom line. For instance, the ability to streamline supply chain processes reduces excess inventory, leading to lower carrying costs and minimizing the environmental footprint of SME operations (Carter & Easton, 2011). Logistics capabilities, when geared towards sustainability, can contribute to the environmental performance of SMEs. Green logistics practices, such as eco-friendly transportation and packaging, are essential components. As highlighted by McKinnon et al. (2015), adopting environmentally friendly logistics practices positively influences the overall sustainability of SMEs.

The positive moderating effect of digital technology on the relationship between logistics capability and supply chain performance represents a critical area of study, reflecting the evolving landscape of contemporary business operations. Digital technology, such as advanced data analytics and cloud-based platforms, has the potential to enhance connectivity and information sharing within supply chains. As highlighted by Laudon and Laudon (2015), these technologies enable real-time data exchange, facilitating seamless communication across various supply chain components. In the context of logistics capability, this connectivity contributes to improved coordination and collaboration among supply chain partners. For example, a study by Wang and Zhang (2018) found that the integration of digital technologies in logistics operations positively influences supply chain coordination and responsiveness, thereby enhancing overall supply chain performance.

Digital technology provides real-time visibility into supply chain activities, allowing organizations to make informed and timely decisions. This real-time capability is crucial for logistics operations and can significantly impact supply chain performance. According to Chopra and Meindl (2016), real-time information enables organizations to identify and respond quickly to disruptions, reducing lead times and improving overall supply chain efficiency. Digital technology's impact on real-time visibility and decision-making is evident in the work of Lee, Padmanabhan, and Whang (1997), who emphasized the importance of information sharing and visibility in achieving supply chain responsiveness.

The positive moderating effect of digital technology on the relationship between logistics capability and the sustainability of Small and Medium-sized Enterprises (SMEs) is a critical aspect that aligns with the evolving landscape of contemporary business practices. Digital technology, particularly in the form of advanced tracking systems and real-time monitoring, enhances visibility and traceability within supply chains. This heightened visibility is crucial for SMEs aiming to improve their sustainability practices. According to Hohenstein et al. (2015), digital technology allows SMEs to trace the environmental impact of their supply chain activities, contributing to improved sustainability performance. For instance, digital technologies enable SMEs to track and measure their carbon footprint, thereby facilitating better environmental management practices (Hohenstein et al., 2015).

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Digital technology empowers SMEs with data-driven insights that can inform sustainable decision-making. The integration of analytics tools and platforms allows SMEs to analyze their logistics operations and identify areas for improvement in sustainability. As highlighted by Wagner and Bode (2008), data-driven decision-making supports the development and implementation of sustainable practices within supply chains. Research by Tachizawa and Wong (2014) emphasizes that digital technology enables SMEs to make informed decisions related to supplier selection, transportation modes, and packaging materials, ultimately impacting their overall sustainability performance.

In conclusion, the positive moderating effect of digital technology on the relationship between logistics capability and the sustainability of SMEs is evident across various dimensions. By enhancing visibility, enabling data-driven decision-making, promoting efficiency through automation, and supporting the integration of eco-friendly practices, digital technology plays a pivotal role in amplifying the impact of logistics capabilities on SMEs' sustainability. As SMEs increasingly recognize the strategic value of digital technology, they can leverage these tools to not only optimize their logistics but also enhance their overall sustainability performance in a competitive and environmentally conscious business landscape.

5.0 CONCLUSIONS

Logistics Capabilities and Supply Chain Performance: The study examined the influence of logistics capability on supply chain performance and the findings of the concluded that logistics capabilities have a statistically significant influence on supply chain performance.

Logistics Capabilities and SMEs Sustainability: The study further assessed the influence of logistics capability on SMEs sustainability and the findings of the concluded that logistics capabilities have a statistically significant impact on the sustainability of Small and Medium-sized Enterprises (SMEs).

Moderating effect of Digital Technology: The study also examined the moderating role of digital technology on the relationship between logistics capability and supply chain performance and the findings of the study concluded that that digital technology positively and significantly moderates the relationship between logistics capability and supply chain performance.

Moderating effect of Digital Technology: The study also examined the moderating role of digital technology on the relationship between logistics capability and sustainability and the findings of the study concluded that digital technology positively and significantly moderates the relationship between logistics capability and sustainability.

5.1 Managerial Implications

Digital technology enables real-time data collection and analysis, providing managers with actionable insights to optimize logistics capabilities. This improves sustainability by reducing inefficiencies, such as unnecessary fuel consumption or resource wastage. Managers can implement predictive analytics to forecast demand and plan logistics activities more sustainably. Digital technologies such as Internet of Things (IoT) sensors, blockchain, and artificial intelligence (AI) enhance tracking, transparency, and collaboration throughout the supply chain. By leveraging these tools, managers can ensure that logistics processes align with sustainability goals, such as minimizing carbon emissions and improving resource utilization.

The moderating role of digital technology underscores its importance in integrating logistics with sustainability strategies. Managers should prioritize investments in digital infrastructure to bridge gaps between operational capabilities and environmental or social sustainability objectives. For instance, digital platforms can facilitate the adoption of circular

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logistics practices. Firms with strong logistics capabilities enhanced by digital technology are better positioned to achieve sustainability.

This differentiates them in the market, particularly as consumers and stakeholders increasingly value environmentally responsible practices. Managers can leverage this advantage to improve brand reputation and customer loyalty. Digital technology enables better measurement and reporting of sustainability metrics. Managers can utilize digital tools to monitor carbon footprints, energy usage, and waste reduction, aligning logistics operations with global sustainability standards and regulatory requirements.

Digital technology can moderate the cost implications of implementing sustainable logistics practices. For example, route optimization algorithms can lower transportation costs while reducing environmental impact. Managers can advocate for technology adoption as a means of balancing cost efficiency with sustainability goals. By integrating digital technology, logistics systems become more resilient to disruptions, which contributes to sustainable performance.

Managers can use technologies like digital twins and supply chain simulation models to identify vulnerabilities and implement proactive measures. To fully realize the moderating effects of digital technology, managers must invest in employee training programs. Equipping staff with the skills to use digital tools ensures the seamless integration of technology into logistics operations, fostering a culture of continuous improvement in sustainability.

5.2 Theoretical Contribution

The positive influence of logistics capability on supply chain performance and Small and Medium-sized Enterprises (SMEs) sustainability makes a significant theoretical contribution to the fields of logistics, supply chain management, and sustainability. Theoretical frameworks such as the Resource-Based View (RBV) emphasize the strategic importance of resources and capabilities in achieving competitive advantage. The positive influence of logistics capability on supply chain performance and SMEs sustainability aligns with the RBV by highlighting logistics as a critical organizational capability. This perspective underscores how effective management of logistics resources contributes to superior supply chain performance and sustainability outcomes.

5.3 Recommendations

The positive moderating effect of digital technology on the relationship between logistics capability and supply chain performance suggests several strategic recommendations for businesses aiming to leverage this synergy.

Invest in Advanced Data Analytics: Implement advanced data analytics tools to harness the full potential of the data generated within the supply chain. These tools can provide actionable insights into performance metrics, demand forecasting, and process optimization. Investing in analytics enhances decision-making and supports logistics capabilities in improving overall supply chain performance.

Embrace Internet of Things (IoT) Technologies: Adopt IoT technologies for real-time monitoring and visibility across the supply chain. IoT devices, such as sensors and RFID tags, enable organizations to track the movement and condition of goods, monitor equipment health, and optimize routing. This enhanced visibility supports logistics capabilities and contributes to improved supply chain performance.

Implement Cloud-Based Collaboration Platforms: Deploy cloud-based collaboration platforms to facilitate seamless communication and information sharing among supply chain partners. These platforms enhance coordination and collaboration, enabling logistics capabilities

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to work cohesively with suppliers, manufacturers, and distributors. Improved collaboration positively influences supply chain performance.

Automate Routine Processes with Robotic Systems: Integrate robotic systems and automation technologies to streamline routine logistics processes. Automated warehouses, robotic picking systems, and autonomous vehicles contribute to efficiency gains and reduce operational costs. Automation supports logistics capabilities by optimizing resource utilization and minimizing errors, thereby enhancing overall supply chain performance.

5.6 Suggestions for future Study

A future study should assess the moderating effect of digital culture on the relationship between logistics capabilities and firms' sustainability. The influence of logistics capability on competitive advantage the role of technological orientation should also be assessed.

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