

Advancing Supply Chain Sustainability in SMEs Through Strategic Capabilities: The Roles of Supply Chain Resilience and Mapping

Jehad Abdallah Atieh Afaneh, Department of Management, College of Business Administration, King Faisal University, Al-Ahsa, Saudi Arabia. Email: jafaneh@kfu.edu.sa

Zainab Bello, Waziri Umaru Federal Polytechnic, Birnin Kebbi, Nigeria.
Email: zainab@wufpbkas.edu.ng

Corresponding Author: Jehad Abdallah Atieh Afaneh; Email: jafaneh@kfu.edu.sa

ABSTRACT

The primary purpose of this research is to investigate strategic problems and strategic solutions for the positive application of the supply chain sustainability in the small and medium sized enterprises in Saudi Arabia. The independent variables are supplying chain collaboration, supply chain learning, strategic customer integration and strategic supplier integration. and the dependent variable is supplying chain sustainability. Furthermore, the study has examined the mediation of supply chain mapping and moderation of supply chain resilience. The study has adopted a quantitative research method and collect primary data from the hall population currently working in variety of small and medium sized enterprises in Saudi Arabia. The findings of the study revealed that supply chain collaboration, supply chain learning and strategic supply integration significantly impact supply chain sustainability however the influence of strategic customer integration is insignificant. Moreover, the mediating impact of supply chain mapping was found to be significant between independent variables and dependent variable. and the moderation of supply chain resilience on the association between supply chain mapping and supply chain sustainability was also found to be significant. Just study provides significant practical and theoretical implications and suggests future research directions.

KEYWORDS: Supply chain mapping, Supply chain resilience, Supply chain sustainability, Strategic customer integration, Strategic supplier integration, Supply chain learning, Supply chain collaboration, SMEs.

1. INTRODUCTION

In current times a business is not only evaluated on the basis of its profit but their environmental and societal impacts are considered an important indicator for business competitive edge, in such condition sustainability has become a catchphrase today's business environment (Jadhav, Orr, & Malik, 2019). Moreover, Business is evolved by globalization and technological advancement which heavily depends on outsourcing, and keeping up with current dynamics is challenging as well. For keep going in ever changing work dynamics having sustainable supply chain is crucial (Kusi-Sarpong, Gupta, & Sarkis, 2019). A sustainable supply chain is supplying system that reduce its environmental impact and cost by adopting sustainable methods in production and distribution of products and services to final customers. Incorporating sustainability in supply chain leads to cost cutting for waste, energy consumption that saves a lot for business (Khan et al., 2021). Furthers it instigates resilience in overall supply chain to deal with unexpected events to ensure smooth supply chain.

It is clear that to sustain in global market, sustainable supply chain management holds on an indispensable role in small and medium sized enterprise's key performance (Khan & Qianli, 2017), so overall firms are under pressure to introduce sustainable practices in their supply chain operations for better social and environmental sustainability. However, there are certain resource and operational constraints in small and medium enterprises of developing economies that are inhibiting frosting a sustainable supply chain to persist in the globalized market competition (Singh & Kumar, 2020; Wamba & Queiroz, 2020). Yet for dealing with these obstacles different strategic capabilities like Supply chain collaboration, Supply chain learning, and Strategic customer integration can be device for achieving the sustainability of supply chain (Chen et al., 2017). Operating supply chain sustainability can be a main motivating element for attainment of SMEs in vigorous world economy that can be improved by adopting different Strategic Capabilities.

In last decade, Saudi Arabia's faced exponential economic growth, which as the outcome has given rise to many industrial developments and additionally, industrialized activities have increased (Ahmed, 2021). Saudi Economy heavily hang on supply chain networks which dictates the necessity of integrating sustainable supply chain in organizations. Many countries including Saudi Arabia are able to device sustainability measures, larger companies are well aware of the importance of sustainability for surviving and succeeding in massive competition (Azmi et al., 2022), many firms have opted sustainable supply chain methods. conversely, small and medium sized enterprises are not able to employee sustainability guidelines in their supply chains systems due to lack of understanding and operational constraints. One of the reasons is that the main attention points of research has been developed countries few significant studies have explored supply chain sustainability and resilience in Saudi's SMEs context. Moreover, few studies (Barbosa-Póvoa, da Silva, & Carvalho, 2018; Yadav et al., 2020) have drawn attention the towards the challenges in creating sustainable supply chain but no study has tried to look for the ways and strategies to overcome these. Therefore, the key aim of this paper is to explore diverse strategic problems and strategic solution for positive application of Supply chain sustainability in Saudi's SMEs. This paper is designed to see how implementing SC strategic capabilities will guide SMEs to foster sustainability in SCM. The managers lack understanding of supply chain resilience and supply chain mopping due to few attention of researchers of this subject matter in emerging economy. Therefore, this paper aims to check the moderation of supply chain resilience for strategic capabilities and supply chain mapping, further how supply chain mediates for supply chain sustainably is also part of this paper. This paper offers a framework that will help to understand what factors are inhibiting SSC and how they can be resolved.

2. LITERATURE REVIEW

Within Small and Medium Enterprises (SMEs), prioritizing sustainable supply chain practices is crucial. This literature review explores the complexities of enhancing supply chain sustainability in SMEs, emphasizing the key roles of strategic capabilities, supply chain resilience, and mapping techniques. A comprehensive understanding of these factors is vital for navigating the challenges of sustainable supply chain management in SMEs, offering valuable insights to businesses, academics, and decision-makers.

2.1. Supply chain sustainability in SMEs

Leveraging technology is instrumental in enhancing the sustainability of supply chains. By integrating innovative solutions, businesses can streamline processes, reduce waste, and

optimize resource usage, thereby fostering a more sustainable approach within the supply chain. This framework, designed specifically for the unique challenges faced by smaller businesses, emphasizes the strategic utilization of technology (Ramaswamy, 2023). Effective green logistics management contributes positively to the adoption of circular economy practices and overall sustainability performance. Furthermore, the ability to trace products within the supply chain influences circular economy practices, although it does not alter the connection between green logistics strategies and sustainability performance outcomes (Zhou et al., 2023).

2.2. Strategic Capabilities in SMEs:

In small and medium-sized enterprises (SMEs), having strategic capabilities is essential for securing sustainable supply chains. ALfaraja (2023) emphasizes the importance of both strategic and supply chain agility, which significantly affect SMEs' performance. Notably, the ability to innovate plays a key role as it acts as a moderator, shaping the connection between strategic agility and overall performance. This finding highlights the critical significance of adaptability and innovation in the sustainable supply chain approaches adopted by SMEs. Tarifa-Fernández, Céspedes-Lorente, and de Burgos Jiménez (2023) highlights the crucial importance of cultivating environmental capabilities alongside integrating supply chains. The study indicates that this dual strategy improves both environmental and financial performance. By concurrently enhancing environmental capabilities and integrating supply chains, companies can attain favorable results in sustainability and economic stability. Moreover, Kot, Haque, and Kozlovski (2019) has revealed that strategic supply chain management significantly and positively mediates the enhancement of social and environmental sustainability performances in SMEs, regardless of the economic conditions. These results underline the widespread significance of strategic supply chain practices in fostering sustainable outcomes for both social and environmental aspects in small and medium-sized enterprises.

Mushtaha and Alsmairat (2023) reveals the direct impact of supply chain capabilities on sustainability, clarified through the mediation of the balanced scorecard method. Likewise, Nguyen et al. (2020) demonstrates the positive influence of dynamic capabilities and sustainable supply chain management on the sustainable growth of exporting enterprises in Vietnam. These studies emphasize the pivotal role played by strategic supply chain practices and dynamic capabilities in enhancing businesses' sustainability initiatives, offering essential insights for shaping sustainable supply chain strategies.

2.3. Supply Chain Collaboration in SMEs

Imtiaz et al. (2023) examining the influence of supply chain collaboration on the operational outcomes of small and medium-sized enterprises (SMEs) situated in developing nations. The research underlines the favorable relation between supply chain collaboration and the performance metrics of SMEs. Additionally, the study delves into the moderating role of supply chain technology implementation concerning the impact of collaboration within the supply chain.

The volatile conditions have necessitated supply chains to form collaborations with various entities to manage risks. These collaborations have enhanced supply chain efficiency by reducing costs and improving cash flow for companies involved. These strategic

partnerships have conferred resilience upon supply chains, allowing them to address challenges adeptly, manage finances more effectively, and enhance overall operational effectiveness and stability (Hughes et al., 2019; Madsen & Petermans, 2020). Enhancing collaboration among SMEs can be facilitated by integrating supply chain technology, promoting effective information exchange, and utilizing advanced manufacturing techniques (Soysal, Belbağ, & Erişkan, 2022). Moreover, fostering a supportive organizational culture for embracing supply chain collaboration has been proven to enhance SMEs' overall performance (Stekelorum, Courrent, & Spence, 2023). Strategic partnerships between SMEs can mitigate supply chain challenges, optimizing resource utilization (Arsawan et al., 2022). Institutional factors, positively impact CSR practices within SMEs (Zaridis, Vlachos, & Bourlakis, 2021). Notably, supply chain collaboration significantly influences SMEs' capabilities, innovation, and overall supply chain performance. Overall, the effectiveness of SMEs can be improved through enhanced collaboration, influenced by factors such as technology integration, organizational culture, and institutional pressures. Based on this, the study has been proposed the following hypotheses:

H1: Supply chain collaboration positively influences supply chain sustainability in SMEs.

2.4. Supply Chain Learning and SME Sustainability

Leveraging supply chain learning proves instrumental in advancing supply chain sustainability through various strategic approaches. This includes the facilitation of sustainability knowledge transfer and development (Silva, Pereira, & Boffelli, 2023). Effective selection of buyers capable of appropriating value and promoting sustainability knowledge learning through interactive exchanges is pivotal (Salinas-Navarro et al., 2022). Integrating diverse sustainability practices within supply chain finance solutions, such as supplier assessments, incentives, and third-party engagements, significantly enhances sustainability (Medina, Caniato, & Moretto, 2023). Moreover, the involvement of new stakeholders like third-party information providers, NGOs, positively influences the evolution of sustainable supply chain finance solutions (Mat Ishah, Lee, & Nawanir, 2023). Additionally, integrating digital literacy initiatives into educational supply chain sustainability efforts not only bridges the digital gap but also elevates sustainability standards in the educational supply chain (Fritz, 2022). Supply chain learning plays a pivotal role in driving sustainability by facilitating knowledge transfer, embedding sustainable practices, and tackling digital literacy challenges.

Supply chain learning significantly contributes to sustainability, especially within small business enterprises (Ramaswamy, 2023). Digital literacy is crucial for achieving sustainability in educational supply chains, focusing on both economic and environmental aspects (Mat Ishah et al., 2023). In multi-tiered food supply chains, sub-suppliers adopt sustainability practices through shared knowledge and unlearning processes, facilitated by buyer and first-tier supplier firms (Santos, Silva, & Pereira, 2023). Relationship-specific investments positively influence sustainability performance, and supply chain learning acts as a mediator, with different types of RSIs exerting diverse effects (Yang et al., 2023). Effective transfer and implementation of sustainability knowledge between suppliers and buyers are vital for supply chain sustainability, with buyer selection and interactive exchanges enabling this knowledge transfer (Silva et al., 2023). Based on this, the study has been proposed the following hypotheses:

H2: Supply chain learning positively influences supply chain sustainability in SMEs.

2.5. Strategic Customer and Supplier Integration

Strategic incorporation of customers is pivotal for enhancing the sustainability of small and medium-sized enterprises (SMEs) (Bruce et al., 2023). Utilizing technologies like social media, SMEs in manufacturing can enhance their sustainability and overall performance (Abzug, 2023). Directly correlated with SME manufacturing firms' performance, social media integration significantly impacts their operations (Silvestre, Fonseca, & Morioka, 2022). Moreover, social media usage not only aids SME firms' performance but also nurtures their sustainability efforts (Fonseca, Abreu, & Silvestre, 2021). Implementing social media marketing strategies strengthens customer relationships and encourages internal and external collaborations, thereby bolstering sustainability (Kang et al., 2018). Therefore, SMEs should explore integrating social media into their operations to augment both their performance and sustainability.

The integration of suppliers holds immense importance for the sustainability of small and medium enterprises (SMEs). Within the realm of supply chain management, the process of supplier selection carries substantial weight, emphasizing the need to incorporate sustainability considerations in this crucial decision-making process (Medina Serrano et al., 2020; Ratna & Kumar, 2021). The ISSSED-F framework, designed to support supplier relationship management, stands as a vital tool in the realm of supply chain management. Its successful implementation not only fosters effective supplier relationships but also guarantees the continuous development and enhancement of supply chains (Coşkun, Kumru, & Kan, 2022). The conventional emphasis on environmental preservation has broadened, now encompassing economic and social dimensions of sustainability in the assessment of suppliers. Yazdani, Chatterjee, and Torkayesh (2020) presents a fresh method for sustainable supplier selection, combining Analytic Hierarchy Process (AHP) and Quality Function Deployment (QFD) into an integrated model. This unique approach establishes a compromise ranking system, systematically integrating sustainability factors into supplier selection procedures. Notably, this model stands out for its adaptability, being applicable across a wide array of industries. By merging AHP and QFD techniques, organizations from diverse sectors can utilize this comprehensive framework to make well-informed decisions when choosing suppliers, ensuring their selections align effectively with sustainable practices.

Rudiyanto, Paniran, and Yumhi (2022) reveals that integrating suppliers and customers significantly influences the environmental sustainability of ISO 14001 certified manufacturing firms in Malaysia. This emphasizes the pivotal role of collaborative relationships in promoting eco-friendly practices in the industrial sector. Effective integration involves shared objectives, joint efforts in waste reduction, and implementing green processes across the supply chain. This underscores the significance of fostering robust partnerships, emphasizing collective responsibility in advancing environmental sustainability within manufacturing industry. Based on this, the study has been proposed the following hypotheses:

H3: *Strategic customer integration positively influences supply chain sustainability in SMEs.*

H4: *Strategic supplier integration positively influences supply chain sustainability in SMEs.*

2.6. Supply Chain Mapping as a Mediator

Supply chain mapping involves systematically visualizing and understanding the elements and relationships in a supply chain network. Through visual diagrams, businesses gain insights into

supplier, manufacturer, distributor, and customer connections. This visualization boosts supply chain visibility, enabling the identification of bottlenecks and vulnerabilities (Mubarik et al., 2021). Recognizing these weaknesses empowers companies to proactively strategize, minimizing risks, optimizing processes, and enhancing overall supply chain resilience. Ekanayake, Shen, and Kumaraswamy (2021) claimed that adopting a supply chain mapping approach empowers businesses to gain comprehensive insights into their supply network. Through visualizing and understanding the connections among suppliers, manufacturers, and distributors, companies enhance their visibility into operational intricacies. This heightened awareness enables firms to spot weaknesses, identify bottlenecks, and detect inefficiencies within their supply chain. Equipped with this information, businesses can proactively tackle these challenges, bolster their resilience, and streamline their supply chain processes for improved efficiency and adaptability.

The COVID-19 pandemic has underscored the essential requirement for supply chain resilience. Key factors like technology implementation, sourcing strategies, customer relationships, ecosystem management, and financial assets have gained significant importance in constructing robust and adaptable supply chains, as revealed by recent studies (Pimenta et al., 2022). This heightened awareness emphasizes the critical role these elements play in ensuring that supply chains can effectively withstand unexpected challenges, making them essential components for businesses aiming to build resilient supply networks. Based on this, the study has been proposed the following hypotheses:

H5: *Supply chain mapping mediates the relationship between supply chain collaboration and supply chain sustainability in SMEs.*

H6: *Supply chain mapping mediates the relationship between supply chain learning and supply chain sustainability in SMEs.*

H7: *Supply chain mapping mediates the relationship between strategic customer integration and supply chain sustainability in SMEs.*

H8: *Supply chain mapping mediates the relationship between strategic supplier integration and supply chain sustainability in SMEs.*

2.7. Supply Chain Resilience as a Moderator

Supply chain resilience denotes the ability of a supply chain network to recover and return to regular operations following disruptions. This includes proactive preparations for unforeseen events and the formulation of effective strategies to mitigate their negative impacts (Olivares-Aguila & Vital-Soto, 2021). In essence, it involves the supply chain's capability to swiftly recover from disturbances, ensuring a prompt return to normal functioning by employing strategic planning and preparedness measures. Hussain et al. (2023) suggests that supply chain resilience acts as a mediator, meaning it plays a vital role in how resilience enablers affect the organization's ability to cope with disruptions, known as disruption orientation. Additionally, supply chain complexity moderates this relationship. This implies that the intricacies within a supply chain, such as multiple suppliers or intricate logistics, influence how these enablers impact the overall resilience of the supply chain.

Supply chain resilience has evolved into a crucial strategic capability within operations management, focusing on minimizing the impact of unexpected disruptions. This strategic approach entails proactive measures and contingency plans, ensuring continuous business operations and minimizing disruptions in the face of unforeseen events affecting the supply

chain (Zavala-Alcívar, Verdecho, & Alfaro-Saiz, 2023). Improving supply chain performance is achieved through enhanced sustainability practices, emphasizing efficiency and reliability. Remarkably, supply chain resilience, although not a direct performance influencer, indirectly shapes it by impacting sustainability. This complex connection operates through mediation: supply chain resilience influences sustainability practices, subsequently enhancing overall performance (Zhu & Wu, 2022). This complex relationship highlights the need for a comprehensive strategy, emphasizing the relationship between resilience, sustainability, and performance in supply chains. Based on this, the study has proposed the following hypotheses:

H9: *Supply chain resilience moderates the relationship between supply chain mapping and supply chain sustainability in SMEs.*

The current body of literature sheds light on diverse aspects of supply chain sustainability in SMEs, encompassing supply chain collaboration and learning, and strategic customer and supplier integrations. However, a substantial research gap persists in fully grasping the intricate connections and subtleties of these components within the SME context. This study endeavors to bridge this gap by delving into the complex relationships among supply chain collaboration, learning, strategic customer integration, and strategic supplier integration. Here, supply chain resilience functions as a moderator, and supply chain mapping acts as a mediator. Through this exploration, the research addresses the specific potentials and challenges encountered by SMEs, offering a holistic insight into the interactions shaping supply chain sustainability in order to empowering these enterprises to enhance their sustainability initiatives effectively.

After reviewing the past literature, this study proposes a conceptual framework that is given below:

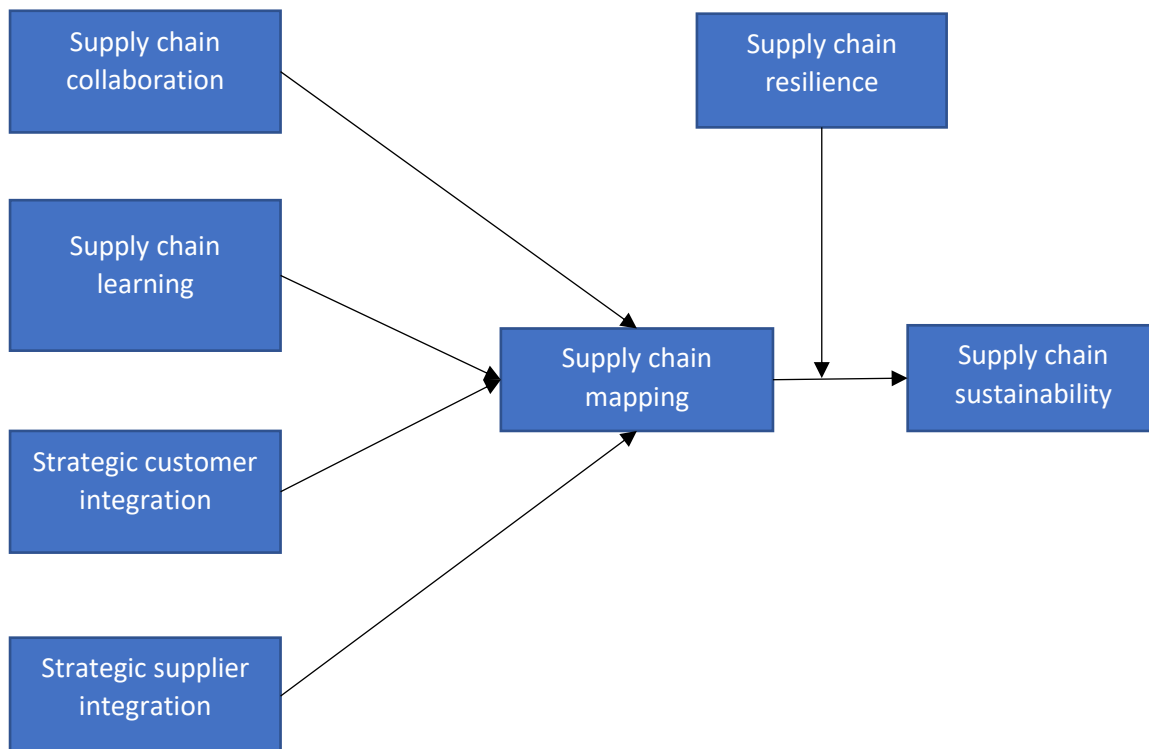


Figure 2.1: Conceptual Framework

3. METHODOLOGY

3.1. Data Collection Method and Location

The researchers have used the non-probability purposive sampling technique for gathering primary data on the basis of a quantitative research method. In addition to this, the researchers have adopted the online medium for data collection and has achieved the goal of diversity and generalizability in the datasheet. The researchers distributed the questionnaire as an email attachment. As per the respondents of the study were concerned, the researchers have used the employees of SMEs as the whole population working in variety of SME firms and organizations of Saudi Arabia.

3.2. The Survey Tool Measurement

The researchers have elegantly presented all the necessary and appropriate information to portray the details of the adopted scale items.

Variable name	No of items and items used	Sources reference for items
Supply chain collaboration	Total 7: The upstream and downstream supply chain system established by a company needs cooperation with supply chain partners. Your company has extensive cooperation with supply chain partners in forecasting and production planning. 5 more ...	(Li et al., 2023)
Supply chain learning	Total 5 items We ensure that our employees and managers change their behaviors and processes appropriately as they gain new knowledge from our key suppliers (e.g., the technology gained from the suppliers will be incorporated into the process of green product development 4 more...	(Guo, Wang, & Chen, 2020)
Strategic customer integration	Total 8 items The level of computerization for customer's ordering. Customers share demand information. 6 more ...	(Tang et al., 2023)
Strategic supplier integration	Total 6 items Share information about the inventory level with suppliers. Select supplier based on historical performance. 4 more...	(So & Sun, 2010)
Supply chain resilience	Total 4 items The supply chain would easily recover to its original state. Material flow would be quickly restored. 2 more ...	(Dubey et al., 2023) (Brandon-Jones et al., 2014)
Supply chain mapping	25 total Based on three dimensions of upstream, mid-stream and downstream mapping We have system of sharing real time information with customers. We have mapped the geographical dispersion of our customers.	(Mubarik et al., 2021)
Supply chain sustainability	Total 9 items Training/education in sustainability issues for suppliers' personnel. Joint efforts with suppliers to improve their sustainability performance. 7 more	(Gouda & Saranga, 2018)

3.3. Data Analysis and Ethics Followed in the Study

The researchers have conducted all the screening and testing on the data with the basic and most effective software named SPSS. The researchers have performed the tests of normality, reliability, validity, correlation, and regression analysis to reach and make the decision of hypotheses acceptance and rejection. In addition to this, the researchers have made the journey of this whole research by strictly following all the ethical rules and regulations of research and primarily assured the requirements of anonymity, confidentiality, trust, and originality in data collection and results computation.

4. ANALYSIS

4.1. Demographics

While conducting a research study, it is critical to examine the demographical attributes of study's respondents, because it assists the researcher in the identification of most appropriate participants for data collection. Table 4.1 shows the results of demographics in current study. In this study, 102 participants i.e., 51.7% were males and 95 that is 48.2% were females. According to the education of the target population, majority of the respondents holds a diploma degree i.e., 75 participants comprising 38.1%, 63 i.e., 32% were holding post-graduation degree, and only 21 respondents i.e., 10.7% did a graduation program, however 38 i.e., 19.3% participants were holding any other degree.

Table 4.1: Demographics

	Frequency	%
Gender		
male	102	51.7
female	95	48.2
Education		
Graduation	21	10.7
Post-Graduation	63	32.0
Diploma	75	38.1
Other	38	19.3

4.2. Descriptive Statistics

The test of descriptive statistics confirms that the current statistical data set is normal and it also ensures that the values of minimum maximum mean and standard deviation meet the standard criterion and the data set does not contain any outlier because their presence may potentially harm the findings of the study (Kaur, Stoltzfus, & Yellapu, 2018). The descriptive statistics summarizes and simplifies the complex data sets thus makes it easier to understand the data (Fisher & Marshall, 2009). The results of descriptive statistics are presented in table 4.2 below. The N value confirms the number of total responses analysed that is 197. For all the variables observed, the maximum value is 5 and the minimum value is 1. The mean values of SMP, SPC, SCL, SSI, SCI and SCS are 2.81, 328, 3.90, 3.47, 3.20 and 3.47, and the standard deviation values are 0.76, 0.90, 0.83, 1.01, 0.89, and 0.96.

Table 4.2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SMP	197	1.00	4.61	2.8142	.76218
SPC	197	1.00	4.86	3.2872	.90339
SCL	197	1.00	5.00	3.9061	.83837
SSI	197	1.00	5.00	3.4763	1.01687
SCI	197	1.38	5.00	3.2081	.89775
SCS	197	1.00	5.00	3.4738	.96826
Valid N (listwise)	197				

“SMP= Supply chain mapping, SCR= Supply chain resilience, SCS= Supply chain sustainability, SCI= Strategic customer integration, SSI= Strategic supplier integration, SCL= Supply chain learning, SPC= Supply chain collaboration.”

4.3. KMO and Bartlett's Test

In order to assess the measurement scales' sustainability, factor loadings analysis has been examined. According to Hadi, Abdullah, and Sentosa (2016), the primary reasons for conducting factor loadings analysis is to examine the underlying interrelationships among the items of measurement scales. The KMO & Bartlett's tests significance has been evaluated with a value above 0.70 and 1.00. The results of KMO & Bartlett's test are provided in table 4.3. The resultant value of KMO is 0.909; thus significant, and Bartlett's test is also significant.

Table 4.3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.909
	Approx. Chi-Square	6941.272
Bartlett's Test of Sphericity	df	1540
	Sig.	.000

4.4. Correlation Analysis

Correlation is a statistical tool which represents how closely two variables of the research investigation are related to each other. Correlation analysis demonstrates the extent to which two or more constructs are associated with one another. Results of correlation of present study given in table 4.4 shows all the obtained values represents with ** are significant and shows that variables are correlated.

Table 4.4: Correlation

	SMP	SPC	SCL	SSI	SCI	SCS	SCR
SMP	1						
SPC	.097	1					
SCL	-.007	.408**	1				
SSI	.005	.296**	.550**	1			
SCI	.066	.169*	.396**	.519**	1		
SCS	.017	.309**	.398**	.432**	.275**	1	
SCR	-.057	.237**	.284**	.244**	.023	.172*	1

“SMP= Supply chain mapping, SCR= Supply chain resilience, SCS= Supply chain sustainability, SCI= Strategic customer integration, SSI= Strategic supplier integration, SCL= Supply chain learning, SPC= Supply chain collaboration.”

4.5. R-Square

According to Gelman et al. (2019), the analysis of R-square or the coefficient of determination states how well the study's regression model fits the observed data values. R-square provides with the information the extent of variance contributed to dependent variables by the predictors. Table 4.5 presents the results of R-square; it can be observed that there is 24.4% variance in the relevant constructs.

Table 4.5: R-square

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.494 ^a	.244	.228	.85077

a. Predictors: (Constant), SCI, SPC, SCL, SSI

“SCI= Strategic customer integration, SSI= Strategic supplier integration, SCL= Supply chain learning, SPC= Supply chain collaboration.”

4.6. ANOVA

For the examination of model fitness, ANOVA analysis has been done by conducting F-test. Results of ANOVA presented in table 4.6 has shown that F-test is significant thus the model of study is a good fit overall.

Table 4.6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.783	4	11.196	15.468	.000 ^b
	Residual	138.973	192	.724		
	Total	183.756	196			

4.7. Hypotheses Testing

In this study, there are four direct hypotheses. Table 4.7 presents the summary of direct hypotheses. It has been observed that the association between SPC and SCS has been accepted (t-statistics= 2.20, p-value= 0.02), the association between SCL and SCS has been supported (t-statistics= 2.12, p-value= 0.34), similarly, the relationship between SSI and SCS has been accepted as well (t-statistics= 3.31, p-value= 0.01). However, it was found that association between SCI and SCS has not been supported (t-statistics= 0.55, p-value= 0.57).

Table 4.7: Direct Hypotheses testing

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.126	.332		3.392	.001
	SPC	.164	.074	.153	2.209	.028
	SCL	.197	.092	.170	2.129	.034
	SSI	.259	.078	.272	3.311	.001
	SCI	.045	.080	.041	.556	.579

a. Dependent Variable: SCS

“SCS= Supply chain sustainability, SCI= Strategic customer integration, SSI= Strategic supplier integration, SCL= Supply chain learning, SPC= Supply chain collaboration.”

4.8. Mediation Analysis

The study has examined the mediating impact of SMP. From the results presented in table 4.8, it was found that SMP significantly mediates the association between SPC and SCS (lower-bound=.1876, upper-bound= 0.4755), SCL and SCS (lower-bound=.3102, upper-bound= 0.6095), SSI and SCS (lower-bound=.2899, upper-bound= 0.5325) and SCI and SCS (lower-bound=.1506, upper-bound= 0.4435).

Table 4.8: Mediation Analysis

Relationship	Total-effect	Direct effect	Indirect effect	Confidence Interval		t-statistics	p-value	Conclusion
				Lower-bound	Upper-bound			
SPC→SMP→SCS	.3316	.3329	-.0013	.1876	.4755	4.5429	.0000	Supported
SCL→SMP→SCS	.4598	.4600	-.0002	.3102	.6095	6.0610	.0000	Supported
SSI→SMP→SCS	.4112	.4111	.0001	.2899	.5325	6.6863	.0000	Supported
SCI→SMP→SCS	.2970	.2971	.0000	.1506	.4435	4.0006	.0001	Supported

“SMP= Supply chain mapping, SCS= Supply chain sustainability, SCI= Strategic customer integration, SSI= Strategic supplier integration, SCL= Supply chain learning, SPC= Supply chain collaboration.”

4.9. Moderation Analysis

The study has examined the moderation of supply chain resilience between the mediating and dependent variable i.e., between supply chain mapping and supply chain sustainability in SMEs. The results given in table 4.9 shows that moderation is significant, thus supported.

Table 4.9: Moderation Analysis

	Model						Conclusion
	Coeff	se	t	P	LLCI	ULCI	
constant	2.9612	.8571	3.4550	.0007	1.2708	4.6516	Supported
SMP	.0107	.2918	.0368	.9707	-.5648	.5863	
SCR	.1357	.2691	.5041	.6147	-.3952	.6665	
Int_1	.0080	.0925	.0865	.9311	-.1745	.1905	

“SMP= Supply chain mapping, SCR= Supply chain resilience.”

5. DISCUSSION

This study investigates the interconnected dynamics of supply chain collaboration, learning, strategic customer integration, and strategic supplier integration, by seeking to uncover the complex network of elements influencing sustainable practices within SMEs. In examining H1, which asserts that positive collaboration within supply chains enhances sustainability in SMEs, this study validates the hypothesis. The research revealed that collaborative endeavors among supply chain partners, characterized by improved communication and resource sharing, significantly enhance sustainable practices within SMEs. These outcomes resonate with existing scholarly works underscoring the favorable impact of collaboration on sustainable supply chain management (Imtiaz et al., 2023). Similarly, H2, suggesting that continual learning within supply chains enhances sustainability in SMEs, gains support from the study's outcomes. SMEs engaging in ongoing learning and knowledge-sharing activities within their supply chains demonstrated more sustainable practices. This underscores the importance of knowledge acquisition and adaptive learning processes in promoting sustainability, aligning with

previous research highlighting the role of organizational learning in sustainable supply chain management (Salinas-Navarro et al., 2022; Silva et al., 2023).

H3, suggesting that strategic customer integration positively impacts supply chain sustainability in SMEs, is refuted due to insignificant findings. Surprisingly, the data indicate that integrating customer needs into SME supply chains might not significantly enhance sustainability, urging a closer examination of the intricacies involved. This prompts a deeper exploration into the challenges and gaps between theoretical expectations and practical realities concerning customer integration within SMEs. Conversely, H4, proposing that strategic supplier integration positively influences supply chain sustainability in SMEs, gains robust support from the study's outcomes. It highlights the essential role of collaborative partnerships with suppliers, highlighting their positive impact on sustainable practices within SME supply chains. These findings emphasize the necessity of cultivating robust relationships with suppliers, recognizing them as fundamental allies in advancing supply chain sustainability. The affirmation of this hypothesis aligns with the broader understanding of supply chain management, emphasizing the pivotal contribution of supplier partnerships in achieving sustainable outcomes.

The acceptance of H5, H6, H7, and H8 highlights the pivotal function of supply chain mapping as a mediator in shaping sustainable practices within SMEs. Supply chain mapping serves as a crucial intermediary, enriching the connection between diverse aspects of supply chain management and overall sustainability initiatives. In the context of H5, supply chain collaboration significantly enhances supply chain sustainability in SMEs when guided by proficient mapping strategies. Similarly, the incorporation of learning processes, as highlighted in H6, yields more substantial impact when supported by well-organized supply chain mapping. This highlights the significance of knowledge dissemination and strategic mapping in fostering sustainable outcomes. Moreover, strategic customer integration (H7) and supplier integration (H8) intensify their sustainability effects when mediated through supply chain mapping, emphasizing the importance of streamlined communication, seamless collaboration, and effective resource allocation. The acceptance of these hypotheses highlights the complex nature of supply chain mapping, which not only enhances individual components but also synergistically strengthens the entire range of sustainable practices within SMEs. This stresses the necessity for comprehensive mapping strategies to optimize sustainability efforts in supply chain management.

The validation of H9 underlines the pivotal role of supply chain resilience as a moderator in shaping the connection between supply chain mapping and sustainability within SMEs. Effective supply chain mapping, guided and strengthened by resilient strategies, significantly boosts sustainability efforts in SMEs. This acceptance is rooted in the recognition that during disruptions and challenges, supply chain resilience acts as a protective shield, guaranteeing the efficacy of mapping initiatives. In the face of unexpected events or alterations in the supply chain landscape, resilient strategies enhance the flexibility and responsiveness of supply chain mapping. This enables SMEs to uphold sustainable practices even amidst adversities. This highlights the necessity of integrating supply chain resilience techniques with mapping strategies, reinforcing not only the mapping process but also ensuring the durability and strength of sustainable practices within SMEs. This underscores the importance of a comprehensive approach in enhancing supply chain sustainability.

6. CONCLUSION

In summary, this study marks a significant upgradation in comprehending supply chain sustainability within SMEs. This study's outcomes emphasize the pivotal roles of supply chain collaboration and learning in elevating supply chain sustainability within SMEs. While customer integration did not yield significant results in this study, the findings underscore the critical role of supplier collaboration in enhancing supply chain sustainability within SMEs. These insights offer valuable guidance for SMEs aiming to improve their sustainable practices, pinpointing specific areas where strategic partnerships can drive meaningful advancements in supply chain sustainability. The study stresses the need for SMEs to adopt comprehensive mapping strategies, emphasizing the crucial role these strategies play in optimizing sustainability efforts within supply chain management practices. Supply chain resilient strategies enhance supply chain mapping, ensuring effectiveness during disruptions. Integrating resilience techniques strengthens mapping, emphasizing adaptability and bolstering sustainability in SMEs. This study highlights the necessity for SMEs to embrace flexible approaches, robust mapping methods, and cooperative alliances. These factors are crucial in strengthening supply chain sustainability amidst the constantly shifting challenges and uncertainties.

7. IMPLICATIONS

This study represents a ground breaking investigation into the complexities of supply chain sustainability within SMEs. By dissecting the intricate dynamics encompassing supply chain collaboration, supply chain learning, strategic customer integration, and strategic supplier integration, this research offers a fresh perspective. It introduces the concept of supply chain resilience as a moderator and supply chain mapping as a mediator, refining existing theoretical frameworks and providing a detailed understanding of their interrelationships. The research sheds light on the distinct challenges and opportunities specific to SMEs, enriching the broader discourse on supply chain management. Beyond conventional boundaries, the study highlights the pivotal roles of adaptability and mapping strategies in shaping sustainable supply chains. Moreover, it seamlessly integrates theoretical insights into practical contexts, enabling the formulation of targeted strategies tailored to SMEs.

The practical implications of this valuable research are significant, especially for SMEs aiming to strengthen their supply chain sustainability. Firstly, SMEs can leverage the findings of this study to customize their approaches in response to their specific challenges and advantages. Understanding the complex links between supply chain collaboration, learning, strategic customer integration, and strategic supplier integration empowers SMEs to forge targeted partnerships. For instance, they can nurture stronger associations with essential suppliers and customers, strengthening communication channels and building resilient relationships. Additionally, recognizing the pivotal roles of supply chain resilience and mapping equips SMEs to proactively address disruptions. Investing in technologies and practices enhancing supply chain resilience ensures operational continuity, even in unforeseen circumstances.

Moreover, SMEs can utilize these insights to strengthen their environmental sustainability initiatives. Furthermore, SMEs can invest in training programs focusing on areas like supply chain management, collaboration, and adaptability. Well-trained employees are better

equipped to implement strategies derived from this research effectively. Additionally, the study emphasizes the significance of technology adoption. These tools enable monitoring, identifying potential issues in advance and ensuring swift responses, thereby enhancing operational efficiency and customer satisfaction.

This holistic approach bridges theoretical gaps and translates theoretical knowledge into actionable measures. Empowering SMEs, the study facilitates the enhancement of their supply chain, enhance operational efficiency, reduce costs, promote environmental sustainability and thrive in the competitive business world. This research contributes significantly to both theoretical advancement and practical implementation, fostering a profound understanding of supply chain dynamics and equipping SMEs with effective tools for realizing more resilient and sustainable business practices.

8. LIMITATIONS

This study provides valuable insights into supply chain sustainability within SMEs, it faces several limitations that need to be consider. A notable issue arises from the limited response rate during data collection, raising concerns about potential bias and the study's reliability. Additionally, there's a challenge related to the generalizability of this study; the findings may not have universal relevance due to the study's specific context, restricting broader applications across diverse SME sectors. External variables, such as market fluctuations, beyond the study's control, could influence the drawn conclusions. Recognizing and acknowledging these constraints is imperative. It ensures a detailed interpretation of the study's outcomes, allowing for a precise understanding of the boundaries within which its findings can be appropriately employed.

9. FUTURE DIRECTIONS

Expanding upon the existing research, future studies have the opportunity to delve into various unexplored paths, deepening the comprehension of supply chain sustainability in SMEs. Firstly, conducting longitudinal studies offers a chance to monitor the evolution of sustainability strategies over time, providing valuable insights into their durable impact. Comparative analyses across diverse industries and regions can offer a more all-encompassing view, augmenting the applicability of the research findings. Additionally, exploring the roles of emerging technologies such artificial intelligence in enhancing supply chain resilience and mapping presents a promising and uncharted area. Investigating the influence of cultural and regulatory differences on sustainability initiatives among SMEs can yield invaluable cross-cultural perspectives. The exploration of innovative financing models and collaborations between SMEs and larger corporations holds potential for innovative solutions. Lastly, qualitative exploration involving in-depth interviews or case studies can reveal detailed insights, enhancing our understanding of the human factors shaping sustainable supply chain practices. By venturing into these directions, future research endeavors can furnish comprehensive, and actionable insights, further propelling sustainable practices within SMEs.

10. ACKNOWLEDGMENT

This work was supported by the Deanship of Scientific Research, Vice Presidency for Graduate Studies and Scientific Research, King Faisal University, Saudi Arabia [Grant 4565]'.

REFERENCES

- Abzug, R. (2023). Structural drivers and barriers to the strategic integration of sustainability in US B-schools. *International Journal of Sustainability in Higher Education*, 24(5), 986-1001. <https://doi.org/10.1108/IJSHE-10-2021-0433>
- Ahmed, A. (2021). The Importance of Supply Chain Management Practices in Increasing Customer Satisfaction and Customer Retention: Evidence from Saudi Arabia. *International Journal of Scientific Research and Management*, 9(3), 2136-2151. <https://doi.org/10.18535/ijstrm/v9i03.em04>
- ALfaraja, J. M. (2023). Strategic agility and supply chain agility: Potential antecedents of SMEs performance. *Uncertain Supply Chain Management*, 11(3), 875-884. <https://doi.org/10.5267/j.uscm.2023.5.011>
- Arsawan, I. W. E., Koval, V., Suhartanto, D., Babachenko, L., Kapranova, L., & Suryantini, N. P. S. (2022). SMEs' Supply Chain Performance: The Role of Collaboration, Capabilities and Innovation. *Business and Management 2022*. <https://doi.org/10.3846/bm.2022.788>
- Azmi, N. A., Sweis, G., Sweis, R., & Sammour, F. (2022). Exploring Implementation of Blockchain for the Supply Chain Resilience and Sustainability of the Construction Industry in Saudi Arabia. *Sustainability*, 14(11). <https://doi.org/10.3390/su14116427>
- Barbosa-Póvoa, A. P., da Silva, C., & Carvalho, A. (2018). Opportunities and challenges in sustainable supply chain: An operations research perspective. *European Journal of Operational Research*, 268(2), 399-431. <https://doi.org/10.1016/j.ejor.2017.10.036>
- Brandon-Jones, E., Squire, B., Autry, C. W., & Petersen, K. J. (2014). A contingent resource-based perspective of supply chain resilience and robustness. *Journal of Supply Chain Management*, 50(3), 55-73. <https://doi.org/10.1111/jscm.12050>
- Bruce, E., Keelson, S., Amoah, J., & Bankuoru Egala, S. (2023). Social Media Integration: An opportunity for SMEs sustainability. *Cogent Business & Management*, 10(1), 2173859. <https://doi.org/10.1080/23311975.2023.2173859>
- Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., & Zhu, W. (2017). Supply chain collaboration for sustainability: A literature review and future research agenda. *International Journal of Production Economics*, 194, 73-87. <https://doi.org/10.1016/j.ijpe.2017.04.005>
- Coşkun, S. S., Kumru, M., & Kan, N. M. (2022). An integrated framework for sustainable supplier development through supplier evaluation based on sustainability indicators. *Journal of Cleaner Production*, 335, 130287. <https://doi.org/10.1016/j.jclepro.2021.130287>
- Dubey, R., Bryde, D. J., Dwivedi, Y. K., Graham, G., Foropon, C., & Papadopoulos, T. (2023). Dynamic digital capabilities and supply chain resilience: The role of government effectiveness. *International Journal of Production Economics*, 258, 108790. <https://doi.org/10.1016/j.ijpe.2023.108790>
- Ekanayake, E. M. A. C., Shen, G. Q., & Kumaraswamy, M. (2021). Supply chain resilience: mapping the knowledge domains through a bibliometric approach. *Built Environment Project and Asset Management*, 11(4), 705-721. <https://doi.org/10.1108/BEPAM-03-2020-0040>
- Fisher, M. J., & Marshall, A. P. (2009). Understanding descriptive statistics. *Australian Critical Care*, 22(2), 93-97. <https://doi.org/10.1016/j.aucc.2008.11.003>
- Fonseca, A., Abreu, I., & Silvestre, W. J. (2021). Investigating context factors in the strategic management of corporate sustainability integration. *Journal of Cleaner Production*, 314, 128002. <https://doi.org/10.1016/j.jclepro.2021.128002>

- Fritz, M. M. C. (2022). A supply chain view of sustainability management. *Cleaner Production Letters*, 3, 100023. <https://doi.org/10.1016/j.cpl.2022.100023>
- Gelman, A., Goodrich, B., Gabry, J., & Vehtari, A. (2019). R-squared for Bayesian Regression Models. *The American Statistician*, 73(3), 307-309. <https://doi.org/10.1080/00031305.2018.1549100>
- Gouda, S. K., & Saranga, H. (2018). Sustainable supply chains for supply chain sustainability: impact of sustainability efforts on supply chain risk. *International Journal of Production Research*, 56(17), 5820-5835. <https://doi.org/10.1080/00207543.2018.1456695>
- Guo, Y., Wang, L., & Chen, Y. (2020). Green Entrepreneurial Orientation and Green Innovation: The Mediating Effect of Supply Chain Learning. *SAGE Open*, 10(1), 2158244019898798. <https://doi.org/10.1177/2158244019898798>
- Hadi, N. U., Abdullah, N., & Sentosa, I. (2016). An Easy Approach to Exploratory Factor Analysis: Marketing Perspective. *Journal of Educational and Social Research*, 6, 215. <https://doi.org/10.5901/JESR.2016.V6N1P215>
- Hughes, D. E., Richards, K. A., Calantone, R., Baldus, B., & Spreng, R. A. (2019). Driving In-Role and Extra-Role Brand Performance among Retail Frontline Salespeople: Antecedents and the Moderating Role of Customer Orientation. *Journal of Retailing*, 95(2), 130-143. <https://doi.org/10.1016/j.jretai.2019.03.003>
- Hussain, G., Nazir, M. S., Rashid, M. A., & Sattar, M. A. (2023). From supply chain resilience to supply chain disruption orientation: the moderating role of supply chain complexity. *Journal of Enterprise Information Management*, 36(1), 70-90. <https://doi.org/10.1108/JEIM-12-2020-0558>
- Imtiaz, M., Hamid, A. B. A., Nadarajah, D., Mehmood, S. A., & Ahmad, M. K. (2023). Enhancing SMEs Performance through Supply Chain Collaboration and moderation of Supply Chain Technology Implementation. *Brazilian Journal of Operations & Production Management*, 20(2), 1494. <https://doi.org/10.14488/BJOPM.1494.2023>
- Jadhav, A., Orr, S., & Malik, M. (2019). The role of supply chain orientation in achieving supply chain sustainability. *International Journal of Production Economics*, 217, 112-125. <https://doi.org/10.1016/j.ijpe.2018.07.031>
- Kang, M., Yang, M. G., Park, Y., & Huo, B. (2018). Supply chain integration and its impact on sustainability. *Industrial Management & Data Systems*, 118(9), 1749-1765. <https://doi.org/10.1108/IMDS-01-2018-0004>
- Kaur, P., Stoltzfus, J., & Yellapu, V. (2018). Descriptive statistics. *International Journal of Academic Medicine*, 4(1). https://doi.org/10.4103/IJAM.IJAM_7_18
- Khan, S. A. R., & Qianli, D. (2017). Impact of green supply chain management practices on firms' performance: an empirical study from the perspective of Pakistan. *Environmental Science and Pollution Research*, 24(20), 16829-16844. <https://doi.org/10.1007/s11356-017-9172-5>
- Khan, S. A. R., Yu, Z., Golpir, H., Sharif, A., & Mardani, A. (2021). A state-of-the-art review and meta-analysis on sustainable supply chain management: Future research directions. *Journal of Cleaner Production*, 278, 123357. <https://doi.org/10.1016/j.jclepro.2020.123357>
- Kot, S., Haque, A., & Kozlovski, E. (2019). Mediating effect of strategic supply chain management on social and environmental sustainability: Evidence from SMEs of Canada, Iran and Turkey. *International Journal of Supply Chain Management*, 8(6), 105-117. <https://doi.org/10.59160/ijscm.v8i6.2907>

- Kusi-Sarpong, S., Gupta, H., & Sarkis, J. (2019). A supply chain sustainability innovation framework and evaluation methodology. *International Journal of Production Research*, 57(7), 1990-2008. <https://doi.org/10.1080/00207543.2018.1518607>
- Li, L., Wang, Z., Chen, L., Zhao, X., & Yang, S. (2023). Supply chain collaboration and supply chain finance adoption: the moderating role of information transparency and transaction dependence. *Supply Chain Management: An International Journal*, 28(4), 710-723. <https://doi.org/10.1108/SCM-04-2022-0169>
- Madsen, S. M., & Petermans, A. (2020). Exploring the system of digitised retail design—flattening the ontology. *Journal of Retailing and Consumer Services*, 54, 102053. <https://doi.org/10.1016/j.jretconser.2020.102053>
- Mat Ishah, N. S., Lee, K. L., & Nawanir, G. (2023). Educational supply chain sustainability. *Asian Education and Development Studies*, 12(2/3), 137-149. <https://doi.org/10.1108/AEDS-09-2022-0123>
- Medina, E., Caniato, F., & Moretto, A. (2023). Framing Sustainable Supply Chain Finance: how can supply chain sustainability practices and supply chain finance solutions be integrated? *Journal of Purchasing and Supply Management*, 29(3), 100837. <https://doi.org/10.1016/j.pursup.2023.100837>
- Medina Serrano, R., Wellbrock, W., González-Ramírez, R., & Gascó, J. L. (2020). Integration of sustainability aspects in the supplier selection process: a case study from a German electronics firm. <https://doi.org/10.33422/ijarme.v3i2.170>
- Mubarik, M. S., Naghavi, N., Mubarik, M., Kusi-Sarpong, S., Khan, S. A., Zaman, S. I., & Kazmi, S. H. A. (2021). Resilience and cleaner production in industry 4.0: Role of supply chain mapping and visibility. *Journal of Cleaner Production*, 292, 126058. <https://doi.org/10.1016/j.jclepro.2021.126058>
- Mushtaha, A. S., & Alsmairat, M. A. K. (2023). The Role of Big Data tools and Supply Chain Capabilities in Promoting Supply Chain Sustainability: Insights using Balanced Scorecard Approach. In *2023 International Conference on Business Analytics for Technology and Security (ICBATS)* (pp. 1-6). <https://doi.org/10.1109/ICBATS57792.2023.10111466>
- Nguyen, H. V., To, T. H., Trinh, V. X., & Dang, D. Q. (2020). The Role of Supply Chain Dynamic Capabilities and Sustainable Supply Chain Management Practices on Sustainable Development of Export Enterprises. *Acta Technologia: International Scientific Journal about Technologies*, 7(1), 9-16. <https://doi.org/10.22306/atec.v7i1.98>
- Olivares-Aguila, J., & Vital-Soto, A. (2021). Supply Chain Resilience Roadmaps for Major Disruptions. *Logistics*, 5(4), 78. <https://doi.org/10.3390/logistics5040078>
- Pimenta, M. L., Cezarino, L. O., Piatto, E. L., da Silva, C. H. P., Oliveira, B. G., & Liboni, L. B. (2022). Supply chain resilience in a Covid-19 scenario: Mapping capabilities in a systemic framework. *Sustainable Production and Consumption*, 29, 649-656. <https://doi.org/10.1016/j.spc.2021.10.012>
- Ramaswamy, M. (2023). Small businesses and supply chain sustainability. *Administrative Issues Journal: Connecting Education, Practice, and Research*, 13(2), 143-150.
- Ratna, S., & Kumar, B. (2021). Supplier Selection for Sustainable Supply Chain Using an Integrated GRA-VIKOR Approach in an SME. In R. K. Phanden, K. Mathiyazhagan, R. Kumar, & J. Paulo Davim (Eds.), *Advances in Industrial and Production Engineering* (pp. 237-243). Springer Singapore. https://doi.org/10.1007/978-981-33-4320-7_22
- Rudiyanto, R., Paniran, P., & Yumhi, Y. (2022). SME Sustainability Through the Role of Suitability Tasks in Accounting Information Systems and Internal Control. *Akurasi: Journal of Accounting and Finance Studies*, 5(2), 153-166. <https://doi.org/10.29303/akurasi.v5i2.235>

- Salinas-Navarro, D. E., Mejia-Argueta, C., Montesinos, L., & Rodriguez-Calvo, E. Z. (2022). Experiential Learning for Sustainability in Supply Chain Management Education. *Sustainability*, 14(20). <https://doi.org/10.3390/su142013133>
- Santos, K. A., Silva, M. E., & Pereira, S. C. F. (2023). (Un)Learning sustainability practices in a multi-tiered supply chain: an interpretive study. *International Journal of Operations & Production Management*, 43(8), 1226-1249. <https://doi.org/10.1108/IJOPM-08-2022-0504>
- Silva, M. E., Pereira, M. M. O., & Boffelli, A. (2023). Bridging sustainability knowledge management and supply chain learning: evidence through buyer selection. *International Journal of Operations & Production Management*, 43(6), 947-983. <https://doi.org/10.1108/IJOPM-01-2022-0047>
- Silvestre, W. J., Fonseca, A., & Morioka, S. N. (2022). Strategic sustainability integration: Merging management tools to support business model decisions. *Business Strategy and the Environment*, 31(5), 2052-2067. <https://doi.org/10.1002/bse.3007>
- Singh, R. K., & Kumar, R. (2020). Strategic issues in supply chain management of Indian SMEs due to globalization: an empirical study. *Benchmarking: An International Journal*, 27(3), 913-932. <https://doi.org/10.1108/BIJ-09-2019-0429>
- So, S., & Sun, H. (2010). Supplier integration strategy for lean manufacturing adoption in electronic-enabled supply chains. *Supply Chain Management: An International Journal*, 15(6), 474-487. <https://doi.org/10.1108/13598541011080455>
- Soysal, M., Belbağ, S., & Erişkan, S. (2022). Horizontal Collaboration among SMEs through a Supply and Distribution Cooperative. *Open Transportation Journal*, 16. <https://doi.org/10.2174/18744478-v16-e2208101>
- Stekelorum, R., Courrent, J.-M., & Spence, M. (2023). Supply chain pressures and SMEs' CSR practices: the moderation effect of supply chain position. *International Journal of Logistics Research and Applications*, 1-26. <https://doi.org/10.1080/13675567.2023.2226611>
- Tang, Y. M., Chau, K. Y., Ip, Y. K., & Ji, J. (2023). Empirical research on the impact of customer integration and information sharing on supply chain performance in community-based homestays in China. *Enterprise Information Systems*, 17(7), 2037161. <https://doi.org/10.1080/17517575.2022.2037161>
- Tarifa-Fernández, J., Céspedes-Lorente, J., & de Burgos Jiménez, J. (2023). Drivers of environmental sustainability: environmental capabilities and supply chain integration. *Management of Environmental Quality: An International Journal*, 34(3), 843-861. <https://doi.org/10.1108/MEQ-08-2022-0217>
- Wamba, S. F., & Queiroz, M. M. (2020). Blockchain in the operations and supply chain management: Benefits, challenges and future research opportunities. *International Journal of Information Management*, 52, 102064. <https://doi.org/10.1016/j.ijinfomgt.2019.102064>
- Yadav, G., Luthra, S., Jakhar, S. K., Mangla, S. K., & Rai, D. P. (2020). A framework to overcome sustainable supply chain challenges through solution measures of industry 4.0 and circular economy: An automotive case. *Journal of Cleaner Production*, 254, 120112. <https://doi.org/10.1016/j.jclepro.2020.120112>
- Yang, Y., Jiang, Y., Chen, H., & Xu, Z. (2023). Linking relation-specific investments and sustainability performance: the mediating role of supply chain learning. *International Journal of Operations & Production Management*, 43(8), 1329-1356. <https://doi.org/10.1108/IJOPM-07-2022-0463>

- Yazdani, M., Chatterjee, P., & Torkayesh, A. E. (2020). An integrated AHP-QFD-based compromise ranking model for sustainable supplier selection. In *Handbook of research on interdisciplinary approaches to decision making for sustainable supply chains* (pp. 32-54). IGI Global. <https://doi.org/10.4018/978-1-5225-9570-0.ch002>
- Zaridis, A., Vlachos, I., & Bourlakis, M. (2021). SMEs strategy and scale constraints impact on agri-food supply chain collaboration and firm performance. *Production Planning & Control*, 32(14), 1165-1178. <https://doi.org/10.1080/09537287.2020.1796136>
- Zavala-Alcívar, A., Verdecho, M.-J., & Alfaro-Saiz, J.-J. (2023). Supply chain resilience: a conceptual evolution analysis. *Dirección y Organización*, (79), 5-17. <https://doi.org/10.37610/dyo.v0i79.633>
- Zhou, B., Siddik, A. B., Zheng, G.-W., & Masukujjaman, M. (2023). Unveiling the Role of Green Logistics Management in Improving SMEs' Sustainability Performance: Do Circular Economy Practices and Supply Chain Traceability Matter? *Systems*, 11(4). <https://doi.org/10.3390/systems11040198>
- Zhu, X., & Wu, Y. J. (2022). How Does Supply Chain Resilience Affect Supply Chain Performance? The Mediating Effect of Sustainability. *Sustainability*, 14(21). <https://doi.org/10.3390/su142114626>