Measuring the Impact of Sustainable Supply Chain Management Practices on Sustainable Performance: An Empirical Investigation in Batam Indonesia MSMEs

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ABSTRACT

The study sought to determine the influence of Sustainable Supply Chain Management Practices (SUSSCMP), including Sustainable Supplier Management Practices (SUSSMP), Sustainable Operations Management Practices (SUSOMP), Sustainable Customer Management Practices (SUSCMP) on Micro-Small and Medium Enterprises Sustainable Performance (MSMEs-SUSPER) Riau Island (KEPRI), Indonesia. Cross-sectional data and a quantitative methodology were employed in this investigation. Questionnaires are distributed to 100 MSMEs' managers and owners. The validity of the questionnaire was tested using confirmatory factor analysis (CFA). Through path analysis, hypotheses were examined. Structural equation modelling (SEM) results show that SUSSCMP has an effect on MSMEs-SUSPER. In order to enhance MSMEs-SUSPER it is necessary to enhance SUSSMP, SUSOMP and SUSCMP.

Keywords
Sustainable; Supplier management; Operations management; Customer management; Micro-small and medium enterprises

Introduction

Significant economic and environmental constraints are being faced by Micro Small and Medium Enterprises (MSMEs), and these challenges are especially prominent in developing economies (Agyabeng-Mensah et al., 2020; Toke & Kalpande, 2024). These concerns have attracted increasing public and governmental attention, which has encouraged businesses to adopt Sustainable Supply Chain Management Practices (SUSSCMP) as a way to secure new competitive advantages (Sánchez-Flores et al., 2020). However, the outcomes of SUSSCMP are not always satisfactory, and enterprises frequently fail to obtain the expected benefits from their implementation (Dai et al., 2021).

In Indonesia, MSMEs are categorized into three groups: micro, small, and medium enterprises. These are profit-oriented business entities operated by individuals or legal organizations and regulated under Law Number 20 of 2008. Micro businesses are defined as enterprises with annual revenue of no more than IDR 300 million and a maximum net worth of IDR 50 million, not including property and buildings used for commercial purposes. Small businesses have a net worth between IDR 50 million and IDR 500 million, excluding land and buildings used for business operations, and an annual turnover ranging from IDR 300 million to IDR 2.5 billion. Medium-sized businesses have a net worth between IDR 500 million and IDR 10 billion, with the same exclusion for land and buildings, and an annual turnover between IDR 2.5 billion and IDR 50 billion. MSMEs in Indonesia operate across diverse sectors such as agribusiness, fashion, crafts, street vendors, barbershops, market traders, coffee shops, and various forms of culinary enterprises. Within the Batam economy, MSMEs play an essential role in increasing GDP, creating employment, supporting exports, and reducing poverty. Despite this contribution, many MSMEs in Batam continue to encounter significant challenges, particularly regarding the implementation of SUSSCMP.

According to Wiredu et al. (2024), SUSSCMP represent a comprehensive and dynamically interconnected system engineering approach designed to address challenges and demands arising from internal and external environments. The primary objective of SUSSCMP is to enhance overall performance (Feng et al., 2018). Sustainable supply

networks generally achieve strong outcomes in environmental, social, and economic dimensions. Abdallah and Al Ghwayeen (2020) further argue that operational performance should also be considered. Therefore, in order to provide a more complete and detailed understanding, this article evaluates the performance outcomes of SUSSCMP across four categories which are environmental performance, social performance, economic performance, and operational performance.

The connection between SUSSCMP and performance is still up for debate in the literature (Balon, 2020; Yadav et al., 2023). The majority of academics think that SUSSCMP may assist MSMEs deal with social and environmental challenges in an efficient manner, which will increase their competitiveness and result in better economic performance (Paulraj et al., 2017; Yu et al., 2014). Some academics disagree with this finding, nevertheless. Sustainability or green SCM strategies, according to Hahn et al. (2010) and Green et al. (2015), have a detrimental effect on business profitability and financial performance. Gopal and Thakkar (2016) and Zhu et al. (2012) contend that businesses are not sufficiently motivated to adopt green supply chain management (SCM) practices, and that there is no discernible positive correlation between SUSSCMP and operational performance.

SUSSCMP encompasses a broader range of corporate operations, from the processing of raw materials to the distribution of products to end users, making it a potentially more effective strategy for ensuring both economic advancement and ecologically friendly manufacturing practices (Yun et al. 2019; Manik, Kurniawati, & Masnita, 2025). Although there are many studies related to SUSSCMP and the environment and economic performance conducted in developed countries (Dubey et al. 2017), most of these studies try to show the impact of SUSSCMP on the environment, society and economy. Such as studies conducted in China and Iran focused on the impact of SUSSCMP on environmental and cost performance (Esfahbodi, Zhang, and Watson 2017). This research tried to show the impact of SUSSCMP and sustainable performance in Batam, Riau Island, Indonesia. As the manufacturing industry takes centre stage and continues to experience exponential growth, Batam emerges as an increasingly thriving and dynamic hub. With that in mind, Batam presents many promising business prospects for local entrepreneurs and global investors

The majority of current research views stakeholder pressure as an antecedent variable or driving force. For example, Awan et al. (2017) found that stakeholders have an impact on important resources that businesses require, which in turn affects SUSSCMP and the performance of sustainable development. According to Truant et al. (2023), increasing the supply chain's transparency and broadening the influence of stakeholder pressure on businesses can help effectively promote sustainable supply chain practices.

Literature Review

Supply chain systems and the idea of sustainable development are strongly related. Supply chains are in charge of moving raw resources into finished goods that end up in the hands of customers. There are many intermediate processes involved, including manufacture, distribution, and transportation. Each of these processes has multiple effects on the environment. Consequently, it is thought that sustainable supply chains are a crucial component of business since they guarantee that corporate operations have as little adverse environmental impact as possible. According to Wiredu et al. (2024), SUSSCMP methods are seen as a sophisticated, all-encompassing, and dynamically intersecting system engineering to handle demands and problems that come from both internal and external sources. Zhu et al. (2012) stress that in order to accomplish integrated economic, environmental, and social growth, internal and external sustainable supply chain practices interact and cooperate.

The ideas that underlie the study variables, such as Sustainable Supplier Practices (SUSSMP), Sustainable Operations Management Practices (SUSOMP) and Sustainable Customer Management Practices (SUSCMP). SUSSMP, SUSOMP and SUSCMP has a significant impact on Micro-Small and Medium Enterprises Sustainable Performance (MSMEs-SUSPER). Adam et al. (2019) assert that sustainable supply chain management practices are essential for the effective functioning of MSMEs. According to Hong et al. (2018) and Mugoni et al. (2023), sustainable supply chain management refers to the coordinated management of material, capital, human, and information resources across supply chain partners who are committed to maintaining social, economic, and environmental stability to achieve long-term sustainability. The term *sustainable supply chain* has increasingly appeared in the literature due to the rising number of studies emphasizing sustainability across different industries (Lis, Sudolska, & Tomanek, 2020; Sánchez-Flores et al., 2020).

SUSSMP consists of supplier evaluation (SEV), supplier development (SDEV) and information sharing with suppliers (INFSWS) (Luthra et al., 2014). SEV is Assessing or keeping track of suppliers' long-term performance across the supply chain. This assessment has the potential to enhance sustainable behaviours. SDEV Measures implemented by the company to enhance the sustainability performance or capabilities of its suppliers. The sharing of sustainability knowledge amongst businesses is one instance of these collaborations. INFSWS is important and confidential information is usually transferred between supply chain participants during this information exchange (Luthra et al., 2014, Yang et al., 2010, Das, 2017)

SUSOMP include Quality of Management (QM), Corporate Environmental Management (COREM) and Corporate Social Responsibility (CORSR). QM has to do with maintaining equipment and productivity levels, improving the quality of products and processes, and streamlining SC businesses' production operations. Corporate Environmental Management (COREM): Putting a series of plans and initiatives into action to enhance COREM. CORSR providing quantitative and qualitative data regarding the company's sustainable performance and humanitarian pledges to social groups, employers can improve the general health, safety, and pay of their workforce (Beske et al., 2014; Emamisaleh et al., 2018; Agan et al., 2016).

SUSCMP consist of Customer Management (CUSTMAN) and Information Sharing with Customers (INFSWC). Supply chain information exchange with consumers to educate manufacturing enterprises about consumers' views on sustainability. Customer service to improve customers' overall happiness with sustainability and the environment. Businesses' initiatives to lessen greenhouse gas emissions, water and environmental degradation, and the risks associated with waste produced in the industrial setting across the supply chain (Pekovic et al., 2016, Esfahbodi et al., 2017).

MSMEs-SUSPER consists of Environmental Performance (ENVPER), Economic Performance (ECOPER) and Sosial Performance (SOSPER). ENVPER refers to Businesses' initiatives to lessen greenhouse gas emissions, water and environmental degradation, and the risks associated with waste produced in the industrial setting across the supply chain. ECOPER mean Increasing the company's marketing and financial performance. SOSPER) refers to Supply chain enterprises' efforts to engage in charitable endeavours, pay fair wages, consider the safety and health of their employees, and engage in social activities (Esfahbodi et al., 2017, Kristal et al., 2010). These are summarized in Table 1.

Table 1 Literature Review

Concept		Component/ Description	Supporting Reference
SUSSMP		**Supplier evaluation (SEV)**: Assessing or keeping track of suppliers' long-term performance across the supply chain. This assessment has the potential to enhance sustainable behaviours.	Luthra et al., 2014
	SEV-1	Our business uses a performance evaluation system to evaluate suppliers' environmental impact.	
	SEV-2	Our organization assesses the quality standards (such as ISO 9000) of suppliers.	
	SEV-3	Our business assesses the environmental standards (such as ISO 14000) of its suppliers.	
	SEV-4	The social responsibility of suppliers is evaluated by our organization.	
		Supplier Development (SDEV): Measures implemented by the company to enhance the sustainability performance or capabilities of its suppliers. The sharing of sustainability knowledge amongst businesses is one instance of these collaborations.	Yang et al., 2010
	SDEV-1	In order to raise the caliber of employee performance, our organization occasionally provides training to its suppliers.	
	SDEV-2	Our business offers suppliers pollution control consulting.	
	SDEV-3	Suppliers are taught social responsibility by our organization.	
	SDEV-4	Our business visits the locations of our suppliers and assists them in enhancing their environmental performance.	
		Information Sharing with Suppliers (INFSWS): Important and confidential information is usually transferred between supply chain participants during this information exchange.	Das, 2017
	INFSWS-1	We share a product delivery strategy with major vendors	
	INFSWS-2	Our primary suppliers update us on the status of their production orders	
	INFSWS-3	We receive information about environmental regulations from our primary suppliers.	
	INFSWS-4	Our primary suppliers provide us with information about eco-friendly materials.	
		Quality of Management (QM):	

SUSOMP		QM has to do with maintaining equipment and productivity levels, improving the quality of products and processes, and streamlining SC businesses' production operations	Beske et al. (2014)
	QM-1	Our business intends to keep raising the standard	
	QM-2	In addition to other quality assurance certifications, our organization holds ISO certifications.	
	QM-3	To enhance the quality control procedure, our organization employs statistical quality control tools in addition to other methods.	
	QM-4	Our organization strives to maintain machinery and equipment and increase output.	
		Corporate Environmental Management (COREM): Putting a series of plans and initiatives into action to enhance COREM	Emamisaleh, Korosh; Rahmani, Kamaleddin; and Iranzadeh, Soleyman (2018)
	COREM-1	Our goods are made to be recyclable and reintegrate into the ecosystem.	
	COREM-2	A portion of our organization is responsible for environmental standards-related procedures.	
	COREM-3	It is possible to report the company's performance in relation to pollution and environmental conditions	
	COREM-4	Environmental rules and sustainability serve as the foundation for internal procedures.	
		Corporate Social Responsibility (CORSR): By providing quantitative and qualitative data regarding the company's sustainable performance and humanitarian pledges to social groups, employers can improve the general health, safety, and pay of their workforce.	Agan et al., 2016
	CORSR-1	Our organization places a high priority on employee health and safety.	
	CORSR-2	Clear reports on the organization's resource consumption and efficiency are available from our company	
	CORSR-3	Social activities are supported by our organization.	
	CORSR-4	The business respects its employees' rights	
SUSCMP		**Customer Management (CUSTMAN):** Customer service to improve customers' overall happiness with sustainability and the environment	Pekovic et al., 2016.
	CUSTMAN-1	Our business advises clients on how to exploit products in accordance with the ecosystem cycle	
	CUSTMAN-2	Our business looks into consumer complaints regarding the caliber of our products.	
	CUSTMAN-3	The organization assesses compliance with social responsibility standards through our consumers.	
	CUSTMAN-4	Our business solicits client feedback regarding the environmental aspects of our products.	
		Information Sharing with Customers (INFSWC): Supply chain information exchange with consumers to educate manufacturing enterprises about consumers' views on sustainability	Pekovic et al., 2016.
	INFSWC-1	We share a product delivery strategy with major vendors	
	INFSWC-2	Our primary suppliers update us on the status of their production orders	
	INFSWC-3	We receive information about environmental regulations from our primary suppliers.	
	INFSWC-4	Our primary suppliers provide us with information about eco-friendly materials.	
MSMEs-SUSPER		**Environmental Performance (ENVPER):** Businesses' initiatives to lessen greenhouse gas emissions, water and environmental degradation, and the risks associated with waste produced in the industrial setting across the supply chain	Esfahbodi et al., 2017
	ENVPER-1	The business has done a suitable job of lowering water contamination.	
	ENVPER-2	The business has done a fantastic job of lowering the generation of solid waste.	
	ENVPER-3	The business has performed appropriately when it comes to recycling waste products	
	ENVPER-4	The business has performed appropriately in terms of energy efficiency.	
		Economic Performance (ECOPER): Increasing the company's marketing and financial performance	Kristal et al., 2010
	ECOPER-1	Over the past year, the company's market share has increased at a respectable pace	
	ECOPER-2	Our company's market share is currently at a suitable level	
	ECOPER-3	The rate of return for the business is suitable.	
	ECOPER-4	Our products meet the quality standards set by our customers.	
		Sosial Performance (SOSPER): Supply chain enterprises' efforts to engage in charitable endeavors, pay fair wages, consider the safety and health of their employees, and engage in social activities	Esfahbodi et al., 2017
	SOSPER-1	Our business is dedicated to raising the caliber of our employees.	
	SOSPER-2	Our business is committed to enhancing employee health and safety.	
	SOSPER-3	Our business supports state initiatives pertaining to the community.	
	SOSPER-4	Our business maintains strong ties with the local population and the wider public.	

The Study's Underlying Theories

Stakeholder Theory

According to Menezes et al., (2022) and Seuring and Muller (2008), stakeholders bear a significant duty for ensuring that the sustainability of the supply is distributed, including in response to customer requests and government pressure. This is thought to help create sustainable supply chains (Menezes et al., 2022; Schmidt Christoph G., Kai Foerstl & Birte Schaltenbrand, 2017). Over the past three decades, stakeholder theory has been created to address or at least rethink a number of particular issues. The first could be titled the "problem of managerial mindset," "problem of capitalism's ethics," or "problem of value creation and trade."

Sustainable Theory

After the Club of Rome, an international think tank, released its "Limits to Growth" study in 1972, the idea of sustainability gained widespread attention. The 1987 World Commission on Environment and Development study, also referred to as "Our Common Future" or the Brundtland study, helped sustainable development achieve international recognition. According to this report, "sustainable development is a development that meets the needs of the present without compromising the ability of the future generations to meet their own needs" (WCED, 1987). This definition is well-known and often used. Although some have criticized the Brundtland Report's definition for tightly tying sustainability to development, with a particular focus on human needs, to the exclusion of other life, this term is still used by the majority of organizations and agencies. Despite a lot of criticism, the report generated a lot of discussion on sustainability. Since sustainability makes arguments for and against free markets, social expenditures, climate treaties, and environmental preservation, the term appears ambiguous. According to the Brundtland Report, sustainability development acknowledges human responsibility and responsibilities to future generations, but it ignores how these responsibilities relate to the requirements of the current generation. The research highlights the necessity of figuring out how to strike a balance between current and future responsibilities. The responses to the question must be separated into strong and weak approaches in order to determine what must be maintained (Mugoni, et al 2023).

Conceptual Model and Hypotheses

Resource-based theory suggests that Enterprises must manage their most valuable assets and resources to achieve competitive advantage, and should inform organizational management practices in the supply chain. At the same time, environmental changes and resource constraints mean that the management of supply chain components has become increasingly important in today's increasingly competitive business environment. To manage resources well, companies must move towards sustainability. Resource dependency theory states that companies try to reduce dependence on other organizations by minimizing resource consumption through proper management of operational components. Companies also try to make other organizations dependent on them for resources through efficient management of operational components through the supply chain (Morali & Searcy, 2013; Emamisaleh, et al, 2018). Therefore, SUSSCMP are directly related to SUSPER, and this is the focus of this study. Figure 2.1 presents the conceptual model of this study.

SUSSMP and SUSPER

SUSSMP have been studied in many previous studies. Das (2017); Emamisaleh et al (2018); Li, Li, and Li. (2025); Shebeshe, and Sharma, D. (2025) examined the dimensions of the SC and how they relate to sustainable enterprise performance. Das's (2017), Alam et al (2025) findings showed that operational components, SC coherence, concern for employees, and social and environmental indicators are dimensions of SSCM that can help improve various aspects of enterprise performance in relation to sustainability. Wu, Lv, Li-ang, and Hu (2017); Mark Pagell and Wilhelm, (2025) found that sustainable manufacturing practices are related to organizational sustainability, which can lead to improved MSMEs-SUSPER.

The economic, social, and environmental performance of enterprises is impacted by SSCM techniques and business capacities, as demonstrated by Hong, Zhang, and Ding (2017). Additionally, Seuring, Stefan & Müller, Martin (2008) demonstrated that boosting sustainability performance might be achieved through better information and material management across the SC. Hasan (2013; Paul et al., 2024) demonstrated how a business's operational and

environmental performance can be impacted by sustainable supplier management techniques in a study that examined five organizations in several dimensions. The following Hypotheses were put forth in light of the data from these investigations.

H_{1a}: SUSSMP have a positive influence on ECOPER
H_{1b}: SUSSMP have a positive influence on ENVPER
H_{1c}: SUSSMP have a positive influence on SOSPER

SUSOMP and SUSPER

Prior research has looked at SUSOMP in connection to corporate social responsibility, corporate environmental management, and quality management, as well as how these aspects affect sustainability. For instance, Abdul-Rashid, Sakundarini, Raja Ghazilla, and Thurasamy (2017), Mohammad Chaidir, Dadang Irawan, & Seger Santoso (2024) demonstrated how sustainable thinking in relation to product design and development, production processes and quality, supply chain management, environmental conditions, and product life cycle can improve ENVPER, ECOPER and SOSPER in the SC. According to King and Lenox (2001), a company's ENVPER is impacted by its manufacturing processes' adherence to environmental requirements.
Yang, Hong, and Modi (2011); Kottala, Sriyogi. (2021) pointed out that an organization's ECOPER can be impacted by quality management and energy usage requirements. For ENVPER, Zailani, Jeyaraman, Vengadasan, and Premkumar (2012) emphasized the significance of suitable and eco-friendly packaging, recycling throughout production, and production attitudes based on sustainability.

De Sousa Jabbour, Jabbour, Latan, Teixeira, and de Oliveira (2015); Mark Pagell & Miriam Wilhelm, (2025) examined the function of quality management standards and their implementation, showing that ISO 1400 and total quality management standards are necessary in the SC to enhance ENVPER. According to Pereira-Mo-liner, Claver-Cortés, Molina-Azorín, and Tarí (2012); Appiah, Dordaah, Sam, A., & Amaning, N. (2024), QM plays a part in lowering SC waste and enhancing sustainability and ENVPER. According to Ağan, Kuzey, Acar, and Açıkgöz (2016), a socially conscious mindset contributes to increased SC sustainability. The following theories were put forth in light of the information provided in this section.

H_2a: SUSOMP have a positive influence on ECOPER
H_2b: SUSOMP have a positive influence on ENVPER
H_2c: SUSOMP have a positive influence on SOSPER

SUSCMP and SUSPER

In order to move enterprises toward SUSPER, customers are crucial. Customers' actions attest to the necessity of sustainability in businesses. Specifically, implementing environmental standards throughout the SC can motivate consumers to purchase eco-friendly goods (Grolleau, Mzoughi, & Pekovic, 2007; Ferrer-Estévez, Maria & Chalmeta, Ricardo, 2022).
Pekovic, Rolland, and Gatignon (2016) demonstrated how an enterprise's management and ENVPER may be enhanced by providing customers with knowledge about the creation of sustainable products and reacting to community needs and values. Since client attitudes compel businesses to invest in sustainability through innovation, Yalabik and Fairchild (2011); Nafisah et al (2025)' Arifin et al (2023) found that customer behaviour is the primary driver of organizational sustainability gains. Brik, Rettab, and Mellahi (2011); Shebeshe, E.N. and Sharma, D. (2025) claim that by educating their suppliers and customers about sustainability, social responsibility pushes businesses toward sustainability and sustainable performance.

Therefore, it is evident that modern firms must prioritize meeting consumer needs and ensuring customer happiness through sustainability, such as through sustainable product design. The following theories were put out as a result.

H_3a: SUSCMP have a positive influence on ECOPER
H_3b: SUSCMP have a positive influence on ENPER
H_3b: SUSCMP have a positive influence on SOSPER

Methodology

Sample and Procedure

In this study, the population includes MSMEs in Batam city. Data were collected from managers and/or owners of these MSMEs. Based on data from the Online Data System (ODS) at the Indonesian Ministry of Cooperatives and Small and Medium Enterprises (SMEs), Batam has 81,486 MSMEs in Batam. This study focused on 100 MSMEs. To choose the sample, the researcher employed Slovin's formula with a 10% margin of error (Sugiyono, 2017)

$$n = \frac{N}{1 + Ne2}$$

$$n = \frac{81{,}486}{1 + 81486\ (0{,}1)2}$$

$$n = \frac{81486}{81487(0{,}01)} = 100$$

The questionnaire used in the study was disseminated electronically through social networks to the managers and owners MSMEs in Batam city.

Measurement

The research variables were measured using a five-point Likert scale in a questionnaire that was based on earlier research. A measurement model and structural equation modelling were used to test the validity of the questionnaire.

Table 2 displays the questionnaire items. After choosing the questionnaire items based on previous research, a group of supply chain experts and specialists were requested to pretest the concepts and questions in relation to the variables. The questionnaire was then updated and reexamine in light of their feedback.

The previous research by Seuring and Muller (2008) and Bai and Sarkis (2010) served as the foundation for the measures of SUSSMP and their components. Yang et al. (2011) provided the basis for the items pertaining to SUSOMP. The study by Pekovic et al. (2016) served as the basis for measurements of SUSCMP, while the study by Kristal et al. (2010) served as the basis for measures of SUSPER.

Table 2 An Explanation of the Measurements and Variables

Component	Item Questionnaire	Factor Leading	Composite Reliability (CR)	AVE	Alpha
SEV	SEV-1	0.69	0.85	0.56	0.75
	SEV-2	0.63			
	SEV-3	0.87			
	SEV-4	0.82			
SDEV	SDEV-1	0.85	0.83	0.65	0.77
	SDEV-2	0.76			
	SDEV-3	0.66			
	SDEV-4	0.75			
INFSWS	INFSWS-1	0.86	0.82	0.72	0.78
	INFSWS-2	0.77			
	INFSWS-3	0.75			
	INFSWS-4	0.76			
QM	QM-1	0.71	0.77	0.74	0.70
	QM-2	0.73			
	QM-3	0.72			
	QM-4	0.78			
COREM	COREM-1	0.67	0.83	0.80	0.70
	COREM-2	0.72			
	COREM-3	0.69			
	COREM-4	0.76			
CORSR	CORSR-1	0.71	0.77	0.75	0.77
	CORSR-2	0.69			
	CORSR-3	0.77			
	CORSR-4	0.68			
	CUSTMAN-1	0.81			

CUSTMAN	CUSTMAN-2	0.82	0.80	0.72	0.69
	CUSTMAN-3	0.77			
	CUSTMAN-4	0.70			
INFSWC	INFSWC-1	0.77	0.77	0.69	0.74
	INFSWC-2	0.69			
	INFSWC-3	0.70			
	INFSWC-4	0.68			
ENVPER	ENVPER-1	0.73	0.78	0.70	0.80
	ENVPER-2	0.70			
	ENVPER-3	0.69			
	ENVPER-4	0.77			
ECOPER	ECOPER-1	0.68	0.74	0.71	0.75
	ECOPER-2	0.67			
	ECOPER-3	0.70			
	ECOPER-4	0.72			
SOSPER	SOSPER-1	0.68	0.80	0.70	0.72
	SOSPER-2	0.71			
	SOSPER-3	0.66			
	SOSPER-4	0.70			

Results

Cronbach's alpha and confirmatory factor analysis (CFA) were used to examine the constructs. Considering both the measurement model and the structural model, the hypotheses were tested and the model was validated using structural equation modelling (SEM). Partial least squares (PLS) and linear structural relations (LISREL) were used to examine the data. The PLS software uses path analysis, and the LISREL software is suggested for testing research hypotheses and assessing second-order variables.

The measurement model's absolute indices, which display the model's attributes and fitness, are reported in Table 4 (Hair, Anderson, Tatham, & Black, 2005). As suggested by Meyers, Gamst, and Guarino (2006), Table 2 indicates that the Average Variance Extracted (AVE) is more than 0.5. The measurement model's Composite Reliability (CR), as indicated in Table 2, is higher than 0.7, as advised by Hair et al. (2005)

The model's adequate convergent validity is confirmed by the AVE and CR values. By comparing the square root of the AVE for each concept and correlation level involving the constructs, discriminant validity was confirmed (Hair et al., 2005). Discriminant validity is confirmed by Table 3, which demonstrates that the square root of the AVE for each construct is greater than the correlation level involving the constructs.

The measurement model's fit was evaluated using the following absolute fit metrics: comparative fit index (CFI), goodness of fit index (GFI), root mean square error of approximation (RMSEA), and observed normed (χ2/df). All fit indices reached satisfactory values, as indicated in Table 4.

As a second-order structure, SUSOMP, SUSSMP, and SUSCMP were also investigated in order to analyse the measurement model. Fitness markers are within the normal range, according to the results shown in Tables 5.

Table 3 Factor Correlation Matrix With Square Root of AVE

	SEV	SDEV	INFSWS	QM	COREM	CORSR	CUSTMAN	INFSWC	ENVPER	ECOPER	SOSPER	AVE
SEV	1											0.544**
SDEV	0.602**	1										0.432**
INFSWS	0.511**	0.427**	1									0.555**
QM	0.582**	0.455**	0.422**	1								0.540**
COREM	0.399**	0.275**	0.322**	0.199**	1							0.532**
CORSR	0.299**	0.243**	0.244**	0.277**	0.433**	1						0.543**

CUSTMAN	0.277**	0.197**	0.322**	0.188**	0.422**	0.444**	1					0.433**
INFSWC	0.237	0.278**	0.422**	0.299**	0.322**	0.432**	0.433**	1				0.433**
ENVPER	0.281**	0.188**	0.214**	0.333**	0.198**	0.322**	0.211**	0.432**	1			0.222**
ECOPER	0.483**	0.299**	0.456**	0.312**	0.433**	0.199**	0.199**	0.433**	0.4322**	1		0.400**
SOSPER	0.273**	0.276**	0.319**	0.199**	0.422**	0.278**	0.233**	0.322**	0.322**	0.432**	1	0.412**

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

Table 4 Overall fit indices of the CFA model

Fix index	Score	Recommended cut-off value
X^2/df	2.75	>2, <5
GFI	0.83	>0.90, >0.80
RMSEA	0.08	<0.08, < 0.1
CFI	0.90	>0.90

Table 5 Second-order confirmatory factor analysis of SUSSMP, SUSOMP and SUSCMP

	First-order construct	Firs-order			Second-order	
		Indicator	Loading	t-value	Loading	t-value
SUSSMP	SEV	SEV-1	0.63		0.85	12.20
		SEV-2	0.53	11.90		
		SEV-3	0.33	15.20		
		SEV-4	0.61	13.21		
	SDEV	SDEV-1	0.63		0.94	9.25
		SDEV-2	0.55	7.75		
		SDEV-3	0.33	7.62		
		SDEV-4	0.32	7.55		
	INFSWS	INFSWS-1	0.44		0.94	12.30
		INFSWS-2	0.65	13.20		
		INFSWS-3	0.67	7.55		
		INFSWS-4	0.80	8.20		
SUSOMP	QM	QM-1	0.62		0.80	4.90
		QM-2	0.64	10.20		
		QM-3	0.55	11.24		
		QM-4	0.57	12.04		
	COREM	COREM-1	0.59		0.94	9.11
		COREM-2	0.42	13.20		
		COREM-3	0.60	13.20		
		COREM-4	0.66	11.11		
	CORSR	CORSR-1	0.68		0.90	9.15
		CORSR-2	0.77	13.30		
		CORSR-3	0.55	13.20		
		CORSR-4	0.54	13.19		
SUSCMP	CUSTMAN	CUSTMAN-1	0.57		0.77	2.11
		CUSTMAN-2	0.66	9.20		
		CUSTMAN-3	0.68	13.22		
		CUSTMAN-4	0.69	11.22		
	INFSWC	INFSWC-1	0.88		0.95	10.22
		INFSWC-2	0.87	11.08		
		INFSWC-3	0.77	13.21		
		INFSWC-4	0.63	11.22		

Model of Structure

Hypotheses were tested using a structural model after validation of the measurement model. PLS software was used in this study to test one structural model. As a second-order structure, SUSSMP, SUSOMP, and SUSCMP were examined, and their impacts on ENVPER, ECOPER, and SOSPER were examined. H1a-H1c showed that SUSSMP had an effect on ECOPER (t > 1.96). Furthermore, H2a-H2c and H3a-H3c showed that SUSSMP had a significant and

beneficial impact on ENVPER and SOSPER (t > 1.96). Furthermore, H3a, H3b, and H3c were not rejected due to the positive and significant effects of SUSOMP on ENVPER, ECOPER, and SOSPER (t > 1.96). Table 6 provides a summary of the results of the hypothesis testing.

Table 6 Structural parameter estimates

Path	Hypothesis	Estimates	t-value	Result
SUSSMP → ENVPER	H1a	0.088	2.433	Supported
SUSSMP → ECOPER	H1b	0.071	2.941	Supported
SUSSMP → SOSPER	H1c	0.074	3.211	Supported
SUSOMP → ENVPER	H2a	0.544	4.251	Supported
SUSOMP → ECOPER	H2b	0.457	5.222	Supported
SUSOMP → SOSPER	H2c	0.421	4.224	Supported
SUSCMP → ENVPER	H3a	0.411	5.258	Supported
SUSCMP → ECOPER	H3b	0.514	4.147	Supported
SUSCMP → SOSPER	H3c	0.614	4.123	Supported

Discussions

The findings show that SUSSMP has a beneficial impact on the supply chain ENVPER. Accurate assessment based on desire indicators and knowledge enhancement throughout the supply chain, as well as supplier development through information sharing and evaluation, can achieve sustainable economic performance, as we found that this method has an effect on ECOPER. It makes sense that the data indicate that SUSSMP improves ENVPER in the supply chain. It appears that ENVPER can be obtained by developing and accurately evaluating suppliers using sustainability indicators and by enhancing supply chain knowledge and data.

In line with other studies, Hong et al. (2017), Li et al. (2025), Kottala (2021), and Shebeshe and Sharma (2025) showed that organizational capabilities and sustainable supply chain management practices influence the environmental, economic, and social performance of supply chain organizations. Additionally, the results show that SUSSMP has a beneficial impact on supply chain SOSPER and that SOSPER may be enhanced by utilizing SUSSMP's supply chain dimensions. Hasan (2013; Mugoni et al., 2023) demonstrated that SUSSMP has an impact on an ENVPER and operational performance by examining five businesses in various aspects.

Once more, the result that SUSOMP improves ECOPER is in line with earlier studies. This implies that sustainable ECOPER in the supply chain is impacted by the SUSOMP dimensions of quality management, internal management, and social responsibility. Baumann and Genoulaz (2014; Lis, A.; Sudolska, A. 2020) demonstrated that sustainable supply chain components contribute to triple sustainability performance by analysing their effects on the ECOPER, SOSPER, and ENVPER dimensions of sustainability. Esfahbodi et al. (2017); Mark Pagell & Miriam Wilhelm, (2025); Appiah et al (2024) showed that ECOPER and ENVPER are improved by SUSOMP on aspects including sustainable distribution, sustainable processes, sustainable and high-quality design, and sustainable inventory control. Through the dimensions of SUSOMP and lean production, Martínez-Jurado and Moyano-Fuentes (2014) demonstrated the relationship between concepts like SCM and sustained SC performance. Additionally, they observed a good correlation between ECOPER, SOSPER, and ENPER in the SC and quality management that employs lean thinking. Overall, the data show that SUSOMP has a beneficial effect on ENVPER and are acceptable. Braam et al. (2016; Maria & Chalmeta, Ricardo, 2022) demonstrated how environmental management and internal management can improve sustainable ENVPER in the SC by concentrating on data and sustainability information. According to Adebanjo, Teh, and Ahmed (2016), the management of the organization's operational components enhances production performance in the sustainable SC, which in turn leads to the intended ENVPER.

Since social responsibility, internal environment management, and quality management may all impact an organization's concern for its employees and community, SUSOMP was also found to have a beneficial impact on SOSPER. The concept of justice for employees can be implemented through internal management, and through quality management, goods can be provided to the community to satisfy social demands. Activities including material flow analysis, product design, sustainability reports, and supplier communication are crucial to organizational sustainability in the social, economic, and environmental domains, as demonstrated by Hörisch et al. (2015); Nafisah et al (2025); Arifin et al (2025). Therefore, it appears that Hörisch et al. (2015); Li, X et al (2025) findings may be verified.

In terms of customer management and information and knowledge sharing with customers, it is discovered that SUSCMP positively affects sustainable ECOPER. Customer management can result in sustainable ECOPER in the SC by gathering customer data and sharing expertise with them to satisfy their demands.

By using environmental indicators, Pekovic et al. (2016) and Shebeshe and Sharma (2025) demonstrated that gathering consumer data and aligning it with their values and needs can enhance sustainable performance. Results also show that SSCMPS has a favourable impact on ENVPER. In this instance, it appears that collecting and managing consumer data to plan and build products with appropriate consideration for environmental considerations will satisfy customers' expectations for environmental factors including pollution management and the use of environmental resources. Social information from customers regarding how to treat employees and relationships with local communities helps to explain SC activities and improve SOSPER, and SSCMPS has a beneficial effect on SOSPER. Access to client data and experiences can result in value creation that will please customers, as Chen and Lin (2015); Mark Pagell & Miriam Wilhelm, (2025) noted. They also demonstrated how consumer satisfaction leads to sustainable social communication and sustained SOSPER. Once more, the results appear to be rational.

Implication

From the standpoint of operational components, these functions are examined in this study of sustainability performance in the supply chain of MSMEs. Businesses operating in the MSMEs sector can utilize the findings to help managers plan for long-term SC performance improvement by utilizing elements like SUSSMP, SUSOMP, and SUSCMP, which have been discussed here. Furthermore, managers and policymakers in the MSMEs sector have a framework for assessing sustainable performance thanks to the components of SC sustainability performance described here (ENVPER, ECOPER, SOSPER). Other academics looking at SC sustainability will also find these parameters useful, and they can be expanded upon in subsequent research.

Conclusion

The results validate the effect of SUSSCMP on SUSPER when focusing on SUSSMP, SUSOMP, and SUSCMP as SUSSCMP dimensions. The sustainability aspects of SCM must be considered in order to attain SUSPER (ENVPER, ECOPER, and SOSPER) in the SC. This is a new approach to SC performance, building the conceptual model from both the resource-based view and the re-source dependence theory. A distinct approach to SC dimensions that had not been thoroughly examined in earlier studies was also embodied by each SUSSCMP component, which was examined as a second-order structure based on the literature. The following recommendations are made in order to enhance the SUSPER in light of these findings: (a) By monitoring sustainability metrics and fostering a sustainable consumption mindset in consumers through advertising and consumer social awareness, MSMEs may pay attention to the issue of product quality, (b) Encourage management and SC employees to be more socially conscious when it comes to product offerings, (c) Create avenues of communication with consumers to learn about their wants and requirements and to influence their perceptions of sustainable consumption, (d) Customers should be informed about the company's sustainable practices by sharing information, standards, and attitudes regarding SC companies.

Limitation and Future Research

This research may be expanded to a wider study area because it was carried out within the framework of the SMEs industry KEPRI. The study may also compare the supply networks of the SMEs industry across multiple areas, which sounds like a promising avenue for further investigation. The SEM method, which was employed in data analysis, may be substituted in subsequent studies by alternative techniques including dynamic systems and mathematical models. Additionally, the current study concentrated on the SC's operational elements, leaving out any cogent modelling of elements like environmental capacities and incentives, which ought to be the subject of future investigate

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper

References

Abdallah, A. B., & Al-Ghwayeen, W. S. (2020). Green supply chain management and business performance: The mediating roles of environmental and operational performances. *Business Process Management Journal, 26*(2), 489–512.

Abdul-Rashid, S. H., Sakundarini, N., Raja Ariffin Raja Ghazilla, R. A., & Thurasamy, R. (2017). The impact of sustainable manufacturing practices on sustainability performance: Empirical evidence from Malaysia. *International Journal of Operations & Production Management, 37*(2), 182–204. https://doi.org/10.1108/IJOPM-04-2015-0223

Adebanjo, D., Teh, P. L., & Ahmed, P. K. (2016). The impact of external pressure and sustainable management practices on manufacturing performance and environmental outcomes. *International Journal of Operations & Production Management, 36*(9), 995–1013.

Ağan, Y., Kuzey, C., Acar, M. F., & Açıkgöz, A. (2016). The relationships between corporate social responsibility, environmental supplier development, and enterprise performance. *Journal of Cleaner Production*, *112*, 1872–1881.

Agyabeng-Mensah Y, Afum E, Ahenkorah E (2020) Exploring financial performance and green logistics management practices: examining the mediating influences of market, environmental and social performances. *Journal Cleaner Production,* 258:120613

Alam M.C., Setiawan B., Toiba H., Maulidah S., Rahman M.S. (2025) Supply chain management practices of SMEs in developing countries: Bibliometric and systematic reviews. *Agric. Econ. – Czech*, 71, 99–112.

Appiah, M. K., Dordaah, J. N., Sam, A., & Amaning, N. (2024). Modelling the implications of sustainable supply chain management practises on firm performance: the mediating role of green performance. *Cogent Engineering*, *11*(1). https://doi.org/10.1080/23311916.2024.2370898

Arifin, F., Wiryono, S. K., Damayanti, S. M., & Yudoko, G. (2023). Sustainable Performance Model and Strategy: A Conceptual Framework. *International Journal of Entrepreneurship and Sustainability Studies*, *3*(2), 95.

Awan U, Kraslawski A, Huiskonen J (2017) Understanding the relationship between stakeholder pressure and sustainability performance in manufacturing firms in Pakistan. *Procedia Manufacturing,* 11, 768–777

Bai, C., & Sarkis, J. (2010). Integrating sustainability into supplier selection with grey system and rough set methodologies. *International Journal of Production Economics*, *124*(1), 252–264.

Balon V (2020) Green supply chain management: pressures, practices, and performance—An integrative literature review. *Business Strategy Development* , *3*, 226–244

Beske, P., Land, A., & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. *International Journal of Production Economics, 152*, 131–143.

Brik, A. B., Rettab, B., & Mellahi, K. (2011). Market orientation, corporate social responsibility, and business performance. *Journal of Business Ethics, 99*(3), 307–324.

Carter, C.R.; Jennings, M.M (2002). Logistics social responsibility: An integrative framework. *J. Bus. Logist. 2002, 23,* 145–180.

Chen, S. C., & Lin, C. P. (2015). The impact of customer experience and perceived value on sustainable social relationship in blogs: An empirical study. *Technological Forecasting & Social Change, 96*, 40–50.

Dai J, Xie L, Chu Z (2021) Developing sustainable supply chain management: The interplay of institutional pressures and sustainability capabilities. *Sustainable Production Consumption 28*, 254–268.

Das, D. (2017). Development and validation of a scale for measuring Sustainable Supply Chain Management practices and performance. *Journal of Cleaner Production, 164*, 1344–1362.

de Sousa Jabbour, A. B. L., Jabbour, C. J. C., Latan, H., Teixeira, A. A., & de Oliveira, J. H. C. (2014). Quality management, environmental management maturity, green supply chain practices and green performance of Brazilian companies with ISO 14001 certification: Direct and indirect effects. *Transportation Research Part E: Logistics and Transportation Review*, *67*, 39-51.

Emamisaleh, K., Rahmani, K., & Iranzadeh, S. (2018). Sustainable supply chain management practices and sustainability performance in the food industry. *The South East Asian Journal of Management*, *12*(1), 1-19.

Esfahbodi, A., Zhang, Y., Watson, G., & Zhang, T. (2017). Governance pressures and performance outcomes of sustainable supply chain management—An empirical analysis of UK manufacturing industry. *Journal of Cleaner Production, 155*, 66–78.

Feng M, Yu W, Wang X, Wong CY, Xu M, Xiao Z (2018). Green supply chain management and financial performance: The mediating roles of operational and environmental performance. *Business Strategy Environment, 27*, 811–824

Ferrer-Estévez, Maria & Chalmeta, Ricardo (2022). Sustainable customer relationship management. *Marketing Intelligence & Plannin, 41*.

Gopal, P., & Thakkar, J. (2016). Sustainable supply chain practices: An empirical investigation on the Indian automobile industry. *Production Planning & Control, 27*(1), 49–64.

Green, K. W., Toms, L. C., & Clark, J. (2015). Impact of market orientation on environmental sustainability strategy. *Management Research Review, 38*(2), 217–238.

Giunipero, L. C., Hooker, R. E., & Denslow, D. (2012). Purchasing and supply management sustainability: Drivers and barriers. *Journal of Purchasing and Supply Management, 18*(4), 258–269.

Hahn, T., Figge, F., Pinkse, J., & Preuss, L. (2010). Trade-offs in corporate sustainability: You can't have your cake and eat it. *Business Strategy and the Environment, 19*(4), 217–229.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2005). *Multivariate data analysis* (6th ed.). Prentice Hall.

Hong, J., Zhang, Y., & Ding, M. (2017). Sustainable supply chain management practices, supply chain dynamic capabilities, and enterprise performance. *Journal of Cleaner Production, 22*(3), 1–12.

Hörisch, J., Ortas, E., Schaltegger, S., & Álvarez, I. (2015). Environmental effects of sustainability management tools: An empirical analysis of large companies. *Ecological Economics, 120*, 241–249.

King, A. A., & Lenox, M. J. (2001). Does it really pay to be green? An empirical study of firm environmental and financial performance. *Journal of Industrial Ecology, 5*(1), 105–116.

Kottala, Sriyogi. (2021). Sustainable Supply Chain Management Practices: A Review. *International Journal of Social Ecology and Sustainable Development, 12*(3), doi: 47-65. 10.4018/IJSESD.2021070104.

Kristal, M., Huang, X., & Roth, A. (2010). The effect of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance. *Journal of Operations Management, 28*(5).

Luthra, S., Govindan, K., Kannan, D., Mangla, S. K., & Garg, C. P. (2014). An integrated framework for sustainable supplier selection and evaluation in supply chains. *Journal of Cleaner Production, 140*, 1686–1698.

Lis, A.; Sudolska, A.; Tomanek, M (2020). Mapping research on sustainable supply-chain management. *Sustainability 12*, 3987.

Li, X., Li, Y., Li, G. *et al.* (2025) Sustainable supply chain management practices and performance: The moderating effect of stakeholder pressure. *Humanit Soc Sci Commun, 12*(336). https://doi.org/10.1057/s41599-025-04676-4

Manik, S. A., Kurniawati, K., & Masnita, Y. (2025). Does A Sustainable Supply Chain Enhance Manufacturing Cost Performance?. *Jurnal Ilmiah Edunomika*, *9*(1). https://doi.org/10.29040/jie.v9i1.1649

Mark Pagell & Miriam Wilhelm, (2025). Putting the S in Sustainable Supply Chain Management: A People-Centric Research Agenda. *Journal of Supply Chain Management*, *61*(1), 83-95.

Martínez-Jurado, P. J., & Moyano-Fuentes, J. (2014). Lean management, supply chain management and sustainability: A literature review. *Journal of Cleaner Production, 85*, 134–150.

Menezes, David & Vieira, Diego & de Oliveira, Jessica Eloísa. (2022). Stakeholder Theory: evolution and the proposal of a research agenda. *Iberoamerican Journal of Strategic Management, 21*(1), 1-34. doi: 10.5585/riae.v21i1.1882.

Mugoni, Ernest & Kanyepe, James & Tukuta, P (2023). Sustainable Supply Chain Management Practices (SSCMPS) and environmental performance: A systematic review. *Sustainable Technology and Entrepreneurship. 3*. 100050. doi: 10.1016/j.stae.2023.100050.

Mohammad Chaidir, Dadang Irawan, & Seger Santoso. (2024). Sustainable Operations Management Practices: A Comparative Study of Manufacturing Industries. *International Journal of Management, Accounting &Amp; Finance (KBIJMAF)*, *1*(2), 01–09. https://doi.org/10.70142/kbijmaf.v1i2.186

Morali, O., & Searcy, C. (2013). A review of sustainable supply chain management practices in Canada. *Journal of Business Ethics, 117*, 635–658.

Nafisah, Kania Hasna, and Elis Dwiana Ratnamurni. (2025). "Green Supply Chain Management and Sustainability Performance: The Mediating Role of Competitive Advantage in Bandung SMEs". *Asian Journal of Economics, Business and Accounting, 25* (2):131-44. https://doi.org/10.9734/ajeba/2025/v25i21669.

Paul, P. O., Aderoju, A. V., Shitu, K., Ononiwu, M. I., Igwe, A. N., Ofodile, O. C., & Ewim, C. P.-M. (2024). Supplier relationship management for sustainability: A comprehensive review of business intelligence applications. *GSC Advanced Research and Reviews, 21*(1), 328–350. https://doi.org/10.30574/gscarr.2024.21.1.0381

Paulraj A, Chen IJ, Blome C (2017) Motives and performance outcomes of sustainable supply chain management practices: A multi-theoretical perspective. *Journal Business Ethics, 145*, 239–258.

Pekovic, S., Rolland, S., & Gatignon, H. (2016). Customer orientation and organizational innovation: The case of environmental management practices. *Journal of Business & Industrial Marketing, 31*(7), 835–848.

Pereira-Moliner, J., Claver-Cortés, E., Molina-Azorín, J. F., & Tarí, J. J. (2012). Quality management, environmental management and firm performance: Direct and mediating effects in the hotel industry. *Journal of Cleaner Production, 37*, 82–92.

Sánchez-Flores, R.B.; Cruz-Sotelo, S.E.; Ojeda-Benitez, S.; Ramírez-Barreto, M.E. (2020) Sustainable supply chain management—A literature review on emerging economies. *Sustainability, 12*, 6972.

Schmidt, C. G., Foerstl, K., & Schaltenbrand, B. (2017). The supply chain position paradox: green practices and firm performance. *Journal of Supply Chain Management*, *53*(1), 3-25.

Shebeshe, E.N. and Sharma, D. (2025), "Impact of sustainable supply chain management practices on competitive advantage and organizational performance in the manufacturing sector", *International Journal of Productivity and Performance Management*, *74*(3), 995-1025. https://doi.org/10.1108/IJPPM-03-2024-0143

Sugiyono (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: CV. Alfabeta.

Toke LK, Kalpande SD (2024) Critical analysis of green accounting and reporting practises and its implication in the context of Indian automobile industry. *Environment, Development Sustainability, 26*, 3243–3268.

Truant, E, Borlatto, E, Crocco, E, Sahore, N (2023) Environmental, social and governance issues in supply chains. A systematic review for business strategy. *Journal of Cleaner Production,* 140024

Wiredu J, Yang Q, Sampene AK, Gyamfi BA, Asongu SA (2024) The effect of green supply chain management practices on corporate environmental performance: does supply chain competitive advantage matter? *Business Strategy Environment, 33*, 2578–2599.

Wu, H., Lv, K., Liang, L., & Hu, H. (2017). Measuring performance of sustain able manufacturing with recyclable wastes: A case from China's iron and steel industry. *Omega, 66*, 38–47.

Seuring, Stefan & Müller, Martin. (2008). From a Literature Review to a Conceptual Framework for Sustainable Supply Chain Management. *Journal of Cleaner Production. 16*. 1699-1710. doi: 10.1016/j.jclepro.2008.04.020.

Yadav S, Choi T-M, Kumar A, Luthra S, Naz F (2023) A meta-analysis of sustainable supply chain practices and performance: the moderating roles of type of economy and innovation. *International Journal Operations Production Management, 43*, 802–845.

Yang, M. G., Hong, P., & Modi, S. B. (2011). Impact of lean manufacturing and environmental management on business performance: An empirical study of manufacturing enterprises. *International Journal of Production Economics, 129*(2), 251–261.

Yang, C., Lin, S., Chan, Y., & Sheu, C. (2010). Mediated effect of environmental management on manufacturing competitiveness: An empirical study. *International Journal of Production Economics, 123*(1), 210–220.

Yalabik, B., & Fairchild, R. J. (2011). Customer, regulatory, and competitive pressure as drivers of environmental innovation. *International Journal of Production Economics, 131*(2), 519–527.

Yu W, Ramanathan R (2015) An empirical examination of stakeholder pressures, green operations practices and environmental performance. *International Journal Production Research, 53*, 6390–6407.

Yu W, Chavez R, Feng M, Wiengarten F (2014) Integrated green supply chain management and operational performance. *Supply Chain Management: International Journal, 19*(56), 683–696.

Zailani, S., Jeyaraman, K., Vengadasan, G., & Premkumar, R. (2012). Sustainable supply chain management (SSCM) in Malaysia: A survey. *International Journal of Production Economics, 140*(1), 330–340.

Zhu Q, Sarkis J, Lai K-H (2012) Examining the effects of green supply chain management practices and their mediations on performance improvements. *International Journal Production Research, 50*, 1377–1394.

Zhu, Q, Sarkis, J, Lai, K-H, (2013). Institutional-based antecedents and performance outcomes of internal and external green supply chain management practices. *Journal of Purchasing and Supply Management, 19*, 106–117.