Application of the PLS-SEM model in assessing the green supply chain management performance of small and medium enterprises in Ho Chi Minh City, Vietnam

Dieu Van Nguyen[1], Thinh Thi Thu Duong[2*], Anh Tuan Tran[3]

[1]People's Police University, Ho Chi Minh City, Vietnam
[2]Nong Lam University, Ho Chi Minh City, Vietnam
[3]Hoa Sen University, Ho Chi Minh City, Vietnam
[*]Corresponding author: thinh.duongthithu@hcmuaf.edu.vn

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ABSTRACT

In today's business climate, there is a growing demand for integrating social responsibility and environmental stewardship into supply chain management practices. This study investigates how green supply chain management mediates the relationship between social responsibility, engagement orientation, and overall supply chain performance. Data were collected through a survey of Small and Medium-Sized Enterprises (SMEs) in Ho Chi Minh City, Vietnam, which yielded 333 valid responses. The research employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to conduct a thorough quantitative analysis. The results validated the study's hypotheses, highlighting the essential role of green supply chain management in the framework. Furthermore, it was found that both social responsibility and environmental orientation positively affect the supply chain performance of SMEs in the area. These findings provide valuable insights for business managers, emphasizing the substantial impact of green supply chain management on enhancing supply chain efficiency.

1. Introduction

In Vietnam, the responsibility for environmental protection is a collective duty that spans across the political system, society, and businesses. The Prime Minister's 2022 decree on the national environmental protection strategy underscores that safeguarding the environment is an urgent necessity and a fundamental component of the nation's development path (Government Electronic Portal, 2022). However, environmental crises such as water contamination, air pollution, and noise pollution present substantial global and local challenges (Cable & Cable, 1994; Nguyen, 2011). In response, businesses have increasingly integrated environmental considerations into their operations (Agyapong et al., 2023; Yan et al., 2020). Thus, businesses and commercial organizations must align economic benefits with responsible environmental management, creating a bridge to sustainable performance (Roxas & Coetzer, 2012).

Companies with subpar environmental performance - characterized by pollution and resource wastage - highlight the critical need for sustainability, including green supply

chain management practices (Dzikriansyah et al., 2023). Green supply chain management encompasses incorporating environmental considerations throughout every phase of the supply chain, from product design and sourcing to production, distribution, and end-of-life management. Research consistently shows that businesses implementing green supply chain practices achieve better environmental outcomes compared to those that do not (Rakhmawati et al., 2019; Zhu et al., 2017).

The factors driving the adoption of green supply chain management reveal that only well-established businesses with robust knowledge management and innovative strategies are capable of effectively implementing can effectively implement these practices. These enterprises generally have the resources and capacity to invest in sustainable processes and green technologies, thus mitigating environmental impacts and enhancing operational efficiency. Conversely, Small and Medium-sized Enterprises (SMEs) often need help adopting green supply chain management due to financial limitations, resource constraints, and difficulties in accessing advanced technologies. Consequently, SMEs frequently experience a minimal relationship between green supply chain management practices and environmental performance (Dzikriansyah et al., 2023; Namagembe et al., 2019).

Environmental orientation is recognized as a crucial intangible asset that guides strategic activities and enhances business performance (Chan et al., 2012). Banerjee (2002) argues that environmental orientation is a core business principle that drives enterprises' ecological initiatives. Companies with a strong environmental orientation are acutely aware of the importance of environmental impacts and can effectively mitigate associated risks through targeted management practices. Despite research suggesting that increased environmental orientation can enhance a company's strategic and operational performance, comprehensive studies exploring this impact are limited (Lindell & Karagozoglu, 2001). Most prior studies have primarily examined the correlation between environmental orientation and business performance (Menguc & Ozanne, 2005).

Corporate Social Responsibility (CSR) is pivotal in ensuring sustainable economic growth and influencing environmental protection and community welfare (Long & Deng, 2024). CSR involves more than balancing economic interests with social responsibilities; it requires proactive engagement with ecological and societal issues to create enduring value for the company and its community (Yu et al., 2022). Within the green supply chain management framework, all participants - from suppliers to distributors - are essential in executing sustainable practices. Companies must uphold product quality while meeting environmental and social standards, fostering consumer trust, and contributing significantly to societal sustainability. However, implementing CSR presents substantial challenges for SMEs, which often contend with financial constraints, compliance issues, and limited resources (Frynas & Yamahaki, 2016; Sheehy & Farneti, 2021).

This study aims to elucidate the mediating role of green supply chain management in the interplay between corporate social responsibility, environmental orientation, and supply chain performance among SMEs in Ho Chi Minh City. The insights gained will assist SMEs in enhancing their supply chain management performance by effectively adopting green supply chain practices. The structure of the study includes the first part, the introduction; the second part, which presents the theoretical foundation and research model; the third part, which covers the research methodology; the fourth part, which presents the research results; and the final part is the conclusion.

2. Theoretical framework and research model

2.1. Theories used in the research

2.1.1. Transaction cost theory

Transaction Cost Theory is a classical economic concept introduced by Coase (1993) and later expanded by Williamson (1996). This theory examines the costs associated with transactions and market coordination. Firms primarily exist to mitigate the substantial and inefficient costs incurred through market mechanisms. These costs encompass searching for supplier information, negotiating contracts, and addressing unforeseen expenses. Consequently, to avoid these costly and complex issues, businesses often choose to internalize various functions. This approach not only facilitates superior control over production processes but also reduces expenses and enhances operational efficiency (Vachon, 2007).

Transaction Cost Theory exerts a profound influence on green supply chain management by offering an analytical framework for optimizing supply chain relationships and operations (Jiang, 2009). The theory advocates for investment in systems such as green technologies and recyclable assets, as these investments not only facilitate environmental compliance but also create sustainable competitive advantages for businesses.

2.1.2. Stakeholder theory

Stakeholder theory posits that organizations should not only focus on meeting shareholder interests but also consider the needs and desires of other stakeholders (Freeman, 1984). In the context of sustainable development becoming a global trend (Nguyen et al., 2018), businesses are encouraged to engage in social responsibility and environmental protection to meet stakeholder expectations, especially in Green Supply Chain Management (GSCM). Previous studies have shown that environmentally oriented and socially responsible companies achieve better supply chain performance through GSCM (Bu et al., 2020; Chan et al., 2012; Zhou et al., 2019; Zhu et al., 2008). Companies that adopt GSCM can enhance their environmental and economic performance by optimizing processes, reducing waste, and minimizing resource consumption (Zhu et al., 2013). Sarkis et al. (2011) argue that GSCM links environmental strategy and supply chain efficiency, improving supply chain performance and better fulfilling stakeholders' social and environmental responsibilities, thereby increasing sustainability in supply chain operations.

2.1.3. Resource-Based View (RBV) theory

In the early stages of the Resource-Based View (RBV) theory, resources were considered any element that could be seen as a strength or weakness of a firm (Wernerfelt, 1984). According to RBV, a firm's resources are the true source of competitive advantage (Barney, 1991). However, this perspective was initially too broad and lacked specificity, creating the need to differentiate between "resources" and "capabilities" to strengthen the concept (Gavronski et al., 2011). RBV was later developed further, proposing that a firm achieves sustainable competitive advantage when it possesses strategic resources - those that are valuable, rare, difficult to imitate, and non-substitutable. By implementing Green Supply Chain Management (GSCM), companies can build and accumulate these strategic resources. GSCM not only helps companies meet customer expectations for environmentally friendly products but also contributes to the creation of green capabilities - unique, sustainable abilities in clean production, waste management, and green product development (Yu et al., 2017). As companies implement GSCM, they can establish supply chains that adhere to higher environmental standards, thereby better meeting

customer needs. This enables companies to improve supply chain performance, increase sales of green products, and strengthen long-term competitive advantage (Shi et al., 2012).

2.2. Environmental orientation impacts green supply chain management

Environmental orientation can be understood as "the extent to which a business integrates ecological issues into its business strategy to minimize the negative impacts of its operations on the natural environment" (Banerjee, 2002; Hirunyawipada & Xiong, 2018, p. 22). In the modern business context, environmental issues have become a primary concern for government agencies, policymakers, and businesses (Bu et al., 2020). Consequently, companies that effectively address environmental issues are more likely to gain sustainable competitive advantages (Zhou et al., 2020; Agyapong et al., 2023). Previous studies have shown that environmental orientation is a key driver with a positive impact on the implementation of green supply chain activities (Bu et al., 2020; Chan et al., 2012; Zhou et al., 2019; Zhu et al., 2008), contributing to minimizing environmental impacts and improving overall supply chain performance. By integrating environmental orientation into supply chain management, businesses meet the need for environmental protection and create long-term value, develop green capabilities, and build a positive green reputation among stakeholders (Bu et al., 2020). Therefore, the following hypothesis is proposed:

H1: Environmental orientation has a positive impact on green supply chain management

2.3. Social responsibility influences green supply chain management

Corporate Social Responsibility (CSR) was introduced by the Organization for Economic Co-operation and Development around 1977 (Xu et al., 2022). With the increasing adoption of Green Supply Chain Management (GSCM) by businesses, they also aim to balance economic, social, and environmental benefits to promote sustainable development (Soda et al., 2016). According to ISO 26000, quality and ecological responsibility are particularly emphasized (Chu et al., 2017); therefore, GSCM is closely linked and considered a driver of CSR activities (Visamitanan & Assarut, 2021; Zhu et al., 2008). Tabesh et al. (2016) agree with this view, asserting that integrating GSCM and CSR is essential. Companies implementing CSR strategies feel less pressure from stakeholders, enabling them to execute GSCM strategies more easily (Sarkis et al., 2011). On the other hand, Balon (2020) firmly argues that companies without CSR policies are less likely to implement GSCM effectively. Internal and external CSR positively impact GSCM, enhancing corporate reputation and delivering economic benefits in the market (Farooq et al., 2017). Therefore, the following hypothesis is proposed:

H2: Social responsibility has a positive relationship with green supply chain management

2.4. Green supply chain management impacts supply chain performance

Green Supply Chain Management (GSCM) is increasingly asserting its critical role in enhancing the supply chain performance of businesses. According to Geng et al. (2017), GSCM helps reduce waste in production processes and optimizes operational efficiency through the smart use of resources and energy. Implementing green measures contributes to developing environmentally friendly products and improving product quality and customer satisfaction (Agustia et al., 2019). However, measuring supply chain performance poses a significant challenge for researchers, as they must clearly define the criteria to evaluate this performance (Sukati et al., 2012). To boost competitiveness, companies need to adopt effective supply chain management strategies and foster close coordination among supply

chain members to optimize operational performance. Research shows that supply chain management affects not only the operations of individual members but also has a comprehensive impact on overall supply chain performance (Cohen & Roussel, 2005; Green et al., 2008). Notably, Khan et al. (2020) emphasize that GSCM plays a key role in enhancing supply chain performance by helping companies save costs, reduce energy consumption, and use resources more efficiently. As a result, GSCM lowers operating costs and increases productivity, creating sustainable competitive advantages in the modern business environment. Based on this evidence, we propose the following hypothesis:

H3: Green supply chain management positively influences supply chain performance

2.5. The mediating role of green supply chain management

Corporate environmental orientation typically encompasses strategies, policies, and processes to minimize environmental impacts, protect natural resources, and promote sustainable development (Banerjee, 2002; Hirunyawipada & Xiong, 2018). However, to achieve practical effectiveness from these commitments, companies must integrate Green Supply Chain Management (GSCM) into their supply chain activities, including product design, green procurement, clean production, and waste management (Sarkis et al., 2011). According to Hanna et al. (2000), there is a positive relationship between environmental management and operational performance. Previous studies have shown that companies adopting GSCM can optimize processes, minimize waste, and reduce resource consumption, thereby improving economic and environmental performance (Green et al., 2015; Zaid et al., 2018; Zaid & Sleimi, 2021). GSCM enhances operational processes, helping companies minimize risks, improve reputation, and enhance supply chain performance (Zhu et al., 2011). According to Sarkis et al. (2011), when companies implement GSCM, they not only meet environmental protection requirements but also fulfill stakeholder expectations regarding social responsibility, thus creating competitive advantages and improving supply chain performance. Therefore, we propose the following hypothesis:

H4: Green Supply Chain Management positively mediates the relationship between environmental orientation and supply chain performance

Corporate Social Responsibility (CSR) is an increasingly important topic in the fields of business and management research. According to Zhu et al. (2022), CSR refers to activities through which businesses integrate social and environmental factors into their operations and relationships with stakeholders. According to stakeholder theory, CSR not only addresses the immediate demands or legal obligations of a business but also extends to activities that provide social benefits. Social responsibility directly influences the supply chain performance of companies in achieving social objectives alongside business efficiency (Jones et al., 2019). Fombrun et al. (2000) argue that establishing a straightforward relationship between social responsibility and supply chain performance is challenging because CSR activities impact profitability through various mediating relationships. Based on these arguments, the research proposes the following hypothesis:

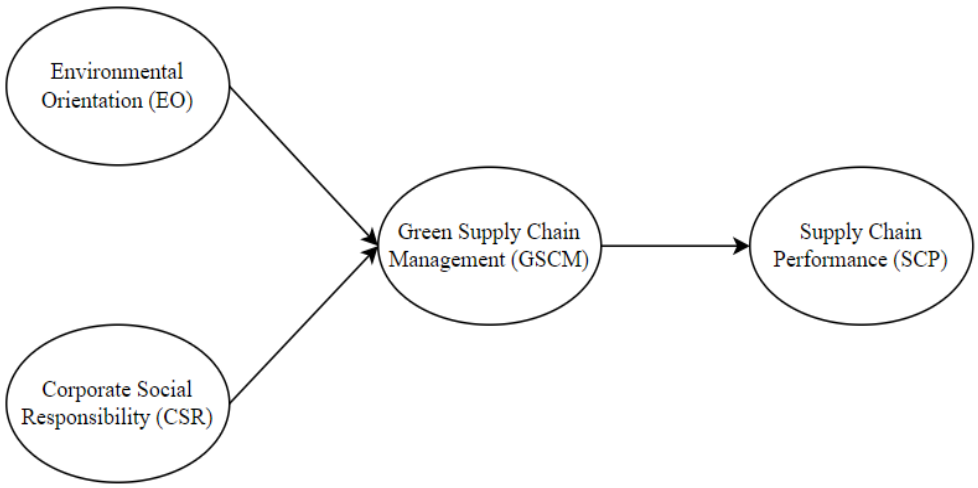
H5: Green Supply Chain Management positively mediates the relationship between Corporate Social Responsibility and supply chain performance

2.6. Research model

Based on the theoretical foundation and proposed research hypotheses, the research model is illustrated in Figure 1 below:

Figure 1

The Proposed Research Model



Note. Suggested by authors

3. Methodology

3.1. Sample collection and data gathering

This study employs a quantitative approach, utilizing structured questionnaires administered from February 2024 to June 2024 in Ho Chi Minh City, using a convenience sampling method, which is a non-probability sampling technique. The research involves targeted interviews with specific groups, including sales staff, supervisors, and managers from small and medium-sized enterprises in Ho Chi Minh City. The questionnaire comprises two sections: demographic information of the respondents and questions designed to measure the relationships between environmental orientation, social responsibility, green supply chain management, and supply chain performance.

A large sample size is a common requirement among researchers to ensure the reliability of Structural Equation Modeling (SEM) (Christopher, 2010). According to Jichuan and Xiaoqian (2012), a sample size should ideally include at least 10 observations per variable, with a recommended total of around 300. Consequently, we opted for a survey size of 400. After screening, the final sample comprised 333 responses, reflecting a response rate of 83.25% of the initially distributed surveys.

Table 1

Sample Description

Item		Frequency	Percentage (%)
Gender	Male	256	76.88
	Female	77	23.12
Age	18 - 24	30	9.01
	25 - 34	115	34.53
	35 - 44	108	32.43
	45 - 60	80	24.02

Item		Frequency	Percentage (%)
Education level	High School	60	18.02
	College	130	39.04
	University	100	30.03
	Above the University	43	12.91
Marital status	Married	187	56.16
	Single	99	29.73
	Divorced	47	14.11

Note. The study results

The survey reveals a notable predominance of male respondents, constituting 76.88% of the total, compared to their female counterparts at 23.12%. Participants are distributed across four age brackets: 18 - 24 years (9.01%), 25-34 years (34.53%), 35 - 44 years (32.43%), and 45 - 60 years (24.02%). Given the managerial and supervisory roles of the respondents, the majority have attained higher education qualifications, with 39.04% holding a College and 30.03% holding a University. The remaining participants have a High School (18.02%) or above a University (12.91%). Most respondents are married (56.16%), while a smaller percentage are either single (29.73%) or divorced (14.11%).

3.2. Measurement scale

All variables in the model are measured using a 5-point Likert scale (Likert, 1932) as shown in Table 2.

Table 2

Measurement Scales for Variables and Observations

Variables	Items	Measurement	Source
Corporate Social Responsibility (CSR)	CSR1	We incorporate environmental and social concerns into our business approach and strategy	Zhu et al. (2008); Chu et al. (2017); Xu et al. (2022)
	CSR2	We have a long-term strategy to contribute to improving social welfare	
	CSR3	We have a long-term plan to save energy	
	CSR4	We manage an advanced system for product traceability	
	CSR5	We have an advanced system of processes in place to enhance efficiency	
	CSR6	We provide support activities for stakeholders to promote the implementation of green supply chain management	

Variables	Items	Measurement	Source
Green Supply Chain Management (GSCM)	GSCM1	We process according to ISO standards to protect the environment	Zhu et al. (2005); Agyapong et al. (2023)
	GSCM2	We manage a green procurement strategy	
	GSCM3	We manage a green marketing and distribution strategy	
	GSCM4	We manage according to a green system conducive to recycling	
Environmental Orientation (EO)	EO1	Our company strives to collaborate to ensure employees understand the importance of environmental protection	Menguc and Ozanne (2005); Chan et al. (2012); Zhou et al. (2020); Agyapong et al. (2023)
	EO2	Environmental protection is a core value of our company	
	EO3	Environmental protection is a critical factor for the existence of our company	
Supply Chain Performance (SCP)	SCP1	We deliver to customers on time	Cohen and Roussel (2005); Khan et al. (2020)
	SCP2	Our customers are satisfied with our service	
	SCP3	We can achieve our profit targets	
	SCP4	We have projected revenue	
	SCP5	Our production costs are lower than those of our competitors	

Note. The Authors

3.3. Data analysis

The Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology has become a quintessential tool for analyzing intricate interactions between observed and latent variables in social science research. This study adopts a quantitative research approach and PLS-SEM for its versatility and applicability across diverse measurement scales (Hair et al., 2014). Consequently, scholars extensively utilize this technique (Hair et al., 2016). We employed SmartPLS 4.0 software to conduct the Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis to evaluate the hypotheses within our model.

4. Research findings

4.1. Assessment of the measurement model

According to Hair et al. (2020), the reliability and validity of the measurement scale are assessed through three steps: reliability, convergent validity, and discriminant validity.

Evaluation of the Quality of Observed Variables: The objective of assessing the quality of observed variables is to selectively retain those that meet the necessary criteria while eliminating variables of inadequate quality during data analysis. According to Hair et al. (2016),

observed variables with loadings ≥ 0.7 are deemed acceptable; those with loadings ≥ 0.4 but < 0.7 should be scrutinized for potential removal. If removing such variables enhances the measurement coefficient beyond the acceptable threshold, they may be discarded, although their content validity should be considered. Conversely, if removal does not improve the measurement coefficient, the variables should be retained. Variables with loadings < 0.4 should be removed, taking into account their content validity. The results presented in Table 3 demonstrate that all loadings exceed the permissible threshold, thus no variables were excluded.

Table 3

Analysis of Outer Loading Values for Measurement Scale

	EO	GSCM	SCP	CSR
EO1	0.897			
EO2	0.936			
EO3	0.846			
GSCM1		0.848		
GSCM2		0.725		
GSCM3		0.768		
GSCM4		0.877		
SCP1			0.876	
SCP2			0.870	
SCP3			0.868	
SCP4			0.876	
SCP5			0.854	
CSR1				0.833
CSR2				0.867
CSR3				0.763
CSR4				0.740
CSR5				0.791
CSR6				0.778

Note. Data Analysis Results (2024)

The results of the measurement scale validation indicate that Cronbach's α and Composite Reliability (CR) coefficients range from 0.824 to 0.881, all of which surpass the threshold of 0.7, thereby affirming the reliability of the scales. The Average Variance Extracted (AVE) serves as an indicator derived from the average percentage of variance explained (extracted variance) among the observed variables of a construct. A measurement scale is deemed acceptable if the AVE coefficient is ≥ 0.5, signifying that the latent variable accounts for 50% of the variance in the observed variables (Hair et al., 2016). The findings presented in Table 4 reveal that AVE values range from 0.635 to 0.799, all exceeding 0.5, thus confirming the convergent validity of the measurement scales.

Table 4

Assessment of Reliability and Convergent Validity of the Measurement Scales

	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
EO	0.874	0.922	0.799
GSCM	0.824	0.881	0.651
SCP	0.919	0.939	0.755
CSR	0.885	0.912	0.635

Note. Data Analysis Results (2024)

The discriminant validity of the measurement scales is assessed using the Fornell-Larcker criterion, which involves comparing the square root of the Average Variance Extracted (AVE) with the correlation coefficients among constructs, and the Heterotrait-Monotrait Ratio (HTMT). Fornell and Larcker (1981) illustrated that discriminant validity is established when the square root of the AVE for each construct exceeds its correlations with all other constructs. Moreover, Henseler et al. (2015) indicated that discriminant validity is achieved if the HTMT ratio remains below 0.9. Based on these criteria, we conclude that the measurement scales demonstrate robust discriminant validity.

Table 5

Fornell-Larcker Matrix and HTMT Ratio

Structure	Fornell-Larcker Criterion				HTMT			
	EO	**GSCM**	**SCP**	**CSR**	**EO**	**GSCM**	**SCP**	**CSR**
EO	0.894							
GSCM	0.550	0.807			0.614			
SCP	0.597	0.661	0.869		0.664	0.728		
CSR	0.223	0.265	0.419	0.797	0.242	0.314	0.451	

Note. Data Analysis Results (2024)

In summary, the foregoing analyses demonstrate that all indices are within acceptable ranges. This confirms that the model exhibits robust convergent validity and that the constructs under investigation attain significant discriminant validity. As a result, the measurement model has been validated and is thus suitable for structural model assessment.

4.2. Structural model assessment

4.2.1. Results of multicollinearity assessment

The Variance Inflation Factor (VIF) is utilized to gauge the degree of correlation among latent variables in the model. In this study, multicollinearity is evaluated by ensuring VIF values are below 5, as recommended by Hair et al. (2011). The analysis presented in Table 6 demonstrates that all VIF values for the model variables fall within the acceptable range, thereby confirming that the current research model is devoid of multicollinearity issues.

Table 6

Variance Inflation Factor (VIF) Results

	EO	GSCM	SCP	CSR
EO		1.052		
GSCM			1.000	
SCP				
CSR		1.052		

Note. Data Analysis Results (2024)

4.2.2. Results of R-squared and Q-squared assessment

The R-squared (R^2) coefficient is evaluated to ascertain the accuracy of the model's predictive performance. R^2 values range from 0 to 1, with higher values indicating a superior fit of the linear model. The R^2 values reported in Table 7 are all above 0, signifying that the linear regression model is appropriately fitted. Specifically, Corporate Social Responsibility and Environmental Orientation account for 32.3% of the variance in Green Supply Chain Management, while Green Supply Chain Management explains 43.7% of the variance in Supply Chain Performance.

Furthermore, Table 7 shows that the Q-squared (Q^2) values for GSCM and SCP are 0.305 and 0.343, respectively, both exceeding 0. This demonstrates that the variables in the model possess substantial predictive relevance.

Table 7

Results of R-squared and Q-squared Evaluation

	R^2	Adjusted R-squared (R^2)	Q^2
GSCM	0.323	0.319	0.305
SCP	0.437	0.436	0.343

Note. Data Analysis Results (2024)

4.2.3. Hypothesis testing

Following the evaluation of measurement scales, data, and the theoretical model - where all elements were deemed suitable - the author conducted hypothesis testing within the PLS-SEM path modeling framework. This analysis utilized bootstrapping with a resampling size of 1,000 observations to ascertain path coefficients, standard errors, t-values, and p-values (Hair et al., 2020). The results presented in Table 8 reveal that all p-values are below 5%, thereby affirming the validity of all research hypotheses.

Table 8

Research Hypothesis Testing

Hypothesis	Relationship	Path Coefficient	t-value	p-values	Conclusion
H1	EO → GSCM	0.516	10.624	0.000	Accept
H2	CSR → GSCM	0.150	3.012	0.003	Accept
H3	GSCM → SCP	0.661	18.647	0.000	Accept
H4	EO →GSCM →SCP	0.341	8.646	0.000	Accept
H5	CSR →GSCM →SCP	0.099	2.974	0.003	Accept

Note. Data Analysis Results (2024)

4.3. Discussion

This study explores the direct relationship between environmental orientation and social responsibility with green supply chain management in small and medium-sized enterprises in Ho Chi Minh City by testing two hypotheses, H1 and H2. The results demonstrate that both hypotheses are supported: (H1) environmental orientation positively impacts green supply chain management, and (H2) social responsibility positively influences green supply chain management. These findings are consistent with previous studies by Zhu et al. (2008), Sarkis et al. (2011), and Chan et al. (2012), emphasizing the key role of environmental orientation and social responsibility in promoting green supply chain management.

Our hypothesis H1 differs from many studies that establish a relationship between environmental orientation and firm performance (Menguc & Ozanne, 2005; Yu & Huo, 2019). This difference may stem from the research context of Small and Medium-sized Enterprises (SMEs), which face numerous limitations in developing strategies to enhance economic performance. These firms often struggle with limited resources and the capacity to assess performance effectively. However, despite these challenges, SMEs continue to pursue an environmental orientation to move toward green supply chain management, aligning with the findings of Rasheed et al. (2024).

Hypothesis H2 explores the relationship between social responsibility (CSR) and Green Supply Chain Management (GSCM), whereas many other studies separate CSR into internal and external components (Farooq et al., 2017; Werther & Chandler, 2010; Wang et al., 2020). Internal CSR focuses on activities directly related to employees, enhancing their creativity and engagement in the workplace (Greenwood, 2007; Hur et al., 2018). Additionally, internal CSR forms part of corporate culture (El Akremi et al., 2018); companies that emphasize internal CSR often foster a positive cultural atmosphere that helps them maintain a competitive position, positively influencing supply chain innovation and supporting GSCM (Spena & De Chiara 2012). Meanwhile, external CSR creates value for the environment and society (Boulouta & Pitelis, 2014). Moreover, companies with a focus on external CSR often face pressure from stakeholders, which may prompt them to implement strategies that fulfill these stakeholders' demands, laying a foundation for GSCM (Thong & Wong, 2018). However, as this study focuses on Small and Medium-sized Enterprises (SMEs), social responsibility activities are typically not differentiated. Therefore, it may not be necessary to separate CSR into distinct categories for the purposes of this research.

The study also confirms that Green Supply Chain Management (GSCM) has a positive impact on supply chain performance, as verified through Hypothesis H3. This finding aligns with Khan et al. (2020), who highlight the direct role of GSCM in enhancing supply chain performance. The study contributes by demonstrating the positive impact of GSCM on supply chain performance. Implementing GSCM brings environmental benefits and helps improve supply chain performance. Optimizing supply chain activities according to green standards strengthens competitiveness and enhances the supply chain's reputation in today's business environment. These findings are also supported by previous studies, including those by Cohen and Roussel (2005), Green et al. (2008), and Khan et al. (2020).

Additionally, the study sheds light on the mediating role of Green Supply Chain Management (GSCM) in the relationship between environmental orientation, social responsibility, and supply chain performance, as presented through Hypotheses H4 and H5.

Research by Chan et al. (2012), Xu et al. (2022), and Agyapong et al. (2023) also supports the notion that achieving sustainable supply chain performance requires a coordinated integration of environmental orientation, social responsibility, and GSCM.

5. Conclusion

This study aims to explore the relationships and the mediating role of Green Supply Chain Management (GSCM) in the connections between environmental orientation, social responsibility, and supply chain performance in Small and Medium-sized Enterprises (SMEs) in Ho Chi Minh City. Data was collected through direct surveys of 333 respondents and analyzed using SmartPLS software to test the hypotheses. All hypotheses were accepted, showing positive effects across the examined relationships.

Theoretically, this study has uncovered new insights. First, it examines the direct relationship of environmental orientation and social responsibility with Green Supply Chain Management (GSCM), whereas few studies have simultaneously addressed these variables in a single experiment. Next, the role of GSCM is emphasized as both a mediating and direct influencing factor in the proposed hypotheses. Finally, the study selects supply chain performance as the outcome measure of GSCM, instead of business performance as used in previous studies.

Practical research shows that green supply chain management strategies not only help businesses effectively meet environmental requirements but also enhance the productivity and efficiency of the supply chain. In particular, Small and Medium-sized Enterprises (SMEs) can adopt these measures to achieve sustainable benefits, contributing to socio-economic development. The study's findings confirm the crucial role of environmental orientation and social responsibility in promoting green supply chains, thus enabling businesses to improve operational efficiency, build customer trust, and achieve long-term sustainable development. To integrate social responsibility and environmental protection into the supply chain, SMEs should take several specific steps. First, they need to establish a Corporate Social Responsibility (CSR) policy that requires partners to commit to environmental protection and ensure safe working conditions. Next, SMEs should select sustainable suppliers, prioritizing collaboration with entities that hold environmental certifications and use recycled materials. In logistics, optimizing transportation routes can not only reduce fuel consumption but also limit carbon emissions. These efforts will not only enhance the company's reputation but also create a positive impact on the environment and the community.

This study highlights the significance of green supply chain management within the context of global sustainability. Although the research yields promising results, it is not without certain limitations. Firstly, the survey sample was drawn exclusively from Ho Chi Minh City, which may restrict the generalizability of the findings to other regions. Additionally, the study focuses on Small and Medium-sized Enterprises (SMEs), which may not fully represent the diversity of industries or the range of business sizes. To address these limitations, future research should expand the sample to include diverse geographical areas and industry sectors, thereby enhancing the relevance of the findings for policy formulation.

NO CONFLICT OF INTEREST STATEMENT

All authors declare that they have no conflict of interest.

References

Agustia, D., Sawarjuwono, T., & Dianawati, W. (2019). The mediating effect of environmental management accounting on green innovation: Firm value relationship. *International Journal of Energy Economics and Policy, 9*(2), 299-306. https://doi.org/ 10.32479/ijeep.7438

Agyapong, A., Aidoo, S. O., Acquaah, M., & Akomea, S. (2023). Environmental orientation and sustainability performance: The mediated moderation effects of green supply chain management practices and institutional pressure. *Journal of Cleaner Production, 430*(2023), Article 139592. https://doi.org/10.1016/j.jclepro.2023.139592

Balon, V. (2020). Green supply chain management: Pressures, practices, and performance - An integrative literature review. *Business Strategy & Development, 3*(2), 226-244. https://doi.org/10.1002/BSD2.91

Banerjee, S. B. (2002). Corporate environmentalism: The construct and its measurement. *Journal of Business Research, 55*(3), 177-191. https://doi.org/10.1016/S0148-2963(00)00135-1

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99-120.

Boulouta, I., & Pitelis, C. N. (2014). Who needs CSR? The impact of corporate social responsibility on national competitiveness. *Journal of Business Ethics, 119*(3), 349-364. https://doi.org/10.1007/s10551-013-1633-2

Bu, X., Dang, W. V., Wang, J., & Liu, Q. (2020). Environmental orientation, green supply chain management, and firm performance: Empirical evidence from Chinese small and medium-sized enterprises. *International Journal of Environmental Research and Public Health, 17*(4), Article 1199. https://doi.org/10.3390/ijerph17041199

Cable, S., & Cable, C. (1994). *Environmental problems, grassroots solutions: The politics of grassroots environmental conflict*. St. Martin's Press.

Chan, R. Y., He, H., Chan, H. K., & Wang, W. Y. (2012). Environmental orientation and corporate performance: The mediation mechanism of green supply chain management and moderating effect of competitive intensity. *Industrial Marketing Management, 41*(4), 621-630. https://doi.org/10.1016/j.indmarman.2012.04.009

Christopher, W. J. (2010), Lower bounds on sample size in structural equation modeling. *Electronic Commerce Research and Applications, 9*(6), 476-487.

Chu, S. H., Yang, H., Lee, M., & Park, S. (2017). The impact of institutional pressures on green supply chain management and firm performance: Top management roles and social capital. *Sustainability, 9*(5), Article 764. https://doi.org/10.3390/su9050764

Coase, R. H. (1993). *The nature of the firm (1937).* http://econdse.org/wp-content/uploads/2014/09/firm-coase.pdf

Cohen, S., & Roussel, J. (2005). *Strategic supply chain management: The five core disciplines for top performance*. McGraw-Hill.

Dzikriansyah, M. A., Masudin, I., Zulfikarijah, F., Jihadi, M., & Jatmiko, R. D. (2023). The role of green supply chain management practices on environmental performance: A case of Indonesian small and medium enterprises. *Cleaner Logistics and Supply Chain, 6,* Article 100100. https://doi.org/10.1016/j.clscn.2023.100100

El Akremi, A., Gond, J. P., Swaen, V., De Roeck, K., & Igalens, J. (2018). How do employees perceive corporate responsibility? Development and validation of a multidimensional corporate stakeholder responsibility scale. *Journal of Management, 44*(2), 619-657. https://doi.org/10.1177/0149206315569311

Farooq, O., Rupp, D. E., & Farooq, M. (2017). The multiple pathways through which internal and external corporate social responsibility influence organizational identification and multifoci outcomes: The moderating role of cultural and social orientations. *Academy of Management Journal, 60*(3), 954-985. https://doi.org/10.5465/amj.2014.0849

Fombrun, C. J., Gardberg, N. A., & Barnett, M. L. (2000). Opportunity platforms and safety nets: Corporate citizenship and reputational risk. *Business and Society Review, 105*(1), 85-106.

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

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman Publishing.

Frynas, J. G., & Yamahaki, C. (2016). Corporate social responsibility: Review and roadmap of theoretical perspectives. *Business Ethics: A European Review, 25*(3), 258-285. https://doi.org/10.1111/beer.12115

Gavronski, I., Klassen, R. D., Vachon, S., & do Nascimento, L. F. M. (2011). A resource-based view of green supply management. *Transportation Research Part E: Logistics and Transportation Review, 47*(6), 872-885. https://doi.org/10.1016/j.tre.2011.05.018

Geng, R., Mansouri, S. A., & Aktas, E. (2017). The relationship between green supply chain management and performance: A meta-analysis of empirical evidences in Asian emerging economies. *International Journal of Production Economics, 183*(Part A), 245-258. https://doi.org/10.1016/j.ijpe.2016.10.008

Government Electronic Portal. (2022). *Decision No. 450/QD-TTg of the Prime Minister: Approval of the National Environmental Protection Strategy for 2030, with a vision to 2050*. https://chinhphu.vn/?pageid=27160&docid=205605&tagid=6&type=1

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

Green, K. W., Whitten, D., & Inman, R. A. (2008). The impact of logistics performance on organizational performance in a supply chain context. *Supply Chain Management: An International Journal, 13*(4), 317-327. https://doi.org/10.1108/13598540810882206

Greenwood, M. (2007). Stakeholder engagement: Beyond the myth of corporate responsibility. *Journal of Business Ethics, 74*(4), 315-327.

Hair, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*(2020), 101-110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2016). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). In U. Manchester (Ed.), *Specifying the path model and collecting data*. Sage Publications.

Hair, J. F., Hult, T., Ringle, C., & Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* Sage Publications.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 139-152. https://doi.org/10.2753/MTP1069-6679190202

Hanna, M. D., Rocky Newman, W., & Johnson, P. (2000). Linking operational and environmental improvement through employee involvement. *International Journal of Operations & Production Management, 20*(2), 148-165. https://doi.org/10.1108/01443570010304233

Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review, 20*(4), 986-1014.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115-135. https://doi.org/10.1007/s11747-014-0403-8

Hirunyawipada, T., & Xiong, G. (2018). Corporate environmental commitment and financial performance: Moderating effects of marketing and operations capabilities. *Journal of Business Research, 86*(2018), 22-31. https://doi.org/10.1016/j.jbusres.2018.01.002

Hur, W. M., Moon, T. W., & Ko, S. H. (2018). How employees' perceptions of CSR increase employee creativity: Mediating mechanisms of compassion at work and intrinsic motivation. *Journal of Business Ethics, 153*(3), 629-644. https://doi.org/10.1007/s10551-016-3321-5

Jiang, B. (2009). The effects of interorganizational governance on supplier's compliance with SCC: An empirical examination of compliant and non-compliant suppliers. *Journal of Operations Management, 27*(4), 267-280. https://doi.org/10.1016/j.jom.2008.09.005

Jichuan, W., & Xiaoqian, W. (2012). *Sample size for structural equation modeling: 31 Applications using Mplus*. John Wiley and Sons.

Jones, D. A., Newman, A., Shao, R., & Cooke, F. L. (2019). Advances in employee-focused micro-level research on corporate social responsibility: Situating new contributions within the current state of the literature. *Journal of Business Ethics, 157*(2), 293-302. https://doi.org/10.1007/s10551-018-3792-7

Khan, S. A. R., Zhang, Y., & Nathaniel, S. (2020). Green supply chain performance and environmental sustainability: A panel study. *LogForum, 16*(1), 141-159. http://doi.org/10.17270/J.LOG.2020.394

Le, T. T. (2023). The association of corporate social responsibility and sustainable consumption and production patterns: The mediating role of green supply chain management. *Journal of Cleaner Production, 414*(2023), Article 137435. https://doi.org/10.1016/j.jclepro.2023.137435

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology, 140*, 5-55.

Lindell, M., & Karagozoglu, N. (2001). Corporate environmental - A comparison between Nordic and US firms. *Business Strategy and the Environment, 10*(1), 38-52.

Long, R., & Deng, R. (2024). Analyzing the nexus between environmental regulations, green supply chain management, and corporate social responsibility in the agri-food business. *Polish Journal of Environmental Studies, 33*(4), 4213-4227. https://doi.org/10.15244/pjoes/181185

Menguc, B., & Ozanne, L. K. (2005). Challenges of the "green imperative": A natural resource-based approach to the environmental orientation - business performance relationship. *Journal of Business Research, 58*(4), 430-438. https://doi.org/10.1016/j. jbusres.2003.09.002

Namagembe, S., Ryan, S., & Sridharan, R. (2019). Green supply chain practice adoption and firm performance: manufacturing SMEs in Uganda. *Management of Environmental Quality: An International Journal, 30*(1), 5-35. https://doi.org/10.1108/MEQ-10-2017-0119

Nguyen, H. M., & Phan, C. A., & Matsui, Y. (2018). Contribution of quality management practices to sustainability performance of Vietnamese firms. *Sustainability, 10*(2), Article 375. https://doi.org/10.3390/su10020375

Nguyen, N. X. (2011). The development of sociological perspectives in the face of challenges of environmental issues. *Ho Chi Minh City Open University Journal of Science - Social Sciences, 6*(1), 12-19.

Rakhmawati, A., Rahardjo, K., & Kusumawati, A. (2019). Faktor anteseden dan konsekuensi green supply chain management. *Jurnal Sistem Informasi Bisnis, 9*(1), 1-8. https://doi.org/10.21456/vol9iss1pp1-8

Rasheed, R., Rashid, A., Amirah, N. A., & Hashmi, R. (2024). Integrating environmental and entrepreneurship advocacy into enviropreneurship through green supply chain management, waste management, and green innovation: A study on SMEs of US. *Cleaner Engineering and Technology, 21*(2014), Article 100768. https://doi.org/10.10 16/j.clet.2024.100768

Roxas, B., & Coetzer, A. (2012). Institutional environment, managerial attitudes and environmental sustainability orientation of small firms. *Journal of Business Ethics, 111*(4), 461-476. https://doi.org/10.1007/s10551-012-1211-z

Sarkis, J., Zhu, Q., & Lai, K. H. (2011). An organizational theoretic review of green supply chain management literature. *International Journal of Production Economics, 130*(1), 1-15. https://doi.org/10.1016/j.ijpe.2010.11.010

Sheehy, B., & Farneti, F. (2021). Corporate social responsibility, sustainability, sustainable development and corporate sustainability: What is the difference, and does it matter? *Sustainability, 13*(11), Article 5965. https://doi.org/10.3390/su13115965

Shi, V. G., Koh, S. C. L., Baldwin, J., & Cucchiella, F. (2012). Natural resource based green supply chain management. *Supply Chain Management: An International Journal, 17*(1), 54-67.

Soda, S., Sachdeva, A., & Garg, R. K. (2016). Literature review of multi-aspect research works carried out on the concept and implementation of GSCM. *International Journal of Industrial and Systems Engineering, 23*(2), 223-253. https://doi.org/10.1504/ijise.2016.076404

Spena, T. R., & De Chiara, A. (2012). CSR, innovation strategy and supply chain management: Toward an integrated perspective. *International Journal of Technology Management, 58*(1/2), 83-108. https://doi.org/10.1504/ijtm.2012.045790

Sukati, I., Hamid, A. B., Baharun, R., & Yusoff, R. M. (2012). The study of supply chain management strategy and practices on supply chain performance. *Procedia-Social and Behavioral Sciences, 40*(2012), 225-233. https://doi.org/10.1016/j.sbspro.2012.03.185

Tabesh, A. R., Batt, P. J., & Butler, B. (2016). Modelling the impact of environmental and organizational determinants on green supply chain innovation and performance. *Journal of Food Products Marketing, 22*(4), 436-454. https://doi.org/10.1080/10454446.2014. 949987

Thong, K. C., & Wong, W. P. (2018). Pathways for sustainable supply chain performance - Evidence from a developing country, Malaysia. *Sustainability, 10*(8), Article 2781. https://doi.org/10.3390/su10082781

Vachon, S. (2007). Green supply chain practices and the selection of environmental technologies. *International Journal of Production Research, 45*(18/19), 4357-4379. https://doi.org/10.1080/00207540701440303

Visamitanan, K., & Assarut, N. (2021). Impact of green supply chain management practices on employee engagement and organizational commitment: Mediating role of firm performance. *Global Business Review, 25*(5), 1336-1355. https://doi.org/10.1177/09721 509211018569

Wang, C., Zhang, Q., & Zhang, W. (2020). Corporate social responsibility, green supply chain management and firm performance: The moderating role of big-data analytics capability. *Research in Transportation Business & Management, 37*(2020), Article 100557. https://doi.org/10.1016/j.rtbm.2020.100557

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171-180.

Werther, W. B., & Chandler, D. (2010). Strategic corporate social responsibility. In S. O. Idowu, N. Capaldi, L. Zu, & A. D. Gupta (Eds.), *Encyclopedia of corporate social responsibility*. Springer. https://doi.org/10.1007/978-3-642-28036-8_101507

Westland, J. C. (2010). Lower bounds on sample size in structural equation modeling. *Electronic Commerce Research and Applications, 9*(6), 476-487. https://doi.org /10.1016/j.elerap.2010.07.003

Williamson, O. E. (1996). *The mechanisms of governance*. Oxford University Press.

Xu, J., Yu, Y., Wu, Y., Zhang, J. Z., Liu, Y., Cao, Y., & Eachempati, P. (2022). Green supply chain management for operational performance: Anteceding impact of corporate social responsibility and moderating effects of relational capital. *Journal of Enterprise Information Management, 35*(6), 1613-1638. https://doi.org/10.1108/JEIM-06-2021-0260

Yan, S. R., Fazilati, M. A., Boushehri, R., Mehryaar, E., Toghraie, D., Nguyen, Q., & Rostami, S. (2020). Experimental analysis of a new generation of membrane Liquid Desiccant Air-Conditioning (LDAC) system with free convection of desiccant for energy economic management. *Journal of Energy Storage, 29*(2020), Article 101448. https://doi.org/10.1016/J.EST.2020.101448

Yu, F., Jiang, D., & Wang, T. (2022). The impact of green innovation on manufacturing small and medium enterprises corporate social responsibility fulfillment: The moderating role of regional environmental regulation. *Corporate Social Responsibility and Environmental Management, 29*(3), 712-727. https://doi.org/10.1002/csr.2231

Yu, W., Chavez, R., & Feng, M. (2017). Green supply management and performance: A resource-based view. *Production Planning & Control, 28*(6/8), 659-670. https://doi.org/10.1080/09537287.2017.1309708

Yu, Y., & Huo, B. (2019). The impact of environmental orientation on supplier green management and financial performance: The moderating role of relational capital. *Journal of Cleaner Production, 211*(2019), 628-639. https://doi.org/10.1016/j.jclepro .2018.11.198

Zaid, A. A., & Sleimi, M. (2021). Effect of total quality management on business sustainability: The mediating role of green supply chain management practices. *Journal of Environmental Planning and Management, 66*(3), 524-548. https://doi.org/10.1080/09640568.2021.1997730

Zaid, A. A., Jaaron, A. A., & Bon, A. T. (2018). The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study. *Journal of Cleaner Production, 204*(2018), 965-979. https://doi.org/10.1016/j.jclepro.2018.09.062

Zhou, C., Xia, W., Feng, T., Jiang, J., & He, Q. (2020). How environmental orientation influences firm performance: The missing link of green supply chain integration. *Sustainable Development, 28*(4), 685-696. https://doi.org/10.1002/sd.2019

Zhou, Y., Xu, L., & Shaikh, G. M. (2019). Evaluating and prioritizing the green supply chain management practices in Pakistan: Based on Delphi and fuzzy AHP approach. *Symmetry, 11*(11), Article 1346. https://doi.org/10.3390/sym11111346

Zhu, C., Du, J., Shahzad, F., & Wattoo, M. U. (2022). Environment sustainability is a corporate social responsibility: Measuring the nexus between sustainable supply chain management, big data analytics capabilities, and organizational performance. *Sustainability, 14*(6), Article 3379. https://doi.org/10.3390/su14063379

Zhu, Q., Feng, Y., & Choi, S. B. (2017). The role of customer relational governance in environmental and economic performance improvement through green supply chain management. *Journal of Cleaner Production, 155*(2), 46-53. https://doi.org/10. 1016/j.jclepro.2016.02.124

Zhu, Q., Geng, Y., Sarkis, J., & Lai, K. H. (2011). Evaluating green supply chain management among Chinese manufacturers from the ecological modernization perspective. *Transportation Research Part E: Logistics and Transportation Review, 47*(6), 808-821. https://doi.org/10.1016/j.tre.2010.09.013

Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green supply chain management in China: Pressures, practices and performance. *International Journal of Operations & Production Management, 25*(5), 449-468. https://doi.org/10.1108/01443570510593148

Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Green supply chain management implications for "closing the loop". *Transportation Research Part E: Logistics and Transportation Review, 44*(1), 1-18. https://doi.org/10.1016/j.tre.2006.06.003

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*(2), 106-117. https://doi.org/10.1016/j.pursup.2012.12.001