

Greening the Chain: How Top Management Commitment Shapes Firm Sustainability

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Abstract

The primary focus of this research is to determine the impact of green supply chain management practices (green purchasing, green manufacturing, green packaging, green distribution, and green marketing) on a firm's sustainability with the moderating impact of top management commitment. Manufacturing industries (Fertilizers and food) were used for data collection. Data was collected through e-mail questionnaires. The study applied a quantitative approach to data analysis. The research study results showed that the direct impact of green purchasing, green manufacturing, and green packaging was significant on a firm's sustainability. Still, the direct impact of green distribution and marketing on a firm's sustainability was insignificant. On the other hand, top management commitment significantly moderates the relationship between green manufacturing and a firm's sustainability, as well as green packaging and a firm's sustainability. However, top management commitment did not moderate the connection between green purchasing and the firm's sustainability, green distribution and sustainability, and green marketing and the firm's sustainability.

Keywords: Green Supply Chain Management, Green Purchasing, Green Manufacturing, Green Packaging, Green Distribution, Green Marketing and Firm's Sustainability

1 Introduction

In this era of increased consciousness regarding environmental issues, there is a great deal of pressure on firms in diverse sectors to incorporate Green Supply Chain Management (GSCM)

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procedures in their regular supply chain and develop sustainable business methods to stay environment-friendly. GSCM aims to align all the supply chain stages concerning environmental factors, from product development to disposal (Jaegler & Sarkis, [2014](#)). The increasing correlation between organizational success and sustainability underscores the need to recognize the impact of harmonizing environmentally conscious policies throughout the supply chain (Chen et al., [2022](#)). The concept of "green supply chain management" (GSCM) refers to a set of activities and procedures that are projected to incorporate environmental aspects into the supply chain's purchasing, manufacturing, distribution, packaging, and disposal procedures (Carter & Rogers, [2008](#)).

This research stresses the essential connection between a firm's sustainability and GSCM. Also, it highlights the importance of creating balance among the environmental, economic, and social spheres of sustainability for overall organizational success (Seroka-Stolka, [2014](#)). To maintain this balance, GSCM suggests that it may provide benefits like increased stakeholder involvement, less resource consumption, cost advantage, and enhanced product quality (De Camargo & Jabbour, [2017](#)). In developing countries, much of the research has been conducted on the influence of GSCM on the environment and the economic aspect of sustainability. Still, less is known about the impact of GSCM procedures and practices on the social aspect of a firm's sustainability (Novitasari et al., [2023](#)). So, there is a need for further research to fully understand the influence of GSCM practices on a firm's sustainability across all dimensions (Aguilar et al., [2018](#)).

The commitment of top management plays a crucial role in guiding organizations to stay competitive in the market. The top management makes all the major decisions related to resource allocation and developing organization capabilities, so realizing the importance of GSCM practices is very important for top management (Chadwick et al., [2015](#)). To address this concern, this research also investigates whether top management commitment moderates GSCM practices and a firm's sustainable performance (Naseer et al., [2023](#)). Organizations can more effectively match their strategic priorities and resource allocations to create significant environmental and social impact by determining the circumstances in which GSCM strategies enhance firm sustainability.

In this competitive era, it is generally understood that sustainability concerns are progressively more challenging due to speedy globalization and industrialization. Due to environmental and socio-economic concerns, organizations are embracing Green Supply Chain Management (GSCM) procedures and practices much faster (Seman et al., [2012](#)). Green practices are being integrated into supply chains due to pressures from globalization and stakeholder expectations for green products and processes. Stakeholders nowadays are very concerned about green products and practices. Stakeholders' concerns about ecological and socio-economic problems put great pressure on manufacturing firms that should take the initiative to integrate and implement green procedures and practices in their supply chains.

Suppose the organization successfully incorporates green procedures and practices in its supply chain and ensures that they are properly embedded in a firm's organizational culture. In that case, a firm will progressively enjoy a positive corporate image regarding environmentally friendly products, services, procedures, systems, and technologies (Vanalle et al., [2017](#)). In the Pakistani context, research on green supply chain practices is limited (Naseer et al., [2023](#)). This research aims to close the existing gap in the past literature by examining the impact of green supply chain strategies on a firm's sustainability in South Punjab, Pakistan. Green supply chain practices comprise green distribution, production, marketing, procurement, and packaging.

1.1 Research Objectives

The objectives of this research include:

- To study the impact of green supply chain management (GSCM) practices on a firm's

sustainability.

- To study the moderating role of top management commitment in the association between green supply chain management (GSCM) practices and a firm's sustainability.

1.2 Research Significance

Research in supply chain management and a firm's sustainable practices advances our theoretical understanding of how GSCM practices affect ecological performance, social responsibility, and economic feasibility—all measures linked to a firm's sustainability. There is a need to understand the detailed processes through which GSCM practices affect business sustainability. We need to examine these connections to strengthen our knowledge of how various strategies and intrusions might be best utilized to achieve the most impact. Organizational competitiveness can be increased by using GSCM methods as they increase operative competence, reduce costs, and reduce risks related to customer preferences and ecological regulations (Yu et al., [2023](#)). As well as by integrating GSCM practices in business operations, risks related to resource deficiencies, supply chain disruptions, and governing compliance can be reduced. Due to climate change and increased global environmental concerns, understanding and incorporating GSCM practices becomes essential. By applying sustainable supply chain activities, a firm can improve its presence and corporate image with investors, customers, and other stakeholders, increasing market shares and customer loyalty (Mahmood et al., [2024](#)).

Organizations using GSCM practices are positioned to conform to environmental standards and evade penalties as governments worldwide establish more severe environmental standards. Various stakeholders, such as investors, consumers, and non-governmental organizations, are increasing their pressure on firms to apply sustainable corporate practices.

2 Literature Review

2.1 Theories Used in Research

2.1.1 Stakeholder Theory

According to Freeman's [2004](#) stakeholder theory, the business function is to please and benefit various stakeholders, including the public sector, shareholders, customers, suppliers, communities, and employees. Businesses are embracing more (GSCM) methods in response to expectations from many stakeholder groups, including shareholder interests, employee concerns, government restrictions, and environmental activists (Frooman & Murrell, [2005](#)). Freeman's revised stakeholder theory states that companies must focus on maximizing shareholders' profit and consider the interests of all parties involved to consider the wider society's impact. Stakeholder theory, closely correlated to corporate social responsibility, examines how businesses interact with society and influence managerial choices (Ayuso et al., [2014](#)).

2.1.2 Institutional Theory

Institutional theory, which was presented by DiMaggio and Powell ([1983](#)), states that businesses adjust according to their surroundings by following the law and pursuing social legitimacy. In organizational studies, institutional theory is a well-known point of view that looks at how institutions influence the structure and behavior of organizations and society. Institutions theory comprises societal norms, legal systems, and cultural values that impact businesses. Nowadays, organizations are not inspired by efficiency; rather, GSCM operations are frequently inspired by a desire for social legitimacy and company sustainability (Zhu et al., [2007](#)). To be accepted and survive in the business environment, organizations must consider institutional influences.

2.2 Green Supply Chain Management

GSCM appears to be a more particular feature of sustainable SCM, which stresses the firm's

sustainability. Incorporation of ecological thinking into supply chain management (SCM) includes material procurement and supplier selection, product design and development, production methods, the final item delivered to customers, return logistics, and waste management (Shrivastava, 1995). In response to stakeholder expectations for ecologically sustainable processes and products, businesses are implementing GSCM practices (Green et al., 2012).

2.2.1 Green Purchasing

Green purchasing is a key component of GSCM that ensures all environmental standards are met. According to Carter et al., (2000) selection of suppliers is important, but it is insufficient to advance ecological performance on its own. After choosing appropriate suppliers, developing supportive and strategic relationships with suppliers is essential for successfully implementing green purchasing. Furthermore, it is important to assess suppliers' conformance with environmental standards (Paulraj, 2011).

2.2.2 Green Manufacturing

Recent research stressed the importance of green manufacturing in handling sustainability issues. According to Sarkis et al. (2021), there is a need to incorporate the idea of circular economy to integrate sustainability into production, whereas Li et al. (2024) highlight the importance of Industry 4.0 technology in assisting environmentally conscious activities. Previous research stresses the dire need for adopting sustainable manufacturing practices in organizations for long-term success.

2.2.3 Green Packaging

Recent literature also attracts the attention of researchers who want to examine the impact green packaging plays in minimizing the negative environmental effects. To minimize the damaging environmental impact due to packaging waste, nowadays, businesses are converging towards using environmentally friendly ingredients and materials (Gupta et al., 2023). Further research on cutting-edge technology for ecologically friendly packaging solutions is conducted by Lu et al. (2024), which puts a great deal of emphasis on businesses giving sustainability a high priority when it comes to packaging practices. These results highlight how important green packaging is to encouraging environmental stewardship and satisfying customer demand for environmentally friendly goods.

2.2.4 Green Distribution

Maximum damages to the environment are caused by the logistic/distribution function of the supply chain management. Packaging characteristics are also part of the green distribution which includes size, shape, and materials. These packaging characteristics have positive impacts on distribution practices such as better packaging and reorganized loading patterns could minimize material usage, increase space utilization, and also reduces the cost of handling (Wang et al. 2023).

Green distribution is also a key activity that has a positive impact on GSCM's performance. Green distribution includes all undertakings to reduce environmental damages and wastes during shipment (Chen et al., 2024). Past literature emphasizes the importance of green, sustainable distribution plans to reduce damaging environmental effects.

2.2.5 Green Marketing

Past researches highlight the importance of green marketing for the promotion of environmentally friendly goods and services. According to Soomro et al., (2024) green products increased the likelihood of positive customer perception and attitudes towards product, while Kaur & Gupta. (2024) discusses various methods of green marketing for successfully convincing target audiences about eco-friendly products and services. The increasing demand of customers for sustainable

solutions through green products makes it inevitable for organizations to incorporate green marketing ideas into their product development and marketing strategies.

2.3 Firm's Sustainability

Recent research highlights the importance of organizations' sustainability in resolving the current environmental and social issues. Sustainability unifies the economic, social & environmental aspects of organizational performance. According to Tseng et al. (2023), there is a strong association between organization sustainability determination and financial success. In contrast, De Oliveira et al. (2018) explore the impact of sustainable practices on stakeholder relations and brand reputation. Past research highlights that the sustainability efforts taken by organizations are essential for the long-term prosperity and well-being of society.

2.3.1 Green Purchasing and Firms Sustainability

The mutual association between green purchasing and firm sustainability has been heightened in past literature. Liu et al. (2020) research determines how smart procurement options that emphasize eco-friendly suppliers and products can minimize resource usage and carbon footprint while supporting wider sustainability objectives. Furthermore, research conducted by Faruquee et al., (2021) highlights the value of supportive partnerships with environmentally conscious suppliers in promoting creativity and progressing ongoing advancements toward sustainability goals. These findings show that green purchasing is essential for improving a company's sustainability by reducing environmental effects and ensuring ethical supplier chain practices.

H1: *A positive relationship exists between green purchasing and a firm's sustainability.*

2.3.2 Green Manufacturing and Firms Sustainability

Manufacturing is one of the largest sectors of the Pakistani economy. It is a core sector of our country's success and contributes greatly to its development and economic sustainability. Green manufacturing and firm sustainability are directly interlinked. Companies can reduce costs and eradicate waste by executing green manufacturing tools, techniques, and processes (Schoenherr & Narasimhan, 2012).

Recent literature showed a very strong connection between green manufacturing and organization sustainability. By executing sustainable production practices like waste reduction and energy efficiency, organizations can expand their environmental performance and support long-term economic viability (Quayson et al., 2023). Moreover, Li et al., (2024) argued that green manufacturing improves the companies' overall sustainability through better stakeholder collaborations and enhanced brand reputation. These findings highlight the importance of incorporating green manufacturing practices into their daily operations to meet sustainability targets and keep a competitive edge in the market.

H2: *There is a positive association between green manufacturing and a firm's sustainability.*

2.3.3 Green Packaging and Firms Sustainability

Past literature did not ignore the important connection between green packaging and a firm's sustainability. Firms, by using sustainable packing ingredients and techniques, can greatly lessen the environmental impact at every phase of the supply chain (Gupta et al., 2023). Furthermore, Wandosell (2021) also highlights that green packaging benefits consumer perception of products and brand reputation, which ultimately supports long-term business sustainability. Green packaging techniques are very crucial for broader sustainability initiatives to enhance environmental stewardship and preserve market advantage.

H3: *There is a positive association between green packaging and a firm's sustainability.*

2.3.4 Green Distribution and Firms Sustainability

Through green distribution practices, firms can implement environmentally friendly modes of transportation and streamline distribution networks which can drastically cut carbon emissions and their negative effects on the environment, which is consistent with broader sustainability objectives (Wang et al., [2023](#)). Additionally, automobile electrification and route optimization are improved green logistic techniques emphasizing supply chain resilience and sustainability through green distribution (Chen et al., [2024](#)). These results highlight how crucial it is to incorporate green distribution tactics into larger sustainability initiatives to reduce environmental damage and encourage ethical supply chain management techniques.

H4: *There is a positive association between green distribution and a firm's sustainability.*

2.3.5 Green Marketing and Firms Sustainability

Green marketing strategies and firm sustainability are interdependent of each other, as green marketing strategies help companies maintain long-term sustainability by nurturing a competitive edge, reducing cost, enhancing brand image, regulatory compliance, and stakeholder engagement (Menon & Ravi, [2021](#)). Through green marketing strategies, companies can differentiate themselves by targeting environmentally conscious consumers and adopting sustainable practices. By incorporating the concept of green in marketing, firms can differentiate themselves in the market, reduce operational costs, build trust with consumers, comply with environmental regulations, and engage stakeholders in sustainability efforts.

H5: *There is a positive association between green marketing and a firm's sustainability.*

2.4 Moderating Role of Top Management Commitment towards Firm's Sustainability

Top management commitment is essential for a company's sustainability since it drives environmental strategies and cultivates a sustainable corporate culture (Banerjee et al., [2003](#)). Active participation of top management regarding environmental issues communicates to staff members the significance of sustainability. Top Management involvement affects supply chain cooperation, technology adoption, and resource allocation, eventually improving organizational success and competitive advantage (Chadwick et al., [2015](#)). Top Management Commitment, being moderator, laid down the following hypothesis

H6: *Top Management Commitment moderates the relationship between Green Purchasing and the firm's sustainability.*

H7: *Top Management Commitment moderates the association between Green Manufacturing and the firm's sustainability.*

H8: *Top Management Commitment moderates the association between Green Packaging and the firm's sustainability.*

H9: *Top Management Commitment moderates the association between Green Distribution and a firm's sustainability.*

H10: *Top Management Commitment moderates the association between Green Marketing and a firm's sustainability.*

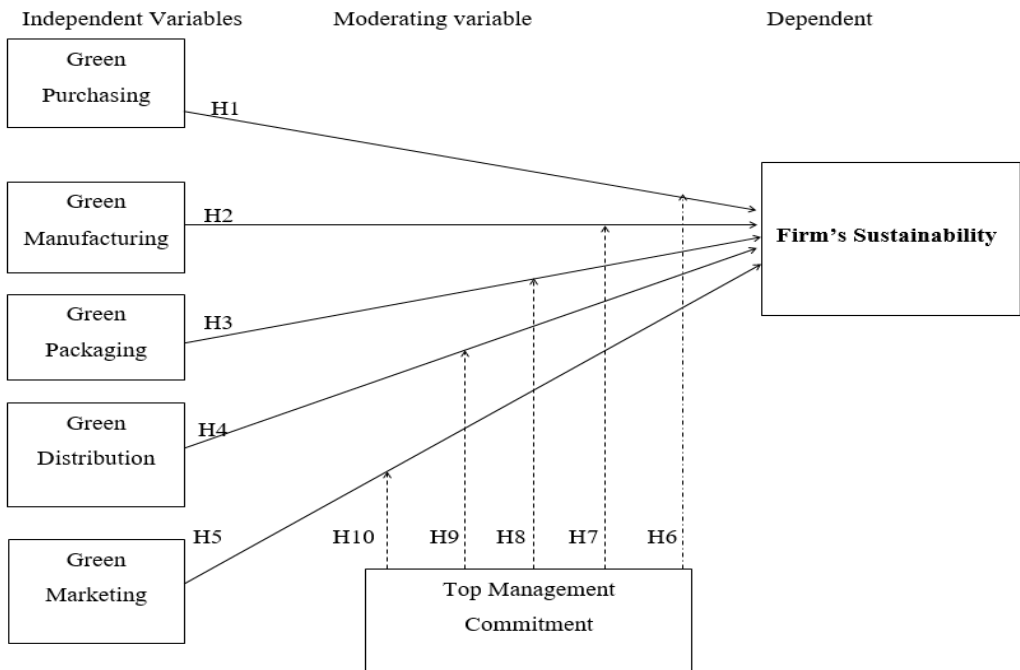


Figure 1: Conceptual Framework of the Study

Undoubtedly, GSCM has gained a lot of attention among scholars, but there remains a lack of studies exploring its operations and implementation, particularly in the context of Southern Punjab. The concept is still novel and evolving in industries of this region. There is a need to explore GSCM practices and their impact on organizational performance. Furthermore, companies in Southern Punjab are still in the learning stage regarding the implementation methods of GSCM in their day-to-day business activities. According to Dhillon et al. (2023), previous research on GSCM has been limited and mostly conducted in Western cultures. Thus, this study aims to explore current GSCM practices in manufacturing units of Southern Punjab and emphasize the role of top management commitment to link GSCM practices with sustainability.

3 Research Methodology

To measure the effect of green SCM practices on a firm's sustainability, this study uses a quantitative methodology and a logical approach to formulate hypotheses based on accepted theories. The quantitative method, which emphasizes measurement and empirical research, aligns with the post-positivist perspective (Fetters & Creswell, 2013). The study attempts to improve knowledge of the association between green SCM practices and a firm's sustainability in the manufacturing industry (fertilizer & food) by using a positivist approach (Johnson et al., 2007). Data was collected about the variables, including independent variables (green purchasing, green manufacturing, green packaging, green distribution, green marketing), moderating variables (top management commitment), and dependent variables (firm sustainability). Adapted questionnaires were used for data collection from respondents. A 5-point Likert scale, from strongly disagree to agree strongly, was used in the questionnaire to gauge the extent to which green SCM practices are used in the manufacturing industry (fertilizer & food). Each participant was asked to choose one option that best reflected the situation that exists in their organization. The questionnaire has two sections: the first part collected the respondents' demographic information, while the second half addressed the study's hypotheses. The survey took place in the manufacturing industry

(fertilizer & food). The survey data was gathered in the form of an email survey questionnaire. Questionnaires were sent through email to related companies; they were informed by telephone calls; after two weeks' emails were again sent for reminders to the participants. A total of 122 responses were attained through email.

Table 1: Instruments Used in the Study

Variable	Source
Green Purchasing	Adapted from (Zhu et al., 2007), (Shang et al., 2010).
Green Manufacturing	Adapted from (Shang et al., 2010), (Perotti et al., 2012),
Green Packaging	Adapted from (Shang et al., 2010), (Perotti et al., 2012).
Green Distribution	Adapted from (Shang et al., 2010), (Perotti et al., 2012).
Green Marketing	Adapted from (Shang et al., 2010)
Top Management Commitment	Adapted from (Liang et al., 2007)
Firm's sustainability	Adapted from (Harmon et al., 2009)

4 Results and Discussion

4.1 Partial Least Square (Structural Equation Modeling)

Partial Least Square Structural Equation Modeling was executed to examine the statistical analysis in this study. A partial least square was used to estimate the equation parameters through regression-based path analysis by joining the principle component analysis (Kaufmann & Gaeckler, 2015).

4.2 Measurement Model

The measurement model was done using the Smart PLS algorithm command. Outer loadings (indicators), convergent validity (AVE), discriminant validity, Cronbach alpha, and composite consistency have been investigated (Hair Jr et al., 2017). The upcoming table shows the values for outer loading, convergent validity (AVE), discriminant validity, Cronbach alpha, and composite consistency.

In the measurement model, GPA stands for Green Packaging, GPU stands for Green Purchasing, GMA stands for Green Marketing, GMFA stands for Green Manufacturing, GD stands for Green Distribution, TMC stands for Top Management Commitment, and FS stands for Firm's sustainability.

4.2.1 Cronbach's Alpha

Table 3 indicated the values of Cronbach alpha for all constructs were above the threshold level of 0.70 (Hair Jr et al., 2017). All the constructs had high reliability, as shown by FS (0.879), GD (0.837), GMA (0.825), GMFA (0.860), GPA (0.839), GPU (0.795) and TMC (0.865).

Table 2: Overall Reliability of Variables

Constructs	Cronbach's Alpha
FS	0.879
GD	0.837
GMA	0.825
GMFA	0.860
GPA	0.839
GPU	0.795
TMC	0.865

4.2.2 Discriminant Validity (Hetrotrait-Monotrait (HTMT))

Table 4 indicates the outcomes of discriminant validity that were measured through the Hetrotrait and Mono-trait (Henseler et al., 2015) and the results revealed that all the values were less than 0.9. Hence, there was no issue with discriminant validity.

Table 3: Heterotrait-Monotrait criterion for all constructs

	FS	GD	GMA	GMFA	GPA	GPU	TMC
FS							
GD	0.057						
GMA	0.669	0.072					
GMFA	0.472	0.066	0.549				
GPA	0.063	0.540	0.059	0.073			
GPU	0.467	0.088	0.682	0.614	0.138		
TMC	0.383	0.075	0.361	0.350	0.099	0.243	

4.2.3 Convergent Validity

The results of convergent validity were stated through (AVE) shown in table 4.3. The AVE values of all constructs were as following: FS (0.734), GD (0.650), GMA (0.548), GMFA (0.636), GPA (0.668), GPU (0.613), TMC (0.647) were above the suggested value 0.5 which indicate that all constructs have no issue of convergent validity (Hair Jr et al., [2017](#)).

Table 4: AVE Values

Constructs	AVE
FS	0.734
GD	0.650
GMA	0.548
GMFA	0.636
GPA	0.668
GPU	0.613
TMC	0.647

4.2.4 Factor loadings (Indicators)

Table 6 presented the individual item outer loadings for entire constructs used in the study. Factor loadings of all constructs were in the satisfactory range of 0.40 onward. 0.60 to 0.70 is acceptable in exploratory research (Hair Jr et al., [2017](#)) Indicators with weaker outer loadings are sometimes taken on the basis of their involvement in content validity. Indicators with values (below 0.40) should however, always be deleted from the construct (Hair et al., [2011](#)). Few of the items were deleted from the model to improve the results. These items were FS4, GD4, GPA5, and GPU5.

Table 5: Factor Loadings (Indicators)

	FS	GD	GMA	GMFA	GPA	GPU	TMC
FS1	0.840						
FS2	0.870						
FS3	0.857						
FS5	0.859						
GD1		0.745					
GD2		0.679					
GD3		0.966					
GMA1			0.764				
GMA2			0.825				
GMA3			0.891				
GMA4			0.839				
GMA5			0.530				
GMA6			0.498				
GMFA1				0.829			

GMFA2	0.744		
GMFA3	0.753		
GMFA4	0.872		
GMFA5	0.782		
GPA1		0.884	
GPA2		0.789	
GPA3		0.762	
GPA4		0.828	
GPU1			0.856
GPU2			0.846
GPU3			0.778
GPU4			0.633
TMC1			0.797
TMC2			0.852
TMC3			0.829
TMC4			0.808
TMC5			0.733

Measurement Model

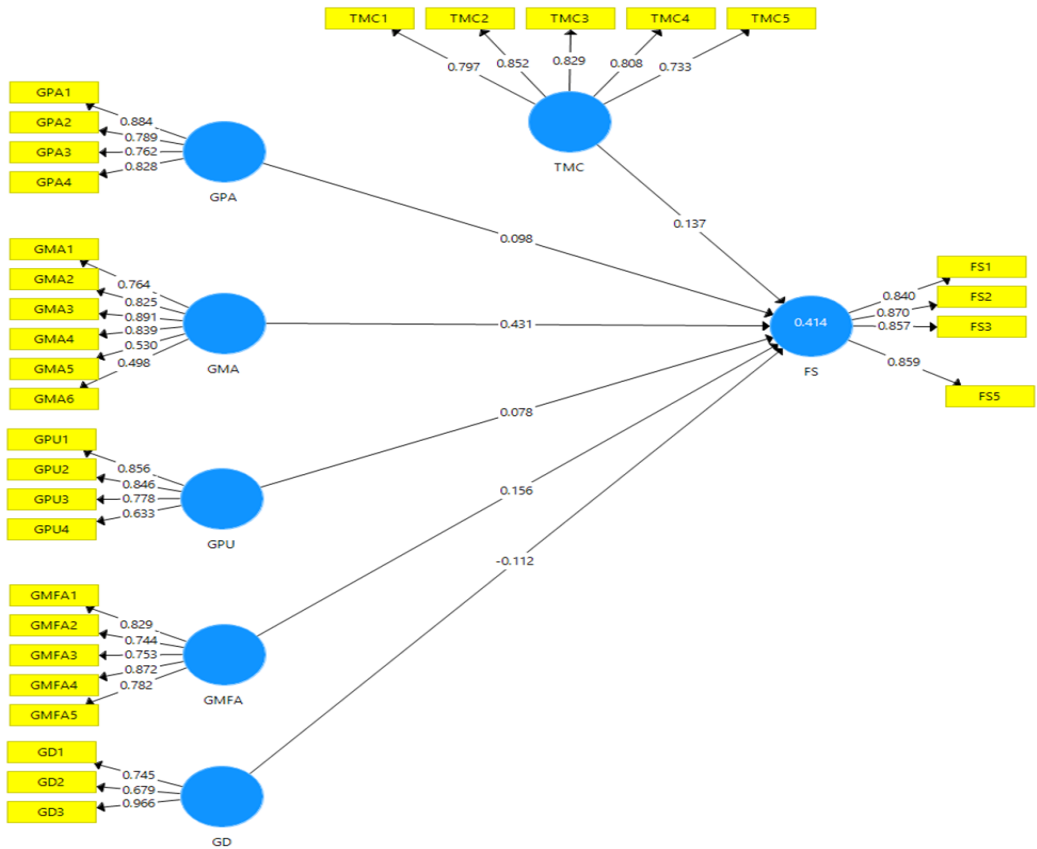


Figure 2: Measurement Model

4.3 Coefficient of determination (R^2)

Table 7 showed the results for determination of coefficient (R^2). R^2 values were software generated for this model. In this study, the R^2 for FS (endogenous construct) was 0.414. R^2 values which indicates that 41.4% variation in endogenous construct was explained by other exogenous constructs which is considered as substantial (Hair Jr et al., [2017](#)).

Table 6: Coefficient of Determination

Construct	R Square
FS	0.414

4.4 Standardized Root Mean Square Residual (SRMR)

According to Table 8, SRMR was 0.082 for FS (endogenous construct) in this study. Its value was a bit higher than the threshold 0.08 which is still acceptable for this study (Hair Jr et al., [2017](#)).

Table 7: Standardized Root Mean Square Residuals (SRMR)

	Saturated Model	Estimated Model
SRMR	0.082	0.082

4.5 Assessing the Significance and Relevance of Structural Model Relationships

Structural model shows relationships with path coefficients were calculated by PLS bootstrapping in smart PLS. Bootstrapping was done using a resample of 1000. To examine the strength of the hypothesized relationships, path coefficient values (between +1 to -1) were used. The value near to 0 is considered as weak relationship whereas a value closes to +1 is taken as strong positive relationship. Negative sign shows opposite relationship between two constructs. So, the value closer to -1 is considered as strong negative relationship. For one tail, a relationship is significant when p value is equal or less than 0.05 whereas t value is equal to or greater than 1.64.

Table 8: Direct and Moderating Relationship with Path Coefficients

Hypothesis	Relationships	Std. Beta	Sample mean	Std. Dev	t-values	P-values	Decision
H1	GD -> FS	-0.116	-0.074	0.093	1.238	0.108	Rejected
H2	GD*TMC -> FS	-0.003	-0.001	0.053	0.062	0.475	Rejected
H3	GMA -> FS	0.484	0.479	0.074	6.535	0.000	Accepted
H4	GMA*TMC -> FS	-0.189	-0.186	0.064	2.954	0.002	Accepted
H5	GMFA -> FS	0.052	0.059	0.058	0.904	0.183	Rejected
H6	GMFA*TMC -> FS	0.277	0.262	0.075	3.698	0.000	Accepted
H7	GPA -> FS	0.104	0.074	0.075	1.383	0.084	Rejected
H8	GPA*TMC -> FS	0.024	0.018	0.048	0.489	0.312	Rejected
H9	GPU -> FS	0.132	0.130	0.071	1.864	0.031	Accepted
H10	GPU*TMC -> FS	-0.135	-0.124	0.078	1.724	0.043	Accepted
H11	TMC -> FS	0.099	0.101	0.056	1.754	0.040	Accepted

For first hypothesis, it showed direct relationship between GD and FS. This relationship was found to be insignificant because p value was 0.108 and t value was 1.238. Findings of this study are consistent with (Esfahbodi et al., [2017](#)) who also concluded that green distribution had no impact

on the performance of the companies. Two constructs were multiplied to generate the interaction terms to be used in analysis part for moderation analysis. It used two-stage approach which was advised when independent variables and moderator are reflective in nature (Henseler and Chin, 2010). For the second hypothesis, the moderating effect of top management commitment between a green distribution and a firm's sustainability was investigated. As expected, this relationship was also found to be insignificant, as shown by the p-value of 0.475 and the t-value of 0.062. It can be because Green Supply Chain Management (GSCM) practices are in the initial stage, and top management considers it a financial burden or an addition to the cost of investing in green distribution. Acquiring green distribution means green logistics and transportation to be used that can have minimum impact on the environment. According to Kumar et al. (2015), green distribution reduces fuel consumption and ensures containers are fully packed.

For the third hypothesis, it showed a direct relationship between GMA and FS. This relationship was significant because the value was 0.000, the value was 6.535, and the path coefficient was 0.484. The results of this study are in line with Chan (2012), who argued that green marketing practices enhance the image and reputation of companies in the eyes of their customers. Thus, enabling them to increase their sale and, ultimately, their performance. However, these results contradict those (Yildiz & Sezen, 2019), who found no association between green marketing and firm performance. For the fourth hypothesis, the moderating effect of top management commitment between green marketing and a firm's sustainability was determined. As expected, this relationship was found to be significant, as shown by the p-value of 0.002, t-value of 2.954, and path coefficient of 0.189 with a negative sign. Top management considers a good investment that will pay back the company in the longer run but puts additional costs for a shorter period.

For the fifth hypothesis, it showed a direct relationship between GMFA and FS. This relationship was found to be insignificant because the value was 0.183 and the value was 0.904. The outcomes of this study are not aligned with many studies that stated an increase in productivity, profits, and market share (Luthra et al., 2016). For sixth hypothesis, moderating effect of top management commitment between green manufacturing and firm's sustainability was tested. Unexpectedly, this relationship was found to be significant as shown by the p value 0.000, t value 3.698 and path coefficient 0.277. This can be because the higher or top management of any company know the importance of pressure built by customers and institutions like government to promote green initiatives like green manufacturing. This is one of the core activities of any GSCM that is usually supported by higher management to gain advantages for the firm's sustainability.

For seventh hypothesis, it showed direct relationship between GPA and FS. This relationship was found to be insignificant because p value 0.084 and t value 1.383. Green packaging was also found to be insignificant in (Yildiz & Sezen, 2019). For eighth hypothesis, moderating effect of top management commitment between green packaging and firm's sustainability was determined. This relationship was found to be insignificant as shown by the p value 0.312 and t value 0.489.

For ninth hypothesis, it showed direct relationship between GPU and FS. This relationship was found to be significant because p value 0.031, t value 1.864 and path coefficient of 0.132. It states that green purchasing is more related to external factors more focused on suppliers and raw material or inputs provided by them (Eltayeb et al., 2011). For tenth hypothesis, moderating effect of top management commitment between green purchasing and firm's sustainability was investigated. Unexpectedly, this relationship was found to be significant as shown by the p value 0.043, t value 1.724 and path coefficient 0.135 with negative sign. Although acquiring green inputs or raw material is considered as vital for the green initiatives because green process starts with green purchasing. However, top management hesitates to invest in green purchasing causing a significant and negative moderating effect. For eleventh hypothesis, it showed direct relationship between TMC and FS. This relationship was also found to be significant because p value 0.040, t value 1.754 and path coefficient of 0.099. Outcomes of the study were in line with Tseng et al.

(2013) who showed that top management commitment had significant influence on firm's sustainability. Similarly, top management commitment was proved to contributing to the green innovation process. These innovations lead towards gaining sustainable competitive advantage and ultimately achieving firm's sustainability (Zailani et al., 2015)

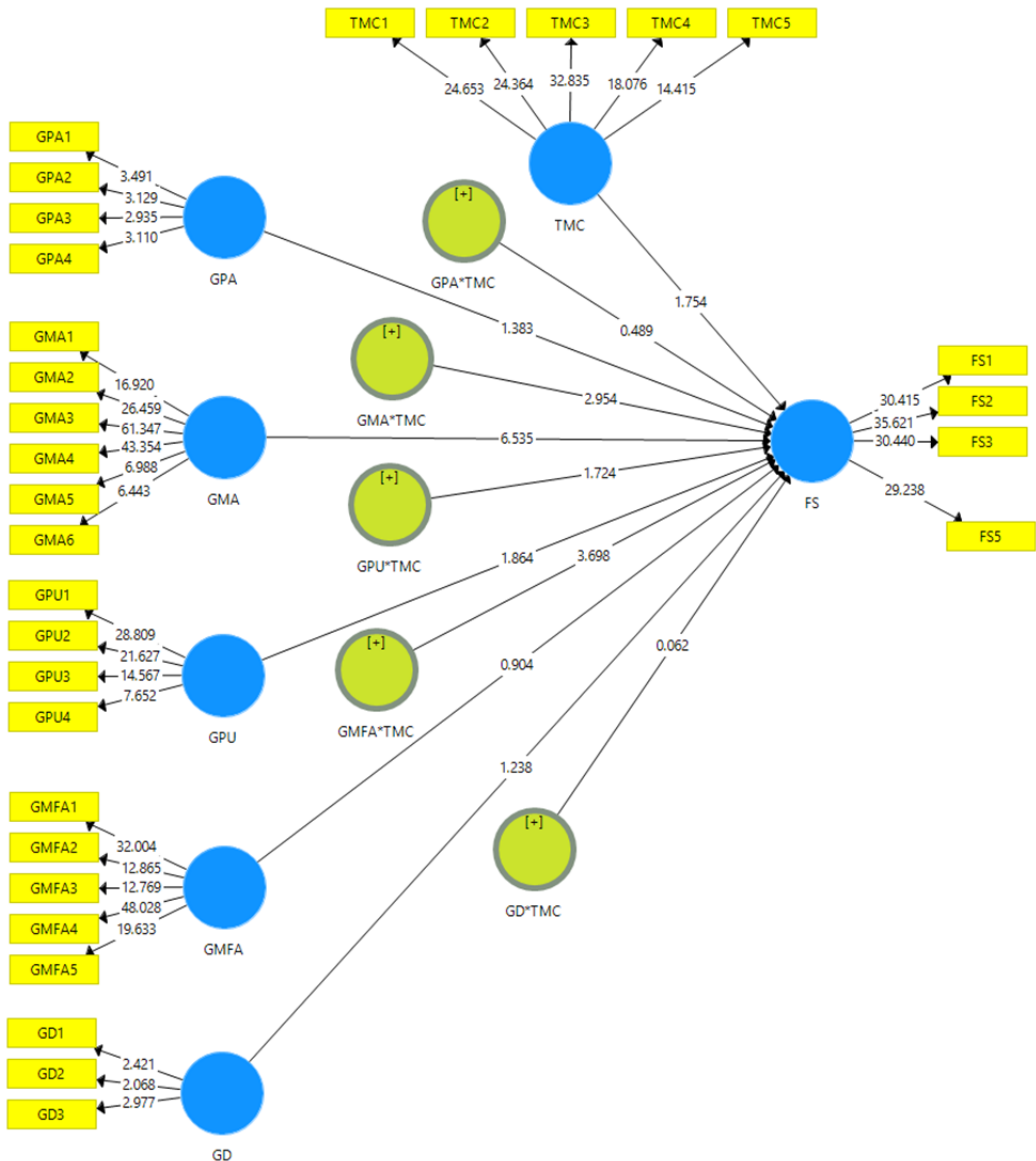


Figure 3: Structural Model

5 Conclusion

Given the key importance to GSCM practices, the main consideration of the research was to determine the association between GSCM practices and firm's sustainability and determine the moderation effect of top management commitment in the association between GSCM practices and firm's sustainability. The study model comprised five independent variables such as green purchasing, green manufacturing, green packaging, green distribution, green marketing,

moderating variable top management commitment and dependent variable firm sustainability.

The model included on three factors GSCM practices, firm sustainability and top management commitment. The study applied a quantitative approach to achieve the purpose of data analysis. In this regard, the structural model shows relationships with path coefficients calculated by PLS bootstrapping in Smart-PLS. The outcomes showed that all the direct relationships, such as GMFG, GPA, GPU, and TMC, were found to be significant towards FS except GD and GMA. On the other hand, moderating relationships such as TMC were found to be significant between GMA and FS, as well as GPA and FS. However, top management commitment was not found to moderate between GD and FS, GMA and FS, GPU and FS.

5.1 Implications

This study had significant implications for both manufacturing sector practitioners and policy makers. Manufacturers' primacies in emerging nations such as Pakistan are to mend their economic situation and overcome economic risks. The results of this study can benefit businesses and keep firms sustainable, mainly through green purchasing, green packaging, and green manufacturing practices (Foo et al., [2019](#)).

The concept of environmental education is not being successfully addressed by enterprises in Pakistan. However, putting green practices into effect requires environmental education. In regard to environmental issues, this approach can promote better working relationships with vendors, clients, and partners in the distribution chain. Consequently, in order to successfully address the gaps in this area, the Pakistani government must increase its investment in green education (Yildiz & Sezen, [2019](#)).

Adopting green supply chain strategies improves businesses' capacity to protect the environment and supports their financial sustainability. A lot of manufacturing enterprises have started to implement detailed programs to monitor environmentally friendly activities across their supply chains. These plans specifically entail managing environmental risks related to suppliers' operations, ensuring proper product usage, coordinating environmental collaboration, controlling and tracking the flow of materials and products, and utilizing strategies for knowledge sharing about green practices among supply chain members (Khan & Qianl, [2017](#)).

5.2 Limitations and Future Directions

The study focused on GSCM practices' effect on firm sustainability in the fertilizers and food manufacturing industries of South Punjab. The model can be applied to other industries where GSCM practices are common, like automobiles. The sample size of the study was small due to financial and time constraints, which can be increased in future studies to increase the generalizability of the results.

As mentioned above, some of the direct and indirect variables were not significant in this research. More specifically, GSCM couldn't show the desired effect on firm sustainability. In this regard, these relations may be closely followed to how green supply chain management affects firm sustainability. Though, there are many studies on environmental issues and their related topics in Pakistan. However, limited studies have been found in GSCM. There is a need to address GSCM more by putting some other variables and measurements. Since the study used top management commitment as a moderator, future studies can be conducted by incorporating the mediating effect of some other variables (Yildiz & Sezen, [2019](#)).

6 References

Aguilar, R. J. B., Borromeo, M. R. E., Pereja, J. M. M., & Guia, J. E (2018, June 20-22). How Green Supply Chain Management Affects the Company's Performance? (Paper Presentation). *DLSU Research Congress*, Manila, Philippines

- Ayuso, S., Rodríguez, M. A., García-Castro, R., & Ariño, M. A. (2014). Maximizing stakeholders' interests: An empirical analysis of the stakeholder approach to corporate governance. *Business & Society*, 53(3), 414–439. <https://doi.org/10.1177/0007650311433122>
- Banerjee, S. B., Iyer, E. S., & Kashyap, R. K. (2003). Corporate environmentalism: Antecedents and influence of industry type. *Journal of Marketing*, 67(2), 106–122. <https://doi.org/10.1509/jmkg.67.2.106.18604>
- Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: moving toward new theory. *International Journal Of Physical Distribution & Logistics Management*, 38(5), 360–387. <https://doi.org/10.1108/09600030810882816>
- Carter, C. R., Kale, R., & Grimm, C. M. (2000). Environmental purchasing and firm performance: an empirical investigation. *Transportation Research Part E: Logistics and Transportation Review*, 36(3), 219–228. [https://doi.org/10.1016/S1366-5545\(99\)00034-4](https://doi.org/10.1016/S1366-5545(99)00034-4)
- Chadwick, C., Super, J. F., & Kwon, K. (2015). Resource orchestration in practice: CEO emphasis on SHRM, commitment-based HR systems, and firm performance. *Strategic Management Journal*, 36(3), 360–376. <https://doi.org/10.1002/smj.2217>
- Chan, H. K., He, H., & Wang, W. Y. (2012). Green marketing and its impact on supply chain management in industrial markets. *Industrial Marketing Management*, 41(4), 557–562. <https://doi.org/10.1016/j.indmarman.2012.04.002>
- Chen, L., Shen, Q., Yu, X., & Chen, X. (2024). Knowledge spillovers along the sustainable supply chain of China's listed companies: The role of long-term orientation. *Journal of Innovation & Knowledge*, 9(2), 100478. <https://doi.org/10.1016/j.jik.2024.100478>
- Chen, N., Cai, J., Ma, Y., & Han, W. (2022). Green supply chain management under uncertainty: a review and content analysis. *International Journal of Sustainable Development & World Ecology*, 29(4), 349–365. <https://doi.org/10.1080/13504509.2021.2021561>
- De Camargo Fiorini, P., & Jabbour, C. J. C. (2017). Information systems and sustainable supply chain management towards a more sustainable society: Where we are and where we are going. *International Journal of Information Management*, 37(4), 241–249. <https://doi.org/10.1016/j.ijinfomgt.2016.12.004>
- De Oliveira, A. C., Sokulski, C. C., da Silva Batista, A. A., & De Francisco, A. C. (2018). Competencies for sustainability: A proposed method for the analysis of their Interrelationships. *Sustainable Production and Consumption*, 14, 82–94. <https://doi.org/10.1016/j.spc.2018.01.005>
- Dhillon, M. K., Rafi-ul-Shan, P. M., Amar, H., Sher, F., & Ahmed, S. (2023). Flexible green supply chain management in emerging economies: a systematic literature review. *Global Journal Of Flexible Systems Management*, 24(1), 1–28. <https://doi.org/10.1007/s40171-022-00321-0>
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 147–160. <https://doi.org/10.1515/9780691229270-005>
- Eltayeb, T. K., Zailani, S., & Ramayah, T. (2011). Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes. *Resources, Conservation and Recycling*, 55(5), 495–506. <https://doi.org/10.1016/j.resconrec.2010.09.003>
- 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. <https://doi.org/10.1016/j.jclepro.2016.07.098>
- Faruquee, M., Paulraj, A., & Irawan, C. A. (2021). Strategic supplier relationships and supply chain resilience: is digital transformation that precludes trust beneficial? *International Journal Of Operations & Production Management*, 41(7), 1192–1219. <https://doi.org/10.1108/IJOPM-10-2020-0702>

- Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs—principles and practices. *Health Services Research*, 48(6pt2), 2134–2156. <https://doi.org/10.1111/1475-6773.12117>
- Foo, M. Y., Kanapathy, K., Zailani, S., & Shaharudin, M. R. (2019). Green purchasing capabilities, practices and institutional pressure. *Management Of Environmental Quality: An International Journal*, 30(5), 1171–1189. <https://doi.org/10.1108/MEQ-07-2018-0133>
- Freeman, R.E. (2020). The Stakeholder Approach Revisited. In Beschoner, T., Brink, A., Hollstein, B., Hübscher, M.C., & Schumann, O. (Eds), *Wirtschafts- und Unternehmensethik*. Springer VS, Wiesbaden. https://doi.org/10.1007/978-3-658-16205-4_55
- Frooman, J., & Murrell, A. J. (2005). Stakeholder influence strategies: The roles of structural and demographic determinants. *Business & Society*, 44(1), 3–31. <https://doi.org/10.1177/0007650304273434>
- Green Jr, K. W., Zelbst, P. J., Meacham, J., & Bhadauria, V. S. (2012). Green supply chain management practices: impact on performance. *Supply Chain Management: An International Journal*, 17(3), 290–305. <https://doi.org/10.1108/13598541211227126>
- Gupta, B. B., Gaurav, A., Panigrahi, P. K., & Arya, V. (2023). Analysis of artificial intelligence-based technologies and approaches on sustainable entrepreneurship. *Technological Forecasting and Social Change*, 186, 122152. <https://doi.org/10.1016/j.techfore.2022.122152>
- Hair Jr, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2017). *Advanced issues in partial least squares structural equation modeling*. Sage Publications.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017). Mirror, mirror on the wall: a comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy Of Marketing Science*, 45(5), 616–632. <https://doi.org/10.1007/s11747-017-0517-x>
- Harmon, J., Fairfield, K., & Wirtenberg, J. (2009). *Missing an opportunity*. Institute for Sustainable Enterprises. Madison, NJ, USA.
- Henseler, J., & Chin, W. W. (2010). A comparison of approaches for the analysis of interaction effects between latent variables using partial least squares path modeling. *Structural Equation Modeling*, 17(1), 82–109. <https://doi.org/10.1080/10705510903439003>
- 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>
- Jaegler, A., & Sarkis, J. (2014, January). The Theory and Practice of sustainable supply chains. *Supply Chain Forum: An International Journal*, 15(1), 2–5. <https://doi.org/10.1080/16258312.2014.11517329>
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112–133. <https://doi.org/10.1177/1558689806298224>
- Kaufmann, L., & Gaeckler, J. (2015). A structured review of partial least squares in supply chain management research. *Journal of Purchasing and Supply Management*, 21(4), 259–272. <https://doi.org/10.1016/j.pursup.2015.04.005>
- Kaur, J., & Gupta, M. (2024, February). Exploration of factors of green marketing (Paper Presentation). *International Conference on Communications and Cyber Physical Engineering 2018* (pp. 885–899). Springer Nature Singapore.
- Khan, S. A. R., & Qianli, D. (2017). Impact of green supply chain management practices on firms' performance: an empirical study from the perspective of Pakistan. *Environmental Science and Pollution Research*, 24, 16829–16844. <https://doi.org/10.1007/s11356-017-9172-5>
- Kumar, A., Jain, V., & Kumar, S. (2015). A comprehensive environment friendly approach for supplier selection. *Omega*, 42(1), 109–123. <https://doi.org/10.1016/j.omega.2013.04.003>

- Li, P., Abbas, J., Balsalobre-Lorente, D., Wang, Q., Zhang, Q., & Shah, S. A. R. (2024). Impact of sectoral mix on environmental sustainability: How is heterogeneity addressed? *Gondwana Research*, 128, 86–105. <https://doi.org/10.1016/j.gr.2023.09.018>
- Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management. *MIS Quarterly*, 3(1), 59–87. <https://doi.org/10.2307/25148781>
- Liu, J., Liu, Y., & Yang, L. (2020). Uncovering the influence mechanism between top management support and green procurement: The effect of green training. *Journal of Cleaner Production*, 251, 119674. <https://doi.org/10.1016/j.jclepro.2019.119674>
- Lu, H., Zhao, G., & Liu, S. (2024). Integrating circular economy and Industry 4.0 for sustainable supply chain management: a dynamic capability view. *Production Planning & Control*, 35(2), 170–186. <https://doi.org/10.1080/09537287.2022.2063198>
- Luthra, S., Garg, D., & Haleem, A. (2016). The impacts of critical success factors for implementing green supply chain management towards sustainability: an empirical investigation of Indian automobile industry. *Journal of Cleaner Production*, 121, 142–158. <https://doi.org/10.1016/j.jclepro.2016.01.095>
- Mahmood, S., Misra, P., Sun, H., Luqman, A., & Papa, A. (2024). Sustainable infrastructure, energy projects, and economic growth: Mediating role of sustainable supply chain management. *Annals of Operations Research*, 1–32. <https://doi.org/10.1007/s10479-023-05777-6>
- Menon, R. R., & Ravi, V. (2021). Analysis of barriers of sustainable supply chain management in electronics industry: An interpretive structural modelling approach. *Cleaner and Responsible Consumption*, 3, Article e100026. <https://doi.org/10.1016/j.clrc.2021.100026>
- Naseer, S., Song, H., Adu-Gyamfi, G., Abbas, K., & Naseer, S. (2023). Impact of green supply chain management and green human resource management practices on the sustainable performance of manufacturing firms in Pakistan. *Environmental Science and Pollution Research*, 30(16), 48021–48035. <https://doi.org/10.1007/s11356-023-25409-7>
- Novitasari, M., Wijaya, A. L., Agustin, N. M., Gunardi, A., & Dana, L. P. (2023). Corporate social responsibility and firm performance: Green supply chain management as a mediating variable. *Corporate Social Responsibility and Environmental Management*, 30(1), 267–276. <https://doi.org/10.1002/csr.2353>
- Paulraj, A. (2011). Understanding the relationships between internal resources and capabilities, sustainable supply management and organizational sustainability. *Journal of Supply Chain Management*, 47(1), 19–37. <https://doi.org/10.1111/j.1745-493X.2010.03212.x>
- Perotti, S., Zorzini, M., Cagno, E., & Micheli, G. J. (2012). Green supply chain practices and company performance: the case of 3PLs in Italy. *International Journal of Physical Distribution & Logistics Management*, 42(7), 640–672. <https://doi.org/10.1108/09600031211258138>
- Quayson, M., Bai, C., Sun, L., & Sarkis, J. (2023). Building blockchain-driven dynamic capabilities for developing circular supply chain: Rethinking the role of sensing, seizing, and reconfiguring. *Business Strategy and the Environment*, 32(7), 4821–4840. <https://doi.org/10.1002/bse.3395>
- Sarkis, J., Kouhizadeh, M., & Zhu, Q. S. (2021). Digitalization and the greening of supply chains. *Industrial Management & Data Systems*, 121(1), 65–85. <https://doi.org/10.1108/IMDS-08-2020-0450>
- Schoenherr, T., & Narasimhan, R. (2012). The fit between capabilities and priorities and its impact on performance improvement: revisiting and extending the theory of production competence. *International Journal Of Production Research*, 50(14), 3755–3775. <https://doi.org/10.1080/00207543.2011.588266>
- Seman, N. A. A., Zakuan, N., Jusoh, A., Arif, M. S. M., & Saman, M. Z. M. (2012). Green supply

- chain management: a review and research direction. *International Journal of Managing Value And Supply Chains*, 3(1), 1–18. <https://doi.org/10.5121/ijmvsc.2012.3101>
- Seroka-Stolka, O. (2014). The development of green logistics for implementation sustainable development strategy in companies. *Procedia-Social and Behavioral Sciences*, 151, 302–309. <https://doi.org/10.1016/j.sbspro.2014.10.028>
- Shang, K.-C., Lu, C.-S., & Li, S. (2010). A taxonomy of green supply chain management capability among electronics-related manufacturing firms in Taiwan. *Journal Of Environmental Management*, 91(5), 1218–1226. <https://doi.org/10.1016/j.jenvman.2010.01.016>
- Shrivastava, P. (1995). The role of corporations in achieving ecological sustainability. *Academy Of Management Review*, 20(4), 936–960. <https://doi.org/10.5465/amr.1995.9512280026>
- Soomro, B. A., Moawad, N. F., Saraih, U. N., Abedelwahed, N. A. A., & Shah, N. (2024). Going green with the green market and green innovation: building the connection between green entrepreneurship and sustainable development. *Kybernetes*, 53(4), 1484–1504. <https://doi.org/10.1108/K-09-2022-1353>
- Tsang, A., Frost, T., & Cao, H. (2023). Environmental, social, and governance (ESG) disclosure: A literature review. *The British Accounting Review*, 55(1), Article e101149. <https://doi.org/10.1016/j.bar.2022.101149>
- Tseng, M.-L., & Chiu, A. S. (2013). Evaluating firm's green supply chain management in linguistic preferences. *Journal of Cleaner Production*, 40, 22–31. <https://doi.org/10.1108/K-09-2022-1353>
- Vanalle, R. M., Ganga, G. M. D., Godinho Filho, M., & Lucato, W. C. (2017). Green supply chain management: An investigation of pressures, practices, and performance within the Brazilian automotive supply chain. *Journal of Cleaner Production*, 151, 250–259. <https://doi.org/10.1016/j.jclepro.2017.03.066>
- Wandosell, G., Parra-Meroño, M. C., Alcayde, A., & Baños, R. (2021). Green packaging from consumer and business perspectives. *Sustainability*, 13(3), Article e1356. <https://doi.org/10.3390/su13031356>
- Wang, Y., Xie, Y. H., Jiang, Q. H., Chen, H. T., Ma, R. H., Wang, Z. J., ... & Yan, S. (2023). Efficient polymer-mediated delivery system for thiocyclam: Nanometerization remarkably improves the bioactivity toward green peach aphids. *Insect Science*, 30(1), 2–14. <https://doi.org/10.1111/1744-7917.13033>
- Yildiz Çankaya, S., & Sezen, B. (2019). Effects of green supply chain management practices on sustainability performance. *Journal Of Manufacturing Technology Management*, 30(1), 98–121. <https://doi.org/10.1108/JMTM-03-2018-0099>
- Yu, Y., Xu, J., Huo, B., Zhang, J. Z., & Cao, Y. (2023). The impact of supply chain social responsibility on sustainable performance. *Journal of Cleaner Production*, 385, 135666. <https://doi.org/10.1016/j.jclepro.2022.135666>
- Zailani, S., Shaharudin, M. R., Govindasamy, V., Ismail, M., & Mahdzar, S. F. A. S. (2015, August 25-27). The eco-efficiency practices of the sustainable packaging and its effect towards sustainable supply chain performance (Paper Presentation). *International symposium on Technology Management and Emerging Technologies (ISTMET)* (pp. 448–453). IEEE.
- Zhu, Q., Sarkis, J., & Lai, K.-h. (2007). Green supply chain management: pressures, practices and performance within the Chinese automobile industry. *Journal of Cleaner Production*, 15(11-12), 1041–1052. <https://doi.org/10.1109/ISTMET.2015.7359076>