

MODERATING ROLE GREEN ORGANIZATIONAL CULTURE INTO THE RELATIONSHIP BETWEEN ENVIRONMENTAL PERFORMANCE AND GREEN ORGANIZATIONAL PERFORMANCE: THE MEDIATION ROLE OF GREEN INNOVATION

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ABSTRACT

In response to growing environmental concerns, this study investigates how Environmental Performance and Green Organizational Culture influence Green Organizational Performance within the textile sector. Specifically, it examines the relationship between Environmental Performance and Green Organizational Performance, with Green Organizational Culture as a moderator and Green Innovation as a mediator. A self-administered questionnaire was used to collect data from 230 respondents employed in textile mills. The Statistical Package for Social Sciences (SPSS) and Smart Partial Least Squares (Smart PLS) were employed for data analysis and hypothesis testing. Findings confirm that Environmental Performance positively impacts Green Organizational Performance, with Green Innovation serving as an effective mediating variable. Additionally, Green Organizational Culture plays a significant moderating role, particularly enhancing the relationship between Environmental Performance and Green Organizational Performance in organizations with such a culture. These findings underscore the importance of adopting sustainability measures to enhance organizational performance in an environmentally responsible way. However, the study's scope is limited to the textile industry, and it is uncertain if the findings are generalizable to other sectors. Future research should explore these relationships in different industries and incorporate more complex methodological models to examine how they evolve over time. These insights are valuable for managers seeking to improve organizational performance through green initiatives and foster sustainable practices among employees.

1. INTRODUCTION

1.1. Background of Study

Organizational performance refers to a company's ability to reduce order time, administrative costs, improve raw material efficiency, lead time, and increase distribution capacity (Hermosura, Cui et al. 2008). Green Organizational Performance emphasizes not only internal performance but also focuses on the performance of software and hardware involved in operations related to environmentally friendly processes and items, such as environmental protection policies, energy saving, recycling, pollution prevention, green innovation, and green product design in environmental management (Feng and Wang 2016). Over time, companies have increasingly focused on green technology and sustainability policies, making green organization a popular topic among scholars (Feng and Wang 2016). The measurement, evaluation, and conceptualization of a company's Organizational Performance is a recurring theme in academic research across multiple sectors. Venkatraman and Ramanujan's framework is one of the earliest, widely-used classifications in this area (Hermosura, Cui et al. 2008). Operational metrics are essential in tracking customer satisfaction, internal processes, and improvement-oriented actions within the organization that ultimately lead to future financial returns. Across various industries, Organizational Performance is a key success factor, best measured by the extent to which all business units align to achieve critical objectives. Achieving peak Organizational Performance requires time, and financial performance is often indirectly linked to it. The primary goal of operations in Organizational Performance is to reduce costs and increase productivity (Khosla, Rain et al. 2020).

While environmental protection is gaining global importance (Govindan, Khodaverdi et al. 2015), the objective of environmentally friendly business practices is to improve companies' sustainable ecological effectiveness (Zhu, Feng et al. 2017). Earlier generations recognized the importance of cautious resource use due to their dependence on natural resources. However, the current generation relies heavily on technological advancements to exploit renewable resources without considering ecological consequences (Ngowi 2001). This approach compromises the ecological health of future generations, posing serious risks to sustainable growth (Lin and Ho 2011). Environmental conservation has thus become a priority for regulatory compliance worldwide. Three main factors affect environmental health: reduced energy usage, atmospheric changes, and pollution from hazardous waste disposal (Li, Ngniatedema et al. 2017).

Firms increasingly recognize the importance of responsible environmental management, which has become a critical part of their strategy and outlook (Wang and Juo 2021). Environmental initiatives can help organizations reduce production costs and improve profitability (Ghisellini, Cialani et al. 2016). Scholars are showing growing interest in green organizational culture, viewing it as a significant phenomenon (Wang 2019). In this context, culture refers to a shared set of values, attitudes, concepts, and beliefs that influence organizational behavior. Leadership can cultivate an organizational culture to embed values that guide business objectives (Gao and Yang 2023).

Green innovation is defined as developing environmentally friendly hardware and software innovations, including energy-saving technologies, pollution prevention measures, waste recycling, green ideas, and sustainable practices (Chen, Lai et al. 2006). Green innovation can enhance a product's value and help offset the costs of reducing environmental impact. This study categorizes green innovation into two types: green product innovation and green process innovation. Companies need motivation and creativity to develop new products or processes (Chen, Lai et al. 2006). In response to growing environmental awareness, green

innovation has focused on strategies that enable industrial companies to meet environmental protection goals (Robinson and Stubberud 2013).

1.2. Problem Statement

About a decade ago, practitioners, authors, and scholars worldwide began to focus extensively on green organizational performance. For many businesses in Pakistan, especially in manufacturing, textiles, and agriculture, sustainability is a growing concern (Nazam, Hashim et al. 2020). Previous studies highlight the need for further research on green organizational performance in Pakistan (Shahid, Waseem et al. 2020). Scholars have explored the impact of green organizational culture on performance (Chandra and Kumar 2021), with limited research suggesting that adopting a green organizational culture can significantly improve organizational performance (Wang and Juo 2021). Although several studies have linked a company's success to its green organizational culture, conclusive results have yet to be established, prompting continued investigation into this relationship (Muisyo and Qin 2021). The specific relationship between organizational performance and green organizational culture remains underexplored (Ismail, Imran et al. 2021). Consequently, this study seeks to identify the relationship between environmental performance, green innovation, and green organizational performance, with the moderating effect of green organizational culture.

1.3. Research Objective

RO1: *To determine the relationship between Environmental Performance and Green Organizational Performance.*

RO2: *To examine the mediating effect of Green Innovation on the relationship between Environmental Performance and Green Organizational Performance.*

RO3: *To investigate the moderating effect of Green Organizational Culture on the relationship between Environmental Performance and Green Organizational Performance.*

1.4. Research Questions

RQ1: *Is there a connection between Environmental Performance and Green Organizational Performance?*

RQ2: *How does Green Innovation mediate the relationship between Environmental Performance and Green Organizational Performance?*

RQ3: *How does Green Organizational Culture moderate the relationship between Environmental Performance and Green Organizational Performance?*

1.5. Significance of Study

This study holds significant importance in the field of Green Organizational Performance from both theoretical and empirical perspectives. It represents the first attempt to employ specific variables to explore their interrelationships, particularly focusing on Environmental Performance, Green Innovation, and Green Organizational Performance with the moderating influence of Green Organizational Culture. Rooted in theoretical foundations, this research provides a framework to clarify the connections between these variables. By examining these relationships, particularly within Pakistani textile factories, the study aims to offer insights that can guide organizations toward enhanced performance through green strategies.

1.6. Scope of Study

This study assesses the impact of Environmental Performance, Green Innovation, and Green Organizational Performance in Pakistan's Textile Industry, with consideration given to the moderating effect of Green Organizational Culture. It also aims to provide actionable recommendations for improving Green Organizational Performance in this sector. The scope includes conducting quantitative empirical research within Pakistan's Textile Sector. Several factors justify this focus: Pakistan lags behind developed nations such as the United States,

China, and Japan in green performance, partly due to a lack of information or prior research. Employees from the Textile Sector, particularly those in middle and top management, have been surveyed for their relevant insights and information. This study's target population is middle and top management personnel in Pakistan's Textile Sector.

2. LITERATURE REVIEW

The second chapter of this study focuses on the literature review and theory development. Each variable within our research model, including Environmental Performance, Green Innovation, and Green Organizational Performance, is comprehensively addressed in this chapter. After conducting an extensive review of relevant literature, we have developed theories and hypotheses for each variable.

2.1. Green Organizational Performance

Financial performance is indirectly related to an organization's overall performance (Radnor and Barnes 2007, Tan, Zhang et al. 2013). It takes time for an organization to achieve peak performance, which is defined by factors such as quality, pricing, delivery, and flexibility (Cornejo, Pérez-Tienda et al. 2013, Nakamba, Chan et al. 2017). Major objectives in operations include reducing total operating costs and improving efficiency in daily processes. Organizational performance is also measured by the ability to convert natural resources into high-quality finished products efficiently, with minimal waste and on schedule (Zhu, Yuan et al. 2008, Prajogo and Olhager 2012).

Research has highlighted the significance of operational success in various forms, emphasizing the need for green initiatives to improve performance. Reduction in waste, energy consumption, and increased productivity positively affect green organizational performance (Sirveaux, Favard et al. 2004, Dam and Petkova 2014, Walker, Seuring et al. 2014). Green organizational performance focuses not only on internal aspects but also on the performance of software and hardware involved in green processes, such as policies for environmental protection, energy saving, recycling, pollution prevention, green innovations, and green product design (Feng and Wang 2016). Over time, many companies have increasingly focused on green technologies and sustainability policies, making green organizational practices a popular research topic (Feng and Wang 2016).

The measurement, evaluation, and conceptualization of Organizational Performance are recurring themes across academic research. Venkatraman and Ramanujan's early generic classifications are widely recognized (Hermosura, Cui et al. 2008). Operational metrics are necessary to assess factors like customer satisfaction, internal procedures, and efforts towards improvement and innovation, all of which contribute to long-term financial returns. Organizational Performance is often viewed as a significant success factor, commonly measured by how well a group's business units work together to achieve key objectives. Achieving peak Organizational Performance requires time. Financial performance is indirectly linked to Organizational Performance, with operations primarily aiming to reduce expenses and increase productivity (Khosla, Rain et al. 2020).

2.2. Role of the Textile Industry in Pakistan

The textile industry plays a vital role in the growth of developing countries, contributing significantly to employment. Pakistan ranks as the 4th largest global supplier, with its textile industry accounting for approximately 8.5% of the national GDP. Pakistan's textile sector includes various units, such as 440 spinning units, 1,220 ginning units, 125 large spinning units, and 424 small units. An efficient supply chain supports the textile sector by reducing costs and inventories, minimizing lead time, building customer trust, increasing profits, and boosting productivity (Alam, Athar et al. 2008). The textile industry is the largest production

and manufacturing sector in Pakistan and is highly export-oriented, with garment products comprising about 60% of all national exports. Additionally, it is the country's second-largest employer (Ali 2018).

2.3.Underpinning Theory – Resource-Based View Theory

The Resource-Based View (RBV) theory refers to “the competitive advantages of the company based on the relationship between societal needs that arise for enhanced environmental performance and the deployment of the company's assets to maintain three strategic capabilities: product management, pollution prevention, and sustainable development” (Hart 1995). Consequently, we believe that the Resource-Based View theory can explain the development of resource capabilities as well as the economic aspects of the firm. Therefore, in this study, the RBV is the most appropriate framework for conceptualizing green organizational performance.

2.4.Environmental Performance and Green Organizational Performance

As the importance of environmental protection grows globally (Govindan, Khodaverdi et al. 2015), the goal of environmentally friendly corporate practices is to enhance companies' sustainable ecological effectiveness (Zhu, Feng et al. 2017). Previous generations understood the dependence on the Earth's ecological system and recognized the importance of using natural resources cautiously. However, without considering the negative impacts on the ecosystem, current generations have increasingly relied on technological breakthroughs to exploit renewable resources (Ngowi 2001). The ecological health of future generations is being compromised by the development of current social organizations. Environmental concerns now present significant risks to the pursuit of sustainable growth (Lin and Ho 2011). As a result, regulatory compliance has become a focus to prioritize global environmental preservation. Three main factors harm the environment: excessive energy use, atmospheric changes, and pollution from hazardous waste disposal (Li, Ngniatedema et al. 2017).

Before adopting green practices, various environmental-related initiatives must be considered. These include selecting ethical and sustainable raw materials, evaluating the environmental impact when choosing suppliers, implementing an effective sustainability management system, and eco-design practices. Additionally, companies should organize processes for gathering and using product packaging and waste for reuse and recycling, and minimize the use of renewable resources (Paulraj 2009, Galeazzo, Furlan et al. 2014). Key factors in adopting environmentally friendly business operations include reducing unnecessary energy and water consumption, conserving materials, managing waste generation and emissions, and addressing the harmful effects of pollution and climate change (Verrier, Rose et al. 2014). The regulatory push for environmental management fosters cost-effectiveness and leads to the development of innovative green products, which ultimately generate revenue (Chan, Yee et al. 2016).

H1: Environmental Performance has a positive and significant relationship with Green Organizational Performance.

2.5.Mediating Role of Green Innovation

The term "green innovation" refers to the development of both hardware and software innovations that are linked to environmentally friendly products or processes. This includes energy-saving technologies, pollution prevention measures, waste recycling, innovative green concepts, and sustainable practices within companies (Chen, Lai et al. 2006). Green innovation can enhance a product's value and help offset the costs associated with reducing its environmental impact. Researchers have suggested that green process innovation involves adopting production methods and management techniques that minimize or eliminate

negative environmental impacts (Chen 2011). Measures of green process innovation can be divided into three areas: first, reducing the emission of hazardous substances or waste during manufacturing; second, minimizing water, energy, coal, and oil usage in production; and third, decreasing raw material consumption throughout the production process (Utterback and Abernathy 1975, Guoyou, Saixing et al. 2013). Green innovation (GI) includes several environmental management tools, such as process control, environmental audits, and chain management.

This study investigates pioneering green management practices that enhance organizational systems to promote environmental sustainability. Effective implementation of GI not only improves green performance within organizations but also supports other innovation initiatives (Ruthemeier 2022). Economic green innovation can address pressing environmental issues, especially in developing countries (Ullah, Ahmad et al. 2021). Globally, businesses engage in green innovation to remain competitive, explore new market opportunities, raise profits, achieve operational success, and improve environmental performance. Green innovation is widely viewed as a feasible environmental strategy for manufacturing organizations to attain both financial and ecological benefits (Ullah, Ahmad et al. 2021). For industrialized firms, green innovation is also recognized as a viable sustainability strategy to secure financial and environmental gains (Li, Msaad et al. 2020, Kumar, Kumar et al. 2022). Delmas, Hoffmann et al. (2011) suggest that studying the link between sustainable performance and business outcomes alone, without considering the mediating effect of additional capabilities, overlooks crucial elements in understanding the active role of green strategies.

H2a: Environmental Performance has a positive and significant relationship with Green Innovation.

H2b: Green Innovation has a positive and significant relationship with Green Organizational Performance.

H2c: Green Innovation positively and significantly mediates the relationship between Environmental Performance and Green Organizational Performance.

2.6. Moderating Role of Green Organizational Culture

An “organizational culture” refers to a shared set of opinions, beliefs, and standards created by management teams to shape organizational behavior and attitudes toward achieving common business goals (Al-Swidi, Gelaidan et al. 2021). The business’s mission statement incorporates a key characteristic of its workforce, instilling a sense of responsibility for environmental protection in all employees (Abbas and Dogan 2022). Due to a green culture, employees have become more concerned with sustainability issues, positively affecting their job engagement and motivation (Lee, Wang et al. 2022). To foster this green culture, management must adopt an environmentally conscious approach (Azhar and Yang 2022). Establishing a green culture within an organization encourages creative thinking and challenges the status quo (Pan, Abbas et al. 2022). Employees in such a green environment are more likely to take environmental concerns seriously (Azhar and Yang 2022), which leads to greater sustainability awareness in organizations with environmentally sensitive cultures. Scholars argue that companies must adopt green organizational culture values to develop eco-friendly products (Zhu, Feng et al. 2017).

This study considers green organizational culture as a moderator between Environmental Performance (EP) and Green Organizational Performance (GOP), recognizing the importance of culture and its impact on organizational outcomes. It posits that green culture, as a moderating factor, strengthens the relationship between these variables. Consequently, the following hypothesis has been proposed:

H3: Green Organizational Culture moderates the association between Environmental Performance and Green Organizational Performance.

3. METHODOLOGY

The primary goal of this research, framed within a quantitative methodology, is to examine the relationship between "Environmental Performance, Green Innovation, and Green Organizational Performance with the moderation of Green Organizational Culture in the textile sector of Pakistan." This research employs a correlational study design. Data was collected using convenience sampling rather than probability sampling methods. The questionnaire covered multiple dimensions with 23 items sourced from reliable scales. A five-point Likert scale was employed throughout the questionnaire, with responses ranging from 1 (strongly disagree) to 5 (strongly agree).

The study sample consisted of employees from textile firms in Pakistan. The sample size was determined by following the guideline from F. Hair Jr, Sarstedt et al. (2014), which recommends multiplying the number of questionnaire items by 10. Consequently, the researcher aimed to sample approximately 230 participants. To analyze and validate the data, this study utilized SmartPLS 4 and SPSS v26 software. Descriptive analysis was conducted using SPSS, while SmartPLS 4 was used to evaluate inter-construct relationships and to examine the structural model.

3.1. Conceptual Framework

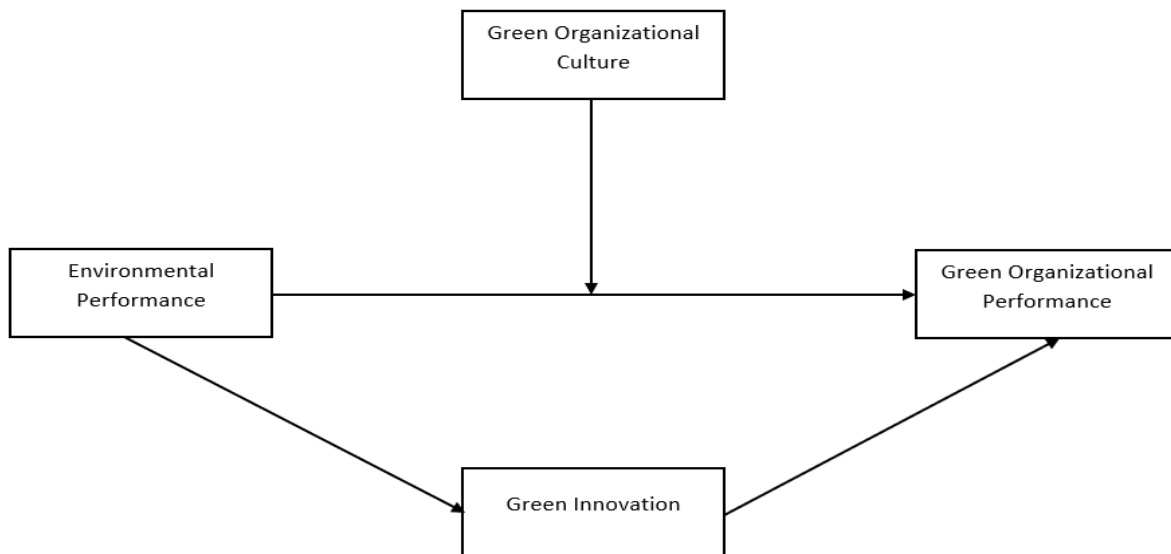


Figure 1: Conceptual Framework

3.2. Measurements

For comparison purposes, we used scales established by previous researchers, as presented in the tables.

Table 1: Measurements

Construct	Items	Source
Environmental Performance	"1 Reduction of air emissions".	(Imran, Arshad et al. 2021)
	"2 Reduction of effluent/ solid waste."	
	"3 Reduction of	

	<p><i>hazardous/harmful/toxic materials consumption.”</i></p> <p><i>“4 Reduction of environmental accidents.”</i></p>	
Green Innovation	<p><i>“1 Our organization uses less or non-polluting/toxic materials”</i></p> <p><i>“2 Our organization improves environmentally friendly packaging for existing and new products”</i></p> <p><i>“3 Our organization recovers end-of-life products and recycling”</i></p> <p><i>“4 Our organization uses eco-labelling”</i></p>	(Chen 2008, Asadi, Pourhashemi et al. 2020)
Green Organizational Culture	<p><i>“1 Our firm makes a concerted effort to make every employee understand the importance of environmental preservation”</i></p> <p><i>“2 Our firm has a clear policy statement urging environmental awareness in every area.”</i></p> <p><i>“3 Environmental preservation is a high-priority activity in our firm”</i></p> <p><i>“4 Preserving the environment is a central corporate value in our firm”</i></p> <p><i>“5 Our firm links environmental objectives with our other corporate goals”</i></p> <p><i>“6 Our firm develops products and processes that minimize the environmental impact”</i></p>	(Azhar and Yang 2022)
Green Organizational Performance	<p><i>“1 Our firm conforms with the requirements of inputs of energy”</i></p> <p><i>“2 Our firm conforms to the requirements of community relations.”</i></p> <p><i>“3 Our firm conforms with the requirements of outputs</i></p>	(Wang 2019)

	<i>of air emissions”</i>	
	<i>“4 Our firm conforms with the requirements of indicators on the local, regional or national condition of the environment”.</i>	
	<i>“5 Our firm conforms with the requirements of the outputs of wastewater.”</i>	
	<i>“6 Our firm conforms with expectations of implementation of environmental policies and programs.”</i>	
	<i>“7 Our firm has achieved important environment-related certifications (e.g. ISO 14031)”</i>	
	<i>“8 Our firm has regularly achieved targets for energy conservation, recycling or waste reductions”</i>	
	<i>“9 On average, the overall environmental performance of our company has improved over the past five years.”</i>	

4. DATA ANALYSIS

This chapter presents the findings and results of the data analysis, examining the participants' responses in a logical sequence. The primary data source for this study was information gathered through a survey questionnaire. The data underwent a thorough analysis to ensure completeness and accuracy. For this purpose, we used “SPSS (Statistical Package for Social Sciences) version 26 and SmartPLS version 4”. Descriptive statistics and frequencies were computed using SPSS, while PLS-SEM analysis, which includes the measurement and evaluation of the structural model, was conducted with SmartPLS. The measurement framework assessed construct validity and reliability. After data coding, statistical tests were applied to present the results in the form of tables and charts.

4.1. Response Rate

In this study, data was collected from employees of textile companies in Punjab. To maximize the response rate, various communication methods, including WhatsApp, SMS, phone calls, and personal visits, were employed. These efforts resulted in 153 valid responses out of 230 distributed questionnaires, yielding a response rate of 66.22%.

4.2.Descriptive Analysis

4.2.1. Gender

The sample consisted of 111 (72.5%) male and 42 (27.5%) female respondents, with a total sample size of N = 153.

Table 2: Gender

		What is Your Gender?			Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	1 = Male	111	72.5	72.5	72.5
	2 = Female	42	27.5	27.5	100.0
	Total	153	100.0	100.0	

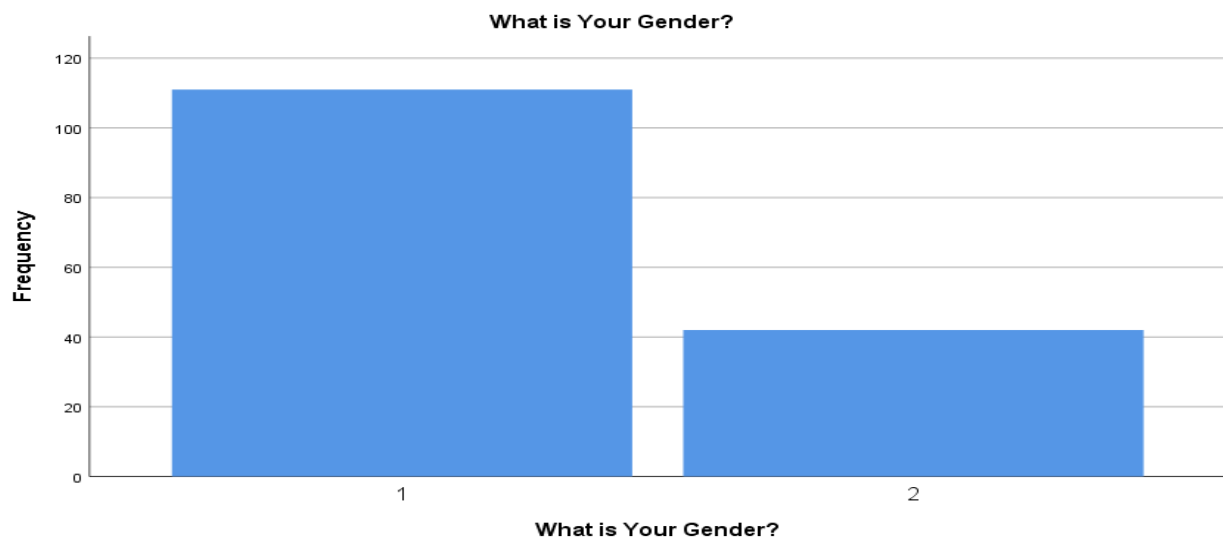


Figure 2: Gender

4.2.2. Age

The results in the table indicate that respondents are fairly distributed across different age groups. Specifically, 43 respondents (28.1%) are aged 26-30 years, and another 41 respondents (26.8%) are over 35 years of age. The next largest age group is 31-35 years, with 40 respondents (26.1%). In contrast, the age group of 20-25 years includes only 29 respondents (19.0%).

Table 3: Age

		What is Your Age?			Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	1 = 20-25	29	19.0	19.0	19.0
	2 = 26=30	43	28.1	28.1	47.1
	3 = 31=35	40	26.1	26.1	73.2
	4 Above 35	41	26.8	26.8	100.0
	Total	153	100.0	100.0	

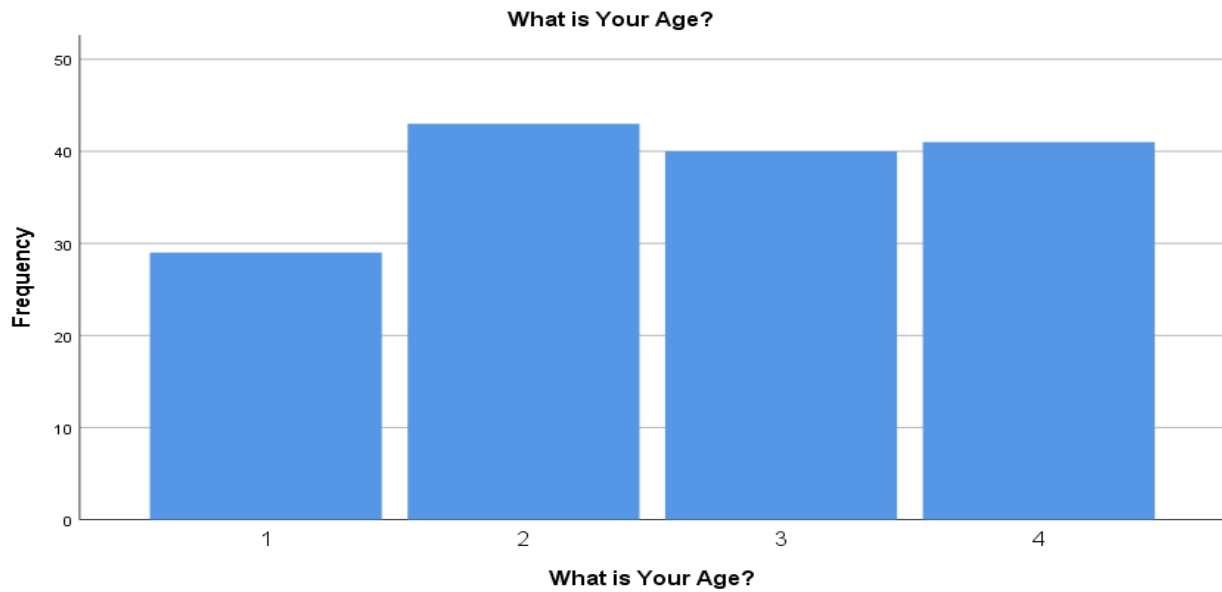


Figure 3: Age

4.3. Evaluation of the PLS-SEM Results

4.3.1. Factor Loadings, Cronbach's Alpha, Reliability & AVE

According to (Fornell and Larcker 1981, Hair Jr, Sarstedt et al. 2014) the value of Average Variance Extracted (AVE) must be at a minimum level of 0.50, while the “Composite Reliability” value should be at least 0.70. As shown in the table below, all variables exhibit high reliability, with AVE values exceeding the threshold of 0.50, indicating the reliability of the measurement model. Additionally, the “Cronbach's Alpha” value was calculated to assess the internal consistency of the data. Following Karolina (2014), the Cronbach's Alpha interpretation is as follows: $\alpha > 0.9$ is considered Excellent, $\alpha > 0.8$ is Good, and $\alpha > 0.7$ is Acceptable. The findings for this study, presented in the table below, show that all indicators have a Cronbach's Alpha value above 0.8, demonstrating that the variables exhibit good consistency.

Table 4: Factor Loadings, Cronbach's Alpha, Reliability & AVE

Construct	Items	Loadings	CA	CR	AVE
<i>Environmental Performance</i>	<i>EP1</i>	0.847	0.904	0.933	0.777
	<i>EP2</i>	0.912			
	<i>EP3</i>	0.898			
	<i>EP4</i>	0.867			
<i>Green Innovation</i>	<i>GII</i>	0.853	0.875	0.914	0.728
	<i>GI2</i>	0.827			
	<i>GI3</i>	0.904			
	<i>GI4</i>	0.827			
<i>Green Organizational Culture</i>	<i>GOC1</i>	0.850	0.929	0.944	0.739
	<i>GOC2</i>	0.907			
	<i>GOC3</i>	0.897			
	<i>GOC4</i>	0.872			
	<i>GOC5</i>	0.819			
	<i>GOC6</i>	0.809			
<i>Green Organizational</i>	<i>GOP1</i>	0.823		0.955	0.700

Performance	<i>GOP2</i>	0.842	0.946
	<i>GOP3</i>	0.874	
	<i>GOP4</i>	0.780	
	<i>GOP5</i>	0.842	
	<i>GOP6</i>	0.802	
	<i>GOP7</i>	0.867	
	<i>GOP8</i>	0.852	
	<i>GOP9</i>	0.845	

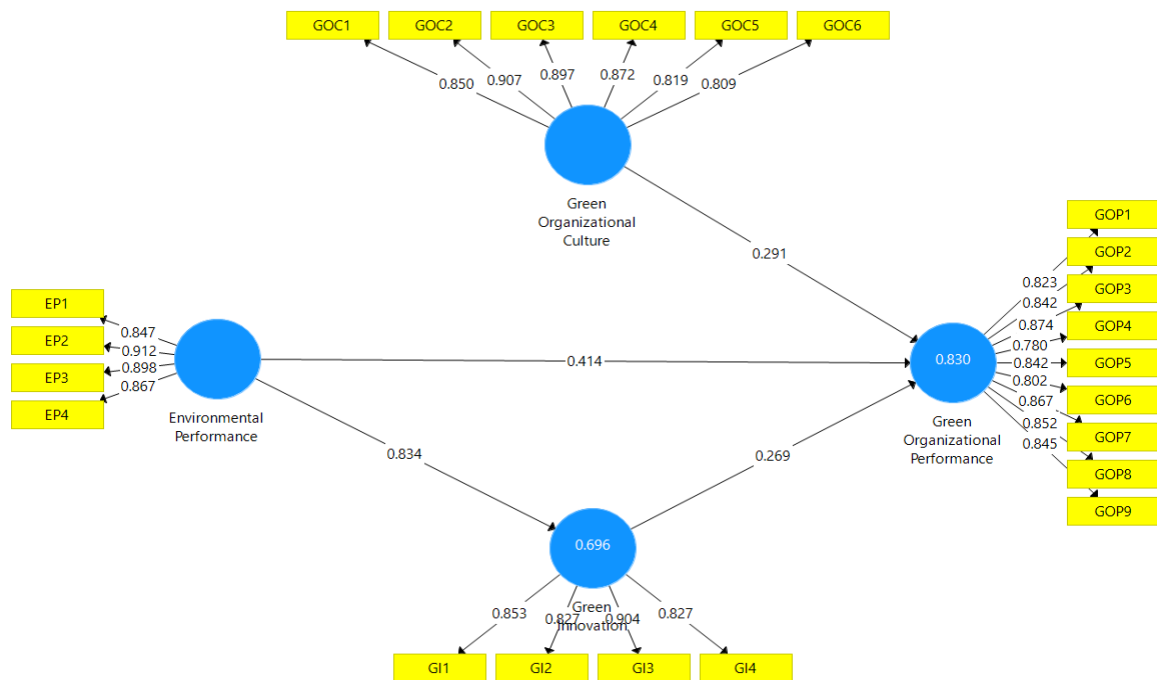


Figure 4: Factor Loadings, Cronbach's Alpha, Reliability & AVE

4.3.2. Discriminant Validity - Fornell and Larcker Criterion

Additionally, discriminant validity was assessed to determine the model's external consistency by examining the associations among the variables. "Specifically, each variable's value was compared with the square root of its AVE. In conclusion, as shown in Table 5, all correlations among the variables are lower than the square root of the AVEs, with exceptions bolded in the diagonal for emphasis".

Table: 5 Table Showing the Values of Construct Reliability and Validity "Fornell-Larcker Criterion"

	<i>EP</i>	<i>GI</i>	<i>GOC</i>	<i>GOP</i>
<i>Environmental Performance</i>	0.881			
<i>Green Innovation</i>	0.834	0.853		
<i>Green Organizational Culture</i>	0.792	0.800	0.859	
<i>Green Organizational Performance</i>	0.869	0.847	0.834	0.837

Note: Bold and Italic Values are Square Root of AVE.

4.4. Structural Model Assessment

"When assessing the measurement model, Smart-PLS 3.0 was used to evaluate the structure of the model". The required tests conducted within the structural model include "hypothesis

testing with path coefficients and T-values”, as well as examinations of effect size and predictive relevance.

4.4.1. Direct Hypotheses

Hypothesis 1 (H1) examines whether “Environmental Performance (EP) has a positive, significant effect on Green Organizational Performance" (GOP)”. The results indicate that EP significantly impacts GOP ($\beta = 0.282$, $t = 4.687$, $p < 0.001$), thus supporting H1.

Table 5: Direct Hypotheses

Path	Beta Coefficient	STDEV	T Values	P Values	Decision
EP -> GOP	0.869	0.017	49.900	0.000	Accepted

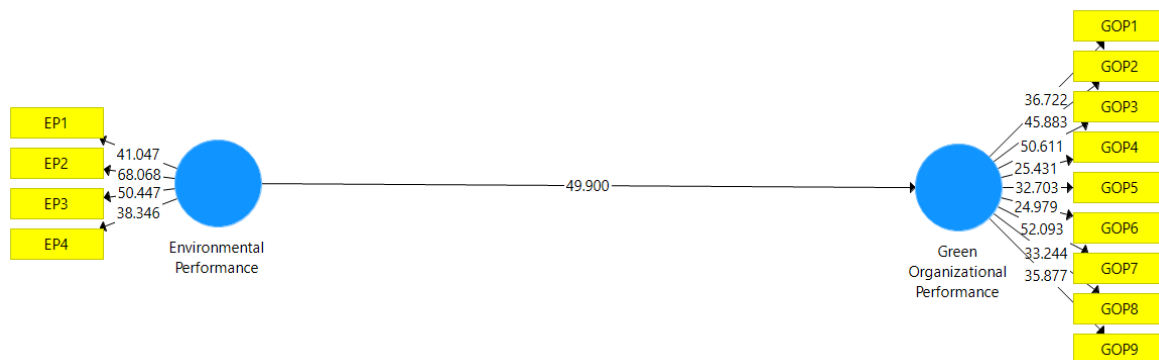


Figure 5: Direct Hypotheses

4.4.2. Mediating Hypotheses

Hypothesis 2a (H2a) examines whether “Environmental Performance (EP) has a positive, significant effect on Green Innovation (GI)”. The results indicate that EP significantly impacts GI ($\beta = 0.282$, $t = 4.687$, $p < 0.001$), thus supporting H2a.

Hypothesis 2b (H2b) tests whether “Green Innovation (GI) has a positive, significant effect on Green Organizational Performance (GOP)”. The results show that GI significantly impacts GOP ($\beta = 0.282$, $t = 4.687$, $p < 0.001$), thereby supporting H2b.

Hypothesis 2c (H2c) explores whether “Green Innovation (GI) positively mediates the relationship between Environmental Performance (EP) and Green Organizational Performance (GOP)”. The findings indicate that GI mediates the relationship between EP and GOP ($\beta = 0.282$, $t = 4.687$, $p < 0.001$), thus supporting H2c.

Table 6: Mediating Hypotheses

Path	Beta Coefficient	STDEV	T Values	P Values	Decisions
EP -> GI	0.834	0.021	39.626	0.000	Accepted
GI -> GOP	0.402	0.055	7.340	0.000	Accepted
EP -> GI -> GOP	0.335	0.047	7.170	0.000	Accepted

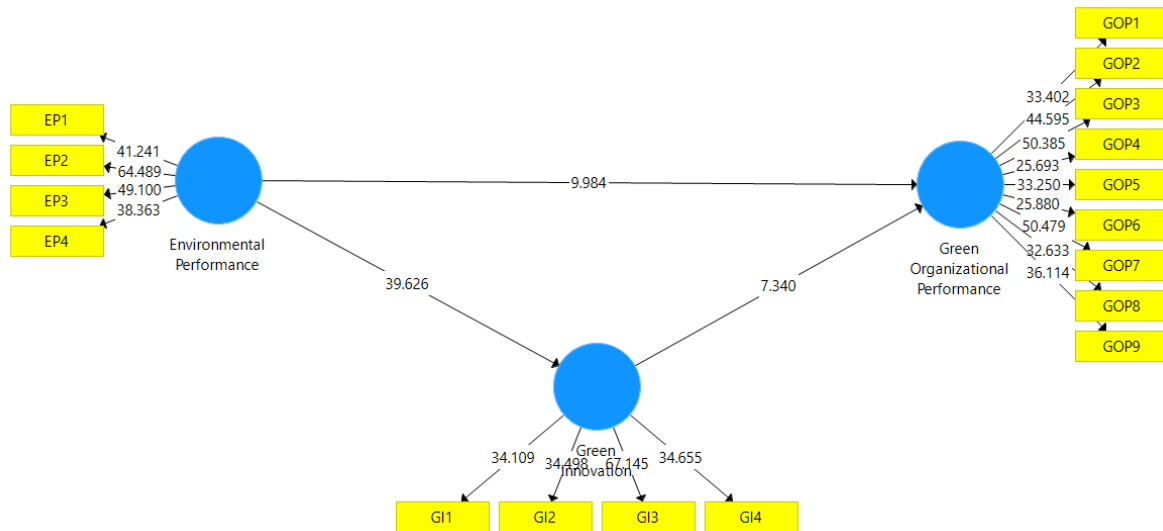


Figure 6: Mediating Hypotheses

4.4.3. Moderating Hypotheses

Hypothesis 3 (H3) examines whether “Green Organizational Culture (GOC) positively and significantly moderates the relationship between Environmental Performance (EP) and Green Organizational Performance (GOP)”. The results show that GOC has a moderating effect on the relationship between EP and GOP ($\beta = 0.282, t = 4.687, p < 0.001$), thus supporting H3.

Table 7: Moderating Hypotheses

	Beta Coefficient	STDEV	T Values	P Values	Decision
<i>GOC*EP->GOP</i>	0.238	0.088	2.235	0.026	Accepted

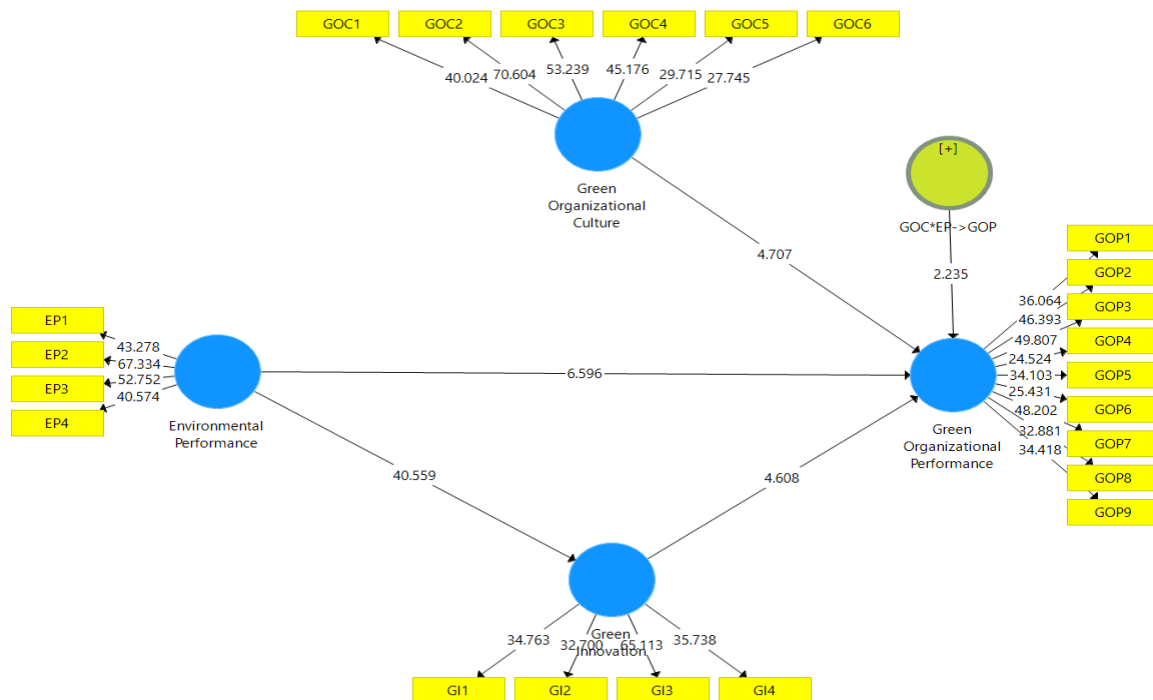


Figure 7: Moderating Hypotheses

5. Conclusion and Discussion

5.1. Discussion

Around a decade ago, practitioners, authors, and scholars worldwide began to focus significantly on the topic of green organizational performance. For many businesses in Pakistan, particularly in the manufacturing, textile, and agricultural sectors, sustainability has become a major concern (Nazam, Hashim et al. 2020). This study holds significant importance in the field of Green Organizational Performance from both theoretical and empirical perspectives. It marks the first attempt to explore the interrelationships between “Environmental Performance, Green Innovation, and Green Organizational Performance, with the moderating influence of Green Organizational Culture”.

The study aims to assess the impact of “Environmental Performance, Green Innovation, and Green Organizational Performance” in the textile industry of Pakistan, considering the moderating effect of “Green Organizational Culture”. Furthermore, it intends to provide recommendations for improving Green Organizational Performance in this context.

Waste reduction, energy conservation (Dam and Petkova 2014, Walker, Seuring et al. 2014), and increased productivity all positively influence green organizational performance (Sirveaux, Favard et al. 2004). Green Organizational Performance not only focuses on the firm’s internal performance but also on its involvement in operations related to green processes and products, such as environmental protection policies, energy saving, recycling, pollution prevention, green innovations, and green product design in environmental management (Feng and Wang 2016).

As global concerns about environmental protection continue to rise (Govindan, Khodaverdi et al. 2015), environmentally friendly company practices aim to enhance companies' sustainable ecological performance (Zhu, Feng et al. 2017). This study investigates innovative green management practices that enable organizational systems to promote environmental sustainability. Effective implementation of Green Innovation (GI) not only improves green performance but can also benefit other innovation initiatives (Ruthemeier 2022). According to Delmas, Hoffmann et al. (2011), studying the link between sustainable performance and business performance without considering the mediating effects of other capabilities overlooks a crucial element in understanding the active role of green strategies.

Due to the emergence of green culture, employees have become more concerned about sustainability issues (Lee, Wang et al. 2022), positively affecting their job performance. To foster a green culture, management must demonstrate greater environmental awareness (Azhar and Yang 2022). This study considers Green Organizational Culture as a moderator between Environmental Performance and Green Organizational Performance, recognizing the importance of culture in influencing organizational performance.

5.2. Conclusion

The primary goal of this study was to understand and objectively investigate the drivers (i.e., top management support, government pressure, consumer awareness, supply chain agility, and supply chain collaboration) that affect Sustainable Supply Chain Management (SSCM) in the textile industries of Pakistan. The study found that Environmental Performance (EP) has a positive and significant impact on Green Organizational Performance (GOP) ($\beta = 0.869$, $t = 49.900$, $p = 0.000$). Additionally, EP positively and significantly influences Green Innovation (GI) in textile industries ($\beta = 0.834$, $t = 39.626$, $p = 0.000$). GI also positively and significantly impacts GOP ($\beta = 0.402$, $t = 7.304$, $p = 0.000$). Furthermore, the mediating effect of GI on the relationship between EP and GOP is positive and significant ($\beta = 0.335$, $t = 7.170$, $p = 0.000$). Finally, the study found that Green Organizational Culture positively moderates the relationship between GI and GOP ($\beta = 0.282$, $t = 4.687$, $p < 0.001$).

While these findings shed light on the significant role of Green Organizational Culture, further research is needed to explore this variable in more depth, as there is limited existing literature on the relationship between Green Innovation and Green Organizational Culture. In the area of this study, the manufacturing sector, especially in Pakistan, is not fully utilizing sustainability concepts. By providing a comprehensive review of existing literature, this study hopes to assist the management of manufacturing firms in developing sustainability strategies within their organizations. The current research contributes significantly to filling existing gaps and provides valuable insights. Notably, no prior studies have examined the relationship between EP, GI, Green Organizational Culture, and GOP in the context of Pakistan. Future studies should explore other textile industries in different provinces of Pakistan to offer more comprehensive and comparative insights while focusing on the drivers of sustainability. Additionally, future research could identify other drivers of Sustainable Supply Chain Management (SSCM), such as competitive pressures, technological capabilities, financial resources, investor influence, employee or supplier influence, and societal pressures. This study primarily focused on textile mills; however, future studies could examine other industries and sectors to gain deeper insights into the variables under study. A cross-cultural comparison across different nations and provinces would also provide valuable perspectives.

REFERENCES

- Abbas, J. and E. Dogan (2022). "The impacts of organizational green culture and corporate social responsibility on employees' responsible behaviour towards the society." Environmental Science and Pollution Research **29**(40): 60024-60034.
- Al-Swidi, A. K., et al. (2021). "The joint impact of green human resource management, leadership and organizational culture on employees' green behaviour and organisational environmental performance." Journal of Cleaner Production **316**: 128112.
- Alam, S., et al. (2008). "The ATLAS experiment at the CERN large hadron collider." Journal of instrumentation **3**(8): S08003-S08003.
- Ali, M. (2018). "Pakistan's quest for coal-based energy under the China-Pakistan Economic Corridor (CPEC): Implications for the environment." Environmental Science and Pollution Research **25**(32): 31935-31937.
- Asadi, S., et al. (2020). "Investigating influence of green innovation on sustainability performance: A case on Malaysian hotel industry." Journal of cleaner production **258**: 120860.
- Azhar, A. and K. Yang (2022). "Examining the influence of transformational leadership and green culture on pro-environmental behaviors: Empirical evidence from Florida city governments." Review of Public Personnel Administration **42**(4): 738-759.
- Chan, H. K., et al. (2016). "The moderating effect of environmental dynamism on green product innovation and performance." International journal of production economics **181**: 384-391.
- Chandra, D. and D. Kumar (2021). "Evaluating the effect of key performance indicators of vaccine supply chain on sustainable development of mission indradhanush: A structural equation modeling approach." Omega **101**: 102258.
- Chen, Y.-S. (2008). "The driver of green innovation and green image-green core competence." Journal of business ethics **81**(3): 531-543.

- Chen, Y.-S., et al. (2006). "The influence of green innovation performance on corporate advantage in Taiwan." Journal of business ethics **67**(4): 331-339.
- Chen, Y. S. (2011). "Green organizational identity: sources and consequence." Management decision.
- Cornejo, P., et al. (2013). "Copper compartmentalization in spores as a survival strategy of arbuscular mycorrhizal fungi in Cu-polluted environments." Soil Biology and Biochemistry **57**: 925-928.
- Dam, L. and B. Petkova (2014). "The impact of environmental supply chain sustainability programs on shareholder wealth." International Journal of Operations & Production Management.
- Delmas, M., et al. (2011). "Under the tip of the iceberg: Absorptive capacity, environmental strategy, and competitive advantage." Business & Society **50**(1): 116-154.
- F. Hair Jr, J., et al. (2014). "Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research." European business review **26**(2): 106-121.
- Feng, T. and D. Wang (2016). "The influence of environmental management systems on financial performance: A moderated-mediation analysis." Journal of business ethics **135**: 265-278.
- Fornell, C. and D. F. Larcker (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics, Sage Publications Sage CA: Los Angeles, CA.
- Galeazzo, A., et al. (2014). "Lean and green in action: interdependencies and performance of pollution prevention projects." Journal of Cleaner Production **85**: 191-200.
- Gao, L. and F. Yang (2023). "Do resource slack and green organizational climate moderate the relationships between institutional pressures and corporate environmental responsibility practices of SMEs in China?" Environment, Development and Sustainability **25**(11): 13495-13520.
- Ghisellini, P., et al. (2016). "A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems." Journal of Cleaner Production **114**: 11-32.
- Govindan, K., et al. (2015). "Intuitionistic fuzzy based DEMATEL method for developing green practices and performances in a green supply chain." Expert Systems with Applications **42**(20): 7207-7220.
- Guoyou, Q., et al. (2013). "Stakeholders' influences on corporate green innovation strategy: a case study of manufacturing firms in China." Corporate Social Responsibility and Environmental Management **20**(1): 1-14.
- Hair Jr, J. F., et al. (2014). "Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research." European business review.
- Hart, S. L. (1995). "A natural-resource-based view of the firm." Academy of management review **20**(4): 986-1014.
- Hermosura, M. C., et al. (2008). "Altered functional properties of a TRPM2 variant in Guamanian ALS and PD." Proceedings of the National Academy of Sciences **105**(46): 18029-18034.
- Imran, M., et al. (2021). "Green organizational culture and organizational performance: The mediating role of green innovation and environmental performance." Jurnal Pendidikan IPA Indonesia **10**(4): 515-530.

- Ismail, F., et al. (2021). "Past, present and future of ecotourism, a systematic literature review from last decade." Studies of Applied Economics **39**(4).
- Karolina, V. (2014). A measure of attitude toward peer assessment: reliability and validity. The 61st TEFLIN International Conference 2014.
- Khosla, R., et al. (2020). "Identifying putative cerebrospinal fluid biomarkers of amyotrophic lateral sclerosis in a north Indian population." Muscle & Nerve **62**(4): 528-533.
- Kumar, M., et al. (2022). "The Effect of Green Manufacturing Practices on Green Achievement in the Ethiopian Manufacturing Industry: A Structural Equation Modelling Study." Process Integration and Optimization for Sustainability: 1-14.
- Lee, C.-C., et al. (2022). "The dimension of green economy: Culture viewpoint." Economic Analysis and Policy **74**: 122-138.
- Li, L., et al. (2020). "Green innovation and business sustainability: New evidence from energy intensive industry in China." International Journal of Environmental Research and Public Health **17**(21): 7826.
- Li, S., et al. (2017). "Understanding the impact of green initiatives and green performance on financial performance in the US." Business Strategy and the Environment **26**(6): 776-790.
- Lin, C.-Y. and Y.-H. Ho (2011). "Determinants of green practice adoption for logistics companies in China." Journal of business ethics **98**: 67-83.
- Muisyo, P. K. and S. Qin (2021). "Enhancing the FIRM'S green performance through green HRM: The moderating role of green innovation culture." Journal of Cleaner Production **289**: 125720.
- Nakamba, C. C., et al. (2017). "How does social sustainability feature in studies of supply chain management? A review and research agenda." Supply Chain Management: An International Journal.
- Nazam, M., et al. (2020). "Modeling the key barriers of knowledge management adoption in sustainable supply chain." Journal of Enterprise Information Management **33**(5): 1077-1109.
- Ngowi, A. (2001). "Creating competitive advantage by using environment-friendly building processes." Building and Environment **36**(3): 291-298.
- Pan, C., et al. (2022). "Interplay between corporate social responsibility and organizational green culture and their role in employees' responsible behavior towards the environment and society." Journal of Cleaner Production **366**: 132878.
- Paulraj, A. (2009). "Environmental motivations: a classification scheme and its impact on environmental strategies and practices." Business Strategy and the Environment **18**(7): 453-468.
- Prajogo, D. and J. Olhager (2012). "Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration." International Journal of Production Economics **135**(1): 514-522.
- Radnor, Z. J. and D. Barnes (2007). "Historical analysis of performance measurement and management in operations management." International Journal of Productivity and Performance Management.

- Robinson, S. and H. A. Stubberud (2013). "Green innovation in Germany: a comparison by business size." Journal of international business research **12**(1): 47.
- Ruthemeier, A. (2022). Cultural Diversity Drives Social Innovation in Germany's Digital Economy. The Global Impact of Social Innovation, Springer: 17-34.
- Shahid, H. M., et al. (2020). "Process innovation as a moderator linking sustainable supply chain management with sustainable performance in the manufacturing sector of Pakistan." Sustainability **12**(6): 2303.
- Sirveaux, F., et al. (2004). "Grammont inverted total shoulder arthroplasty in the treatment of glenohumeral osteoarthritis with massive rupture of the cuff: results of a multicentre study of 80 shoulders." The Journal of bone and joint surgery. British volume **86**(3): 388-395.
- Tan, S., et al. (2013). "Interface-induced superconductivity and strain-dependent spin density waves in FeSe/SrTiO₃ thin films." Nature materials **12**(7): 634-640.
- Ullah, S., et al. (2021). "Mapping interactions among green innovations barriers in manufacturing industry using hybrid methodology: insights from a developing country." International Journal of Environmental Research and Public Health **18**(15): 7885.
- Utterback, J. M. and W. J. Abernathy (1975). "A dynamic model of process and product innovation." Omega **3**(6): 639-656.
- Verrier, B., et al. (2014). "Combining organizational performance with sustainable development issues: the Lean and Green project benchmarking repository." Journal of Cleaner Production **85**: 83-93.
- Walker, H., et al. (2014). "Sustainable operations management: recent trends and future directions." International Journal of Operations & Production Management.
- Wang, C.-H. (2019). "How organizational green culture influences green performance and competitive advantage: The mediating role of green innovation." Journal of Manufacturing Technology Management **30**(4): 666-683.
- Wang, C. H. and W. J. Juo (2021). "An environmental policy of green intellectual capital: Green innovation strategy for performance sustainability." Business Strategy and the Environment **30**(7): 3241-3254.
- Zhu, A., et al. (2008). "Suspension of Fe₃O₄ nanoparticles stabilized by chitosan and o-carboxymethylchitosan." International Journal of Pharmaceutics **350**(1-2): 361-368.
- Zhu, Q., et al. (2017). "The role of customer relational governance in environmental and economic performance improvement through green supply chain management." Journal of Cleaner Production **155**: 46-53.