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THE ROLE OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON THE OPERATIONAL PERFORMANCE WITH ORGANIZATION CULTURE AS A MODERATOR. A STUDY OF THE MANUFACTURING SECTOR OF PAKISTAN

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Abstract

This research primarily investigates the impact of Green supply chain management practices on the operational performance of manufacturing sector in Pakistan in the presence of organization culture as a moderator and how it impacts it, Green procurement, Green manufacturing and Eco design were identified as dimensions and the most prevalent GSCM practices as per previous research articles and papers, it also investigates the separate impacts of GSCM and organization culture on performance in terms of operations. A deductive approach was used in this and cross-sectional data was retrieved from 333 participants from different companies involving manufacturing in Rawalpindi and Islamabad. It was distributed through google forms to individuals of manufacturing companies located around Rawalpindi and Islamabad. SmartPLS4 and SPSS were used to perform the tests for respective hypothesis and it was concluded that GSCM in fact does positively impact the operational metrics of companies and organization culture also positively impacts operational performance whilst not moderating the relationship there indicating more approaches that can be used to further explore this relationship, empirical findings and a qualitative approach could result in more concrete and clear findings.

Keywords: Green Supply Chain Management (GSCM), Green procurement (GP), Green Manufacturing (GM), Eco Design (ED), Organization Culture (OC) and Operational performance

1. Introduction

In the preceding four decades, supply chains have become increasingly fragile. There has been a requirement for integration of all the business activities to meet the demands of the final customers in the supply chain (Green et al., 2012; Rashid et al.,

2024). GSCM has garnered significant attention over the years due to ever increasing environmental crisis and the need for environment friendly business practices. The "green concept" is making its way into industrial organizations' manufacturing aspect, focusing on protecting company resources and reducing impacts on employee well-being and the environment (Khan & Dong, 2017). Researches have been conducted even related to HR regarding green practices (Wajdan et al., 2024). Researchers have highlighted that GSCM combines sustainable approach into supply chain management, incorporating product design, acquisition and sourcing, production, and after sale management (Rao & Holt, 2005). Reduction in costs associated with resources, increase in customer satisfaction, increased supply chain organizational reliability and the ability to effectively manage changing regulatory requirements (Zhu & Sarkis, 2004). At the same time, the concept of green supply chain management (GSCM) has also received a lot of attention from researchers, to preserve resources and reduce the wasteful and harmful practices in manufacturing and other business activities is an idea that has attracted much attention researchers and scholars (Sarkis et al, 2020). Prior studies covering GSCM practices have found out that it is capable to enhance the organizational operational performance in aspects of efficiency, cost decrease, innovations and risk management compared to non-GSCM practices (Zhu & Sarkis, 2004). Researchers have also defined dimensions while discussing GSCM practices (R.A.D. Dillanjani Weeratunge et al., 2019).

Green procurement stems from the concept of sustainable purchasing it involves selecting suppliers based on their environmental credentials. It fosters a sustainable supply chain and aligns operations with organizational goals, improving supplier relationships and ensuring a consistent flow of eco-friendly

resources. Such practice includes the assessment of suppliers' dependent on relative environmental impacts, the choice of environment-friendly products and encouraging the use of recycled or renewable material (Sarkis et al., 2020). Green Manufacturing encompasses cleaner production technologies, lean production, and recycling and reuse programs (Chiarini, 2018). Eco Design focuses on principles such as resource efficiency, waste minimization, and circularity, ensuring that environmental impacts are addressed from acquisition of materials to the management of finished product (Bovea & Pérez-Belis, 2020.), emphasizing responsible consumption and sustainable industrialization (Telenko & Martinez, 2020).

These dimensions are also closely linked to improvements in operational performance, which include enhanced resource efficiency, reduced costs, better compliance with regulations, and improved environmental outcomes and operational excellence. For instance, recent studies such as Khan et al. (2022) and Dubey et al. (2021) have said that adopting Green Supply Chain Management (GSCM) techniques can result in better resource utilization, lower emissions, and a more sustainable competitive advantage. Given modern societies' focus on environmental protection, stricter standards, and attaining higher sustainability and the importance of Pakistan's manufacturing industry in the country and contribution to its economic growth (Khan et al., 2018), the significance of green practices cannot be overstated. However, most manufacturing processes negatively affect the environment and are a threat to the limited natural resource capital (Sarkis & Dhavale, 2017). Pakistani manufacturing firms are in dire need of supply value chain transformation into green and sustainable model (Jabbour et al., 2017). And a strong organization culture rooted in sustainability can enhance that impact (Saadia iddik,

2017). While there are studies conducted by Syed Abdul Rehman Khan (2017) and Nimra Afzal (2022) on the impact of sustainable GSCM practices with a general emphasis on firm performance in general but have indicated to research further into specific metrics of performance to obtain more tangible results. Another comprehensive study by Khan et al., (2022) also studied effect of GSCM practices with mediation of technological innovation. While there is literature on GSCM practices and their impact in different industrial sectors of Pakistan there is nonetheless insufficient data on the impact of strong corporate or organization culture or how it plays a role in this area all the above research articles haven't used organization culture as a moderator in these studies.

This study aims to find the role of GSCM practices on the operational performance of manufacturing sector of firms involving manufacturing of textile, automobile, fertilizer and industries that have processes where raw materials are converted into finished goods whilst investigating if organization culture can act as a moderator for this relationship.

Q1.What is the impact of green manufacturing on operational performance of Manufacturing Firms of Pakistan?

Q2. What is the impact of green procurement on operational performance of manufacturing firms of Pakistan?

Q3. What is the impact of Eco-Design on operational performance of manufacturing firms of Pakistan?

Q4. Does organization culture moderate the relationship between Green procurement & operational performance?

Q5. Does organization culture moderate the relationship between Green manufacturing & operational performance?

Q6. Does organization culture moderate the relationship between Eco Design & operational performance?

Q7. What is the impact of organization culture on operational

performance of manufacturing firms in Pakistan?

And these objectives.

1. To find the impact of green procurement on operational performance in the context of manufacturing firms in Pakistan.
2. To find the impact of green manufacturing on operational performance in the context of manufacturing firms in Pakistan
3. To find the impact of eco design on operational performance in the context of manufacturing firms in Pakistan
4. To Find if organization culture moderates the relationship between green procurement and operational performance.
5. To Find if organization culture moderates the relationship between green manufacturing and operational performance.
6. To Find if organization culture moderates the relationship between eco design and operational performance.
7. To find the impact of Organization culture on Operational performance.

2. Literature review and Hypothesis

RBV theory and Sustainability Theory are the driving forces behind the concept of Green practices which mainly focus on sustainable practices and strategies to improve performance and conserve environment. Barney (1991) introduced the idea that firms must try to utilize synthetic and recyclable resources as opposed to valuable ones to achieve sustained competitive advantage Green GSCM involves incorporating principles into stages of supply chain including design of product, sourcing of items and selection of different manufacturing techniques and methods, product delivery & post use product management (Srivastava, 2007). This concept has significantly developed since its inception in the century due to the ever-growing importance environmental issues & the escalating pressure on businesses to reduce their environmental impact (Zhu & Sarkis 2004). Initially GSCM primarily concentrated on

preventing pollution and reducing waste within supply chains (Beamon, 1999). However, with expanding concerns the scope for GSCM has expanded into different dimensions and now encompasses diverse issues such as resource preservation, energy efficiency and mitigating climate change effects (Seuring & Müller 2008).

Green procurement has been a vital component of GSCM practices that focuses on purchasing products and materials with minimal environmental impact. Green procurement practices contribute to the reduction of environmental impact and promote recycling among other benefits" (Appolloni, 2014).

Eco-design is another practice applied for improving the sustainability of product by incorporating environmental aspects into design stage (Ademulegun et al., 2022). The techniques involve in manufacturing should have a few environmental impacts, should lead to minimization in the utilization of materials and energy also, it should result to limitation in raw material losses and to generate few wastes as possible (Wakulele et al., 2016).

Green manufacturing has emerged another important component of GSCM practices due to its crucial impact on environmental sustainability and organizational performance. By adopting these techniques, firms can lessen waste, mitigate emissions, and improve resource efficiency, contributing to a healthier planet.

Research has shown that green manufacturing practices positively impact both environmental and organizational performance (Noor Aslinda et al., 2012). Furthermore, green manufacturing significantly contributes to the overall effectiveness of GSCM processes (Salah et al., 2024). The core thesis underpinning GSCM is that it represents an essential business strategy for achieving sustainability and reducing environmental

impact.

Organizational or Institutional culture is the set of underlying norms that direct the operations of organization including environmental consciousness, upper management commitment and enrichment and empowerment of workers (Utomo et al., 2024). Absence of management commitment and employee induction can act as a barrier to effective implementation of GSCM practices (Jabbour & Jabbour, 2015). Consequently, the operational performance of firms could possibly be suboptimal if GSCM practices are not embedded within the organization's culture based on these articles.

Researchers have explored the implementation of GSCM in Pakistani industries and identified several challenges. For instance, Du Jianguo and Yasir Ahmed Solangi, (2023) highlighted that technological barriers, financial constraints, and lack of information and knowledge are significant obstacles to adopting GSCM practices in Pakistan's textile industry. Additionally, Akhtar (2019) found that institutional pressures, social pressures, and competitive pressures are key drivers for GSCM initiatives in Pakistan's manufacturing sector highlighting that culture could act as a strong moderator. However, challenges such as energy shortages, inadequate infrastructure, bureaucratic hurdles, and limited access to finance have impeded the widespread adoption of GSCM practices while some studies have observed these practices and their positive impacts (Syed Abdul Rehman Khan, 2017). These research articles give relevant insight regarding the different dimensions influencing GSCM implementation and the obstacles encountered by different sectors and industries in Pakistan so in context of Pakistan this clearly indicates that these practices are still very much in an embryonic stage given the state of manufacturing industries of Pakistan.

Operational performance became a recognizable discipline in its own right due to many theorists and practitioners' contributions over the years. Early contributions were largely concerned with the quantitative, efficiency measures of performance, such as productivity and cycle time (Panigrahi et al., 2022). Yet, as the field of OP matured, researchers started to address the different aspects of performance, such as employee morale, customer satisfaction, and environmental responsibility (Bititci et al., 2015). Firms that consistently develop and deliver quality products or services, produce with greater efficiency, and effectively adapt their operations to shifting market conditions, are more likely to be successful in the competitive arena (Sharma & Modgil, 2020).

Research also reveals that operational effectiveness and end consumer satisfaction are positively related (Rajan, Aruna,2012; Gomaa et al., 2023). Yet, the anti-thesis suggests that firms can become rigid and less innovative if they overemphasize operational efficiency. Some researchers warn that a myopic focus on ever greater efficiency can make firms blind to disruptive technologies and emerging market trends (Mookerjee et al, 2021). Thus, the synthesis required for sustained success (Teece, 2018), is a firm emphasis on both operational excellence and strategic agility.

Hypothesis

Application of green practices been proven to influence operational performance in multiple dimensions. Vachon and Klassen (2006) & Arwa Mukhtar et al, (2019) analyzed the impact of broadening sustainable practices in the complete supply chain from upstream suppliers to downstream customers. Results of their research indicated that involving environmental considerations in both upstream and downstream activities results in enhanced operational efficiency as better coordination, communication, and resource allocation are achieved across the entire supply chain

network (Wu et al., 2024).

Eco-Design (ED) and Operational Performance (OP)

Eco-design has several advantages, such as boosting competitiveness by introducing new goods or services, attempting to reach prospective clients and enter new markets, cutting costs, and many more (Knight & Jenkins, 2009; Li et al., 2024). The use of raw materials, trash, and big environmental footprints may all be decreased with the use of eco-design. This reduces the need for environmental resources, which might have an influence on the organization's efficacy and efficiency. Eco-design in terms of packaging also contributes efficient transport and reduces waste and in turn an increase in performance as indicated by researchers (Molina-Besch et al., 2019). Li et al. (2014) & Li & Sarkis 2021 conducted a case study of automotive manufacturing in China. They found that eco-design can improve manufacturing an operational performance through reduced material use, increased process efficiency, and reduced energy consumption. Nevertheless, some research has discovered negative correlations. For example, a study by Zhu & Sarkis (2005) found that eco design necessitates capital investment, which may negatively impact economic performance, but it can also lead to cost savings, such as lower energy consumption costs and lower waste treatment and discharge fees, which can significantly boost the firm's performance.

H1 Eco design positively effects operational performance.

Green Procurement (GP) and Operational Performance (OP)

Green procurement practices serve as a vital resource for firms striving to improve their sustainability outcomes (Khan et al., 2023). Sustainable procurement, according to the literature now in publication, is predicated on the idea that businesses may enhance the working environment (including health and safety), compliance, efficiency, transparency, and the use of natural resources. (Kozuch

et al, 2024). Singh et al, (2022) conducted a study on Malaysian organizations. A study on how green buying procedures affect an organization's performance in the manufacturing sector was carried out by Ngunjiri (2018) in Kenya and found out that green procurement significantly improves performance. Numerous studies have shown that firm image, innovation, competitiveness, foreign direct investment, and strategic goals and targets are all strongly and favorably correlated with sustainable procurement methods (Song et al., 2017; David et al., 2024; Junejo et al., 2025).

H2 Green procurement has a positive and significant impact on operational performance.

Green Manufacturing (GM) and Operational Performance (OP)

Green manufacturing has been deemed a positive indicator for overall organization performance. Studies by Mahrukhi Saqib 2024 and Syed Abdul Rehman Khan 2017 have shown have positive interaction between green manufacturing and operations efficiency in firms with the latter having FMCG sector as their area of research while Seher Naz (2023) concluded that there was no substantial association between green manufacturing and the operational success of textile industries, highlighting the intricacy of this relationship and the need for more research.

H3 Green manufacturing positively impacts the operational performance.

Organization Culture as a moderator for Green Supply Chain Management (GSCM) Practices

The moderating impact of culture on GSCM practices as a whole is not well researched but impact of organization culture on organizational performance and GSCM separately has been studied throughout the years. The alignment between an organization's cultural values and its operational strategies is crucial; misalignment can impede the adoption of new initiatives and

weaken overall performance (Prieto et al, 2021). According to Copus et al. (2019), the impact of organizational culture has a greater potential to enhance the performance of businesses in the manufacturing sector. This is also supported by further research that a strong organizational culture encourages environmental awareness, which makes managers more conscious of the energy, resources, and waste they utilize, ultimately leading to an improvement in organizational performance (Imran et al., 2021). Alan Gutterman (2020) discussed how organizational culture aligned with sustainability principles enhances the integration of GSCM practices, leading to improved relational efficiency and job satisfaction, which subsequently drive organizational performance.

While some small studies have theorized that a strong green organizational culture can enhance GSCM practices on organizational performance by fostering an environment that supports sustainable practices and innovation (Imran & Gao, 2022) as culture encourages employees to adopt eco-friendly behaviors and aligns organizational goals with environmental sustainability, leading to improved performance outcomes (Fatoki, 2021), it should be noted that these studies investigated the direct impact of culture on GSCM practices or organization performance, there are not enough studies suggesting that organization culture plays a successful moderating role between these relationships.

H4 Organization culture moderates the relationship between green manufacturing and operational performance.

H5 Organization culture moderates the relationship between green procurement and operational performance.

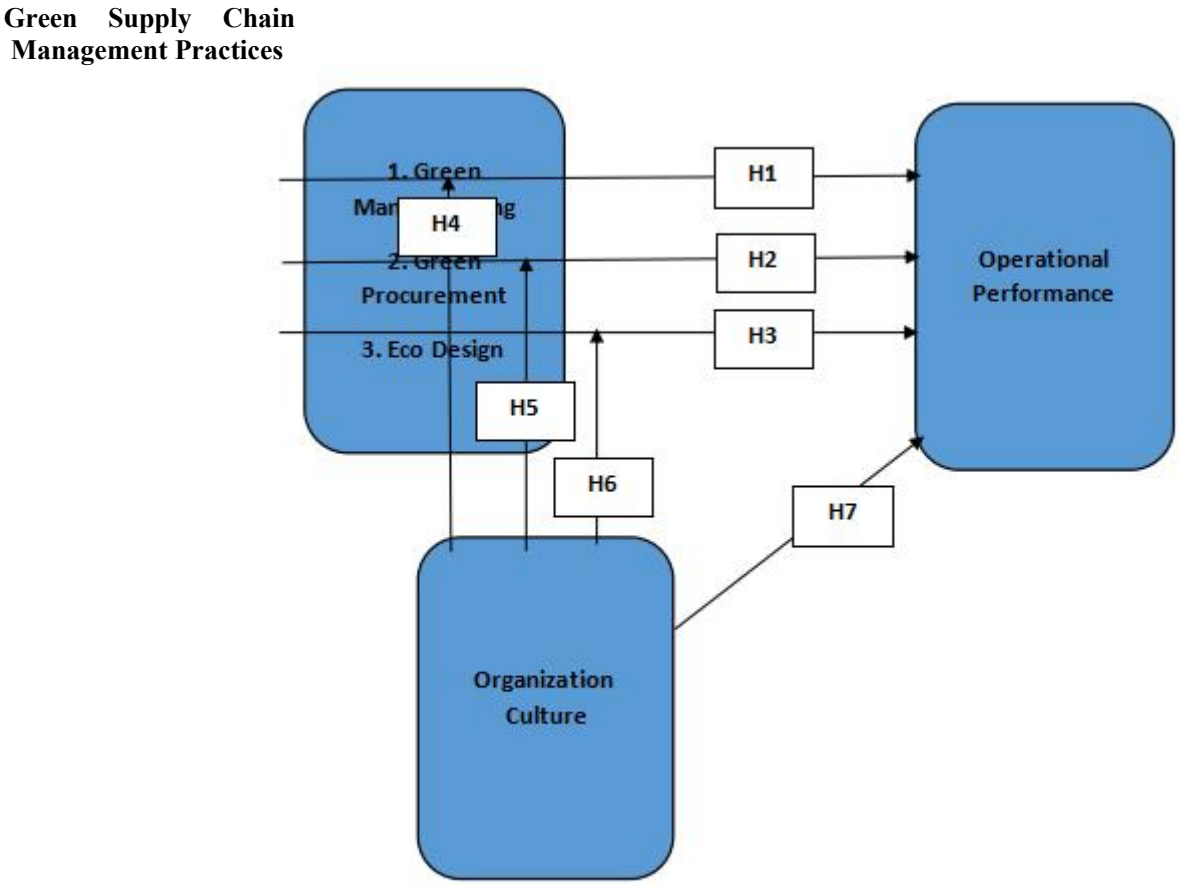
H6 Organization culture moderates the relationship between Eco design and operational performance.

Organization Culture (OC) and Operational Performance (OP)

Moreover, specific cultural dimensions such as prosocial values and leadership adaptability create a balance that enhances productivity and innovation, contributing to a sustained competitive edge. The synergy between an organization's cultural values and its operational strategies is very important for organization (Prieto et al, 2021). Fakhar et al. 2012 studied the literature on culture and performance and found out that organization culture positively contributes to firm performance. Research also highlights that organizational culture archetype's have both direct and indirect effects on performance (Omar, 2020). Other scientific publications however argue that the relationship between organizational culture and operational performance is too complex and ambiguous, a recent literature review by Hartnell et al. (2022) highlights the lack of consensus among scholars regarding definitions of these constructs, as well as inconclusive empirical evidence.

H7 Organization culture positively impacts the operational performance.

Theoretical model



The **Resource-Based View (RBV)** theory formed the foundation of this theoretical model, emphasizing that firms can achieve sustainable competitive advantage by developing and leveraging unique internal resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN). In the context of GSCM, RBV posits that implementing green practices transforms resources such as organizational culture and environmental initiatives into strategic capabilities. Recent studies validate the applicability of RBV in GSCM research. Researchers argue that intra- and inter-organizational environmental practices aligned with RBV enhance organizational performance by creating unique, inimitable capabilities. Elgaraihy et al., (2022) employed RBV to analyze how environmental practices influenced sustainability in industrial firms, demonstrating that green practices result in operational

efficiencies. Mailani et al., (2024) extended RBV by integrating dynamic capabilities, showing that organizations adapt green initiatives to achieve superior operational outcomes in changing environments. Further, Din et al. (2024) linked RBV to environmental management, highlighting that firms with proactive environmental practices develop distinctive capabilities that enhance both environmental and operational performance. Cankaya and Sezen (2019) reinforced the relevance of RBV by demonstrating that green supplier collaboration leads to improved performance outcomes through resource integration. Additionally, Hart and Dowell (2021) emphasized the interplay between RBV and sustainability strategies, indicating how firms capitalize on their green resources to build competitive advantage.

3. Methodology

Research Type

A quantitative research method was used. Quantitative research is a type of research method that focuses on the measurement of variables in terms of numbers and the examination of existing theories through hypothesis testing (Creswell, 2023). The selected approach of analysis is very suitable for the present study since this approach is more centered on measurement and analysis, especially of causal relationships between GSCM practices, operational performance, and organizational culture (Sekaran & Bougie, 2019). The quantitative has been a common approach used in prior researches in comparing the effects of green practices on operational performance. For instance, Zhu et al (2007) established a productive relationship between green practices and firm performance in China out of which they noted enhanced connection between firm performance as well as GSCM practices. Similar to it several other newer studies like Becerra et al., 2021 while investigating impact of GSCM on different factor have used

quantitative approach. Such previous works confirm the validity of utilizing the quantitative approach to analyze the correlations between GSCM practices, operational excellence, and other factors.

Research Design

This paper a descriptive research design to analyze relations between GSCM practice, operational performance, and organizational culture in the manufacturing firms of Pakistan. Thus, this design was appropriate with the quantitative nature of this study because it provided a structured and quantifiable means of collecting data to answer key questions and/or test hypotheses (Saunders et al., 2019; Creswell & Creswell, 2017).

Data Acquisition

A cross sectional technique was used to gather data. It was collected at one single time as this was a quantitative study and there were no interviews where detailed information over a period of time is required to do analysis. Data was collected from green certified companies in Pakistan.

Population and Sample Size

The population for the research comprised of employees working in firms that involve manufacturing located around Rawalpindi and Islamabad. Data was collected from the employees of these industries from employees and through a questionnaire. The population was determined to be around 15000 for these companies and a sample of 375 was determined using Morgan's table.

Sampling Method

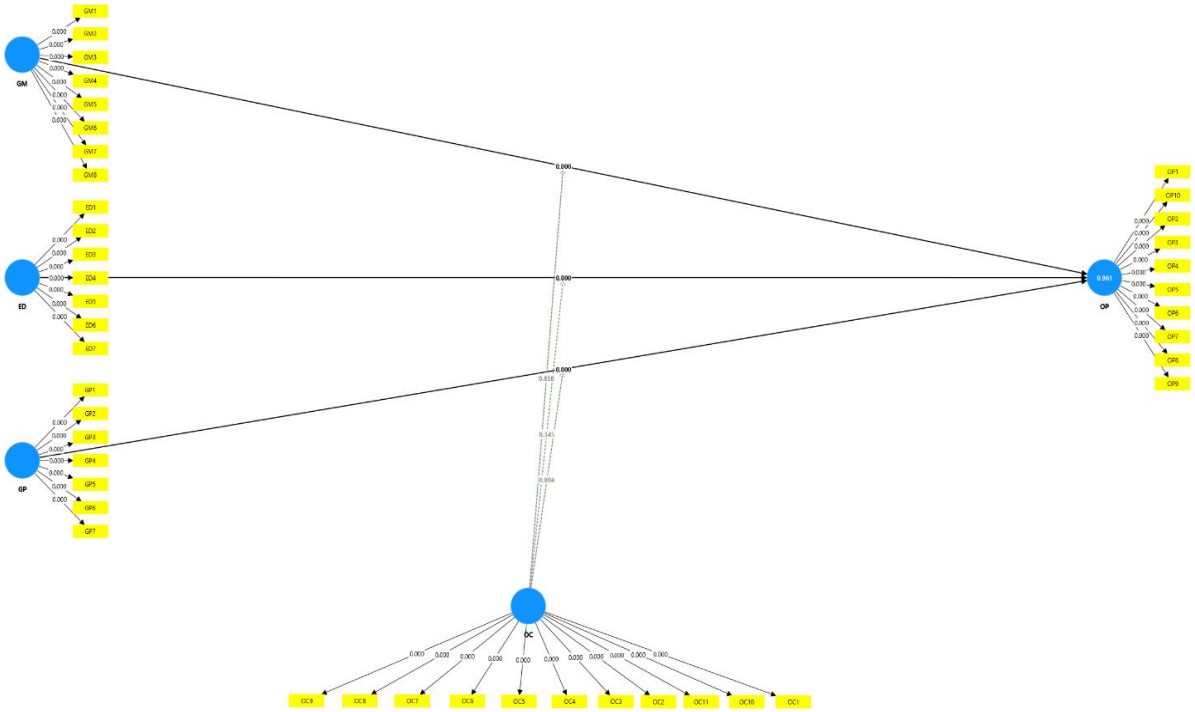
Random sampling method was employed, this approach has been adopted by several other research papers (Ali Rezaei et al, 2019; Sarkis et al, 2005).

Analysis and Results

Analysis was done using smartpls4 and results were collected and

analyzed, there were a total of 379 responses out of which 375 were found appropriate for analysis given the sample size.

Moderation Model



Green Manufacturing (GM), Green Purchasing (GP), Eco Design (ED), Organizational Culture (OC), and Operational Performance (OP) were represented in the provided diagram as part of a moderation model. GM, GP, and ED were identified as independent variables that influenced OP, the dependent variable, while OC acted as a moderating variable.

Arrows from GM, GP, and ED to OP showed the direct effects of green practices on operational performance, while dashed lines showed how OC moderated the effects of green practices on OP, either strengthening or weakening them based on the organization's sustainability-oriented culture.

The model tested hypotheses about the direct effects of GM, GP, and ED on OP, as well as the moderating influence of OC on these relationships.

	N	Min	Max	Mean	Std. Deviation
Gender1	375	1	2	1.70	0.459
Manufacturing Type	375	1	5	3.09	1.343
Company Size Employees	375	1	4	2.41	.914
Years in Operation	375	1	4	2.45	1.027
Annual Revenue in USD	375	1	4	3.03	1.131
Valid N	375				

375 participants made up the sample size for which the descriptive statistics were examined. With a mean of 1.70 and a standard deviation of 0.459, the gender distribution showed that most respondents fell into the second group. The company's manufacturing types varied, with a mean of 3.09 and a standard deviation of 1.343, indicating that the range was 1 to 5.

The majority of businesses were in the mid-range size bracket, as indicated by the mean of 2.41 and standard deviation of 0.914 for company size as determined by the number of employees. A distribution across various operational durations was shown by the years in operation, which had a mean of 2.45 and a standard deviation of 1.027. Annual revenue had a mean of 3.03 and a standard deviation of 1.131, showing variation in financial performance among the companies.

The valid number of responses for all variables was 375.

4. Reliability Analysis

	Original Sample(O)	Sample Mean (M)	Standard Deviation	T Statistics	P values
ED	0.832	0.832	0.017	49.784	0.000
GM	0.877	0.877	0.010	92.117	0.000
GP	0.890	0.890	0.008	112.058	0.000
OC	0.850	0.850	0.011	75.868	0.000
OP	0.888	0.888	0.009	95.961	0.000

Eco Design (ED)

The composite reliability for Eco Design was 0.832, which was above the threshold of 0.7, indicating good internal consistency. The T statistic was 49.784, and the p-value was 0.000, confirming that the reliability of the ED construct was statistically significant.

Green Manufacturing (GM)

The composite reliability for Green Manufacturing was 0.877, which was well above the acceptable threshold, indicating strong internal consistency. The T statistic was 92.117, and the p-value was 0.000, confirming that the reliability of the GM construct was statistically significant.

Green Procurement (GP)

The composite reliability for Green Procurement was 0.890, which was also well above the threshold, indicating excellent internal consistency. The T statistic was 112.058, and the p-value was 0.000, confirming that the reliability of the GP construct was statistically significant.

Organizational Culture (OC)

The composite reliability for Organizational Culture was 0.850, which was above the threshold, indicating good internal consistency. The T statistic was 75.868, and the p-value was 0.000, confirming that the reliability of the OC construct was statistically

significant.

Operational Performance (OP)

The composite reliability for Operational Performance was 0.888, which was well above the threshold, indicating strong internal consistency. The T statistic was 95.961, and the p-value was 0.000, confirming that the reliability of the OP construct was statistically significant.

Summary of Findings The reliability analysis confirmed that the constructs in the study were measured reliably, providing a solid foundation for further analysis of the structural mode

Correlation

		GM	ED	GP	OP	OC
GM	**Pearson Correlation**	1	.835**	.781**	.920**	.870**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	375	375	375	375	375
ED	**Pearson Correlation**	.835**	1	.802**	.887**	.833**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	375	375	375	375	375
GP	**Pearson Correlation**	.781**	.802**	1	.843**	.785**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	375	375	375	375	375
OP	**Pearson Correlation**	.920**	.887**	.843**	1	.955**
	Sig. (2-	.000	.000	.000		.000

	tailed)					
	N	375	375	375	375	375
OC	**Pearson Correlation**	.870**	.833**	.785**	.955**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	375	375	375	375	375

The correlation analysis showed strong positive relationships among all five variables (GM, ED, GP, OP, and OC). All correlations were statistically significant at the **0.01 level (p < .01)**.

OP and OC had the highest correlation (r = .955), indicating a very strong relationship. GM also showed a strong correlation with OP (r = .920) and OC (r = .870). ED was highly correlated with GM (r = .835) and OP (r = .887). Although GP had slightly lower correlation values, it still exhibited strong positive relationships with the other variables (ranging from .781 to .843).

Overall, the results suggested that all variables were closely linked, meaning that changes in one were likely associated with changes in the others.

Cronbach's Alpha

	Cronbach's Alpha	**Items**
GM	.983	8
ED	.971	7
GP	.982	7
OP	.987	10
OC	.984	11

This table presents the reliability analysis using Cronbach's alpha, focusing on the mean, standard deviation (STDEV), t-values, and p-values for different variables (ED, GM, GP, OC, OP).

Reliability Scores (Original Sample & Sample Mean)

The values for all variables (ED, GM, GP, OC, OP) were all above

0.97, indicating excellent consistency.

This suggested that the items highly correlated with each other.

Conclusion

High Cronbach's alpha values (>0.97) confirm that the constructs used in this research were highly reliable.

Data Normality

	N	Mean	St. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
GM1	375	3.2293	1.33272	-.447	.126	-1.034	.251
GM2	375	3.3200	1.40435	-.280	.126	-1.269	.251
GM3	375	3.2587	1.44591	-.326	.126	-1.282	.251
GM4	375	3.2667	1.44538	-.271	.126	-1.318	.251
GM5	375	3.2667	1.43051	-.273	.126	-1.311	.251
GM6	375	3.2507	1.44455	-.258	.126	-1.321	.251
GM7	375	3.2213	1.40723	-.254	.126	-1.300	.251
GM8	375	3.2533	1.39799	-.282	.126	-1.253	.251
ED1	375	3.1467	1.37873	-.376	.126	-1.182	.251
ED2	375	3.3360	1.45858	-.291	.126	-1.344	.251
ED3	375	3.1867	1.45791	-.276	.126	-1.327	.251
ED4	375	3.2560	1.44916	-.252	.126	-1.339	.251
ED5	375	3.2187	1.43119	-.241	.126	-1.322	.251
ED6	375	3.2213	1.44288	-.258	.126	-1.313	.251
ED7	375	3.3227	1.47706	-.288	.126	-1.356	.251
GP1	375	3.2560	1.32985	-.451	.126	-.971	.251
GP2	375	3.3307	1.41327	-.252	.126	-1.303	.251
GP3	375	3.2267	1.38144	-.315	.126	-1.198	.251
GP4	375	3.2400	1.46108	-.215	.126	-1.370	.251
GP5	375	3.1573	1.44943	-.202	.126	-1.366	.251
GP6	375	3.1893	1.46031	-.213	.126	-1.362	.251
GP7	375	3.2827	1.49154	-.264	.126	-1.390	.251
OP1	375	3.2107	1.38204	-.407	.126	-1.173	.251

OP2	375	3.3920	1.48196	-.368	.126	-1.323	.251
OP3	375	3.2747	1.42805	-.354	.126	-1.228	.251
OP4	375	3.2080	1.43651	-.282	.126	-1.275	.251
OP5	375	3.2667	1.45460	-.299	.126	-1.296	.251
OP6	375	3.2533	1.43759	-.326	.126	-1.261	.251
OP7	375	3.2587	1.44221	-.272	.126	-1.292	.251
OP8	375	3.2373	1.42914	-.330	.126	-1.249	.251
OP9	375	3.2427	1.40750	-.293	.126	-1.220	.251
OP1 0	375	3.2587	1.42730	-.346	.126	-1.239	.251
OC1	375	3.2240	1.37314	-.390	.126	-1.157	.251
OC2	375	3.3013	1.31725	-.230	.126	-1.174	.251
OC3	375	3.2107	1.37039	-.322	.126	-1.157	.251
OC4	375	3.2453	1.29109	-.270	.126	-1.092	.251
OC5	375	3.2107	1.35271	-.238	.126	-1.159	.251
OC6	375	3.2267	1.34416	-.293	.126	-1.112	.251
OC7	375	3.2107	1.30646	-.243	.126	-1.104	.251
OC8	375	3.2453	1.32179	-.264	.126	-1.133	.251
OC9	375	3.2480	1.28955	-.290	.126	-1.071	.251
OC1 0	375	3.2480	1.32634	-.256	.126	-1.162	.251
OC11	375	3.2480	1.31216	-.273	.126	-1.158	.251

The table presents the descriptive statistics for various variables from a sample of 375 respondents. Here's a breakdown:

GM1 to GM8 (Green Manufacturing Indicators): The means ranged from 3.22 to 3.32, showing that the respondents had generally moderate assessments of their manufacturing performance. Skewness values were mostly negative, indicating that the data was left-skewed (responses tended to be higher). The kurtosis values ranged from -1.034 to -1.344, suggesting that all distributions were relatively flat.

ED1 to ED7 (Eco- Design Variables): The means were similar, ranging from 3.15 to 3.33, suggesting moderate levels of agreement

or assessment of education-related aspects. Most of these variables showed negative skewness, indicating higher responses, and negative kurtosis, suggesting flat distributions.

GP1 to GP7 (Green Purchasing Indicators): The means varied between 3.16 and 3.33. Like the other variables, these showed negative skewness and kurtosis values below -1, which indicated left-skewed, flatter distributions.

OP1 to OP10 (Operational Performance Indicators): These had means ranging from 3.21 to 3.39. Skewness values were mostly negative (left-skewed), and kurtosis was consistently negative, indicating a flatter distribution compared to normal.

OC1 to OC11 (Organization Culture Indicators): The means ranged from 3.21 to 3.30, showing moderate agreement. The negative skewness values indicated left-skewed distributions, and the negative kurtosis values confirmed that the distributions were flatter than normal.

Overall Summary

Across all variables, the means suggested moderate responses or assessments. Skewness values generally indicated left-skewed distributions (more respondents on the higher end), and the kurtosis values indicated flatter distributions than a normal distribution. This suggests that the responses were somewhat spread out but did not follow a sharply peaked curve.

Model Fit

	Saturated	**Estimated**
SRMR	0.051	0.051
doulas	9.456	9.456
d_g	2.366	2.366

The model fit statistics were evaluated to assess how well the model represented the data. The following values were observed:

1. **SRMR (Standardized Root Mean Square Residual)**: Both the saturated and estimated model showed a value of 0.051. This indicated that the model had a good fit, as SRMR values below 0.08 are typically considered acceptable, suggesting that the residuals between the observed and predicted values were small and the model accurately represented the data.

2. **d_ULS (Unweighted Least Squares Distance)**: Both the saturated and estimated models had a value of 9.456. This statistic measures the discrepancy between the observed and fitted covariance matrices. A lower value typically suggests a better model fit, but in this case, the value was acceptable given the specific context of the analysis.

3. **d_g (Geodesic Distance)**: The value for d_g was 2.366 for both the saturated and estimated models. This statistic measures the distance between the observed and model-implied covariance matrices, with lower values indicating a better fit. This value also suggested that the model was well-fitted.

Overall Interpretation

The fit indices (SRMR, d_ULS, and d_g) all indicated that the model provided a good fit to the data. The SRMR value, in particular, was within the acceptable range, while the d_ULS and d_g values were within a range that suggested the model's residuals and discrepancies were minimal, indicating a well-fitting model.

Hypothesis Testing

		Original Sample(O)	Sample Mean (M)	Standard Deviation	T Statistics	P values	Hypothesis
H1	**GM->OP**	0.250	0.258	0.041	6.121	0.000	Supported
H2	**ED->OP**	0.160	0.162	0.037	4.376	0.000	Supported
H3	**GP-**	0.120	0.120	0.030	3.992	0.000	Supported

	>OP						
H7	**OC->OP**	0.552	0.542	0.047	11.760	0.000	Supported
H4	**OC x GM->OP**	-0.007	-0.007	0.029	0.179	0.858	Not Supported
H5	**OC x ED->OP**	-0.027	-0.025	0.029	0.945	0.345	Not Supported
H6	**OC x GP->OP**	-0.006	-0.006	0.023	0.248	0.804	Not Supported

H1: Green Manufacturing (GM) had a positive effect on Operational Performance (OP).

With a p-value of 0.000 and a path coefficient of 0.250, Green Manufacturing was found to have a statistically significant positive impact on Operational Performance therefore null hypothesis is rejected.

H2: Eco Design (ED) had a positive effect on Operational Performance (OP).

Eco Design significantly improved Operational Performance, as evidenced by the path coefficient of 0.160 and the p-value of 0.000 therefore null hypothesis is rejected.

H3: Green Procurement (GP) had a positive effect on Operational Performance (OP).

The path coefficient was 0.120, and the p-value was 0.000, indicating that Green Procurement had a statistically significant positive effect on Operational Performance therefore null hypothesis is rejected.

H7: Organizational Culture (OC) had a positive effect on Operational Performance (OP).

The path coefficient was 0.552, and the p-value was 0.000, indicating that Organizational Culture had a statistically significant positive effect on Operational Performance therefore null hypothesis is rejected.

H5: the interaction between Organizational Culture (OC) and Green Procurement (GP) had a significant effect on Operational Performance (OP).

The interaction between organizational culture and green procurement did not appear to have a statistically significant effect on operational performance, as indicated by the p-value of 0.804 and the path coefficient of -0.007; hence, the null hypothesis cannot be rejected in this instance.

H6: The interaction between Organizational Culture (OC) and Eco Design (ED) had a significant effect on Operational Performance (OP).

Since there was no statistically significant impact of the interaction between Organizational Culture and Eco Design on Operational Performance, the null hypothesis is accepted. The path coefficient was -0.027 and the p-value was 0.345.

H7: The interaction between Organizational Culture (OC) and Green Manufacturing (GM) had a significant effect on Operational Performance (OP).

The path coefficient was -0.006, and the p-value was 0.858, indicating that the interaction between Organizational Culture and Green Manufacturing did not have a statistically significant effect on Operational Performance therefore null hypothesis is accepted.

Summary of Findings

Direct Effects

The hypothesis that Green Manufacturing, Eco Design, Green

Procurement, and Organizational Culture have a favorable impact on Operational Performance were supported by the statistical significance of all direct effects (GM -> OP, ED -> OP, GP -> OP, and OC -> OP).

Interaction Effects

The combined influence of Organizational Culture with Green Procurement, Eco Design, or Green Manufacturing did not significantly affect Operational Performance, as evidenced by the fact that none of the interaction effects (OC x GP -> OP, OC x ED -> OP, and OC x GM -> OP) were statistically significant.

These results suggest that while individual practices and organizational culture independently contribute to operational performance, their interactions do not provide additional explanatory power in this context.

Conclusion and Future research

This study examined the impact of **Green Manufacturing (GM)**, **Eco Design (ED)**, **Green Procurement (GP)**, and **Organizational Culture (OC)** on **Operational Performance (OP)**. The results indicated that GM, ED, GP, and OC all had significant positive effects on OP, highlighting the importance of sustainable practices and a supportive organizational culture in enhancing operational outcomes. However, the interaction effects between OC and the green practices (GM, ED, GP) were not statistically significant, suggesting that while these factors independently contribute to OP, their combined influence does not provide additional explanatory power. The reliability analysis confirmed that all constructs were measured consistently, and the descriptive statistics provided a clear understanding of the sample characteristics.

Future Research Directions

Future research could explore the role of additional moderating or

mediating variables, such as leadership style, to better understand the complex relationships between green practices and operational performance and also many other performance metrics could be used as dependents such as environmental or general organization performance. Additionally, longitudinal studies could be conducted to assess the long-term impact of these practices on organizational outcomes. Expanding the sample to include diverse industries or geographical regions could also provide broader insights into the generalizability of the findings. Finally, qualitative research could further clarify the moderating role of culture in this relationship a different approach would certainly provide new depth and understanding of these complex relationships.

References

1. Green, Kenneth & Zelbst, Pamela & Meacham, Jeramy & Bhadauria, Vikram. (2012). Green supply chain management practices: Impact on performance. Supply Chain Management: An International Journal. 17. 290-305. 10.1108/13598541211227126.

2. Khan S., Rashid A., Rasheed R., Amirah N. A. (2022). Designing a knowledge-based system (KBS) to study consumer purchase intention: The impact of digital influencers in Pakistan.

3. Purba Rao, Diane Holt (2005). Do green supply chains lead to competitiveness and economic performance? International Journal of Operations & Production Management ISSN: 0144-3577

4. Zhu, Q. and Sarkis, J. (2004) Relationships between Operational Practices and Performance among Early Adopters of Green Supply Chain Management Practices in Chinese Manufacturing Enterprises. Journal of Operations Management, 22, 265-289.
http://dx.doi.org/10.1016/j.jom.2004.01.005

5. Sarkis, Joseph. (2020). Supply chain sustainability: learning from the COVID-19 pandemic. International Journal of Operations &

Production Management. ahead-of-print. 10.1108/IJOPM-08-2020-0568.

6. Weeratunge, R.A.D. Dillanjani & Herath, Renuka. (2019). THE DIMENSIONS OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES. 56-65. 10.17501/24246697.2018.4106.

7. Chiarini, A., Baccarani, C. and Mascherpa, V. (2018) Lean Production, Toyota Production System and Kaizen Philosophy: A Conceptual Analysis from the Perspective of Zen Buddhism. The TQM Journal, 30, 425-438.

8. Wajdan Ahmed Khan, Dr. Muhammad Arif Khattak, Yaver Kundi, & Paghunda Khan. (2024). Impact of Green HRM Practices on Business Performance of Employees with Mediating Role of Environmental Performance in Telecommunication Sector of Twin Cities. *Bulletin of Management Review*, *1*(4), 92–125. Retrieved from https://bulletinofmanagement.com/index.php/Journal/article/view/65

https://doi.org/10.1108/TQM-12-2017-0178

9. Bovea, María & Pérez-Belis, V.. (2018). Identifying design guidelines to meet the circular economy principles: A case study on electric and electronic equipment. Journal of Environmental Management. 228. 10.1016/j.jenvman.2018.08.014.

10. Faludi, J., HoffensonS, S., Kwok, S. Y., Saidani, M., Hallstedt, S. I., Telenko, C., & Martinez, V. (2020). A Research Roadmap for Sustainable Design Methods and Tools. *Sustainability*, *12*(19), 8174. https://doi.org/10.3390/su12198174

11. Khan, S. A. R., Razzaq, A., Yu, Z., & Miller, S. (2022). Industry 4.0 and circular economy practices: A strategic alignment framework for supply chain sustainability. Business Strategy and the Environment, 31(4), 1248-1269. https://doi.org/10.1002/bse.2952

12. Dubey, Rameshwar & Gunasekaran, Angappa & Childe,

Stephen & Fosso Wamba, Samuel & Roubaud, David & Foropon, Cyril. (2019). Empirical investigation of data analytics capability and organizational flexibility as complements to supply chain resilience. International Journal of Production Research. 59. 10.1080/00207543.2019.1582820.

13. Mahmure Övül Arıoğlu Akan, Dileep G. Dhavale, Joseph Sarkis, Greenhouse gas emissions in the construction industry: An analysis and evaluation of a concrete supply chain, Journal of Cleaner Production, Volume 167, 2017, Pages 1195-1207, ISSN 0959-6526,

a. https://doi.org/10.1016/j.jclepro.2017.07.225.

14. Jabbour, Charbel & Mauricio, André & Jabbour, Ana. (2017). Critical success factors and green supply chain management proactivity: shedding light on the human aspects of this relationship based on cases from the Brazilian industry. Production Planning & Control. 28. 671-683. 10.1080/09537287.2017.1309705.

15. Jamal Elbaz, Saadia Iddik. Culture and green supply chain management (GSCM): A systematic literature review and a proposal of a model. Management of Environmental Quality ISSN: 1477-7835

16. Syed Abdul Rehman Khan, Qianli Dong. The Environmental Supply Chain Management and the Companies' Sustainable Development. **DOI** 10.2991/icsshe-17.2017.32

17. Afzal, N., & Hanif, A. (2022). The Impact of Green Supply Chain Management Practices on Firm Performance: Evidence from Manufacturing Industry. Global Business Review, 0(0). https://doi.org/10.1177/09721509221125576

18. Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. Journal of Management, 17(1), 99-120. https://doi.org/10.1177/014920639101700108

19. Srivastava, Samir. (2007). Green Supply Chain Management: A State-of-The-Art Literature Review. International Journal of

Management Reviews. 9. 53 - 80. 10.1111/j.1468-2370.2007.00202.x.

20. Beamon, B.M. (1999) Measuring Supply Chain Performance. International Journal of Operations & Production Management, 19, 275-292. https://doi.org/10.1108/01443579910249714

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

22. Appolloni, Andrea & Sun, Hui & Jia, Fu & Li, Xiaomei. (2014). Green procurement in the Private Sector: A State of the Art Review between 1996 and 2013. Journal of Cleaner Production. 10.1016/j.jclepro.2014.08.106.

23. Ademulegun, & Adebambo, & Olusegun, Adebambo & Alabi,. (2022). Effect of Eco-Design on the Performance of Nigerian Bottling Company. 1. 2454-6186.

24. Effect of Eco-design Practices on the Performance of Manufacturing Firms in Mombasa County, Kenya

a. Swalehe Rehema Wakulele, Stephen Odock, Bellah Chepkulei, Nyile Erastus Kiswili. International Journal of Business and Social Science. ISSN 2219-1933 (Print), 2219-6021 (Online)DOI: 10.30845/ijbss

25. Seman, Noor. (2012). Green Supply Chain Management: A Review and Research Direction. International Journal of Managing Value and Supply Chains. 3. 1-18. 10.5121/ijmvsc.2012.3101.

26. Diab, Salah & Albourini, Faisal & Abu Rumman, Asad. (2024). The Impact of Green Supply Chain Management Practices on Organizational Performance: A Study of Jordanian Food Industries. Journal of Management and Sustainability. 5. 149-149. 10.5539/jms.v5n1p149.

27. Utomo, Alghani & Tanuwijaya, Justine & Gunawan, Andreas.

(2024). The Influence of Organizational Culture on Organizational Performance with Organizational Commitment and Leadership as Mediation. Journal La Sociale. 5. 531-538. 10.37899/journal-la-sociale.v5i2.1114.

28. Jabbour, Charbel & Jabbour, Ana. (2015). Green Human Resource Management and Green Supply Chain Management: Linking two emerging agendas. Journal of Cleaner Production. 112. 10.1016/j.jclepro.2015.01.052.

29. Yasir Ahmed Solangi, Du Jianguo. Examining challenges and solutions for environmental and natural resource management with a focus on mineral resources. Resources Policy, Volume 86, Part A, 2023, 104085, ISSN 0301-4207. https://doi.org/10.1016/j.resourpol.2023.104085.

30. Akhtar, P. (2019). Drivers of Green Supply Chain Initiatives and their Impact on Economic Performance of Firms: Evidence from Pakistan's Manufacturing Sector. *Journal of Competitiveness*.

31. Panigrahi, Rashmi Ranjan & Meher, J. Ranjan & Shrivastava, Avinash & Patel, Gokulananda & Jena, Lalatendu. (2022). Operational performance entitling the knowledge of inventory management practices on business performance: A mediational study. Global Knowledge Memory and Communication. 71. 10.1108/GKMC-07-2022-0177.

32. Bititci, Umit & Bourne, Mike & Cross, Jennifer & Nudurupati, Sai & Sang, Kate. (2015). Towards a Theoretical Foundation for Performance Measurement and Management. International Journal of Management Reviews. 17. 534-536. 10.1111/ijmr.12086.

33. Sanjay Sharma, Sachin Modgil. QM, SCM and operational performance: an empirical study of Indian pharmaceutical industry. Business Process Management Journal ISSN: 1463-7154

34. Rajan, Aruna. (2012). Operational Performance and Customer Satisfaction: An Integrated Approach to Analyzing Inter-

relationships. 165-171. 10.1109/SRII.2012.28.

35. Gomaa Agag, Baseer Ali Durrani, Yasser Moustafa Shehawy, Majed Alharthi, Hawazen Alamoudi, Sherif El-Halaby, Ahmed Hassanein, Ziad H. Abdelmoety, Understanding the link between customer feedback metrics and firm performance,Journal of Retailing and Consumer Services, Volume 73, 2023, 103301, ISSN 0969-6989, https://doi.org/10.1016/j.jretconser. 2023.103301.

36. Mookerjee, Joydeep & Rao, O R S. (2021). A Review of the Impact of Disruptive Innovations on Markets and Business Performance of Players. International Journal of Grid and Distributed Computing. Vol. 14. 605-630.

37. Teece, David. (2017). Business models and dynamic capabilities. Long Range Planning. 51. 10.1016/j.lrp.2017.06.007.

38. Vachon, Stephan & Klassen, Robert. (2006). Extending Green Practices Across the Supply Chain: The Impact of Upstream and Downstream Integration. International Journal of Operations & Production Management. 26. 795-821. 10.1108/01443570610672248.

39. Arwa Mukhtar, Awanis Romli, Mansoor Abdullateef and Hael Al-bashiri. Environmental Risks in Supply Chain: Recommendations and Directions for Future Research. **DOI** 10.1088/1757-899X/551/1/012034

40. Dandan Wu, Hao Ding, Yang Cheng. How does environmental policy affect operations and supply chain management: A literature review, Computers & Industrial Engineering, Volume 197, 2024, 110580, ISSN 0360-8352, https://doi.org/10.1016/j.cie.2024.110580.

41. Paul Knight, James O. Jenkins, Adopting and applying eco-design techniques: a practitioners perspective, Journal of Cleaner Production, Volume 17, Issue 5, 2009, Pages 549-558, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2008.10.002.

42. Jingjing Li, Yongjian Li, Chunxing Fan. A performance evaluation system for product eco-design in the fashion supply chain. Journal of Cleaner Production, Volume 440, 2024, 140716. ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2024.140716.

43. Molina-Besch, K., Wikström, F. & Williams, H. The environmental impact of packaging in food supply chains—does life cycle assessment of food provide the full picture?. Int J Life Cycle Assess 24, 37–50 (2019). https://doi.org/10.1007/s11367-018-1500-6

44. Li, Jingjing & Sarkis, Joseph. (2021). Product eco-design practice in green supply chain management: a China-global examination of research. Nankai Business Review International. ahead-of-print. 10.1108/NBRI-02-2021-0006.

45. Li, Y., Tan, K. H., & Ji, G. (2014). Eco-design and its influence on manufacturing performance: a case study in the automotive industry. Journal of Cleaner Production, 66, 438-449

46. Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green Supply Chain Management in China: Pressures, Practices and Performance. International Journal of Operations & Production Management, 25, 449-468 https://doi.org/10.1108/01443570510593148

47. Khan, Syed & Yu, Zhang & Farooq, Khalid. (2022). Green capabilities, green purchasing, and triple bottom line performance: Leading toward environmental sustainability. Business Strategy and the Environment. 10.1002/bse.3234.

48. Alessa Kozuch, Maurice Langen, Christian von Deimling, Michael Ebig. Does green procurement pay off? Assessing the practice–performance link employing meta-analysis. Journal of Cleaner Production, Volume 434, 2024, 140184, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2023.140184.

49. Singh, Pratik & Chan, Shiau Wei. (2022). The Impact of Electronic Procurement Adoption on Green Procurement towards

Sustainable Supply Chain Performance-Evidence from Malaysian ISO Organizations. Journal of Open Innovation: Technology, Market, and Complexity. 8. 61. 10.3390/joitmc8020061.

50. Ngunjiri, Elijah. (2018). Evaluation of Factors Affecting Implementation of Green Public Procurement Governments in Laikipia County Government, Kenya.. Intern. Journal of Profess. Bus. Review. 4. 91. 10.26668/businessreview/2019.v4i1.91.

51. Song, Hua & Yu, Kangkang & Zhang, Songbo. (2017). Green procurement, stakeholder satisfaction & operational performance. The International Journal of Logistics Management. 28. 00-00. 10.1108/IJLM-12-2015-0234.

52. Ackah David, Suzzy Krist Addo, Isaac Kofi Yornu. Effect Of Green Procurement Practices on Financial Performance. African Journal of Procurement, Logistics & Supply Chain Management 2024, 7(8): 13-40 Open Access Articles Distributed in terms of the Creative Commons Attribution. ORCID: https://orcid.org/0000-0002-5709-4787

53. Ikramuddin Junejo, Muhammad Sufyan Ramish, Ume Amen, Dr. Zahra Nazim, Sumera Kaz. Navigating Sustainability: The Role of Green Purchasing and E-Sourcing in Transforming Supplier Relationships for Environmental Performance in SMEs of developing country. Pakistan Journal of Life and Social Sciences, 2025 www.pjlss.edu.pk https://doi.org/10.57239/PJLSS-2025-23.1.0028

54. Mahrukh Saqib 2024. Impact of green manufacturing, green purchasing, and eco-design on organizational performance in the FMCG sector of Pakistan. South Asian Journal of Operations and Logistics https://doi.org/10.57044/SAJOL.2024.3.1.2450

55. Seher naz 2023. The Impact of Green Manufacturing Practices on The Performance of Textile Firms in Pakistan with A Mediating Role of Just-In-Time & Total Quality Management. International

Review of Management and Business Research 10.30543/12-1(2023)-2

56. Tulcanaza-Prieto, A. B., Aguilar-Rodríguez, I. E., & Artieda, C. (2021). Organizational Culture and Corporate Performance in the Ecuadorian Environment. *Administrative Sciences*, *11*(4), 132. https://doi.org/10.3390/admsci11040132

57. Shahzad, Fakhar & Luqman, Adeel & Khan, Ayesha & Shabbir, Lalarukh. (2012). Impact of Organizational Culture on Organizational Performance: An Overview. 3. 975-985.

58. Lukáš Copuš, Helena Šajgalíková, Emil Wojčák. Organizational Culture and its Motivational Potential in Manufacturing Industry: Subculture Perspective. Procedia Manufacturing, Volume 32, 2019, Pages 360-367, ISSN 2351-9789. https://doi.org/10.1016/j.promfg.2019.02.226.

59. Imran, Muhammad & Ismail, Fadillah & Hussain, Khawar & Zeb, Faheem. (2021). Job Satisfaction and Organizational Performance: Empirical Evidence from Pakistan's Banking sector. 10.46254/SA02.20210622.

60. Miska, Christof & Szőcs, Ilona & Schiffinger, Michael. (2017). Culture's effects on corporate sustainability practices: A multi-domain and multi-level view. Journal of World Business. 53. 10.1016/j.jwb.2017.12.001.

61. Sadia Iddik (2024). The role of cultural factors in green supply chain management practices: a conceptual framework and an empirical investigation. RAUSP Management Journal ISSN: 2531-0488

62. Gutterman, Alan. (2020). Organizational Culture and Sustainability.

63. Mangakane Johanna Lunga, David Pooe (2024). Organisational culture and institutionalization of green supply chain management. **International Journal of Business Ecosystem**

& Strategy (2687-2293) Vol. 6 No. 4 (2024): Special Issue

64. Jamal Elbaz, Sadia Iddik, and Mohamed Oubal, (2021). The effects of Cultural factors on GSCM implementation, Empirical evidence from Morocco. Volume 119, 2021 3rd International Conference on Quantitative and Qualitative Methods for Social Sciences. https://doi.org/10.1051/shsconf/202111903002

65. Imran, Muhammad & Gao, Jingzu. (2022). Green Organizational Culture, Organizational Performance, Green Innovation, Environmental Performance: A Mediation-Moderation Model. Journal of Asia-Pacific Business. 23. 1-22. 10.1080/10599231.2022.2072493.

66. Fatoki, O. (2021). Environmental Orientation and Green Competitive Advantage of Hospitality Firms in South Africa: Mediating Effect of Green Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(4), 223. https://doi.org/10.3390/joitmc7040223

67. Ababneh, Omar. (2020). The impact of organizational culture archetypes on quality performance and total quality management: the role of employee engagement and individual values. International Journal of Quality & Reliability Management. ahead-of-print. 10.1108/IJQRM-05-2020-0178.

68. Hartnell, Chad & Ou, Amy & Kinicki, Angelo & Choi, Dongwon & Karam, Elizabeth. (2019). A Meta-Analytic Test of Organizational Culture's Association With Elements of an Organization's System and Its Relative Predictive Validity on Organizational Outcomes. Journal of Applied Psychology. 104. 10.1037/apl0000380.

69. Elgaraihy, Wael & Badawi, Usama & Seddik, Walid & Torky, Mohamed. (2022). Investigating Performance Outcomes under Institutional Pressures and Environmental Orientation Motivated Green Supply Chain Management Practices. Sustainability. 14. 1523. 10.3390/su14031523.

70. Mailani, Desi & Hulu, Margareth & Simamora, Mikhael & Kesuma, Sambas. (2024). Resource-Based View Theory to Achieve a Sustainable Competitive Advantage of the Firm: Systematic Literature Review. International Journal of Entrepreneurship and Sustainability Studies. 4. 1-15. 10.31098/ijeass.v4i1.2002.

71. Azhar Ud Din, Yang Yang, Rui Yan, An Wei, Majid Ali. Growing success with sustainability: The influence of green HRM, innovation, and competitive advantage on environmental performance in the manufacturing industry, Heliyon, Volume 10, Issue 10, 2024, e30855, ISSN 2405-8440, https://doi.org/10.1016/j.heliyon.2024.e30855.

72. Yildiz Cankaya, S. and Sezen, B. (2019) Effects of Green Supply Chain Management Practices on Sustainability Performance. Journal of Manufacturing Technology Management, 30, 98-121. https://doi.org/10.1108/JMTM-03-2018-0099

73. Hart, Stuart & Dowell, Glen. (2011). A Natural-Resource-Based View of the Firm: Fifteen Years After. Journal of Management - J MANAGE. 37. 1464-1479. 10.1177/0149206310390219.

74. Creswell, J.W. and Creswell, J.D. (2023) Research Design: Qualitative, Quantitative and Mixed Methods Approaches. Sage Publications Ltd.

75. Sekaran, U., & Bougie, R. (2019). Research Methods for Business: A Skill Building Approach. John Wiley & Sons.

76. Becerra Muñoz, Pablo & Mula, Josefa & Sanchis, Raquel. (2021). Green supply chain quantitative models for sustainable inventory management: A review. Journal of Cleaner Production. 328. 129544. 10.1016/j.jclepro.2021.129544.

77. Saunders, Mark & Lewis, Philip & Thornhill, Adrian & Bristow, Alex. (2019). "Research Methods for Business Students" Chapter 4: Understanding research philosophy and approaches to theory development.

78. Creswell. J.W. and Creswell, J.D. (2017) Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th Edition, Sage, Newbury Park.

79. Rezaei, Ali. (2019). The impact of perceived organisational support and organisational citizenship behaviour on turnover intention: An empirical investigation. International Journal of Applied Management Science. 11. 153. 10.1504/IJAMS.2019.098822.

80. Nulkar, Gurudas. (2014). SMEs and Environmental Performance – A Framework for Green Business Strategies. Procedia - Social and Behavioral Sciences. 133. 130–140. 10.1016/j.sbspro.2014.04.177.

81. Bernstein, William & Ramanujan, Devarajan & Zhao, Fu & Cox, Monica & Ramani, Karthik. (2012). Teaching Design for Environment through Critique within a Product-Based Product Design Course. International Journal of Engineering Education. 28.

82. Franzén, O., & Guo, L. (2021). Implementation Of Eco-Design In Product Development : Knowledge management for effective eco-design implementation(Dissertation). Retrieved from https://urn.kb.se/resolve?urn=urn:nbn:se:hj:diva-53541

83. Wiguna, I & Rachmawati, Farida & Rohman, Mohammad & Setyaning, Larashati. (2021). A framework for green supply chain management in construction sector: A case study in Indonesia. Journal of Industrial Engineering and Management. 14. 788. 10.3926/jiem.3465.

84. Setyaning, L & Wiguna, I & Rachmawati, Farida. (2020). Developing activities of green design, green purchasing, and green transportation as the part of green supply chain management in construction sector. IOP Conference Series: Materials Science and Engineering. 930. 012001. 10.1088/1757-899X/930/1/012001.

85. Guzman, Gonzalo & Mojica Carrillo, Elena & Castro, Sandra. (2021). Green supply chain management and firm performance in

the automotive industry. Cuadernos de Administración. 34. 10.11144/Javeriana.cao34.gscmf.

86. Aldoghan, Mohammed & Pandiyan, Veera & Kaliani Sundram, Veera Pandiyan. (2023). Organization operational efficiency and Innovativeness: Exploring the role of employees' task-based training, operational task commitment, operational engagement, and supervisor support. 11. 108-127. 10.46970/2022.29.1.7.

87. Cheng, T. C. E. & Choy, Petrus. (2013). A study of the relationships between quality management practices and organizational performance in the shipping industry. Maritime Economics & Logistics. 15. 10.1057/mel.2012.19.

88. Thuan, Pham & Nguyen Vinh, Khuong & Anh, Nguyen & Hanh, Nguyen & Thi, Vo & Tram, Tieu & Han, Chu. (2022). The Determinants of the Usage of Accounting Information Systems toward Operational Efficiency in Industrial Revolution 4.0: Evidence from an Emerging Economy. Economies. 10. 83. 10.3390/economies10040083.

89. Aggarwal, Priyanka & Agarwala, Tanuja. (2021). Green Organizational Culture: An Exploration of Dimensions. Global Business Review. 097215092110498. 10.1177/09721509211049890.

90. Suvacı, Bahar. (2018). The Impact of Organizational Culture on Employees' Protean and Boundaryless Career Attitudes: An Empirical Study of the Banking Sector in Turkey. J. of Business and Management. 24. 10.1504/JBM.2018.141260.