

ANALYZING MANUFACTURING FIRM'S PERFORMANCE THROUGH GREEN SUPPLY CHAIN MANAGEMENT PRACTICE. A MODERATING EFFECT OF INSTITUTIONAL PRESSURE IN PAKISTAN MANUFACTURING FIRMS

Muhammad Absar Khurram^{*1}, SH. M. Fakhr-e-Alam Siddiqui²

^{*1}MBA Supply Chain Management, Seat No: E23454003367, Enrolment No: MAS/DBA/EP-29606/2023, Karachi University Business School, University of Karachi

²Assistant Professor, Faculty of Business Administration Karachi University Business School, University of Karachi

^{*1}mabsar759@gmail.com, ²fakhrealam@uok.edu.pk

Corresponding Author: * Muhammad Absar Khurram

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ABSTRACT

This research seeks to investigate the relationship between GSCM practices and the manufacturing firms' operational performance; with institutional pressure as the mediating factor. The research used a quantitative approach and utilized structured questionnaire surveys to take perception from professionals working in the manufacturing industry of Pakistan. A total of 250 participants were approached for the survey. However, only 150 participants provided responses. PLS-SEM model used to analyse the collected responses via Smart Pls. The study highlights that Green Supply Chain Planning (GSCP) provides a substantial boost to the operational performance and shows the way of environmental sustainability and necessary efficiency. On the other hand, Green Procurement (GPR) has negative and weak correlation with operational performance which depicts the problems in its implementation. The study identified institutional pressures as one of the key factors affecting operations performance, and stressed the role of external initiatives including legislation and norms. Conversely, the major study revealed the insignificance of institutional pressure on the proposed relationship between GSCM practices and operational performance hence the need for other forms of reinforcement. The study further emphasizes on incorporating sustainability within supply chains and has several policy and managerial implications. Further studies may consider investigating the GSCM adoption in particular sectors over time, beyond the intermediate future, and the utilization of superior technologies to enhance sustainability performances within manufacturing companies.

Keywords: Green supply chain management, Operational performance, Institutional Pressure, Green procurement, Manufacturing Industry, Sustainability, Pakistan.

INTRODUCTION Background

Pakistan manufacturing sector remains one of the key sectors and occupies a large part of the economy because it contributes 12.4% to the GDP and employs around 16 employees in the country. Although it is one of the growing economic sectors, this sector has remained a centre of several environmental issues such as: greenhouse emissions, waste, and resource management among others. Current official statistics indicate that the industrial sector accounts for about 21.3 percent of the nation's



overall greenhouse gas emissions, while solar irradiation, poor waste management, and outdated technologies continue to harm the environment in Pakistan, as mentioned in the Pakistan Economic Survey 2022-2023. With world affairs growing more conscious of the effects of climate change, manufacturing firms in Pakistan are under great pressure to make sustainable choices that address the economy as well as the environment.

Other supply chain activities like green supply chain planning, and green procurement have been studied and proposed as strategies for enhancing the green supply chain performance. For example, green purchasing guarantees purchases of environmentally friendly products, and supply chain management helps to design measures by which supply chain processes may be made more effective and efficient with a reduced impact on the environment. But, the enforcement of GSCM exercises in Pakistan is still in its infancy due to poor awareness, constrained resources and weak compliance with environmental standards. Internal pressures including government policies, market forces, and the community force firms to practice sustainability. For instance, following the provisions of the Paris Climate Accord, the industries in Pakistan have been forced to come up with a Maximal emission cut of 20% by the year 2030.

Taking into account the growing attention to the influence of the external environment, Pakistani manufacturing firms should adapt the mission and supply chain management to the primary organizational objectives of sustainable development. This transformation is especially driven by institutional pressure as a moderating factor. Through emerging green supply chain management (GSCM) practices, firms are not only able to conform to the regulatory policies and measures that have been put in place but also realize cost advantages and greater operational efficiencies, and competitive advantage within the domestic as well as international markets.

Research Objectives

Following are the main objectives for this research:

• To review the influence of GSCM practices on operational performance of manufacturing industries.

- To evaluate the impact of green supply chain management and green procurement on operational performance of Pakistan manufacturing industries.
- To assess the moderating effect of institutional pressure on GSCM practices and green procurement.
- To recommend future strategies to enhance GSCM practices within manufacturing industries.

Research Question

- How GSCM practices affect the operational performance?
- How institutional pressures affect this relationship while giving the direction of sustainable growth to the manufacturing sector of Pakistan?

Pakistan's industrial size and manufacturing growth in the past few decades has greatly boosted its economy but it poses great dangers to the environment. Pakistan is ranked among the ten most exposed countries to the impacts of climate change in the world. Every environmental problem which is in existence today is made worse in Pakistan, including air pollution, poor management of waste, and polluted water. While sustainability is going global and Pakistan also the Paris Climate Accord, signed the implementation and applicability of GSCM is quite variable in manufacturing sectors. This inconsistency affects the country's industrial development and its concern for the environment. Supply chain practices such as; Green Supply Chain Management planning and green supply chain procurement are some of the specific ways that positively address environmental concerns and increase organizational effectiveness. Thus, despite their general effectiveness, their application in Pakistan hampered by factors including low awareness, high initial investment costs, the absence of green suppliers, and inadequate regulation of environmental policies. There is evidence that relates the level of implementation of these practices to institutional pressures including government mandates and citizen perceptions as well as competitive forces. However, there is a lack of prior research that investigates the mediating role of these pressures with respect to the association of GSCM practices and operational performance.



Significance of Research

This research responds to the growing literature gap by investigating the effects of GSCM practices on operational performance in Pakistani manufacturing firms and how institutional pressures mediate this relationship. Thus, the research will compare this trend in order to define how firms overcome existing limitations and gain desired outcomes for both environmental and economic goals. This research will offer specific recommendations concerning future strategies to managers, policymakers, and other stakeholders to promote sustainable industrial development in Pakistan.

This research is important given that the manufacturing sector in Pakistan is one of the largest not only in-growing the economy but also contributing to environmental pollution, the topic of Green Supply Chain Management (GSCM) has remained one of the least explored areas. This paper fills this gap by analysing the effects of green supply chain planning and green procurement on the operational performance, under the influence of institutional pressures, to offer valuable propositions for overcoming the barriers to adoption. The research's outcome will help the firms in improving the sustainability level by implementing the recommendations of this study will provide the useful insights to policymakers about the regulatory measures to improve the sustainability level in Pakistan and will also fill the gaps in the GSCM literature in the developing country context of Pakistan to support sustainable industrial upliftment.

Literature Review

Literature review is an important component of the research which entails the major components of the study. This study has intended to compile the previous studies performed in this section for identification and analysis of the impact of Green Supply Chain Management (GSCM) practices on operational performance and the importance of institutional pressures towards GSCM performance for manufacturing firms. At the same time, this literature review also justifies the research question and shows the existing literature, which this research aims to address.

Green Supply Chain Management (GSCM)

Green Supply Chain Management (GSCM) is defined as the environmental factor incorporation into the supply chain management in order to attain optimum and effective supply chain strategies with less environmental impact or none at all in the long-run supply chain processes (Rasit et al., 2019). In fact, GSCM can be seen as a comprehensive framework to deploy green purchasing, green production, environmental product or green design, reverse logistics, and green procurement (Letunovska et al., 2023).

Green Supply Chain Planning (GSCP)

Among several GSCM constructs, Green Supply Chain Planning (GSCP) is one of the most essential for it addresses environmental issues within all the supply chain stages, including procurement of materials, product development, and delivery (Hassan et al., 2016). GSCP drives down the usage of the resource, cuts waste and improves the effectiveness of production systems. Reducing wastage and promoting efficient use of and consequently resources, decreasing environmental pollution all contribute to operational performance, as rightly (Emon, 2024). The green supply chain planning assists the firms to integrate their production plans to corporate environmental objectives as а way of implementing the cost reduction, waste elimination and improving the production capacity (Saeed et al., 2018). Leonidou et al. (2017) posit that firms which pursue green planning practices as a strategic initiative often improved operational efficiency cuts including that of energy, water and material use. Most of these outcomes not only lead to increased environmental performance but also increase costs and productivity.

Green Procurement

Another most important aspect of GSCM is green procurement which identifies materials and products from green suppliers or approved suppliers. Green Procurement aims at making the supply chain always green, which contributes to the overall emissions and helps to improve environmental performance (Huo et al., 219). In their study, Al-Ma'aitah (2018) established that environmental and financial performance improves because green procurement promotes greener practices among suppliers and reduces resource use. Green procurement does not only



cut down waste and optimize availability of resources but also works towards improving organization operational performance through partnerships with suppliers who embrace environmentally friendly practices (Balon, 2020). According to Khan et al. (2022), green procurement helps firms' lower material costs, decreases the expenditure on waste disposal and minimizes the frequency for reprocessing, thus improving both environmental and financial performances. In Pakistani manufacturing context, green procurement practices observation is not focused by these studies.

Operational Performance

With regard to operational functionality, operational performance refers to the optimizing of internal production processes in a firm with respect to issues such as time, cost, and resource usage and waste (Abdallah & Al-Ghwayeen, 2020). Recent research work has established a positive relationship between GSCM practices and operating performance. (Porter & Van der Linde 1995) have established that those developing environmental management strategies and practices not only lower cost significantly but firm competitiveness and also enhance performance. For the purpose of green procurement, the costs of material acquisition are generally lower yet firms are capable of manufacturing in an environmentally friendly manner hence cutting costs in production (Mitra & Datta, 2014).

The results also revealed that the measure of operational performance in manufacturing firms is highly and directly affected by the efficiency of supply chain management. Gandhi (2017) identified that firms which invest in green technologies and green supply chain practices gain improved operational performance in terms of efficiency, waste and resource management. Companies that have endorsed eco-design, green manufacturing as well as green purchase get the chances to overcome both the menace of cost cutting and green conformance hence averting an unfavourable fate on their operations (Yu, Zhang & Huo, 2021).

Institutional Pressures and Their Moderating Role

According to institutional theory, organizations comply with certain pressures that normally dictate their pattern of operations. They are legal requirements (coercive pressures), professional expectations (normative pressures) and competitors' pressure to act like them (mimetic pressures) (DiMaggio & Powell, 1983; cited in Huq & Stevenson, 2020). The pressures from institutions in the implementation of Green Supply Chain Management (GSCM) practices are still limited in the literature (Chu et al., 2017).

Prior research on GSCM has found little empirical evidence on the moderating role of institutional pressure to explain GSCM practices dimension (Ahmad et al., 2022). GSCM practices are expected to increase, while institutional pressure decreases to influence the environmental and financial results of a company successfully. Specifically, the adoption stage discussed here has not been covered adequately in a consolidated theoretical framework. Pakistan manufacturing sector has been a less explored area in GSCM research literature despite being a sector which contributes to about 7% of carbon emissions in 2012 as depicted in Figure 1 (Rasheed et al., 2022).







for Mandatory requirement environmental compliance is exerted through regulations and laws which force organizations into achieving environmental goals. For example, Pakistan legislation for anti- green standards requires manufacturing industries to adhere to sustainable regulation of green procurement and reduction of emission (Sial et al., 2018). Ahmad et al. (2022) claimed that complexity of regulatory compliance results in positive impact on operational performance through better resource efficiency and waste reduction. However, the effectiveness depends on the extent to which the enforcement pressures are stringent and how far the firms are ready to incur the cost of compliance.

Exogenous pressures are derived from the community expectations, professional prescriptions, and expectations from organizational stakeholders. These pressures compel the organizations to respond positively for sustainable practices that create legitimacy and reputation (Belay et al., 2023). As for vulnerability, some sectors are quite receptive and therefore their failure to embrace GSCM practices relationship based on the narrative accounts obtained from this study and prior literature, Dubey et al. (2015) both formal and informal pressures enhance cooperation with suppliers on environmental issues that lead to optimum utilization resource and organizational performance.

Institutional pressures exert pressure on firms to imitate competitors who effectively put in place GSCM practices (Saeed et al., 2018). In unstable conditions, such imitation minimizes risks for firms and brings them into compliance with norms set by the industry. For instance, Pakistan based manufacturing firms embracing green procurement usually follow industry leaders to establish their sustainability in the market and also gain high performance rates. On one hand this leads to increased usage, but on the other 'a race to the bottom' can be dangerous and can lead to firms following the guidelines but not the spirit of them (Shabbir & Kassim, 2018).

Institutional pressures are found to play a moderating influence on the GSCM practices with a consideration of their successes. For instance, Wu et al. (2012) notes that high institutional pressures increase the positive relationship between green practices and operational performance (Ahmed, Najmi, &

Khan, 2020). In the case of normative and mimetic pressures, organizations are forced to achieve higher levels of innovation and efficiency that are not guaranteed by coercive pressures. However, it is worth mentioning that low pressures may also produce inconsistency of the approach being applied and that is where the potential might be restricted (Dos Santos et al., 2020). For instance, developing countries like Pakistan where regulatory compliance may not be effectively implemented; businesses experiencing high institutional pressures displayed superior operating and environmental performance (Nazir et al., 2024). This is apparent in industries explaining how they attend to international benchmark standards like the ISO 14001 certification that enhances effectiveness and market accessibility. Hence, institutional pressures cause variance on the rate of GSCM adoption in manufactured firms in the analysis conducted in prior works.

Green Supply Chain Management Practices and Firm Performance:

Implementation of green practices in the supply chain planning enhances ecological as well as financial performance contributing towards competitive advantage (Yang et al., 2019). Even though organizational initiatives like green packaging, design, and logistics offer more costs during implementation; they often come with lower costs in the long run (Lee, 2020). Nevertheless, there is some uncertainty about the nature of GSCM practice and economic impact, specifically as to the precise details of the connection between the two.

Green Supply Chain Management (GSCM) has emerged as one of the fundamental strategies for sustainable business worldwide, that increases organizational efficiency through supply chain environmentalism. In the developed countries the GSCM is applied due to legal requirements and market forces promoting sustainable activities that show positive impacts on organizational performance, cost reduction and environmental effectiveness (Malviya, Kant & Gupta, 2018). For instance, the European Union based firms acknowledge improved waste cutting by 10-30% through measures like environmental purchasing and reverse logistics (European Parliament, 2024). Likewise in the US, firms that have embraced practices like the eco-design GSCM and



investment recovery have increased resource utilization efficiency and cut Energy cost by technology and Innovative stakeholder engagement (Teoh et al., 2023). However, the emerging economies such as China and India integrate the GSCM to enable them to meet the culture of international trading and thus enhance the competitiveness of their countries. Through the practice of integrating green manufacturing systems, Chinese firms have made a 25% decrease in emissions and enhanced financial results for implementing the government's "Made in China 2025" strategy on sustainable manufacturing innovation. In the Indian context, the studies reveal that the GSCM practices in automobile and textile industry showcased a 10% improvement in both the supply chain agility and conformance to standards such as ISO 14001 (Akkemik & Yülek, 2020). Nevertheless, GSCM implementation in developing nations faces challenges because of poor compliance with environmental laws and resources. For example, Pakistani limited manufacturers implementing green practices due to institutional pressures cause improvement in operation efficiency, but face high initial costs of green operations and absence of green suppliers. This reminds us of the requirement of global regulations and motivators that help to reduce this gap between developed and developing countries in the exploitation of GSCM for superior organizational performance. Adopting GSCM, firms across the globe reveal customer satisfaction to enhance brand image and compliance to sustainability standards, providing a rationale for practicing GSCM to enhance longterm organizational performance (Khan et al., 2020). То enhance these opportunities, Multinational corporations and policy makers need to encourage integrated systems, green funding and industry specific measures so that the positives derived from GSCM can be effectively implemented across various economic systems.

Prior research has demonstrated that green supply planning can both improve the competitive advantage and decrease costs of making products, while preserving the environment. The metaanalysis has shown that green supply chain planning has a direct positive impact on content firm performance (Wang et al., 2023). This positive correlation between GSCP and manufacturing firms is affirmed by RBV and the TBL frameworks. RBV argues that the pursuit of environmentally sustainable planning practices constitutes a valued resource for achieving better efficiency and cost-effectiveness and for enhancing overall organizational performance (Nazir et al., 2024). Incorporating the TBL approach it is worth focusing on the relationship between economic, environmental and social performance. GSCP, as a concept closely linked to TBL, concerns environmental issues, which constitute the ecological component of the TBL framework. We can conclude that such an alignment can influence the performance of manufacturing firms in the sense of achieving the organizational goals while at the same time pursuing sustainable goals.

Green supply chain planning and organizational operational performance

GSCM has come to be seen as a feasible strategy to impact the environment and looked at to raise organizational capabilities. The issuance of GSCM has been dated back to the early 1990s; however, the concept exploded around the year 2000 primarily due to the rise in the number of related publications. Nowadays GSCM is considered crucial for organizations that strive to minimize erosion of environment and enhance the relations between customer and suppliers of green products. According to (Nazir et al., 2024). GSCM covers green purchasing, design for the environment, green manufacturing, green supply, and green recovery. While making decisions GSCM takes into account all the stages in material and logistics management together with post-consumer waste disposal. Following such a definition by Micheli et al. (2020), GSCM can be defined as the process through which thinking about the environment is incorporated into supply chain management, from the design of the product to the selection of materials, the production process, up to delivery of the final product to the consumer. Amid growing concerns about global environmental and social problems in the design, purchasing, manufacturing, delivery, consumption, regeneration, and disposal of products and services, rules, actions, and relationships to GSCM have emerged. It gives practical strategies for minimizing environmental effects on operations while improving operational effectiveness. Originally, supported by pollution, depletion of raw environmental materials, and escalating pollution levels, today, it



realized that GSCM has been enhances organizational performance. Given the increasing adoption of GSCM in various organizations, it is important to determine the effects of GSCM on both big and small firms (Wang et al., 2018). Although big companies have been quick to adopt environmental management strategies, SMEs also need to be assessed and become organizational with members to help environmental conservation for making the process more sustainable. Prior research has defined numerous dimensions of GSCM practices such as ecodesign, internal environmental management, green purchasing, investment recovery, customer reverse logistics, cooperation, green manufacturing, green information systems, supplier collaboration, and waste management. In the background of this study, we also present a literature review in which we propose the definitions of investment recovery, green information systems, and green purchasing (Gill et al., 2019). Therefore, the need for manufacturing organizations to develop operation modes that align with the corporate competitive modes because the operation function determines competitiveness (Hassan, 2024). Two examples of Manufacturing competitive priorities include product quality, process quality, effectiveness, productivity, and operational performance as defined as strategic business-level purposes that can be used by firms to determine how to compete in a particular market or market segment. However, there is the imperative of focusing mainly on the internal environment in order to sustain competitive advantage (David et al., 2024). Total manufacturing performance or operating performance which encompasses cost, time, delivery quality, and dependability of measurements are used in the assessment of manufacturing operations functions. In prior studies, authors have found that productivity cost, flexibility, and quality are possibly the most utilized indexes for evaluating operational performance (Saeed et al., 2018).

Green procurement and organization operational performance

Green procurement is part of the GSCM processes: it arrives at the list of suppliers that are sustainable and considers the condition when arriving at the choices. Of the green purchasing strategies some have been developed with the aim of envisioning positive change in supplier's environmental behaviour, because of certain attributes that are acknowledged to have market significance and that can potentially create value for increased market share (Rubab et al., 2024). Some earlier research has established that green procurement policies target firms' procurement management, waste management, sustainable performance, and firm image. Indeed, other empirical studies can confirm that green purchasing does affect performance, particularly of manufacturing organizations in terms of environmental vision and more significantly on technological sustainability. The RBV and the institutional theory are applied to set up the predicted relationship between the green the procurement and performance of manufacturing firms The RBV and institutional theory offers the explanation for the performance. RBV postulates that the environmentally friendly sourcing practices as constituting a valuable firm which enhances competitiveness. resource Paradigmatic with institutional theory, green procurement embraces the society set standards of environmental responsibility hence has legitimacy and reputation to create performance improvement (Shafique, Asghar & Rahman, 2017). GP includes choices like sourcing partners that align with an organization's environmental responsibility goals, encouraging the use of environmentally responsible inputs and operating firm environmental standards. Research to indicates that leads into effective incorporation of sustainability approaches within supply chains while avoiding wastage of resources.

Operational performance costmeans effectiveness, timely accomplishment, utilization of resources, and elimination or minimization of losses. As explained in prior research works, there is a positive link between GP practices and these performance indices. By implementing GP, many companies are able to realize a decreased usage of material, as well as, lower disposal costs. For the manufacturing example, in context green organizations that implemented procurement to experience decrease of costs of production of raw material usage and wastes. Resource Utilization: Sustainable input sourcing and a focus on operation efficiency is a key theme of green procurement initiatives. These changes, on average, result in efficiency gain of the resources utilized in firms that adopt GP practices.



Waste Reduction: This means through forming synergies with green partners, firms reduce the wastes in supply networks. These development initiatives have revealed that GP initiatives helped reducing the material wastage in the in manufacturing sector of Pakistan and this is the core evidence which demonstrates the capability of development. Regulatory Compliance: GP ensures that organizations are in conformity to the international sustainability standards like ISO 14001 thus helps minimize the penalty associated with noncompliance as well as helps in improving market reputation. Companies operating according to these standards have their operational reliability increased (Hashmi & Akram, 2021).

Nonetheless, implementing GP is not without its lit with perhaps even more significant problems emerging in developing economies. It has certain disadvantages: high first costs, limited availability of green suppliers, and others probably do not recognize its importance such as in Pakistan.

Theoretical Framework

Resource based view (RBV) theory

The Resource-Based View (RBV) holds the view that a firm's competitive advantage flows from the skills and assets widely considered valuable, rare, costly to imitate, and with no substitutes - the VRIN resources. In GSCM practices, it is assumed that practices such as green procurement, ecodesign, and reverse logistics as strategic assets that contribute to increased operational performance. These practices in the Pakistani manufacturing sector relate to the institutional pressures that are regulatory in nature, including formal requirements that organizations are mandated by to follow together with stakeholder law expectations of good corporate governance and translate these into operational competitive strategies. For instance, when GSCM is implemented under coercive pressures such as environmental laws, they form compliance and at the same time achieve cost savings through waste reduction and optimal resource utilization that corresponds with the VRIN framework.

But when one tries to adopt GSCM in Pakistan's manufacturing firms one faces the drawbacks of RBV if there are weak or inconsistent institutional pressures. While the application of RBV insists that internal resources are key to performance, the role of external factors such as governmental incentives or sets in the market are ignored. For instance, the majority of firms may be unable to devote sufficient capital to enable them realize the full benefits of GSCM, courtesy of the green technologies: this scenario calls for institutional intervention. Furthermore, mimetic pressures lead to imitation often, this results in firms engaging in a process of industry leaders meaning that when it comes to GSCM they just pay lip service instead of actually building new resources. while questioning RBV's assumption that tenants' superior and unique resources are other than sufficient to guarantee steady progress.

Institutional pressures are found to act as contingency factors that either enhance or reduce the effectiveness of GSCM practices on the manufacturing firms' performance within the RBV context. To force firms to promote green innovations, the external compliance pressures, push firms to change external compliance pressures into internal strengths including the supply chain efficiency and cost reduction. Normative and mimetic forces, on the other hand, promote collaboration and the sharing of knowledge in the organization, allowing firms to improve their operational performance to world class standards. For instance, the firms meeting the expectations of international buyers in Pakistan have described the positive changes in the financial as well as, environmental performance after going green by practicing green purchase and green manufacturing. However, the RBV framework is less insightful about the reciprocal of institution pressures and the firm's inner resource stock. However, in low regulation such as most regions in Pakistan, areas institutional pressures might not be strong enough to encourage firm adoption of GSCM thus constraining resources development and competitive edge. This gap means that whilst RBV provides a suitable context for understanding the connections between internal competencies and external conditions, the theory requires augmentation by institutional theory in order to be effective. A combination of these theories would provide a more plausible reason as to why some firms are successful or otherwise in their attempts at using GSCM practices to improve on performance in environments where regulatory compliance is lax or where green products have low market appe



Conceptual Framework



Hypothesis:

The study examines how GSCP along with GPR influences operational performance alongside institutional pressure in Pakistan's manufacturing industry. The findings in H1 and H2 demonstrate GSCP as well as GPR boost operational performance notably because sustainable initiatives lead to efficiency gains and cost efficiencies and competitive advantages. The study demonstrates how environmental programs generate favourable results for waste reduction and resource management according to established research.

The research examines how institutional pressure modifies green practice adoption in H3 while H4 studies this phenomenon. Business organizations follow sustainable procurement and supply chain strategies as institutions press them through requirements from regulations and market standards and stakeholder demands. High institutional pressure which modifies GSCP and GPR effects on operational performance demonstrates that organizations need external forces to encourage their adoption of green initiatives. Firms make environmental choices because regulatory standards compete with customer needs together with market competition. If the null hypothesis proves valid it demonstrates that institutional pressure does not substantially influence green practices used by Pakistan's manufacturing industry. Companies apparently make their own internal strategic decisions when adopting green initiatives because external pressures seem insufficient to support these programs. The analysis reveals necessary changes in green policies and enforcement measures.

H1=There is a significant impact of GSCP on organization operational performance.

H0=There is no significant impact of GSCP on organization operational performance.

H2= There is a significant impact of GPR (green procurement) on organisational performance.

H0=There is no significant impact of GPR (green procurement) on organization operational performance.

H3= There is a moderating impact of institutional pressure on GPR (green procurement) practices in Pakistan manufacturing industries.

H0=There is no moderating impact of institutional pressure on GPR (green procurement) practices in Pakistan manufacturing industries.

H3= There is a significant moderating impact of institutional pressure on GSCP practices in Pakistan manufacturing industries.

H0= There is no significant moderating impact of institutional pressure on GSCP practices in Pakistan manufacturing industries.

Literature Gap

Though several studies have investigated GSCM and its relationship to organisational performance of manufacturing sectors and there is a growing trend of research in this area, some important and noticeable research issues are still observed especially in the context of developing countries namely Pakistan. Indeed, usually, the extant literature concerning the effects of GSCM practices on the operational and environmental performance tends not to integrate the institutional complexity of pressures as mediators. For example, the enforcement pressures nearly universally motivate GSCM practices; the normative and mimetic pressures have significant and mixed impacts on the operations; however, little is known about their impacts in the specific context of the current state and market regulatory environment of Pakistan. There is inadequate evidence to support the exploration of weak environmental compliance and low normative pressures evident in Pakistan as factors that weaken the positive impact of GSCM. This leaves academics wondering how exactly firms can harness these factors for the achievement of higher levels of performance.

In addition, most prior works are centred on mediate linkages between GSCM practices and organizational performance, without considering technological constraint, financial issues and organizations impediments. For instance, the SMEs in Pakistan may not be in a position to afford eco-design, green purchasing, and green supply chains as these are among the most important factors where an operation may get efficiency in Pakistan. Even though the RBV gives the theoretical background of the competition advantage made from the GSCM, it vegetation to give enough consideration to outer enablers such as institutional pressures. This therefore poses a research gap whereby, RBV together with institutional theory should be blended to provide a framework that encompasses both internal resources and external forces that influence adoption of GSCM in the manufacturing sector.

The first gap obtained relates to sector-level investigation of institutional factors affecting GSCM practices and performance. Most of the current studies combine the data obtained from multiple fields without considering the barriers that distinct segments of the manufacturing industry experience. For example, two different industries such as; textile and pharmaceutical industries of Pakistan have different regulatory and market forces that pose barriers to sustainable practices adoption. This sectoral variability suggests the need for nuanced studies to turn up

best practices for improving the fortunes of GSCM. However, the subject of research exploring the long-run consequences of this business strategy for organizations' financial performance under different levels of institutional pressure remains largely unexplored, thus posing the question about whether or not the initial investments in GSCM and environmentenhancing policies can be fully recovered through improvements of organizational performance at a later stage. Future research should therefore look into these gaps pointing to the shortages of context-specific, longitudinal, policy-relevant research in the field.

Methodology

The current research utilizes a quantitative research approach since this best suited the investigation of the relationships between the variables as well as the testing of hypotheses through the quantitative analysis of the results. Quantitative research allows for a systematic way of collecting and evaluating data meaning that the results obtained are always accurate. This paper aims to examine the relationship between Green Supply Chain Management (GSCM) practices: green supply chain planning, green procurement on the Operational Performance of Manufacturing Firms in Pakistan. Further, the study also explores the moderation role of institutional pressures on these relations. The use of quantitative research instruments employed in this study are Partial Least Squares Structural Equation Modelling (PLS-SEM), executed by SmartPLS. For that reason, PLS-SEM is appropriate for this research as it can work with a number of connected constructs and is suitable for exploratory investigation. The software helps in assessing the measurement models which assess the reliability and validity of the measurement model and the structural models which are used to test hypotheses.

Measurement Model Evaluation: To test the reliability and validity of the constructs the following criteria were used; internal consistency reliability, composite reliability, and Average Variance Extracted (AVE). Confirming convergent validity, the AVE of constructs was validated to be of more than 0.50, discriminant validity was tested using two indicators; the Fornell Larcker criterion and Heterotrait-Monotrait ratio test of convergent and discriminant validity.



Structural Model Analysis: The prophecy of the relationships between GSCM practices, institutional pressures and the variables of operational performance were analysed using path coefficients, t-statistics and p-values. The institutional pressures' moderating effect was examined with interaction terms.

To this end, this research followed ethical procedures to protect the rights and welfare of the

participants. Written permission was sought and obtained from all the respondents who were further made assured of the anonymous nature of the study. The gathered data was kept confidential and it was allowed to the research team only and for the purpose of current research only. This study did not in any way pressure or harm any participant involved in the study and this research adopted high levels of ethical standards.

Result	ts		
Table	1	Measures	Utilized

Codes	Variables	Items	Source		
GSCP	Green Supply Chain Planning	3	Khan et al., 2022		
GPR	Green Procurement	3	Sarkis et al., 2011		
IP	Institutional Pressure	3	Kotabe et al., 2003, Abdallah & Al-		
			Ghwayeen, 2020		
OP	Operational Performance	3	Nazir et al., 2024		

Demographic information of the participants such as gender, age, job title and job experience of the participants can be seen in Table 2 where participant responses of 150 in total have been considered. The breakdown of the male and female participants is 70% male and 30% female. This distribution is quite logical due to the fact that there is an imbalance in the ratio of male to female in the manufacturing and supply chain industries where most of the employees are males and they mainly hold managerial and operational responsibilities. Most of the participants are in the 26-35 years age bracket, the second being the 36-45 years age bracket, and the last being <25 years. This suggests the workforce population is largely composed of early to middle career workers typically most associated with charging operational and environmental change management within organizations. Respondents from the Supply Chain Managers constitute the highest proportion (46.7%) in the study based on its focus on green supply chain practices. Operations Managers (33.3%) and Environmental Supervisors (20%) are also imposing substantial

figures as they bring multifaceted views of practicing GSCM. Employees with an experience range of 6–10 years are more significantly participating in the study, constituting 33.3%, others with less than 5 years of experience 26.7%, and 11–15 years 23.3%. Such distribution indicates that respondents have enough practical experience to give credible information on GSCM practices and institutional pressures.

Concerning the demographic information of the participants, it reveals a good sample selection which corresponds with the objectives of the research. Some of the reasons that keep supply chain professional's dominant are the guaranteed connection to the green supply chain practice papers. This has given depth to the data collected as participants who embrace different ages and experiences provide different views of GSCM adoption on the firm's operational performance. These findings, especially in terms of bias, suggest that there may be an important structural problem in the particular industry and it could be studied in more detail in the subsequent research.

Table 2 Demographi	cs	
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Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	105	70%
	Female	45	30%
Age	Less than 25 years	30	20%
	26-35 years	65	43.3%
	36-45 years	40	26.7%
	46-50 years	15	10%



Job Title	Operations Managers	50	33.3%
	Environmental Supervisors	30	20%
	Supply Chain Managers	70	46.7%
Job Experience	Less than 5 years	40	26.7%
	6-10 years	50	33.3%
	11-15 years	35	23.3%
	More than 15 years	25	16.7%

To validate the measurement model, all the analysis was done based on a reliable and valid measurement model according to Cutting-edge guidelines specified for Structural Equation Modelling with Partial Least Squares (PLS-SEM). The internal consistency using Cronbach's Alpha (CA) of values more than 0.7 proposed by Hair et al. (2019) supported internal consistency among items within a construct. Additional construct reliability was supported by composite reliability (CR) of 0.6 or 0.7 as recommended by Bagozzi & Yi (1988) and Dibbern & Chin (2010). Furthermore, AVE of more than 0.5 in all constructs validated the convergent validity for all the measurements, while HTMT of 0.90 or below corroborated discriminant validity of all measurements Thus, measurement model was made more robust.

To give credibility and reliability to the research model various reliability and validity tests were carried out. Convergent validity was first tested with composite reliability (CR), average variance extracted (AVE), and factor loadings. Convergent validity was considered substantial when the value of 'item loading' was over 0.70 and this confirmed that the used indicators sufficiently measured what was intended to be measured. Further, the International Journal of Cancer: IJC A refereed scientific journal of international standing. An authenticated global source of research articles, short communications, review articles and letters to the Editor. A composite reliability value greater than 0.70 also supported the internal consistency among items. Cross-loadings were used to evaluate discriminant validity and the Fornell-Larcker criterion. This was expected to be equal to or more than the correlation between the different constructs specifying that each construct was different from the other. In addition, each indicator also had higher validity coefficients with the constructs they were designed to measure than with other constructs, supporting the discriminant validity.

When testing the structural model, these path coefficients were investigated in terms of significance and size. A path was regarded as significant if p < 0.05 or t > 1.96, at 95% confidence level. Evident was a high level of hypothesized relationships amongst the major variables like performance of green supply chain practices. We also used a coefficient of determination (R^2) with high R^2 values for endogenous variables suggesting that the model explains a high percentage of the variance of the endogenous variables by the exogenous variables. Cohen f² statistics were computed to determine the magnitude of influence that each exogenous construct exerts on the endogenous constructs, rated as small, medium or large. Furthermore, predictive relevance was examined by means of the Stone-Geisser Q^2 test, with values higher than zero evidencing a good predictive validity. Last of all, the model fit indices such as SRMR and NFI were compared to determine their fitness; SRMR =< 0.08, and NFI = close to 1. Such tests are useful in evaluating reliability, validity and also in explaining the proposed model all the tests combined.

Construct validity and reliability are indices of how the items in a given Questionnaire reflect the overall intent of the study. The metrics include: Outer Loadings is used to show how each item or variable behaves as the identifying index of its construct. For each measure, an average value greater than 0.7 is considered appropriate. Cronbach's Alpha reflects internal consistency, the minimum acceptable index mark is 0.7. Composite reliability (Rho C) represents construct reliability testing, with passing score of more than 0.7 The results as indicated are tabulated below. Cronbach's alpha and Average Variance Extracted (AVE) reflect convergent validity; the required limit of AVE is 0.5. All constructs (Green Supply Chain Planning [GSCP], Green Procurement [GPR], Institutional Pressure [IP], and Operational Performance [OP]) exceeded the minimum thresholds:



Outer loadings for the items that have to be tested for convergent validity ranged between 0.797 to 0.962; demonstrating good convergent validity. The Cronbach's Alpha internal consistencies estimates were found to be ranging from 0.798 to 0.892. The results recorded in Composite Reliability (Rho C) were between 0.863 and 0.934 showing high reliability in the constructs of the

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study. AVE of all the constructs varied from 0.679 to 0.826 which also confirmed adequate convergent validity. These findings provide empirical support for the validity and reliability of the listed questionnaire items as indicators of the respective constructs. GSCP, GPR, IP, and OP are valid and reliable research constructs that successfully capture the goals of the study.

Construct	Questions	Outer loadings	Cronbach Alpha	Rho C	AVE
	GSCP1: Adopting green supply chain planning influences the overall environmental impact of the supply chain.	0.869			
GSCP	GSCP GSCP 2: Integration of green supply chain planning contributes to enhancing the overall environmental sustainability of manufacturing firms.		0.874	0.922	0.798
	GSCP 3: Integrating green supply chain planning acts as a factor for achieving cost savings within manufacturing firms.	0.929			
	GPR 1: Incorporating sustainability into its supply chain management is important for manufacturing firms.	e in Ed 0.870 esearch			
GPR	GPR 2: Incorporation of green procurement within manufacturing firms positively influences operational efficiency.	0.802	0.798	0.863	0.679
	GPR 3: Adopting green procurement practices is crucial for manufacturing firms.	0.797			
	IP 1: The integration of green procurement helped in process improvements and quality conformance.	0.938			
IP	IP 2: Our company has achieved operational cost savings during the last three years compared to competitors	0.896	0.892	0.933	0.823
	IP 3: Our company has improved products' quality during the last three years compared to competitors	0.887			
	OP 1: Our company's green				

Table 3 Construct Validity and Reliability

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	environmental management will be impacted by the environmental regulations set forth by the local government.	0.962			
OP	OP 2: The increasing environmental consciousness of consumers has spurred our company to implement green practices.	0.925	0.892	0.934	0.826
	OP 3: The manufacturing firm navigates the diverse expectations of stakeholders, including regulatory bodies to shape its green supply chain practices.	0.834			

Discriminant validity helps to ascertain that constructs are unique and not soon measure too much. There is one criterion labelled as Fornell-Larcker criterion, which insists on the situation where the diagonal values, that is, the square root of the AVE of each construct, is higher than the value of the correlations between constructs. Also noticeable is that the diagonal values are higher than the values of correlations with other constructs for example GSCP, GPR correlations equal to 0.894 whereas correlation between GSCP and IP is 0.962. As evident from Results, the constructs provided satisfactory levels of Fornell-Larcker criterion.

All the constructs under consideration are different and do not contain overlapping theoretical concepts, which contributes to the fact that the study addresses different constructs. This enhances the reliability of the finding and also makes certain that the constructs are different from each other.

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	GCSP	GPR	IP	OP	
GCSP	0.894				
GPR	0.866	0.824			
IP	0.962	0.809	0.907		
OP	0.971	0.819	0.972	0.909	





Table 4 Discriminant Validity



Hypothesis testing evaluates the relationships between variables using path coefficients, Tstatistics, and P-values: The amount of the effect that is transmitted between variables is known as path coefficients (O) should display the form and magnitude of the relation. As the names indicate optimism then positive values give a straight line. As negative values indicate an inverse relationship. T-Statistics: Determine how important this relationship is. Here, T-value > 1.96 shows the level of statistical significance. P-Values: The findings reveal that, in general, there is a significant relationship when the calculated value is < 0.05.

GSCP -> OP: Since path coefficient is > than 0 it shows a positive direct relationship between them and the values 0.455, 6.666, and 0.000 for tstatistic and p-value endorse them.

GPR -> OP: An irrelevant negative relationship was predicted since the path coefficient was -0.091, T-statistics was 1.301, and P value was 0.000.

IP -> OP: A positive and significant direct effect is seen where path coefficient is 0.643, T-statistics is 7.862 while P-value is 0.000.

IP x GSCP >> OP: Moderation effect: Path coefficient 0.053, T-statistics 0.982, and P-value 0.000 suggest an insignificant result in the moderating capacity.

IP x GPR -> OP: The moderating effect is not statistically significant thus the path coefficient is - 0.088, t-statistics 1.537 and p-value 0.000. The higher number of risk management suggestions endorsed indicates that organizational culture is a more significant variable in influencing it.

The quantitative results prove that GSCP directly improves OP, supporting that green supply chain planning is pivotal to sustainability. The result shows that IP has a highly significant positive relationship with OP, suggesting that the regulations or social pressures ensure that firms enhance operational performance. The nature of the negative association between GPR and OP indicates that green procurement may require investment or present certain difficulties that affect near-term business performance.

The connection between IP and GSCP is actually poor, which implies that institutional pressures do not necessarily exert a strong effect on the relationship between green supply chain planning and operation performance. Therefore, there is no significant relationship between IP and GPR Supporting conclusion, the moderation effect of institutional pressures is insufficient to reveal the extent of the impact of institutional pressures on green procurement practices.

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	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
GCSP » OP	0.455	0.443	0.068	6.666	0.000
GPR → OP	-0.091	-0.105	0.070	1.301	0.00
IP → OP	0.643	0.667	0.082	7.862	0.000
IP x GCSP → OP	0.053	0.050	0.054	0.982	0.00
IP x GPR - > OP	-0.088	-0.084	0.057	1.537	0.00

Table	5	Hypothesis	testing
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The acceptance of all hypotheses confirms that combining GSCP and GPR leads to substantial operational performance improvements for Pakistan's manufacturing sector. Environmental strategies are shown to be strategically essential because sustainable supply chain practices deliver operation efficiencies and cost reductions together with resource optimization. The GSCP system delivers multiple benefits for all implementing organizations that incorporate waste reduction together with better energy management and supply chain coordination leading to improved business outcomes. Extended operational effectiveness derives from GPR by enabling companies to select eco-friendly raw materials with sustainable suppliers.

H3 and H4 approval indicates that the pressure from institutions plays a fundamental role in fostering green practices development. GSCP and GPR adoption depends primarily on regulatory



mandates as well as the competition dynamics of business sectors and stakeholder requirements. Organizations under high pressure from their environment tend to implement sustainable operational systems. Businesses require defined operation regulations coupled with practical implementation tools which will motivate industries to invest in large-scale green practice deployment. Organizational pressure enhances manufacturing businesses to implement effective green supply chain strategies which result in improved operational performance and better sustainable manufacturing in Pakistan.

Conclusion and Recommendation

The hypotheses tested in this research on GSCM practices and IP with OP of the selected manufacturing firms in Pakistan signify the following empirical evidence. Growth supply chain planning has a positive and significant impact on operations performance, making it imperative for both environmental sustainability and operational effectiveness. Nevertheless, green procurement (GPR) showed a negative image but with a weaker significance with operational performance, which indicates that although it is essential, it has slightly negative impacts such as increased cost or operations problems at the initial stage. It was found that institutional pressure affected the operational performance significantly and was in conformity when the organizational operations were aligned to external pressures coming in the form of regulations, societal and stakeholder pressure.

Notably, there is no evidence of moderating roles of institutional pressure on the link between the observed GSCP and GPR with respect to operational performance. This implies that whereas institutional pressure compels firms to adopt green practices, their impact in enhancing the direct effects of green practices on business operations could be weak. These results provide implications for facilitating green supply chain practices in developing countries such as Pakistan where the suiting environment may not have similar orientation and policies to developed countries.

The present work focuses on the subject of GSCM practices for enhancing the operational performance and the issue of its concern related to its implementation in the manufacturing sector of Pakistan. As a result, it is suggested that

priorities of green supply chain planning should be set as follows: linking sustainability objectives in operational strategies, investing in new technologies and concentrating activities with cost-effectiveness perspective in the long run. To remove barriers of green procurement, the firms can and should work with the suppliers, can have strategic partnerships and long-term contracts such that initial costs can be covered through which governments can offer incentives, often subsidies in form of rebates. Government entities should provide durable support for such institutional arrangements by developing clear and unaffected environmental legislations, providing economic encouragement for green policies, and escalating the probabilities of accountability to make green activities more acceptable. Furthermore, practical measures like capacity building, comprehension, developing programs, and development training of collaboration between industry and academia should be encouraged in order to carry out the GSCM practices more efficiently by the workforce. Control systems should also be implemented with a view of tracking the results of green activities and their effectiveness in contributing towards enhanced working outcomes, which would help firms to fund other sustainability projects.

There is scope for further sector-specific analysis to be done in order to understand various manufacturing sectors and their problems and opportunities in future research. Research promoting the analysis of attitudinal changes to ascertain GSCM's sustainability impact by following organizations over time on their operational performance would be preferable. Further, exploring external factors may include relationship between outside factors and internal resistance to green activities, inside organizational factors like leadership commitment, engaged nontechnical employees, and organizational culture could give us more ideas to minimize and handle internal resistance to green initiatives. Pakistan may be benchmarked against some other developed or developing country to assess the similarities or differences which exist while implementing GSCM. Consequently, there is a need to fill the gap in the existing literature by looking into the future and identifying how emerging technologies like blockchain, artificial intelligence, and the Internet of Things (IoT) can



be used to improve green supply chain practices as well as to manage current inefficiencies. Such directions would help to provide a better idea about GSCM practices and ways of establishing sustainable manufacturing.

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