



# Exploring the technical and behavioral dimensions of green supply chain management: a roadmap toward environmental sustainability

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## Abstract

Environmental sustainability issues have become an increasing concern for enterprises and organizations due to new tendencies in climate change. Green supply chain management (GSCM) practices are growing worldwide in this context. Based on socio-technical systems and institutional theory, the present study develops a conceptual model highlighting a mediating effect between two distinct categories of GSCM dimensions, i.e., technical practices and behavioral practices, along with the moderating effect of institutional pressure on organizational performance. Data were collected from 260 Pakistani manufacturers, and the structural equation modeling (SEM) approach was employed to analyze the hypotheses. The classification of technical and behavioral GSCM practices and findings of this research contributes to the literature on GSCM. Empirical results reveal that behavioral practices of GSCM (top management support, supplier, and customer involvement) mediate the relationship between technical GSCM practices (eco-design, green manufacturing, and reverse logistics) and organizational performance (economic, environmental, and social). The results also demonstrate that institutional pressure positively moderates the relationship between technical practices and organizational performance. These findings suggest that organizations in developing countries must focus on the behavioral dimensions of GSCM first for the successful implementation of technical dimensions of GSCM to gain effective environmental, economic, and social performance.

**Keywords** Institutional theory · Green Supply Chain Management · Technical dimensions · Behavioral dimensions · Institutional Pressure · Socio-Technical Systems theory

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## Introduction

Countries all over the world have enormously great concerns about climate change after the devastating incidents of the environment (Chandio et al., 2021), such as excessive use of fossil fuels (Shao et al., 2021), energy scarcity (Elavarasan et al., 2022), and bush fires that occurred recently (Rauf et al., 2021). The growing ratio of CO<sub>2</sub> emissions has produced the intensities of air pollution (Razzaq et al., 2020), which is considered the most hazardous type of pollution because it penetrates rapidly into the environment by traveling long distances and it creates environmental destruction all around the globe (Sun et al., 2022). Industries and vehicles are the two significant sources of air pollution in developing countries (Irfan and Ahmad, 2022). Green supply chain management (GSCM) dimensions are the managerial activities that organization employs to minimize energy consumption and pollution to improve sustainability for an extensive time period. Consequently, a competitive advantage will be gained due to these practices. Recently, China

has implemented GSCM to balance its environmental protection and economic improvement.

It is important to understand that the successful implementation of GSCM is based on amalgamates of practices. The most important and dominant GSCM practices are technical/ hard (tangible) practices (Sun et al., 2021), i.e., Eco-design, reverse logistics, and green manufacturing (Green et al., 2012; Miao et al., 2022; Yang et al., 2022). The objective of going green can be achieved by adopting the techniques of these components. However, soft and behavioral (non-technical) GSCM practices such as top management support, customer involvement, and supplier involvement are greatly ignored by the organizations of emerging economies, e.g., India, Brazil (Adebayo et al., 2021; Kumar et al., 2019; Razzaq et al., 2021b). The importance of intangible practices of GSCM has been recognized gradually. However, it is still unclear what these non-technical and behavioral dimensions are and how these dimensions influence hard (technical) dimensions and organizational performance (Anuar et al., 2022; Dubey et al., 2017; Xuefeng et al., 2021).

To protect the environment, various restrictions and standards have been introduced by different brand companies and groups (Bibi et al., 2022; Sinha et al., 2022; Żywiołek et al., 2022). Most of the developed countries also framed regulations for the protection of the environment. For instance, in 2007, the European Union's (EU) announced the rules, regulations, authorization, evaluation, and restriction of hazardous material. Such institutional pressures, i.e., customer's demand for the protection of the environment (market pressure), government rules and regulations (regulatory pressure), and ferocious competitiveness of industries (competitive pressure) are the most important elements which are the base in formulating green and sustainable products in the industrial sector. (Chu et al., 2017) explored that the adoption and implementation of GSCM might respond to a particular institutional pressure in various organizations, which can be altered and developed over time. So, it is claimed that regardless of industry, it is the most forceful and most robust driver of supply chain strategies (Khan et al., 2021; Zhang et al., 2021). In the previous study, it was shown that institutional pressures would enhance the willingness of organizations to adopt and implement environmental management strategies, which ultimately affect the effectiveness of resources (Menguc et al., 2010).

GSCM is well known and implemented successfully in developed countries. In Pakistan, GSCM is a new concept, and its application is still at the primary stage. Environmental constraints and social pressures are driving forces for industries to adopt and implement GSCM practices because environmental pollution is an increasing concern in Pakistan. In developing countries, the reason behind the small and limited implementation of GSCM practices in the manufacturing sector is that there is a lack of research on GSCM

practices and their effect on organizational performance. Remarkably, very limited empirical research studies are available on GSCM practices from numerous developing countries' perspectives, such as Pakistan, Bangladesh, and India. To focus on this research study context, Pakistan is suffering from various environmental problems ranging from devastating changes in climate to deforestation, industrial waste, limited resources of clean water, and many others (Najmi et al., 2020). Along these lines, this study was conducted in the Pakistani context.

In developing countries' perspectives, behavioral GSCM practices are understood poorly (Razzaq et al., 2021a). Although very limited research studies are available, behavioral dimensions of GSCM are discussed systematically, and their effect on organizational performance is analyzed. While behavioral practices are the most important elements for the effective enactment of GSCM (Singh et al., 2021; Singh and El-Kassar, 2019), most organizations in the developing markets have demonstrated the influence of technical dimensions of GSCM on organizational performance (Chippetta Jabbour et al., 2017; Kumar et al., 2019). Limited research studies briefed non-technical GSCM dimensions, but no systematic categorization of technical and behavioral dimensions is available. Consequently, it leads to deficient awareness about GSCM. In this context, scholars called for inclusive research to reveal the empirical approaches to comprehend the relationships between technical and behavioral GSCM practices and organizational performance. Thus, we explore not only the mediating effect of behavioral GSCM practices on technical GSCM practices and organizational performance (Junqi Liu et al., 2020a, b) but also analyze the moderating effects of institutional pressure on this relationship. Meanwhile, this research also responds to the (Chippetta Jabbour et al., 2017) call to explore more dimensions (e.g., social, economic), not just the environmental dimension. This is the novelty of our research because no research has been conducted in developing countries, especially Pakistan, under the framework of institutional and socio-technical systems (STS) theory to further explore the behavioral/soft dimensions. This research will aid policymakers, stakeholders, and managers in enhancing the application of STS theory in supply chain management (Dubey et al., 2017).

## Theory and hypothesis development

### Technical and behavioral GSCM practices

According to (Longoni et al., 2018), the practices of GSCM were classified into two dimensions, namely external and internal dimensions, and primarily emphasized technical/hard practices, i.e., green production, eco-design, and monitoring and supplier selection. GSCM practices are

conceptualized by (Feng et al., 2018) as a single paradigm and mainly focused on behavioral aspects such as cooperation with suppliers, cooperation with customers, and cross-functional cooperation. Such classification of GSCM practices syndicates organizational, human resource, technical, and methodical domains. According to the purpose and requirement of the research, few subsequent research studies have re-classified the above-mentioned dimensions. Liu et al (2020a) categorized the technical GSCM practices into green manufacturing, eco-design, environmental management tools, and reverse logistics used in this study. Further, they categorized behavioral GSCM practices into top management commitment, cooperation with customers and suppliers. The past study conducted by (Bag et al., 2020) defines the technical and behavioral practices in quality management. This study explains the technical practices of GSCM as methodology-driven, technology-driven, and hard dimensions, including techniques of process, design of the product, environmental management systems, and reverse logistics. Whereas behavioral (soft) dimensions of GSCM practices are defined as relationship-driven, people-oriented, and some other soft (intangible) practices such as top management support, cooperation with customers, cooperation with suppliers, and participation of employees.

### Institutional pressure

The institutional theory suggested that expectations, restrictions, and stimulus of organizational members are the key elements that affect the behavior of organizations. This refers to three strategic isomorphisms: coercive, normative, and mimetic isomorphism to articulate the organizational environment's values, rules, and norms. Firstly, normative pressures are the key factors that imitate organizations to be perceived more legitimacy. Usually, external stakeholders who have a keen interest in the organizational settings employ this type of pressure. Secondly, conformism by coercive pressures arises from the influence wielded by those who are in power. These powerful groups include government agencies that may compel the organizations to take actions related to sustainability and environmental protection (Wang et al., 2018). Thirdly, mimetic pressures happen when organizations mimic the activities and activities of competitors who are successful and strongest in the market. Thus, all the above-mentioned institutional pressures have the ability to influence the organizations to adopt the GSCM initiatives in their business settings.

### Institutional and socio-technical systems theory

Institutional theory is broadly used in the study of different types of organizational behaviors, i.e., implementation of GSCM (Dubey et al., 2017), corporation's

sustainability disclosure sustainability, voluntary practices of environmental management, and energy-saving activities (Tanveer et al., 2021). This theory explains that behaviors and organizational structures are influenced by expectations and regulations, common cognition, which originate from the institutional environment composed by competitors, government, and trade associations. Under such institutional pressures, various organizations will change their behaviors and structure similarly, known as isomorphic change (DiMaggio and Powell, 1983). Otherwise, organizational ability to attain social support and secure resources will be affected. The institutional theory explains that how the institutional environment influences organizational actions. The institutional theory explores that behaviors of organizations are not only the consequence of sensible economic decisions but may be affected by external values and norms (Zhu and Sarkis, 2007). From the perspective of institutions, institutions' decision-making is affected by three isomorphic pressures, i.e., coercive, normative, and mimetic pressures (DiMaggio and Powell, 1983).

STS theory was used to describe intra-organizational marvels. For example, the relationship between work design and employee behaviors (Sarkis et al., 2010). STS theory suggested two types of subsystems, i.e., technical (tangible) and social (intangible) subsystems. An organization will be called a socio-technical system if they adopt these two subsystems (Haula and Agbozo, 2020). The tangible (technical) subsystem is defined as "it consists of the tools, techniques, devices, methods, procedures, and knowledge used by organizational members to acquire inputs, transform inputs into outputs and provide outputs or services to clients or customers," while the social (intangible) subsystem is defined as "it is comprised of the people who work in the organization and their social interactions with another" (Redcay and Schilbach, 2019). So, these two subsystems are the key elements to determine the outputs of any system. STS theory is widely used to a better and appropriate understanding of GSCM practices. Based on STS theory, top management support is considered a social dimension, while green manufacturing, eco-design, and reverse logistics are considered technical (tangible) dimensions. However, the previous literature is mainly anxious about verifying and testing the sequential relationships among the social, technical, and organizational performance. Past studies explored a strong relationship interdependently among social components and technical components of GSCM to increase the efficiency of organizational performance (De Giovanni and Esposito Vinzi, 2012; Li et al., 2016). Hence, based on STS theory, technical and behavioral GSCM practices can affect one another, respectively.

## Hypothesis development

### Technical GSCM practices and behavioral GSCM

The researchers have called for more exploration of the sequential relationship between technical GSCM practices and behavioral GSCM practices (Chiappetta Jabbour et al., 2017; Junjun Liu et al., 2020a, b; Muduli et al., 2013). In this research, technical dimensions of GSCM are assumed as the succeeding element for the adoption of behavioral dimensions. For the successful implementation of hard and technical dimensions of GSCM, behavioral dimensions of GSCM are very important because it creates a cooperative environment of the supply chain by support from top management, customer involvement, and involvement of suppliers. For the successful implementation of GSCM, top management support and mid-level manager support are crucial (Cantor et al., 2012). Based on these arguments, we proposed the following hypothesis:

**H<sub>1</sub>:** The implementation of technical practices of GSCM (eco-design, reverse logistics, and green manufacturing) has a positive impact on the implementation of behavioral practices of GSCM (top management support, customer involvement, and supplier involvement).

### Behavioral GSCM practices and organizational performance

The researcher highlighted how organizations' performance could be improved by applying behavioral dimensions of GSCM (top management support, customer involvement, supplier involvement). Several studies have explored that organizational performance is directly affected by the implementation of behavioral GSCM practices. (Yang et al., 2013) argued that organizational performance is positively related to behavioral GSCM practices. (Li et al., 2016) argued that the involvement of customers facilitates the organizations to respond to the customer's requirement of implementing GSCM practices in their business settings well. Customer involvement also helps organizations develop environmentally friendly products and recycle used products. Past literature has shown that the involvement of suppliers boosts the environmental, operational, and economic performance of organizations which are beneficial for both manufacturers and suppliers (Chiappetta Jabbour et al., 2017; Yu et al., 2014; Zhu et al., 2013). Furthermore, it can enhance the goodwill and reputation of organizations in the competitive market by transferring green awareness, knowledge, training to their stakeholders and partners and by providing them technical support, which ultimately could be enhanced through further opportunities of business (Laari et al., 2016). Therefore, the following hypothesis is proposed:

**H<sub>2</sub>:** The implementation of behavioral practices of GSCM (top management support, customer involvement, supplier involvement) has a positive impact on organizational performance (environmental, economic and social).

### Technical GSCM practices and organizational performance

Technical dimensions of GSCM have been recognized as an important organizational strategy through which market share and desired profits can be achieved, and eco-sustainability can be improved. With the implementation of cleaner and greener productions methods, organizations must adopt GSCM practices and must aim to enhance the technical efficiency in quality control management systems. From the GSCM perspective, numerous research scholars argued that organizations must take sustainable and greener initiatives (Shou et al., 2020). At the initial phase of the GSCM application, ecological management was compelled technologically-driven. While, present technical practices of GSCM have moved toward being related to closed-loop supply chains, including design of products, purchasing of material, disposal of used products, and control of production system (Longoni et al., 2018; Srivastava, 2007). To enhance organizational performance, these technical practices of GSCM are crucial (Choi and Hwang, 2015). Additionally, eco-design has more attraction for consumers to purchase and consume such products (Miroshnychenko et al., 2017). Lai et al (2013) revealed that reverse logistics refers to saving energy, reusing and recycling the raw material and many other resources, which ultimately improves and enhances economic, social, and environmental performance. Thus, based on the above-mentioned arguments and research reviewed literature, we develop the following hypothesis:

**H<sub>3</sub>:** The Implementation of technical practices of GSCM (eco-design, reverse logistics, green manufacturing) has a positive impact on organizational performance (environmental, economic, and social).

### The mediating role of behavioral GSCM practices

The previous literature argued that behavioral dimensions of GSCM fully mediate organizational performance and technical dimensions of GSCM. This argument showed that behavioral practices are considered a strategic element that is ultimately helpful to attain a competitive advantage. These arguments contribute to understanding the logic of how behavioral practices of GSCM lead to gaining competitive advantage (Cho et al., 2017). Kumar et al (2020) argued that behavioral factors of GSCM are the most influencing elements for effective organizational performance because top management support is very significant in the adoption of these practices. They further suggested that behavioral

practices are footwear for industrial managers to adopt GSCM practices. Based on the above arguments, STS theory recommends that there is likely a mediating effect of technical/behavioral dimensions of GSCM and organizational performance (environmental, economic, and social).

**H<sub>4</sub>:** The implementation of behavioral practices of GSCM (top management support, customer involvement, and supplier involvement) positively mediates the relationship between technical practices of GSCM (eco-design, reverse logistics, and green manufacturing) and organizational performance (environmental, economic, and social).

### The moderating role of institutional pressure

Institutional pressures motivate organizations to adopt environmentally friendly practices such as GSCM practices and increase the performance of organizations. Organizations will lose their competitive and economic advantages if they fail to meet the standards and feel reluctant to adopt innovative practices related to the environment (Kohli and Hawkins, 2015). They further argued that institutional pressures would be contingent on making decisions about the implementation of GSCM practices. Institutional pressure is a set of institutional actors that moderate organizations' characters to introduce environment-friendly strategies. Political and legislation actors compel the organizations to adopt GSCM practices to protect the environment and enhance organizational performance (Huang et al., 2016). Organizations cannot decide anything and can't make any strategy without considering the institutional pressures. Currently, customers' requirements from organizations are to produce environment-friendly products that will protect the environment and enhance organizational performance (Seles et al., 2016).

Thus, if institutions fail to meet these standards, their competitors will benefit by obtaining ISO 14000 certifications. They will enjoy a competitive advantage by adopting various dimensions of GSCM and through increased economic and environmental performance. Figure 1 depicts the research framework of this study. Based on the above discussion, the following hypothesis is developed.

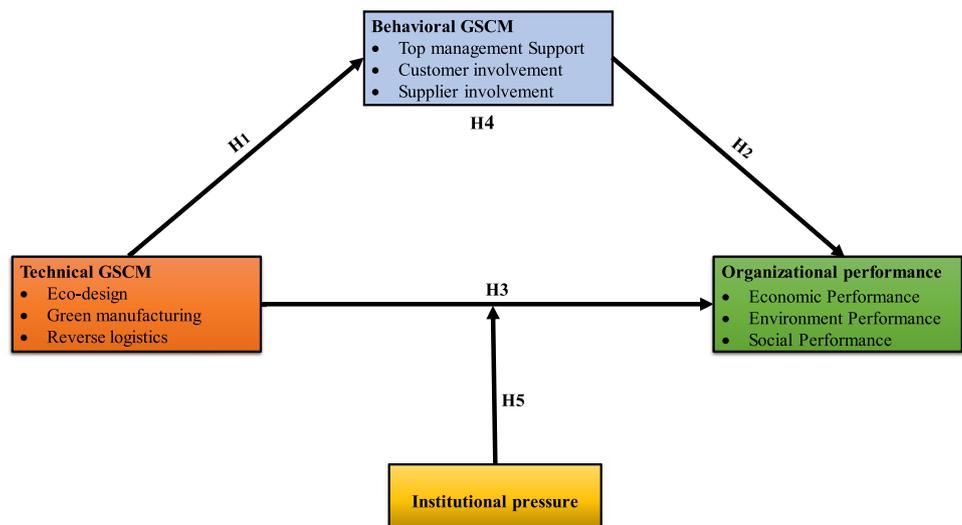
**H<sub>5</sub>:** Institutional pressure positively moderates the relationship between technical GSCM practices and organizational performance.

## Methods

### Questionnaire development

To examine the proposed hypotheses, a survey questionnaire was conducted to collect the data (see Appendix A). To check the content validity, we developed instruments for measurements by using two steps. In the first step, we conduct an extensive review of previous literature related to behavioral GSCM practices, technical GSCM practices, and organizational performance (see Sect. 2). The items for GSCM practices and organizational performance were taken from the past empirical research studies (Feng et al., 2018; Govindan et al., 2015; Green et al., 2012; Muduli et al., 2013; Srivastava, 2007; Yang et al., 2013). The questionnaire of this study employed a five-point Likert scale to evaluate the extent to which the respondents agreed or disagreed with a certain item of GSCM practices, with 1 corresponding to "not considered it" and point 5 representing "implemented successfully." In the present study, a five-point Likert scale was employed to

Fig. 1 Theoretical framework



measure the items of all variables, with 1 being "not at all" and 5 corresponding to "completely." The items for institutional pressure were derived from the previous study of (Zhu et al., 2008). The targeted respondents were requested to select only one scale for each item of institutional pressure, GSCM practices, and organizational performance according to their current organizational situation. Afterward, numerous discussions were made with practitioners and scholars to confirm and refine these measurement instruments. Secondly, to check the validity of the primary questionnaire, a pilot test was ensured with the consent of 10 most senior managers working in the supply chain department of manufacturing organizations.

### Sample and data collection

This research targeted the top and medium-level managers as respondents related to the environment, operations, purchasing, logistics, safety, and health departments in manufacturing organizations. This study was conducted in Pakistan. Being a developing country, Pakistan is facing great pressures from the ecological environment. Due to climate change and pollution in the country, it is important to make policies regarding GSCM practices in manufacturing organizations. The targeted respondents must be aware of the practices of GSCM, organizational performance, and pressures from institutions. Data were collected by direct survey method. Data collection lasted for almost four months due to the pandemic situation of COVID-19 and lockdown. In this study, the snowball sampling technique was followed. In total, 300 questionnaires were distributed among targeted respondents in hard copies, in which 260 questionnaires were completed in all aspects and were usable. The remaining 40 questionnaires were

discarded due to incomplete information. The descriptive details are shown in Table 1 of survey organizations regarding the organizational size, experience, and organization category.

## Analysis and results

### Evaluation of measurement model

To validate the measures of GSCM practices, institutional pressure, and organizational performance. In this study, PLS-SEM is used to proceed with the data with Smart PLS software version 3.2.8. The increasing usage of PLS-SEM has revealed its applicability and sturdiness of the research model in this area. The authors employed this method in this study due to certain reasons. Firstly, for using PLS-SEM, the current recommendations have shown their merits in measuring mediation and moderation. This research model required a mediation and moderation analysis. Secondly, the research model used in this study is complicated with first-order variables and second-order variables, and over 32 items, so that's why the PLS-SEM is the appropriate and best choice for analysis. Thirdly, PLS-SEM has a greater statistical power as compared to CB-SEM. Consequently, PLS-SEM is the most powerful and useful method to analyze the relationships in the population significantly. At last, PLS-SEM can run the different measurement scale together with a small sample size.

Confirmatory factor analysis (CFA) is employed to evaluate the validity and reliability of the model in which all the multi-item scales are included. The CFA model well adapted to the data (Chi-square ( $X^2$ ) = 454.110; standardized root mean square residual (SRMR) = 0.08 normed fit index (NFI) = 0.155) also indicates the model fitness. The CFA results have recommended that all the factor loading items of this research model were above the predicted value of 0.50; thus, we agree and accept the contribution of every indicator to the constructed variable (Table 2) (see Table 3). Afterward, the values are acceptable of Cronbach alpha ( $\alpha$ ) because these are above the 0.70 threshold value. Generally, the results explored the high convergent validity and reliability of the measurement constructs. These are recorded along with composite reliability (CR) and average variance extracted (AVEs). In past studies, the AVEs and CRs reached the standard recommended value of 0.50. So, the reality is that the AVE from every latent construct should exceed the square correlation among every set of the

**Table 1** Sample distribution

Category	Options	Percentage
Size of organization	Less than 100	(10%)
	100–199	(26%)
	200–499	(24%)
	More than 500	(40%)
Experience	Less than 2 years	(5%)
	2–5 years	(25%)
	5–10 years	(48%)
	More than 10 year	(22%)
Firm's ownership	Public	(15%)
	Private	(41%)
	Small & medium enterprises	(26%)
	Others	(18%)

Questionnaires with incomplete information are excluded.

**Table 2** Correlation and discriminant validity

Variables	ED	GM	RL	TMS	CI	SI	ECP	ENP	SP	IP
ED	<b>(0.714)</b>									
GM	0.284	<b>(0.820)</b>								
RL	0.355	0.522	<b>(0.757)</b>							
TMS	0.305	0.461	0.361	<b>(0.864)</b>						
CI	0.425	0.336	0.410	0.111	<b>(0.813)</b>					
SI	0.551	0.110	0.212	0.124	0.611	<b>(0.711)</b>				
ECP	0.173	0.413	0.301	0.537	0.471	0.322	<b>(0.784)</b>			
ENP	0.351	0.160	0.326	0.225	0.323	0.101	0.217	<b>(0.841)</b>		
SP	0.297	0.510	0.420	0.529	0.111	0.222	0.726	0.231	<b>(0.744)</b>	
IP	0.354	0.572	0.604	0.496	0.444	0.301	0.633	0.553	0.225	<b>(0.685)</b>

Diagonal values in parentheses represent the root square of AVEs.

constructs (Tanveer et al., 2021), which ascertains the discriminant validity (see Table 2).

### Common method variance

Because this study is cross-sectional, there might have been chances of common method bias in this research. This research employed Harman's single-factor test (i.e., extraction method = principal axis factoring) to examine common method bias (CMB). According to the guiding principles (Podsakoff et al., 2012), common method bias (CMB) affects the results if more than 50% accumulated variance is found in a single factor. The outcomes showed that the maximum single-factor contribution was 34.50%, less than 50% cutoff value. These findings confirm that there is no common method bias in the data. Moreover, to access the CMB in the data, we employed a procedure recommended by (Kock, 2015). This procedure explains that if VIF variance is more than 3.3, it indicates CMB in the framework. But this study's outcomes show that the factor level of VIF is less than the suggested threshold, i.e., 3.3. Thus, based on the above findings, it is considered that the model of this study has no common method variance.

### Findings of hypotheses

Structural equation modeling (SEM) was used to examine hypotheses proposed in this study through SMART PLS. Green manufacturing, reverse logistics, and eco-design were taken as second-order factors, which are the technical dimensions of GSCM. Top management support, customer and supplier involvement were taken as second-order factors, which are behavioral dimensions of GSCM. Likewise, environmental, economic, and social performance were taken as second-order factors, the organizational performance dimensions. The findings of SEM examination are shown in Table 4, which

represents the direct relationship among any two factors (behavioral, technical, and organizational performance). Furthermore, SEM analysis supported the direct relationship proposed in H1, H2, and H3. Moreover, H4, which proposed that behavioral dimensions of GSCM positively mediates the relationship among technical dimensions of GSCM and organizational performance, is also supported by the findings of SEM examination. SEM analysis also supports H5, which proposed that institutional pressure has a moderating effect on the relationship between GSCM practices and organizational performance.

In the literature of PLS-SEM, the following guidance is indicated, hypotheses are tested in this section and determine the significance and importance of path coefficient (Anderson and Gerbing, 1988). The bootstrapping procedure was employed with the subsample of 5000 by adopting Smart PLS software version 3.2.8. The hypothesis testing is summarized in Table 4. The direct and indirect effects of the hypotheses with  $\beta$  values and  $f$ -values are mentioned. H1 demonstrates a positive and significant relationship between technical GSCM practices and behavioral GSCM practices ( $\beta = 0.264$ ,  $f$ -value = 182.2). Thus, the findings of H1 fully supported this study. H2 demonstrates a positive and significant relationship between behavioral GSCM practices and organizational performance ( $\beta = 0.077$ ,  $f$ -value = 134.4). Thus, the findings of H2 fully supported this study. H3 illustrates a significant and positive relationship between technical GSCM practices and organizational performance ( $\beta = 0.158$ ,  $f$ -value = 131.5). Hence, the findings of H3 fully supported this study. H4 indicated that behavioral GSCM practices fully mediates the relationship between technical GSCM practices and organizational performance ( $\beta = 0.322$ ,  $f$  value = 122.5). Therefore, the findings of H4 fully supported this study. H5 indicated that institutional pressure significantly moderates the relationship between technical GSCM practices and organizational ( $\beta = 0.432$ ,  $f$ -value = 235.1). Therefore, the results of H5 fully supported this study (see Fig. 2).

**Table 3** Factor loadings and results of reliability analysis

Variables	Items	Standard loadings	Cronbach- $\alpha$	AVE	CR
<b>Technical GSCM</b>					
<i>Eco-Design</i>	ED 1	0.556	0.824	0.510	0.903
	ED 2	0.827			
	ED 3	0.718			
<i>Green Manufacturing</i>	GM 1	0.751	0.927	0.672	0.936
	GM 2	0.806			
	GM 3	0.946			
	GM 4	0.975			
	GM 5	0.803			
<i>Reverse Logistics</i>	RL 1	0.732	0.921	0.746	0.924
	RL 2	0.818			
<b>Behavioral GSCM</b>					
<i>Top management support</i>	TMS 1	0.873	0.914	0.574	0.868
	TMS 2	0.958			
	TMS 3	0.744			
<i>Customer Involvement</i>	CI1	0.779	0.922	0.561	0.992
	CI2	0.654			
	CI3	0.892			
<i>Supplier Involvement</i>	SI1	0.881	0.822	0.683	0.728
	SI2	0.836			
	SI3	0.741			
<b>Organizational Performance</b>					
<i>Economic Performance</i>	ECP 1	0.723	0.843	0.614	0.806
	ECP 2	0.735			
	ECP 3	0.703			
	ECP 4	0.687			
<i>Environmental Performance</i>	ENP 1	0.657	0.817	0.708	0.935
	ENP 2	0.846			
	ENP 3	0.820			
	ENP 4	0.872			
<i>Social Performance</i>	SP 1	0.661	9.859	0.553	0.832
	SP 2	0.712			
	SP 3	0.747			
	SP 4	0.668			
	SP5	0.586			

Extraction method: Maximum Likelihood, Rotation method: Promax with Kaiser normalization. CR = composite reliability, AVE = Average variance extracted.

**Predictive relevance (Q2)**

In this study, the Stone and Geisser test is conducted by employing the blindfold technique on smart PLS software, which determines the predictive relevance of our

research model. This technique is anticipated by (Hair et al., 2016), which demonstrates that a structural model comprises predictive relevance if the values of  $Q^2$  of all the endogenous constructs are more than zero ( $> 0$ ) in the path model. Hence, it is proved by Table 5, in which

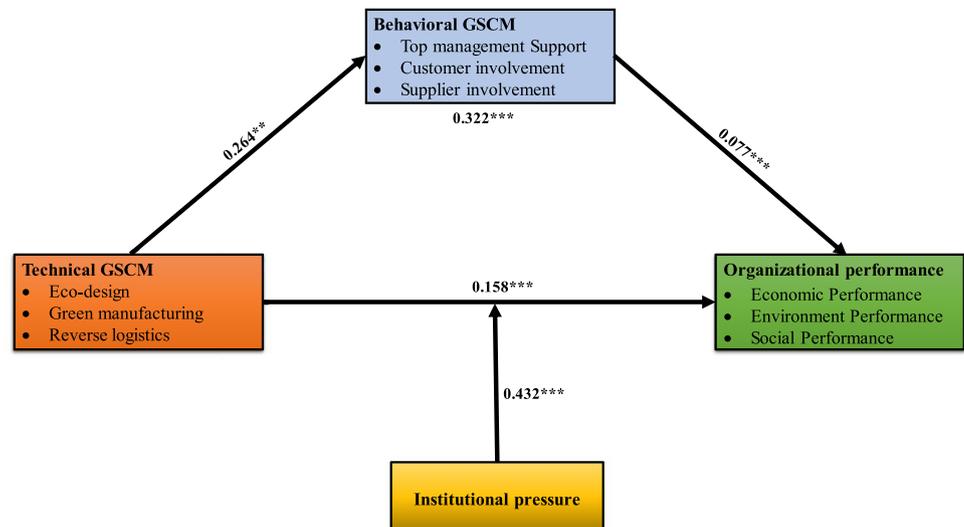
**Table 4** Hypotheses' results

Hypotheses	Structural paths	$\beta$ -value	$f$ -value	Result
H <sub>1</sub>	Technical GSCM → Behavioral GSCM	0.264**	182.2	Accepted
H <sub>2</sub>	Behavioral GSCM → Organizational performance	0.077***	134.4	Accepted
H <sub>3</sub>	Technical GSCM → Organizational performance	0.158***	131.5	Accepted
H <sub>4</sub>	Technical GSCM → Behavioral GSCM → Organizational performance	0.322***	122.5	Accepted
H <sub>5</sub>	Institutional Pressure × Technical GSCM → Organizational performance	0.432***	235.1	Accepted

\*\*\*  $p < 0.00$ , \*\*  $p < 0.01$ .

**Fig. 2** Results of hypotheses.

Notes: \*\*\*  $p < 0.00$ , \*\*  $p < 0.01$

**Table 5** Blindfolding statistics for predictive relevance ( $Q^2$ ) for the general model

Variables	SSO	SSE	$Q^2$ (= 1-SSE/ SSO)
ED	1216.00	1001.808	0.176
GM	1216.00	1101.612	0.094
RL	1520.00	1336.229	0.121
TMS	1520.00	1506.177	0.009
CI	1520.00	1422.245	0.065
SI	1216.00	945.112	0.223
ECP	1216.00	881.512	0.275
ENP	1216.00	977.114	0.196
SP	1216.00	860.135	0.293
IP	1216.00	1195.548	0.017

Diagonal values in parentheses represent the root square of AVEs. **SSO** = Sum of the square of observation; **SSE** = Sum of the square of prediction error.

all the endogenous constructs of our model are shown, and their predictive relevance as the  $Q^2$  values are more than zero.

## Discussion and findings

### Theoretical contributions

The study's findings make important contributions theoretically. We empirically investigated the links between technical GSCM practices, behavioral GSCM practices, institutional pressure, and organizational performance in Pakistan. Firstly, this research categorized the GSCM practices into technical and behavioral dimensions, and the impact of these practices theorizes on organizational performance (Junjun Liu et al., 2020a, b). Usually, the significance of behavioral GSCM practices is ignored, and organizations only focus and pay attention to the technical dimension when implementing GSCM in their business settings. However, this study confirms that behavioral practices are the fundamentals to implement the technical practices of GSCM successfully, and both of these practices positively affect organizational performance (Geng et al., 2017). Additionally, the findings show a full mediation effect of behavioral GSCM practices on the relationship between technical GSCM practices and organizational performance. Furthermore, the findings also confirm a significant moderating effect of institutional

pressures on the implementation of GSCM practices and organizational performance.

These findings are in line and supported by institutional and STS theory. Still, it is not limited to the conventional body of knowledge that behavioral (soft) dimensions of GSCM must be treated like the most critical dimensions to implement the technology-based dimensions GSCM successfully (Dubey et al., 2015; Mitra and Datta, 2014; Muduli et al., 2013). The past research studies work on some practices of GSCM; however, this study's framework integrated the practices of GSCM into soft/behavioral and hard/technical dimensions of GSCM, which are taken from the previous literature (Junqi Liu et al., 2020a, b). This study highlighted the direct relationship between technical (hard), behavioral (soft) GSCM, and organizational performance. Further, our research contributes to the existing body of knowledge by revealing the mediating effect of behavioral GSCM practices and moderating effect of institutional pressure on the relationship between technical practices of GSCM and organizational performance. Secondly, this study makes a contribution to the application of STS theory and institutional theory in the GSCM perspectives. STS theory recommends that to improve the efficiency and effectiveness of organizational systems, both soft (social/behavioral) and hard (technical) subsystems must be integrated (Pasmore, 1989).

Grounded on STS theory, this research elaborates that technical practices of GSCM can increase the adoption of behavioral GSCM practices and motivate organizations to get a more competitive advantage by adopting these practices. In the past researches, these two elements or subsystems contributed to the only economic performance of organizations. However, the present study examined that environmental performance, economic performance, and social performance are influenced by such dimensions under STS and institutional theory perspective. Thirdly, this research contributes to the current body of knowledge by exploring how technical practices of GSCM are influenced by the behavioral practices of GSCM to attain the desired environmental, social, and economic performance of organizations. However, various studies have revealed the relationship between GSCM practices and organizational performance, and very limited studies are available which have examined the three performance dimensions simultaneously. Thus, this research study gives more insights by assessing the effect of technical, behavioral practices of GSCM and institutional pressure on organizational performance.

### Practical implications

For practice, the study findings have acute implications concerning how the managers of organizations in developing countries can achieve desired goals by effective implementation of GSCM practices. As the SEM findings show a

positive relationship among behavioral practices of GSCM and organizational performance, so it is crucial for the managers to more emphasize these factors, i.e., behavioral GSCM practices, because it is considered the most important element in the adoption of the technical practices of GSCM, i.e., cleaner production, clean technology, environmental management tools, information technology systems, etc. to achieve the environmental performance. This implies that behavioral and technical GSCM dimensions are both very important to attain the desired goals and competitive advantage. Moreover, this study highlighted that institutional pressures and the focused commitment of internal management, top management support, customer involvement, supplier involvement (behavioral GSCM practices), and technical GSCM practices would lead to the ideal outcomes for organizational performance.

Research findings suggest that managers of developing countries should pay more attention to the soft dimensions of GSCM practices to adopt technical practices and achieve competitive advantage. Governments should take action and design some demonstrating seminars to encourage the organizations to adopt GSCM practices, particularly among SMEs. The findings of this study will encourage the companies to adopt GSCM practices through which the environmental pollution can be decreased, cost-effectiveness, and improvement of social performance as well. (Khanna, 2015) argued that when organizations considered the behavioral practices as a foundation, then technical practices of GSCM could be leveraged. This argument indicated that equipment or technologies might not be much important, which leads to the best dimensions in emerging markets, but it depends on the behavioral and contextual elements.

In developing countries such as Pakistan, institutional pressure usually influences negatively on the financial measures of organizations due to scarcity of focus and willingness. This study helps the manufacturers develop the strategies to implement the GSCM practices in their entire supply chain network to attain the green goals and improve the organization's overall performance. Additionally, the implementation of the behavioral practices of GSCM develops an accommodating atmosphere between employees and top management of the organizations. Furthermore, behavioral dimensions can enhance the dissemination of GSCM principles across the supply chain partners. All these arguments can motivate the managers of organizations to implement behavioral dimensions of GSCM to attain and enjoy a competitive advantage. Generally, this research provided more insights into the relationship between technical GSCM practices, behavioral GSCM practices, institutional pressure, and organizational performance. Clearly, the area of GSCM has plenty of space that needs more growth in the research and practice.

## Conclusions

This research used an STS and institutional theory-based view to comprehend the role of technical GSCM practices, behavioral GSCM practices, and institutional pressure to enhance the organizational performance in Pakistan, a developing country. GSCM practices were divided into two categories and explored how technical versus behavioral GSCM practices affect the performance of organizations. The mediation of behavioral GSCM practices and moderation of institutional pressure was revealed to examine their impact on technical practices of GSCM and organizational performance. The results demonstrate that the managers of developing countries must focus and pay more attention to the soft and behavioral-oriented practices of GSCM. They must make more investments in the technical-driven practices of GSCM. In general, this research underlines the significance of soft dimensions of GSCM for the improved performance of organizations and reveals the sequential relationship which involves hard/technical, soft/behavioral GSCM dimensions, and moderation of institutional pressure. SEM analyses have supported the mediation of behavioral dimensions of GSCM and moderation of institutional pressure on the relationship among technical GSCM dimensions and organizational performance.

Moreover, compared to the developed country's manufacturing companies, Pakistani manufacturing companies have less sophistication and superiority in implementing GSCM practices. Several Pakistani manufacturing organizations have extreme pressures related to the environment from the government and national/international customers. Consequently, technical dimensions of GSCM have been implemented alone to cope with the environmental pressures, requirements, needs, and wants of customers because they considered it a quick solution to deal with these challenges. However, the developed countries comparatively have a keen focus on the behavioral dimensions of GSCM because they know without the implementation of soft dimensions, they could not achieve their desired goals. They will fail to fulfill the customer's requirements (Cho et al., 2017). Comparative research could be of value by using a sample from developed and developing countries.

In contrast to past studies, this study has various limitations which give prospects for further research. Firstly, it was very difficult to collect the data by direct survey during lockdown due to COVID-19. It is ideal for getting the data through an online survey by using social media or emails. Secondly, this study used the snowball technique to collect the data, risk of the inadequate demonstration was deceptive, and it may influence the explanation of findings, so

it is suggested to use a random sampling technique to collect the data. Thirdly, generalizability is another limitation. This study is conducted in a developing country (Pakistan), which varies from the developed countries. The efficiency and effectiveness of technical and behavioral dimensions of GSCM may differ in other industrial settings and are also influenced by the contingency uncertainty of the environment. Future research is needed for further understanding the effect of contingency on the relationship between technical, behavioral GSCM practices and organizational performance. Fourth, this study used institutional pressure as moderating variable. It is imperative to further explore the other moderators under the same model, such as corporate social responsibility (CSR) and organizational culture. Fifth, this study used behavioral GSCM practices as a mediator. Future research may use green human resource management practices as a mediator in GSCM, such as green training. Lastly, we do not evaluate how and why institutional pressures exist. Also, we do not evaluate all the three institutional pressures separately. Future research may take all the three dimensions of institutional pressures separately in the relationship of GSCM and organizational performance.

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**Authors' contributions** N. Nureen was involved in conceptualization, writing the original draft, and methodology. L. Da was responsible for supervision and funding acquisition. B. Ahmad took part in formal analysis, data handling, and methodology, and writing, reviewing, and editing. M. Irfan participated in writing, reviewing, and editing, and variable construction.

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