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## Article

# Barriers to the adoption of sustainable supply chain management practices: Moderating role of firm size

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## MARKETING | RESEARCH ARTICLE

# Barriers to the adoption of sustainable supply chain management practices: Moderating role of firm size

Sajjad Ahmad Baig<sup>1</sup>, Muhammad Abrar<sup>2</sup>, Aysha Batool<sup>2</sup>, Muhammad Hashim<sup>1</sup> and Rizwan Shabbir<sup>2\*</sup>

**Abstract:** The reason behind the low adoption of sustainable supply chain management practices in developing countries is since emerging economies' supply chains face relatively more barriers to sustainability as compared to those which operate in developed countries. The research on the textile and apparel industry is mostly done in developed countries but empirical research on SSCM in developing countries is lacking. The purpose of this paper is to identify the key barriers that hinder the adoption of sustainable supply chain management practices and firm performance at the triple bottom line and what is the effect of firm size in tackling these barriers. Data is collected through a structured survey from B2B textile companies situated in Pakistan. After analyzing the exploratory factor analysis parameters, three groups of barriers are extracted: sectoral-economic, managerial, and supplier hindrance. The results exhibit that sectoral-economic and supplier hindrance has a significant effect on environmental management practices. Managerial barriers are significant with supply chain integration practices. Moreover, firm size significantly moderates the relationship of sectoral/economic barriers with environmental practices, and managerial

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## PUBLIC INTEREST STATEMENT

As we all know, sustainability is core concern for every business and emerging economies are facing barriers in implementing sustainable supply chain management (SSCM) practices. Globally, textile and apparel industry has implemented environment-friendly procedures to enhance their supply chain performance. This piece of work identified the key barriers that hinder the adoption of sustainable supply chain management practices i.e sectoral-economic, managerial, and supplier hindrance. The industrial experts could enhance the integration of SSCM practices in traditional supply chains by mitigating sectoral-economic factors and efforts should be made at the government level to promote sustainability policies. Moreover, policy makes could design sustainability standards for textile producing countries in order to strengthen buyer-manufacturer-supplier integration for this global cause. The marketing managers could promote social awareness campaigns by empowering their suppliers to fulfill their resources by various financial support programs.

barriers with social practices. Most importantly, the demand for societal awareness is required at both business and client levels to encourage organizations for adopting sustainable measures to gain competitiveness.

**Subjects:** Marketing; Social Sciences; Economics, Finance, Business & Industry; Environmental Economics; Industry & Industrial Studies

**Keywords:** sustainability barriers; sustainable development; textile sector; sustainable supply chain management practices

## 1. Introduction

The fast-paced industrial growth has put doubt among legislators and decision-makers about negative environmental and social impacts across the world (Gadenne et al., 2009). Globally, the textile is one of the major sectors in terms of share in supplier countries' Gross Domestic Product (GDP) and employment. Moreover, the textile and apparel industry faces the most challenging issues for maintaining sustainability parameters with the United Nations (UN) development goals. The global fragmentation of the textile industry has made it problematic as a high level of outsourcing is done in developing countries. Suppliers are located in diverse geographical locations, causing a lack of transparency, especially while lower tiers are involved (Köksal et al., 2017). Owing to the textile sector's importance, the damages to the environment and society by its production must be addressed instantly (Desore & Narula, 2018; Jeswani et al., 2008).

During the last decade, researchers have tried to evolve supply chain management (SCM) within the context of sustainable development to explore sustainable supply chain management (SSCM) (Pagell & Wu, 2009; Tseng et al., 2015). SSCM combines the objectives of green or environmental supply chain management (GSCM/ESCM) and corporate social responsibility (CSR) to help firms achieve their performance at the triple bottom line (Elkington, 1998) i.e. economic, social, and environmental dimensions. The SSCM practices in developing countries are comparatively under-developed; that is why research in such countries is still limited (Esfahbodi et al., 2016; Galal & Moneim, 2016; Kim et al., 2011; Silvestre, 2015a). This low adoption is since emerging and developing economies' supply chains face relatively more sustainability barriers than those who operate in developed countries (Silvestre, 2015b). Businesses certainly do face new challenges and opportunities in the adoption of environment-friendly procedures (Murillo-Luna et al., 2011) and social practices (Köksal et al., 2017) which makes it crucial to understand the ways for integrating sustainability into the textile supply chain by mitigating risks (Freise & Seuring, 2015).

While implementing sustainability, firm size is considered an essential factor (D. Lee, 2019). Larger firms are thought to be implementing environmental and social practices as corporate responsibility and to address international sustainability issues. Moreover, larger firms have better resources, more vigorous research and development, financing, marketing capabilities, and social compact, and use these attributes to pursue sustainable performance. Comparatively, small and medium-sized enterprises (SMEs) have fewer resources and struggle for their existence, causing little focus on sustainability issues (Li & Huang, 2017; Sancha et al., 2015; Walker et al., 2008; Walker & Jones, 2012). But the role of SMEs in the development of many emerging economies cannot be neglected. In Pakistan's textile sector, most of the firms belong to the SME sector.

Barriers to SSCM in the context of various countries, other than Pakistan, and industries, other than textile, have been explored (Chakraborty & Mandal, 2014; Moktadir et al., 2018; Al Zaabi et al., 2013). However, in literature, quantitative studies analyzing the impact of sustainability barriers on the adoption of SSCM practices are scarce, while some have considered the environmental dimension only (Jabbour et al., 2016). Firm size has also been identified as an influential factor having a moderating effect on the relationship between SSCM practices and performance (Wang et al., 2018).

To the best of the authors' knowledge, such primary data-based empirical evidence in the context of a South Asian textile supplier country is somehow lacking which investigates about the underlying sustainability barriers in the textile sector and also examines their impact on the adoption of SSCM practices related to all three TBL dimensions i.e. environmental, social and operations related practices, while also accounting the effect of firm size as a moderator. The present study aims to fill this gap by measuring the impact of sustainability barriers on the adoption of environmental, social, and supply chain integration practices within Pakistani textile firms. This piece of research work extends the existing literature on SSCM by collectively identifying the barriers and their impact on three-dimensional SSCM practices implementation through the theoretical lens of the triple bottom line and stakeholder theory and also considering the moderating role of firm size. Two studies are conducted for this purpose to explore the obstacles and to testify their impact. It would help the practitioners and managers by providing an insight into the underlying barriers and facilitating a workable framework for SSCM practices implementation through controlling or mitigating these barriers according to their impact on larger firms and SMEs. The paper is divided into subsections including literature review, methodology, results and discussion, and conclusion. Limitations and future research directions are also discussed.

## 2. Literature review

### 2.1. Sustainable supply chain management (SSCM)

SSCM is elaborated as *"the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its supply chains"* (Carter & Rogers, 2008). Practically, sustainable supply chains should implement such business practices and procedures, which align with these three pillars of sustainability, i.e., social, environmental, and economical, to create a balance among them. But failing to this will lead to unsustainable supply chains (Das, 2017b).

### 2.2. Sustainable supply chain management practices

Organizational sustainability is not possible unless SSCM practices are integrated. Similarly, the ecological benefits of an organization tend to diminish if the supply chain participants are not engaged in sustainability practices (Özçelik & Öztürk, 2014). Topical research on SSCM practices shows how firms incorporate sustainability practices into their traditional supply chains, but underlying barriers hinder such initiatives (Giunipero et al., 2012; Jia et al., 2018). These SSCM practices include but are not limited to environmental practices, social practices for employees and community, operational practices, and supply chain integration (Das, 2017b). Environmental initiatives consist of practices like senior managers' commitment to eco-friendly SCM, middle management's support, collaboration, total quality environment management, conservational compliance and audits, accreditation of ISO-14001 or similar environment management systems, green product design, non-pollutant production, and green reusable packaging, suppliers' ISO 14001 certification, etc. (Sarkis et al., 2011; Zhu and Sarkis 2004; Zhu, Sarkis, & Geng, 2005; Zhu, Sarkis, & Lai, 2007, 2008).

In supply chains, social issues management is lagging far behind (Klassen & Vereecke, 2012). The social aspect of SSCM is influenced by corporate social responsibility (CSR) practices of the firms. Economic and working conditions, equity and education of employees, health and safety of society and employees, and benefits to the surrounding community are the specific issues affected by businesses, and the latter cannot neglect this impact (Das, 2017a). Understanding and considering the interrelationship among social issues like human rights, safety, diversity, and the environment is an essential element of Corporate social responsibility (CSR) and necessary for incorporating sustainability in the supply chain (Carter et al., 2011; Emamisaieh & Rahmani, 2017).

Numerous activities related to multiple functions within and outside the organization make the supply chain process complex. Flynn et al. (2010) elaborated supply chain integration (SCI) as "the

degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages Intra- and inter-organization processes.” SCI functions include abolishing communicational barriers and solutions to problems through monitoring coordinating and control processes (Swink et al., 2007; Walton et al., 1998). SCI is deemed to be a crucial factor for sustainable supply chain performance as well (Abdul-Rashid et al., 2017; Afum et al., 2020; Hendijani et al., 2020). For empirical investigation in this paper, the scales of SSCM practices are adapted from Das (2017b), i.e., social, environmental, and supply chain integration practices.

### **2.3. Barriers to sustainability and SSCM practices**

Different barriers hamper the incorporation of sustainability in the firms’ supply chain (Giunipero et al., 2012). Organizations face various obstacles while implementing SSCM practices in their businesses, which have also been identified in literature through industry or country-specific studies (Luthra et al., 2011; Moktadir et al., 2018; Al Zaabi et al., 2013). These barriers include lack of commitment from top management, difficulty in aligning short term and long-term plans, difficulty in changing company practices and policies, the requirement of high investment, unavailability of environment-related standards as well as regulations, scarcity of customers awareness, and problems in creating such consciousness, suppliers lack resources, etc. under the various categorization of these barriers like internal and external, social, technological, financial, governmental, economic, managerial, etc. (Moktadir et al., 2018; Murillo-Luna et al., 2011; Trianni et al., 2017). Businesses take SSCM related initiatives due to the underlying pressures, particularly from government, NGOs, and other stakeholders (Diabat et al., 2014; Meixell & Luoma, 2015). Weak regulatory checks and controls act as a significant barrier to sustainability initiatives (Giunipero et al., 2012; Oelze, 2017). Stakeholders are on the top among the influential sustainability group following customers and governments. In developing countries, stakeholders, notably supply chain partners lack awareness about sustainability and their part in its achievement (Moktadir et al., 2018; Soda et al., 2015). They result in an unwillingness to pay and a lack of demand for sustainable products (Jia et al., 2018). Jabbour et al. (2016), in their study about the impact of barriers on environment proactive green operational practices and firm performance, found that internal barriers negatively impact the implementation of environment-friendly operations practices. Researchers have mainly focused on identifying the barriers through qualitative studies, but the empirical evidence by primary data is scarce in this context, which validates these qualitative findings (Sajjad et al., 2020). Due to the global nature of textile supply chains and the extreme importance of the sector in terms of its role in economic development, employment, environmental degradation, and social impact, it is pertinent to identify and examine the impact of sustainability barriers on implementing SSCM practices. This study utilizes three constructs of sustainability barriers -namely sectoral/economic, managerial, and supplier hindrance- through the EFA of barriers scale identified by Giunipero et al. (2012).

### **2.4. Moderating effect of firm size**

Firm size is considered the most influential factor in the implementation of sustainability-related initiatives in supply chains. Larger firms have more resources as compared to small and medium-sized enterprises (SMEs), so their investment and adoption are also higher regarding environment-friendly production, resource-efficient technologies, and process, recycling (Li & Huang, 2017) and strategic activities like manpower training for acquiring eco-friendly certifications, information technology usage, etc. than SMEs (D. Lee, 2019). On the other hand, small firms lack the manpower to acquire environment certifications as they are more prone to business challenges like capital, cost, and system, etc. than large-sized firms. According to D. Lee (2019), firm size can be a conclusive factor in implementing environment-friendly practices in SSCM. Similarly, as far as the social practices of CSR are considered, Klerkx et al. (2012) show that to some extent, large firms excel in the adoption of comprehensive CSR practices as compared to small and medium-sized enterprises (SMEs). Similar results were indicated by Ayuso et al. (2013). Touboul et al. (2014) studied large buyers and their small suppliers through the lens of resource development theory (RDT) to investigate the effect of relative power on applying sustainable supply management practices and sustainability initiatives. According to the authors, power linked with the firm size can either support or hamper effective



cooperation for supply chain sustainability. Sancha et al. (2015), in their study, found that as a traditional control variable, firm size has a significant positive effect on the adoption of sustainable supplier development practices. Large firms are more inclined towards sustainability initiatives owing to their greater resources to invest in these practices and sensitivity to reputational issues due to unethical supplier practices. Tay et al. (2015), in their research, indicate firm size as an internal barrier and one of the most critical organizational characteristics which are likely to impact the adoption of green initiatives. S.-Y. Lee (2008) also found that firm size is an influential factor for firms to practice on SSCM; large-sized organizations are relatively more willing to initiate green supply chain practices.

Thus, the review of previous research demonstrates that firm size as a factor enables or hinders SSCM practices implementation. Whether public or private, large organizations are more likely to integrate such practices due to greater expertise, resource, and buying power (Walker & Jones, 2012; Wang et al., 2018).

Hence it is hypothesized that;

*H1: Sectoral/economic barriers affect the adoption of a) environment management practices; b) social practices for employees and community; c) supply chain integration*

*H2: Managerial barriers affect the adoption of a) environment management practices; b) social practices for employees and community; c) supply chain integration*

*H3: Supplier barriers affect the adoption of a) environment management practices; b) social practices for employees and community; c) supply chain integration*

*H4: Firm size moderates the relationship between sectoral/economic barriers and a) environment management practices; b) social practices for employees and community; c) operational practices; d) supply chain integration*

*H5: Firm size moderates the relationship between managerial barriers and a) environment management practices; b) social practices for employees and community; c) operational practices; d) supply chain integration*

*H6: Firm size moderates the relationship between supplier barriers and a) environment management practices; b) social practices for employees and community; c) operational practices; d) supply chain integration*

### **3. Methodology**

The study implies a triple bottom line and stakeholder theoretical perspective by identifying barriers to SSCM practices and their impact on social, environmental, and SCI levels of firm sustainability initiatives which are of greater importance for the stakeholders of the textile sector. For this research work, two studies were conducted. Study-1 was done to identify the categorical barriers in the context of the Pakistani textile industry through exploratory factor analysis (EFA) which were rarely studied in previous literature. The study-2 was conducted to empirically and statistically examine and testify the effect of identified categories of barriers from study 1. In study 2, with the help of structural equation modeling (SEM) the impact of identified categories of barriers on adopting SSCM practices was investigated along with the moderating role of firm size to know about the majorly affecting barrier groups. The study-2 derived important practical insights for sustainability initiatives in supply chain management.

#### 4. Sample and data collection

Data was collected from B2B textile processing companies, which were either the member of the All Pakistan Textile Mills Association (APTMA) and All Pakistan Textile Processing Mills Association (APTPMA) and situated in the city Faisalabad, the hub of the textile industry in Pakistan. At the time of data collection, 180 firms were registered, out of which 120 organizations were located in the city's main industrial areas, which were telephonically contacted. Out of which 63 companies agreed to respond, which is 52.5%. Doane and Seward (2011) concluded that if the sample size is  $\geq 30$ , it is advised sufficient for statistical analysis. Nulty (2008) and Creswell and Garrett (2008) recommended a response rate of 50% or more via a structured questionnaire while in a mail survey, it can be 20% or low. Based on this argument, a personal visit to the respondents was managed after an appointment to collect a prompt response. A 15-minutes briefing session was conducted with each respondent to help build the concept of SSCM practices and rephrase the items in the Pakistani context if required. The structured survey comprised two sections: the first section included twelve items regarding demographic information such as name and age of the company, number of employees, respondent's experience and designation, etc.; the second section comprised statements regarding barriers affecting the adoption of SSCM practices. The set of barriers in the second section, adapted from the Delphi research of Giunipero et al. (2012), consisted of ten items which were measured on a five-point Likert-scale (e.g., 1 = Not Important, 2 = Slightly Important, 3 = Important, 4 = Fairly Important, 5 = Very Important). The adapted scale was in English, which is also the official language in Pakistan. The prospective respondents were the top and/or senior managers having a good educational background, so the questionnaire was not translated into the native Urdu language. Before data collection, the content understanding was supported by a pilot study on 12 industry experts. The questionnaire items were then modified according to these respondents' feedback in collaboration with the academic experts. Due to the research objectives' sensitivity, questionnaires were self-administered in most companies to develop a better understanding of the respondents about the underlying concept. The descriptive statistics showed that only 24% of firms aged up to 10 years, whereas the rest were more than ten years old. As the textile is a labor-intensive sector, 22.4% of firms had 1000–5000 employees. The responding firms included 59.6% private firms followed by the public ltd. as 22.4% of the total because most textile firms in Pakistan are privately owned. 60.3% of textile organizations were export-orientated, and 39.7% were indulged in fulfilling the the the local market demand. According to the respondents' profile, 61.1% were performing their duties as managers. Their professional experience showed that 44.8% of respondents were having 10–20 years' experience, followed by 25.9% having professional experience of 20–35 years. To reduce biases about responses, they were asked about recent job experience, which expresses that 40.3% of respondents had been serving at the current position for 5–10 years and 31.6% were serving for less than five years.

#### 5. Results and discussion

##### 5.1. Study-1

##### 5.1.1. Identification of barriers

To find the generalized set of sustainability barriers in SSCM, an extensive review of the literature was done to understand the common barriers identified by different researchers through qualitative studies. For example, Moktadir et al. (2018) studied the barriers in the context of Bangladesh's leather industry. Al Zaabi et al. (2013) examined barriers in the fastener manufacturing sector. Oelze (2017) researched textile firms, but those were situated in developed countries like Germany, the USA, Canada, etc. Sachin Kumar Mangla et al. (2017) found barriers through literature review, and their findings were based on an Indian ancillary auto manufacturing firm. Hence, several studies were reviewed for this purpose. As already mentioned in the literature review section that most of the studies highlighted some key common barriers which chiefly become a hindrance to the adoption of SSCM practices in different industries. Although a good number of studies have been done in this regard, yet most of these are with the limitation of generalizability because their



findings are related to a specific industry or developed countries. The most commonly identified barriers in literature were found in a very good Delphi study of Giunipero et al. (2012) on US-based firms. There was found a dearth of such research work in the context of the Pakistani textile sector. To present empirical findings from Pakistan, the scale developed by Giunipero et al. (2012) was selected to be used in the survey for industry experts' feedback.

While applying the scale identified by Giunipero et al. (2012) in a developing economy, i.e., Pakistan, a two-step approach was used. Firstly, Exploratory Factor Analysis (EFA) was performed using Statistical Package for Social Sciences (SPSS) to examine the uni-dimensionality as well as to extract and explore the underlying dimensions of the adapted scale for the complete sample data of Pakistani textile firms (Zhang et al., 2018; Zhao et al., 2008).

Secondly, Cronbach's alpha was used to examine the reliability of identified extracted items (Tatoglu et al., 2016; Zhao et al., 2008). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) test was 0.566, more than the satisfactory threshold level of 0.50 (Hair, 2011), and Bartlett's test of Sphericity held significant with  $p < 0.01$  both indicating sample adequacy for conducting EFA as shown in (Table 1). Ten observable items and extracted factors were refined through three measures in EFA, as established in the study of Zhang et al. (2018), i.e., factor loadings should be more than 0.30, eigenvalue  $> 1$ , and the variance explained by the extracted constructs should be more than 50%.

The cross-loaded items were also examined, and no issue was found as the difference between the cross-loadings was more than 1. Varimax rotation method was applied without mentioning the number of factors to be retained. It resulted in the extraction of 3 factors as given in Table 2, explaining a cumulative variance of 65.49% above the threshold value of 50%. The first extracted factor was named "Sectoral-Economic Barriers" (SEB) with Cronbach's alpha of 0.75, explaining a 35.29% variance. SEB consisted of five items, which included two sectoral factors, i.e., lack of adequate standards and high initial buyer/supplier investment, and three economic factors, i.e., lack of adequate regulations, economic uncertainty, and external awareness about sustainability. The second extracted factor was named "Managerial Barriers" (MB) with a Cronbach's alpha of 0.736, explaining the variance of 18.743%. MB comprises three items, i.e., lack of top management support, difficulty in changing organizational policies and practices, and misaligned short vs. long-term goals. The third extracted factor was termed as "Supplier Barriers" (BSUP) with Cronbach's alpha of 0.673, explaining 11.460% variance. This factor contained two items, i.e., suppliers lack resources and additional burden on suppliers while considering sustainability measures. The value of Cronbach's alpha is sensitive to the number of indicators in a factor. Thus, the low value of 0.637 for BSUP can be justified as the factor consisted of only two items. Moreover, researchers have considered Cronbach's alpha value of 0.60 and above as acceptable (Churchill, 1979; Rahimnia & Hassanzadeh, 2013; Taber, 2018; Van Griethuijsen et al., 2015). Overall, no item was dropped as all the correlation values were above 0.30. Each retained factor's reliability was checked through Cronbach alpha with values 0.755, 0.736, and 0.673 for factors 1, 2, and 3, respectively, depicting an adequate level of construct reliability (Churchill, 1979; Nunnally, 1978).

**Table 1. KMO and Bartlett's test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.566
Bartlett's Test of Sphericity	Approx. Chi-Square	197.895
	Df	45
	Sig.	0.000

Source: Own research.

**Table 2. Barriers to SSCM practices in the textile sector**

Exploratory Factor Analysis		Factor Loadings		
		SEB	MB	BSUP
Sectoral/Economic Barriers	Lack of Regulations	0.760		
	Economic Uncertainty	0.742		
	Initial Buyer and Supplier investment	0.714		
	Lack of Standards	0.713		
	External Awareness	0.479		
Managerial Barriers	Little Top Management Support		0.807	
	Policy Change Difficult		0.799	
	Short Vs. Long Term Goals		0.662	
Supplier Barriers	Suppliers Lack Resources			0.928
	Additional Burden on Suppliers			0.661
Eigen Value		3.530	1.874	1.146
Variance Explained %		35.296	18.743	11.46
Total variance Explained %		35.296	54.039	65.499
Cronbach's alpha		0.755	0.736	0.673

Source: Author's research

SEBs are identified as the most important factor of barriers. These barriers in the textile industry are aligned with the global macro context to deal with SSCM practices. The work of Esfahbodi et al. (2017) confirmed that in developing countries, increasing demand from macro-factors, like economic, legal, technological, and social forces, appeal organizations to eliminate barriers for achieving performance benefits of SSCM practices. The awareness regarding environmentally-friendly initiatives act as an imperative favorable element for manufacturing organizations. Similar finding is summarized by Moktadir et al. (2018) in which leather processing organization are suggested to initiate sectoral awareness programs for implementing sustainable production practices. Firms in the textile sector are majorly concerned about the economic and sectoral issues related to the adoption of SSCM practices. The present study also highlights that awareness programs related to sectoral-economic attributes might also provide SSCM performance in the overall textile industry through, e.g., amendments in export laws, constitute specific standards for export- market and the local market. The utmost priority should be given to the initiation of local community awareness programs to educate the public about sustainability and its consequences.

Managerial barriers are found to be the second challenging factor for applying SSCM practices in the B2B textile and garment sector of Pakistan. These findings are also aligned with prior studies of Al Zaabi et al. (2013), Gandhi et al. (2015), and Moktadir et al. (2018), etc. which described that top-management executives' decisions are not supportive towards adopting SSCM practices. The companies top management's commitment, willingness, and support are the core elements for the sustainability initiative. A study regarding Indian manufacturers explained that executives are unable to drive their organizations to adopt sustainable practices because they are not committed to sustainability vision and organizational objectives (Al Zaabi et al., 2013). They consider that sustainability would cause them high costs and might not bring immediate profitability due to the

inability to plan for more than five years (Giunipero et al., 2012). However, Brazilian manufacturers don't consider managerial factors as barriers to their reverse logistics implementation (Bouzon et al., 2016). Here, an important issue could be that Pakistan is a relatively an underdeveloped or developing economy where managerial decisions and willingness are not concerned with sustainability but with economic conditions and financial benefits (Jia et al., 2018) as changing the company policies and practices to integrate sustainability is a significant challenge for any organization (Giunipero et al., 2012). For national product manufacturers, top-management policies might not be a source of the barrier due to lesser awareness and demand for sustainability initiatives by domestic customers. Still, an international exporter would have to consider managerial commitment towards SSCM practices to better align with the international market's sustainability agenda. As the study of Gandhi et al. (2015) concluded that directors (executive members) are policymakers for an organization and their commitment towards sustainability, demand them to act as resource personals for implementing a complete process to achieve the effectiveness of SSCM practices and engaging all stakeholder for sustainable management performance.

The third group of barriers regarding the textile sector is the supplier-related challenges that need to be addressed for SSCM practices as textile manufacturers in developing countries are more focused on earning financial measures. The study of Vachon (2007) debates that supplier's role toward adopting SSCM practices is vital, but it can only be possible if these practices diminish the social, economic, and environmental problems of the community. The majority of suppliers in Pakistan's textile industry belong to the Small and Medium Enterprises with a low or no focus on CSR standards due to lack of appropriate governmental regulations and specific sustainability standards in the country to drive them. The work of Zhu and Sarkis (2006), Diabat et al. (2014), and Govindan and Hasanagic (2018) concluded that supplier difficulties regarding implementing SSCM practices could be eliminated by strictly pursuing environmental regulations. The BSUP also increases when manufacturing firms' suppliers consider sustainability an extra burden, as concluded by Moktadir et al. (2018). In the leather industry, the pressure is imposed on organizations to take measures for implementing sustainable policies. As the developing country suppliers face more difficulties while incorporating sustainable supply chain practices, such pressures for implementation with a continuous demand for low prices at the same time enhances challenges for textile suppliers in Pakistan also. Thus, barriers to sustainability slow down the implementation and relative performance evaluation of organizational SSCM practices in developing economies. The barriers identified in this study focused on long-term performance because the textile sector in South-Asia is the backbone of countries' economic development.

## **5.2. Study-2**

Keeping in view the complex nature of relationships among study constructs, a more sophisticated multivariate data analysis tool has been followed (Hair, Sarstedt et al., 2014). For this purpose, a variance-based structural equation modeling (PLS-SEM) approach through Smart PLS 3.0 (Ringle et al., 2015) is used. Using Smart PLS, in this case, provides various advantages, e.g., the theory is less developed in our proposed framework, (Hair, Ringle et al., 2011) and PLS-SEM works efficiently with a small sample size, and it makes practically no assumptions about the underlying data (for example, in terms of data distributions).

## **5.3. Assessment of measurement model**

Keeping in view the nature of constructs and their relationships, a reflective measurement model was established (Hair, Hult et al., 2016) assessed based on reliability and validity (Table 3). Cronbach's Alpha, & composite reliability (Bacon et al., 1995), have been used to assess the reliability while outer loadings were used to evaluate indicator reliability. Similarly, validity was assessed based on Average variance extracted (AVE) and outer loadings (Chin, 2010; Mela & Kopalle, 2002). Discriminant validity is assessed through cross-loadings, Fornell and Larcker (1981) Criteria, and HTMT (Hair, Hult et al., 2016). All the criteria i.e. alpha coefficients, CR estimates, and average variance extracted (AVE) were in acceptable range or above their cutoff values (Churchill, 1979; Hair, Ringle et al., 2013; Hair, Hult et al., 2016; Taber, 2018) confirming the reliability and validity of measurement model.

**Table 3. Indicator reliability, cross-loadings, VIF, alpha, rho-A, CR, and AVE**

Cons tructs	Indicator	Indicator reliability	Cross loadings	VIF	Alpha	Com posite Reli ability	AVE
MB	MB1	0.841	0.841	1.305	0.678	0.817	0.601
	MB2	0.661	0.661	1.277			
	MB3	0.812	0.812	1.450			
SEB	SEB1	0.798	0.798	1.548	0.786	0.86	0.606
	SEB2	0.761	0.761	1.423			
	SEB3	0.803	0.803	2.015			
	SEB4	0.749	0.749	1.634			
BSUP	BSup1	0.703	0.703	1.278	0.636	0.824	0.705
	Bsup2	0.957	0.957	1.278			
EMP	EMP1	0.920	0.920	3.271	0.913	0.936	0.785
	EMP2	0.934	0.934	3.373			
	EMP3	0.814	0.814	2.536			
	EMP4	0.871	0.871	2.955			
SCI	SCI1	0.899	0.899	1.292	0.644	0.846	0.734
	SCI3	0.813	0.813	1.292			
SP	SPC1	0.896	0.896	1.314	0.657	0.852	0.742
	SPC2	0.826	0.826	1.314			

Convergent validity is used to assess how an indicator is positively linked with the other indicators within the theoretical framework (Chin, 2010). This study established a reflective measurement model, and in this case, convergent validity is measured through outer loadings and AVE. Initially, items having outer loading below .708 were checked, and all the indicators have acceptable values despite BM2, which was retained because AVE of the respective construct was within the threshold limit. Cross loadings, Fornell and Larcker (1981) criteria, and HTMT results (table-4) confirmed that all the constructs are different from other constructs of the model (Lucas et al., 1996). Here the square root of AVE of each latent variable was higher than the correlations among the latent variables” (Chin, 2010; Hair, Ringle et al., 2011). Cross loadings of each construct’s indicators were higher on the same constructs compared with the other indicators. In addition to this, HTMT values were less than the threshold value of .85, confirming the model’s discriminant validity (Henseler et al., 2015).

**Table 4. Fornell and Larcker (1981) criteria, HTMT, and coefficient of determination**

Cons truct	BM	SEB	BSUP	EMP	SCI	SP	R <sup>2</sup>	R <sup>2</sup> Adjus ted
MB	0.775	0.288	0.416	0.298	0.354	0.345	-	-
SEB	0.164	0.778	0.305	0.182	0.404	0.346	-	-
BSUP	0.414	-0.001	0.840	0.144	0.450	0.278	-	-
EMP	0.017	-0.435	0.244	0.886	0.691	0.259	0.249	0.211
SCI	-0.210	-0.125	0.318	0.287	0.857	0.368	0.246	0.207
SP	-0.190	-0.312	-0.072	0.271	0.154	0.862	0.117	0.072

#### 5.4. Assessment of structural model

Assessment of the structural model in this study is based on linearity, coefficient of determination ( $R^2$ ), effect size ( $f^2$ ), the predictive relevance  $Q^2$ , and path significance (Hair, Ringle et al., 2013). To obtain the best parameter estimation, multicollinearity was assessed (Mela & Kopalle, 2002), and all the values were less than the cut point value of  $\pm 5.0$  (Hair, Ringle et al., 2013). The coefficient of determination (denoted by  $R^2$ ) represents the exogenous latent variables' combined effects on the endogenous latent variable. 25% of the change in EMP and SCI and 11% of the change in SP is explained by this study's exogenous constructs. Predictive accuracy was measured through the coefficient of determination ( $R^2$ ), whereas predictive relevance was assessed based on  $Q^2$  value (Geisser, 1975; Stone, 1974). It was observed that the value of  $Q^2$  was greater than zero, which confirmed the predictive relevance of reflective endogenous latent variables.

The results presented in Table 5 depict negative and highly significant effect of sectoral/economic barriers (SEB) on environmental ( $b = -0.350$ ,  $p < 0.05$ ) and social practices ( $b = -0.310$ ,  $p < 0.05$ ). It indicates that SEB is the major factor that hampers sustainability initiatives at an environmental and social level in the Pakistani textile sector. Managerial barriers are found to hamper the implementation of supply chain integration practices ( $b = -0.350$ ,  $p < 0.05$ ). Lack of managerial commitment and difficulty in changing company policies and practices are the prominent barriers highlighted in SSCM research, which need to be tackled to better adapt and integrate sustainable practices in firm operations. On the other hand, a positive and significant association is found between BSUP and SCI ( $b = 0.457$ ,  $p < 0.01$ ), and between BSUP and EMP ( $b = 0.252$ ,  $p < 0.05$ ) which could be an indicator of the fact that as the supplier's related barriers increase, the firms tend to vigorously work on their collaboration with suppliers and integration of internal operations to cope with these barriers for better implementation of sustainability issues and enhancement of operational efficiency.

Moreover, the firms try to cover up the deficiency of environmental initiatives caused by the lack of resources among suppliers by better adopting EMP at the firm level. This is an exciting finding, which also supports the idea that the buyer firms' environmental sustainability initiatives can support the sustainability of suppliers. Suppliers play a vital role in the implementation of sustainability initiatives. The environmental sustainability pressures received from the international buyers are delivered to the suppliers of exporting textile companies.

**Table 5. Hypotheses testing**

Hypotheses	B	t	p	Confidence Interval		Status
				2.5%	97.5%	
SEB → EMP	-0.438	4.22	0.00	-0.61	-0.22	Supported
SEB → SCI	-0.078	0.52	0.60	-0.31	0.13	Not Supported
SEB → SP	-0.310	2.05	0.04	-0.54	0.02	Supported
MB → SCI	-0.350	2.25	0.02	-0.63	0.06	Supported
MB → SP	-0.127	0.72	0.47	-0.42	0.29	Not Supported
MB → EMP	-0.010	0.10	0.92	-0.29	0.31	Not Supported
BSUP → EMP	0.252	2.04	0.04	-0.03	0.47	Supported
BSUP → SCI	0.457	3.78	0.00	0.18	0.68	Supported
BSUP → SP	-0.020	0.08	0.94	-0.41	0.38	Not Supported

The impact of SEB on SCI, MB on SP and EMP, and BSUP on SP were not found significant in the context of the Pakistani textile industry. The logical justification for these may be that Sectoral and economic barriers relate to the economic and governmental rules and regulations. Whereas SCI is internal to company activity which is based on managerial effectiveness, and in the Pakistani textile industry it does not require large capital investments and governmental regulatory framework. Thus, in this case, SEB may not directly affect the SCI. Similarly, managerial barriers did not impact the implementation of SPs and EMPs which is also supported by our EFA results which state that in the textile sector of Pakistan, economic and governmental barriers are the most crucial factors that hinder the adoption of social and environmental related initiatives which involve expensive measures (i.e. effluent treatment plants, social certifications, better working environment, and facilities) and supportive regulatory framework. Thus, managerial barriers are not the major cause of concern in this scenario. Similarly, supplier-related hindrances do not directly cause a problem for social practices which are majorly disrupted by economic and sectoral conditions.

The inclusion of firm size as a moderating variable has given some important insights. Interaction values of sustainability barriers and firm size are also shown in Table 6. Firm size and sectoral/economic barriers interaction term has a positive impact ( $b = 0.6395$ ,  $p < 0.01$ ) on the link between SEB and EMP. It indicates that as the firm size increases, it offsets the negative effect of sectoral economic barriers on the adoption of environmental management practices. As compared to the SMEs, the large textile firms are usually export-oriented, and they have to abide by the rules and regulations from their international buyer firms about environmental certifications, etc. As the firms get larger, they are more impacted by their buyers from the global textile supply chain. So, they extend their efforts beyond sectoral or economic barriers to secure business in the international market for competitive advantage and meanwhile managing the positive reputation through SSCM practices (Wolf, 2014). Whereas, SMEs tend to be more affected by resources and awareness related issues to adopt innovative technologies, etc due to major concern of saving profits in fewer available resources although they deem it crucial for organizational sustainability (Pozo et al., 2019). Thus, Hypothesis 4a was supported. H5b was also accepted as the findings indicate that with the increase in company size, managerial barriers tend to increase due to a larger number of employees and managers and potential managerial conflicts in decision making, which negatively impact the adoption of social practices ( $b = -0.511$ ,  $p < 0.01$ ). The same has been highlighted in previous researches that lack of managerial commitment, misaligned plans, and difficulty in the change of policy create hindrance for sustainability initiatives. It is important to restate that the direct impact of managerial barriers on SP was not found significant. Still, with the moderating role of the firm size, it becomes statistically significant.

Moreover, the firm size is also found to moderate the association between supplier hindrance and social SSCM practices ( $b = 0.003$ ,  $p < 0.05$ ). As compared to SMEs, big firms have complex and extensive supply chains involving many suppliers, which make them prone to more supplier-related hindrances. That is why as the firms get bigger, they tend to adopt social practices for employees and community, which could improve their image and motivate employees could help them in mitigating and overcoming the barriers they face in their supply networks. Thus, hypothesis 6 c is accepted.

## 6. Conclusion

The study has investigated several important hypotheses, some of which were found significant. In light of the discussed results, this paper exhibits that sectoral and economic, managerial, and suppliers related barriers directly impact the adoption of SSCM practices in either a negative or positive way. Moreover, firm size is also found to have a moderating effect between sustainability barriers and implementation of SSCM practices though few of the hypotheses were supported. Thus, the study findings give important insights into the implementation of sustainability aspects in the textile industry. As compared to the SMEs, the large textile firms are usually export-oriented and they have to abide by the rules and regulations from their international buyer firms about



Table 6. Moderation analysis

H	EMP (Dependent variable)		Coeff.	SE	t	P	LLCI	ULCI
H4a		Constant	3.442	0.131	26.295	0.000	3.180	3.704
	Supported	SEB(X)	-0.280	0.153	-1.835	0.072	-0.586	0.025
	R <sup>2</sup> = .48, MSE = .841, F = 17.873	Firm Size(W)	0.687	0.140	4.903	0.000	0.407	0.968
	Change in	X*W	0.640	0.159	4.031	0.000	0.322	0.957
	R <sup>2</sup> = .1443, p = .000							
H5a	Not Supported	Constant	3.179	0.134	23.695	0.000	2.911	3.448
	R <sup>2</sup> = .3096, MSE = 1.1150, F = 8.6704	BM(X)	-0.037	0.145	-0.254	0.801	-0.328	0.254
		Firm Size(W)	0.724	0.143	5.065	0.000	0.438	1.011
	Change in	X*W	0.063	0.150	0.420	0.676	-0.237	0.362
	R <sup>2</sup> = .0021, p = .6760							
H6a	Not Supported	Constant	3.206	0.137	23.446	0.000	2.933	3.480
	R <sup>2</sup> = .3198, MSE = 1.0930, F = 9.2469	BSUP(X)	0.099	0.162	0.616	0.541	-0.224	0.423
		Firm Size(W)	0.712	0.146	4.886	0.000	0.420	1.003
	Change in	X*W	-0.055	0.172	-0.321	0.749	-0.398	0.288
	R <sup>2</sup> = .0012, p = .7494							
H4b	SP (Dependent variable)							
		Constant	2.858	0.182	15.722	0.000	2.495	3.222
	Not Supported	SEB(X)	-0.271	0.212	-1.277	0.207	-0.695	0.154

(Continued)

Table 6. (Continued)

H	EMP (Dependent variable)		Coeff.	SE	t	P	LLCI	ULCI
	$R^2 = .14$ , MSE = .1.624, F = 3.202	Firm Size(W)	0.369	0.195	1.942	0.063	-0.021	0.758
	Change in $R^2 = .006$ , p = .8423	X*W	0.044	0.220	0.200	0.842	-0.697	0.485
		Constant	2.848	0.149	19.137	0.000	2.550	3.146
H5b	Supported $R^2 = .2740$ , MSE = 1.3717, F = 7.2970	BM(X)	-0.093	0.161	-0.574	0.568	-0.415	0.230
		Firm Size(W)	0.519	0.159	3.272	0.002	0.201	0.836
	Change in $R^2 = .1187$ , p = .0032	X*W	0.511	0.166	-3.080	0.003	-0.843	-0.179
		Constant	2.841	0.164	17.302	0.000	2.512	3.169
H6b	Not Supported $R^2 = .1657$ , MSE = 1.5755, F = 3.9053	BSUP(X)	-0.362	0.194	-1.864	0.067	-0.750	0.027
		Firm Size(W)	0.569	0.175	3.255	0.002	0.219	0.919
	Change in $R^2 = .0000$ , p = .9882	X*W	0.003	0.206	0.015	0.988	-0.409	0.415
	SCI (Dependent variable)							
		Constant	2.708	0.062	43.496	0.000	2.584	2.833
H4c	Not Supported	SEB(X)	0.038	0.073	0.517	0.607	-0.108	0.183

(Continued)

Table 6. (Continued)

H	EMP (Dependent variable)		Coeff.	SE	t	P	LLCI	ULCI
	$R^2 = .1239$ , $MSE = .1904$ , $F = 2.7821$	Firm Size(W)	0.154	0.067	2.303	0.025	0.020	0.287
	Change in $R^2 = .0251$ , $p = .1986$	X*W	-0.098	0.076	-1.300	0.199	-0.249	0.053
		Constant	2.743	0.553	49.550	0.000	2.632	2.853
H5c	Not Supported	BM(X)	-0.104	0.060	-1.733	0.088	-0.224	0.016
	$R^2 = .1375$ , $MSE = .1897$ , $F = .0343$	Firm Size(W)	0.144	0.059	2.436	0.018	0.026	0.262
	Change in $R^2 = .0020$ , $p = .7163$	X*W	0.023	0.062	0.365	0.716	-0.101	0.146
		Constant	2.768	0.056	49.431	0.000	2.656	2.880
H6c	Not Supported	BSUP(X)	0.103	0.066	1.560	0.124	-0.029	0.236
	$R^2 = .1568$ , $MSE = .1833$ , $F = .3.6586$	Firm Size(W)	0.132	0.060	2.213	0.031	0.013	0.251
	Change in $R^2 = .0020$ , $p = .7163$	X*W	-0.103	0.070	-1.467	0.148	-0.244	0.038

environmental certifications, etc (Shibin et al., 2020). As the firms get larger, they are more impacted by their buyers from the global textile supply chain. So, they extend their efforts beyond sectoral or economic barriers to secure business in the international market for competitive advantage and meanwhile managing the positive reputation through SSCM practices (Roy et al., 2020; Wolf, 2014). The results also highlighted EMPs as the most important SSCM practices which also support the previous literature on SSCM for better firm performance (Habib et al., 2020).

To enhance the integration of SSCM practices in traditional supply chains, directly impacting barriers should be mitigated, among which sectoral and economic factors are the most crucial. Efforts should be made at the government level to promote sustainability policies and laws in Pakistan not only at the business level but also at the consumer level along with stricter implementation and control systems. It could be done through awareness campaigns, social and TV media, etc. Sustainability standards should be either developed specifically for textile producing countries and facilitated implementation in the textile manufacturing firms at a subsidized cost due to the global cause of sustainability, which requires buyer-manufacturer-supplier integration. The managerial perspective guides the marketing manager to formulate societal campaigns by empowering suppliers to fulfill their resources in-term of financial support program or by providing a platform for upgrading their business entities. This piece of work underpins practical implications for the policymakers with a comprehensive understanding of barriers in the path to supply chain sustainability, benefits, and underlying linked cost with the adoption of SSCM practices.

This study suggests that external stakeholders like media, NGOs, general public and activists, etc. can also influence the textile organization to become a part of a sustainable community. Internal organizational factors could also be comprehended to initialize programs related to sustainable management practices. For policymakers, this study calls for public awareness related to sustainable issues like efficient usage of water resources, planting trees, and creating a society that encourages recycling and reusing of products. Moreover, governments should increase funding for projects that motivate organizations and customers about sustainability. To stay competitive with the changing demands of global textile buyers for eco-friendly and socially ethical production, it is pertinent to adopt SSCM practices in the Pakistani textile industry by mitigating these barriers. Smaller firms are usually managed under sole proprietorship or partnership without involving a large number of managers for different functions. Whereas, large companies have an increased number of managers to efficiently perform different company functions which increases the chances of conflicts and lower managerial commitments from managers. It makes it difficult to change company practices and badly impact decisions related to social and operational practices.

The incorporation of sustainability aspects in the textile industry would also be an attractive initiative for investments through the China-Pakistan Economic Corridor (CPEC) as sustainability is an integration of the environmental, social, and economic goals of a business. Thus, future researchers are recommended to explore the role of these identified sets of barriers in connection with the TBL approach at firm performance through SSCM practices and analyze the link of barriers with SSCM performance. The relationships among variables that were statistically not significant might be since the data set was small and collected from one country, and those factors might not be effective in the context of the Pakistani textile industry. Future research could explore the role of information system and knowledge management with the context textile SSCM (Nazam et al., 2020). Moreover, the study has examined only the direct impact of identified barriers, whereas the inclusion of contextual factors and interlink of these barriers can be a source of significant research contributions as well as practical implications. Similarly, an extended list of barriers specific to the textile and other major industries in Pakistani or similar South Asian country perspectives can also be helpful for better understanding the micro and macro-environmental factors affecting the achievement of sustainable development goals.

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