Environmental Sustainability, Innovation Capacity, and Supply Chain Management Practices Nexus: A Mixed Methods Research Approach

Abstract

Sustainability has become an integral part of today's business environment and decision-making processes. At all levels of the organizational structure, awareness of sustainable supply chain management (SSCM) practices is now a priority. This paper investigates the potential relationships among environmental sustainability, innovation capacity, and stakeholder relationships of business organizations in the context of SSCM. A mixed methods approach is proposed and designed to understand and assess these complex relationships. Data were collected from 57 firms in Pakistan. The results show that organizational innovation and supplier relations are significant enablers of sustainable practices. Moreover, cluster analysis depicts that service industry lags the production industry in adopting sustainable practices. The analysis of the proposed model also reveals that the role of supply chains in Pakistan towards achieving credible environmental sustainability is still at its infancy and that supplier relationships and organizational innovation are the predecessors of environmental sustainability.

Keywords: Sustainability; Supply Chain Management; Mixed methods research; Structural equation modeling; Innovation capacity; Stakeholder relationships

1. Introduction

Sustainability has become a key business priority across the world, over 90% of the world's largest companies report their environmental footprints regularly to United Nations Global Compact (World Commission on Environment and Development 1987). While business organizations in developed countries have adopted sustainability practices within their supply chains and extended the understanding, of the same, to socio-economic dimensions, the adoption rate is not the same in the other parts of the globe, especially in developing economies (Cheben et al., 2015). The terms Sustainable Supply Chains (SSC) and Sustainable Supply Chain Management (SSCM) are used interchangeably to depict the analytical and conceptual modeling alternatives to cope with the complex issues such as profitability, agility, cost effectiveness and quality. (De Brito and Van der Laan, 2010; Ahi and Searcy, 2013). SSCM is important for business organizations that aim to achieve sustainable economic growth, innovation and operational performance in their supply chains.

The attention on sustainable development and sustainable supply chain management has grown exponentially over the last decade (Fahiminia et al., 2015). Many firms have been forced to integreate sustainability into their supply chains because of relatively stringent government regulations, increased public awareness and market pressures (Kusi-Sarpong et al., 2016; Bai et al., 2017). Many industrial policies have been adopted to increase the environmental sustainability impact, but these initiatives are just confined to internal practices, thus limiting the oveall environmental sustainability (Saksson et al., 2010). Moreover, SSCM is a manageement of supply chains for profit maximization, thus it improves the social aspect of its shareholders by reducing its negative impact on the environment (Hassini et al., 2012).

Manufacturing organizations are directly and indirectly linked with economic sustainability (Warren et al 2001). So, for sustainable development, manufacturing organizations need to respond to multi-stakeholder pressures (Meixell and Luoma, 2015). Furthermore, sustainable development requires sustainable innovation (Boons and Freunds, 2013). Innovation sustainability involves modifications in sytems, production processes, organizations and products to lessen environmental impact. (Horbach, 2005). Firms develop innovation strategies for improving sustainability within their manufacturing systems (Gereffi and Lee, 2014)).

Interestingly, in terms of the adoption of sustainability practices, it has been shown that the impetus comes from customers (Choi and Ng, 2011) and/or stakeholders (the market) (Zhu and Sarkis, 2004; Kumar et al., 2012). Organizations adopting sustainability practices have also focused on assisting their business partners including suppliers, customers, governments, and local communities (Amrina and Yusof, 2011). This is because firms have realized the important role of stakeholders in their supply chains and that supply chain relations and closed-loop production systems primarily contribute towards sustainability at the supply chain level (Hamia et al., 2016). There is a need of linking both internal and external relationships which are ultimately vital in achieving a comprehensive SSCM (Paighari et al., 2018).

Because the Asian region accounts for the majority of the world's manufacturing (Zhu and Sarkis, 2004), it is critical to investigate the applicability of sustainability within developing nations in the

Asian context. In contrast to developed countries, sustainability assessment practices in Pakistani industries are still in their early stages and are expected to adopt sustainability due to global market dynamics and competition. As Pakistan's manufacturing shifts to higher-value-added products, academics' attention has shifted to sustainability (Kumar et. al., 2012; Muzaffar et al., 2019). Pakistan's economy has experienced a rapid growth in gross domestic production in the last decade. This economic growth poses a question whether the business organizations in the country are well-aligned with supply chain management practices and strategies in the context of sustainability.

1.1 Significance of the Study

Integrating sustainability into supply chains is a difficult task, and the search for appropriate methods in this area is still ongoing. Sabuj et al., (2021) claim that in the context of a developing economy, there is a dearth of thorough research on the key variables for environmental sustainability. The role of three crucial components in implementing sustainable practices in businesses, namely innovation capability, stakeholder connections, and a cleaner production system, is the subject of this study. Linking innovation and SSCM is one of the most recent developments in sustainable supply chain management. Although a link between innovation and SSCM has been demonstrated (Behnam, 2017), specific measures and relationships must be found and researched. Innovation has been categorized into four types and lends to the question regarding which type of innovation has an impact on enabling an organization to become more environmentally sustainable. An important contribution of this research is to investigate the impact of these four types of innovation on environmental sustainability. Similarly, improved channels of communication have given stakeholders the ability to put pressure on organizations to address social issues.

In the crux, organizations expect their suppliers to reduce consumption of natural resources so that the negative impact of production on the environment is reduced (Zhu and Sarkis, 2004). According to Bowen et al. (2001), organizations look for financial and operational benefits by implementing sustainable supply chain management. Furthermore, Carroll and Näsi, (1997) suggested that organizations lower the cost of production through product and process innovation. Based on the literature evidence provided above, we propose following research questions:

1. Which stakeholders are more influential in guiding firms toward environmental sustainability?
2. Which cleaner production practices leads to environmental sustainability?
3. What type of innovations influence the environmental sustainability?

Finding practical answers to these concerns is critical for sustaining long-term economic growth, which may be tied to innovation, partnerships inside and beyond the supply chain, and sustainability policies. We evaluated stakeholder interactions in this study to determine the relationships that encourage firms to adopt sustainability policies in the context of an emerging economy of Pakistan.

The rest of the paper is organized as follows; Section 2 presents the literature review, and section 3 introduces the research gap and framework development. Section 4 entails the proposed mixed methods research approach and section 5 presents the results while section 6 concludes the paper with contributions, conclusions, and future research.

2. Related Literature

Majority of the work that focus on environmental sustainability in the context of SSCM has focused on cleaner production strategies and logistics optimization to reduce the overall environmental impacts. To be specific, green packaging, distribution, warehousing, incorporation of environmental standards ISO 14000-14001, sustainable procurement strategies, product stewardship, use of internet of things and information technology are the major areas of environmental sustainability practices in the context of SSCM (Panighari et al., 2018; Karagülle, 2012). In terms of sustainability practices in Pakistan, only a handful of research work is available and that too is at the preliminary level. Ali et al. (2010), Muneer et al. (2006), Kemp and Vinke, (2012) discussed sustainable practices in IT, textile, and aviation industries, respectively. In this section, we provide the relevant literature on environmental sustainability and its linkage with stakeholder relationships, cleaner production and innovation capacity of firms and develop our research hypotheses based on the literature.

2.1. Supply chain relationships and environmental sustainability

Effective SCM requires successful relationships at multiple levels of the organization such as supplier relationships, customer relationships, employee relationships, and community relationships. In fact, the coordination between partnering organizations in a supply chain network needs significant involvement at the strategic level (Seuring and Müller, 2008). Noland and Philips, (2010) stress the importance of engagement rather than mere interaction of stakeholders in a firm's strategy to achieve real success. Furthermore, Mathur et al (2008) suggest the engagement with relevant stakeholders in the form of a dialogue, which, if properly planned may lead to a wide range of outcomes. Toubolic and Walker, (2015) depicts that the theory-building efforts in SSCM remains scarce and more theoretical contributions with adoption of original methods could enhance the practical understanding about SSCM.

In another recent review, Meixell and Luoma, (2015) found out that stakeholder pressure is among the key factors that helps SSCM result in sustainability awareness and adoption of goals, and the implementation performance. Stakeholders are another key factor that could be influential on SSCM performance, depending on the type of stakeholder and the focus of SSCM (e.g., social, or environmental). Moreover, the findings of a recent bibliometric review of 1000+ articles (Fahimnia et al., 2015) in SSCM, indicate that broadening the number and location of countries where green supply chain management is investigated is required. Due to the overwhelming amount of work done in the developed parts of the world, and the lack of diversity in developing parts of the world, this broadening is imperative. Furthermore, recent literature surveys indicate that the literature is dominated by works that employ linear programming and multi-criteria decision analysis techniques (Seuring, 2013; Ansari and Kant, 2017). Even though these techniques are very robust and effective for assessing SSCM performance or assisting with decision making; such methods typically overlook the multi-collinearity between different variables under the same construct and are unable to assess the hidden statistical inference between different constructs and the output variables. In this regard, exploratory and confirmatory factor analysis, structural equation modeling and principal component analysis are among the methods that can mitigate the multi-collinearity problem in a quantitative survey-based dataset that consist of interval-ratio type variables (Doukas et al., 2012; Lowry and Gaskin, 2014).

The stakeholders of the firm have a great influence on the adoption of environmental sustainability of the firm (Delmas and Toffel, 2004; Murillo-Luna et al, 2008; Seroka-Stolka and Fijorek, 2020). Although many classifications of the stakeholders exist in literature, the most cited are categorized as primary and secondary (Clarkson, 1995); or as internal and external (Carrol and Nasi, 1997). In all the existing classifications of stakeholders, customers, suppliers, employees, and community have the most prominence (Hillman and Keim, 2001). We also propose the industrial relations to be explored due to the nature of industry we are investigating. Since firms react differently to the stakeholder pressures according to their importance (Buysse and Verbeke, 2003; Henriques and Sadorsky, 1999; Miles, 2017), a firm establishing an environmental strategy should carefully assess the degree of demands emanating from groups of stakeholders with whom it interacts often Seroka-Stolka and Fijorek 2020).

There is a plethora of literature as well related to sustainable development in developing and emerging economies. Gereffi and Lee (2014) proposed a new form of "synergistic governance" based on some recent studies on global value chains. Furthermore, Hassan and Lund-Thomsen, (2019) linked the dispersed consumers and importers in developed countries with local manufacturer, workers, and communities in developing countries by creating an integrated analytical framework and methodology. Giullani, (2014) proposed an important typology for developing countries and identified the factors which influenced the practices of individuals in developing countries.

Based on the findings from the literature, it is important to question the links between an organization's capability of establishing successful relationships with these partners and its sustainability practices. This could reveal a clearer picture of how these specific relationships impact the overall environmental sustainability performance. To that effect, following hypotheses are proposed:

H1. Sustainable supply chain relationships positively affect environmental sustainability.

H1a. Employee relationships positively affect environmental sustainability.

H1b. Supplier relationships positively affect environmental sustainability.

H1c. Customer relationships positively affect environmental sustainability.

H1d. Community relationships positively affect environmental sustainability.

H1e. Industrial relationships positively affect environmental sustainability.

2.2. Cleaner production system and environmental sustainability

Successful relationships of an organization with its stakeholders in its supply chain is critical and could be typically identified as the external components of SSCM. While production philosophy, production systems and operational procedures are the central elements of SSCM, still cleaner production practices have been an important area of interest to achieve environmental sustainability in SSCM. For instance, Corbett and Klassen (2006) states that SSCM is a natural extension of Just in Time (JIT), total quality management (TQM) and lean manufacturing emphasizing the importance of production and operations in SSCM. Moreover, Madu, (2012) defined sustainable manufacturing as efficient management of resources with minimum impact to the environment through value creation using the cleaner production system. In addition, cleaner production systems and eco-efficiency are typically identified as the integral elements of the internal sustainable manufacturing practices of manufacturing and services organization (Hami et al. 2015).

Lean manufacturing is also an important link for overall supply chain sustainability. Meng, (2019) provided the lean management practices in the construction supply chains through mixed method approach. He proposed that lean management practices lead towards the green and sustainable production processes. Chavez et al. (2015) proposed that lean manufacturing is related to both internal operations and external operations. So, lean manfucturing integrates both types of operations to enhance overall production process. Filho et al. (2016) provided lean management practices in different types of manufacturing companies. As a result, lean manufacturing literature provides systematic understanding of sustainable supply chains.

Modern manufacturing systems face many challenges in achieving supply chain sustainability. In this regard, metaheuristic approaches are gaining importance to integrate social and ecological benefits with overall supply chain strategy (Khan et al., 2021). Choi et al. (2018) used ant colony optimization algorithm to predict a strategy to reduce carbon emmissions. Furthremore, Suzuki, (2011) proposed sustainable schedulling with expert decision making system to reduce carbon emmisisons.

From business point of view, it is very important to understand the impacts of environmental adaptations on firms' operations (Peng and Liu, 2016). Moreover, cleaner production is not yet practised in a systematic manner (Tate et al., 2010). According to Dong et al. (2018), eco-efficiency indices of water and energy consumption in Chinese industires stem from cleaner production system. Furthermore, within organizations, economic returms on cleaner production system leads to adoption of SSCM practices (Dobes, 2013; Scarazzato et al., 2017). Silva et al. (2017) claim that firms get more profits by reducing waste and treating it. It also helps in compliance with environmental legislation.

In the evolution of cleaner production systems, new standards of business operations have been the central subject of discussion (McDonough and Braungart, 2010; Jayal et al., 2010). All in all, there is a plethora of literature that points out why cleaner production is important for a successful SSCM.

Based on the evidence from literature, we propose the following hypotheses.

H2. Cleaner production systems positively affect environmental sustainability.

H2a. Cleaner production practices positively affect environmental sustainability.

H2b. Eco efficiency practices positively affect environmental sustainability.

H2c. Closed loop production positively affects environmental sustainability.

2.3. Innovation capacity and environmental sustainability

There is a large stream of research which suggests that innovation is linked with sustainability and sustainable development goals (McLaughlin et al., 2008; Nill and Kemp, 2009; Nidumolu et al., 2009; Barbieri et al., 2010; Ghobadian et al., 2020), through various mechanisms. Under the realm of strategy, the idea of sustainability has encouraged organizations to consider adding sustainability into their strategy formation, eventually leading to building a competitive edge through innovation (Kuo et al., 2010). According to Jones et al. (2008), besides the competitive edge, the sustainability is a cost saving and innovative strategy. Rules and guidelines set by regulatory authorities also motivate organizations to adopt sustainability practices (Giunipero et al., 2012). Consequently, such regulations and laws encouraged creativity and established favorable circumstances for stimulation of innovative practices linked with sustainability (Doran and Ryan, 2012). A study by Lin and Chen, (2008) that included 245 hi-tech organizations in Taiwan suggested that shared knowledge among stakeholders, creates enhanced innovative capabilities. Research studies conducted across the world have depicted that handling social and environmental sustainability through technological advancements produce better results in achieving overall environmental sustainability (Li, 2014).

Apart from the various indirect relationships, the direct link of innovation and environmental sustainability is also evident. According to Dey et al. (2011), supply chain operations proved to be cost effective and environment friendly through the implementation of innovative products like GPS, auto shut engine and hybrid fuel technology. Bakhtina, (2011) also found that innovation is responsible for the promotion and awareness of reducing carbon emissions.

After establishing the indirect and direct links of innovation with sustainability, this study proposes to link innovation capacity with environmental sustainability. Innovation capacity is defined as the organizational potential to innovate (Prajogo and Ahmed, 2006) and innovation is an important means to achieve sustainability (Hansen et al., 2009). Furthermore, innovation is an implementation of a new or significantly improved product, process, marketing method or organizational method (OECD, 2005). Even though academics such as Klewitz and Hansen, (2014), Nill and Kemp, (2009) have broadly explored concerns linked to sustainability-oriented innovation, there is a lack of consensus on the empirical evidence that manifests the relationship. We find studies that link product innovation with environmental sustainability (Dangelico and Pujari, 2010); process innovation with environmental sustainability (Moyano-Fuentes et al., 2020); process and product innovation with environmental sustainability (Severo et al., 2017; Sánchez-Medina et al., 2011) and as well as organizational innovation and economic sustainability (Sancha et al., 2015). We do not come across studies that link all four types of innovation with environmental sustainability and try to assess the relative strength of these relationships. To fill this gap, we propose hypotheses to link each type of innovation with environmental sustainability. In linking innovation capacity with environmental sustainability, the following hypotheses are proposed that link each of the four types of innovation with environmental sustainability:

H3. Innovation capacity positively affects environmental sustainability.

H3a. Product Innovation positively affects environmental sustainability.

H3b. Process innovation positively affects environmental sustainability.

H3c. Organizational innovation positively affects environmental sustainability.

H3d. Marketing innovation positively affects environmental sustainability.

In the next section, we provide the research gap and framework development. Section 4 entails the methodology which includes factor analysis, scale measurement, internal reliability and discriminant validity measures and model fit indices. After these structural measurements, we provide path coefficients for hypotheses testing and then we discussed the qualitative clustering analysis for manufacturing and service industries. The paper concludes with discussion and theoretical and practical implications section.

3. Research Gap and Framework Development

To address the important critiques of recent review articles in SSCM, this study considers four stakeholder groups (customers, suppliers, community, and industry) along with a newly proposed aspect of innovation within the context of SSCM practices in Pakistan, while keeping the traditional constructs related to sustainable operations (cleaner production) within the scope of the study. The innovation category includes marketing, organizational, process, and product innovation. This study proposes a novel industry-level SSCM assessment approach to examine the complex relationships between innovation, cleaner production and relationships across supply chains and the environmental sustainability performance of an organization. Such an approach will help the industry and practitioners better understand the critical factors linked with environmental sustainability performance in addition to providing an extrinsic investigation of implementation in Pakistan. The focus of the study will be production and service industries of Pakistan. This work extends the state of art in SSCM research since it involves not only the traditional SSCM factors that have been identified in the literature but broadens the scope of research toward innovation capabilities and relationships with key stakeholders within and outside of the SSCM framework. Additionally, the proposed Structural Equation Modeling (SEM) approach deals with inherent multi-collinearity among input variables of a typical SSCM framework. As a result of the proposed research hypotheses, and the literature survey, number of factors (variables) are proposed and summarized in Figure 1.

This research work took more than 15 months from the conceptualization of the idea to final manuscript writing. After conceptualization of idea, literature review and problem definition were done. From the literature, questionnaire design and proposed model were designed. The field stage of collecting the data took more than 6 months and manuscript writing and analysis took another 3 months.

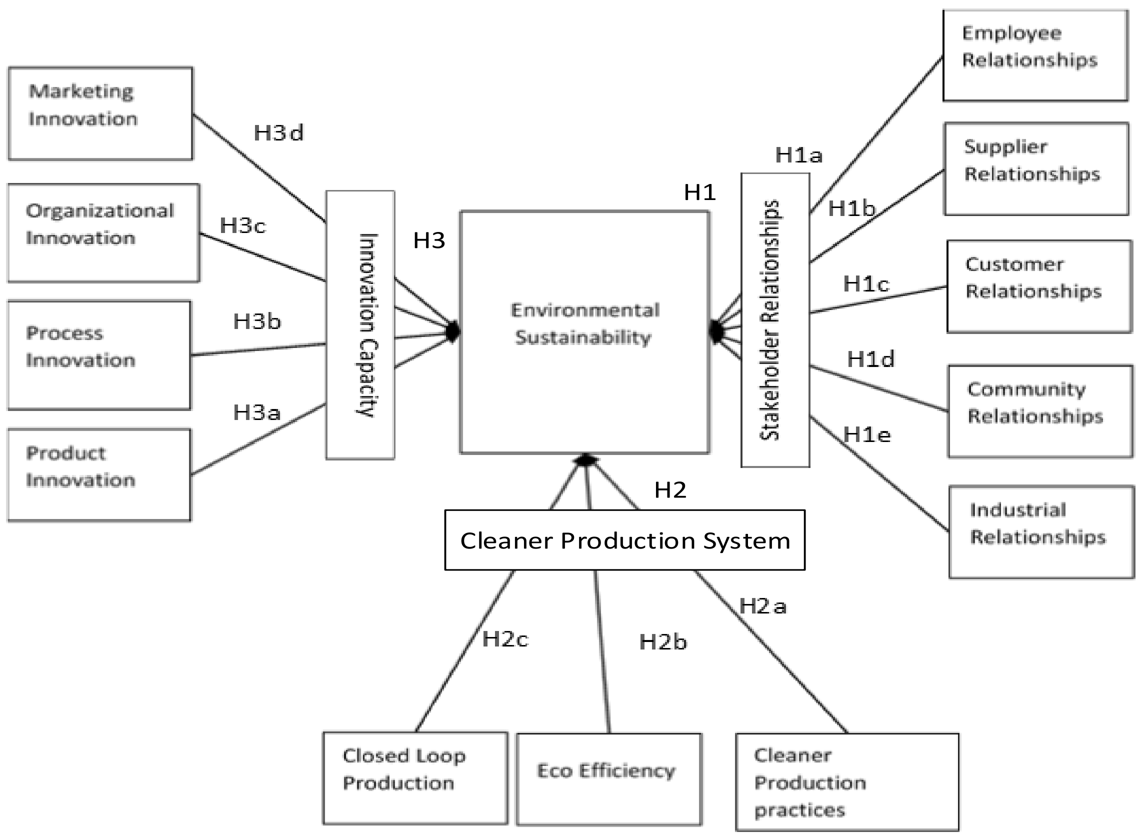

Figure 1: Schematic Diagram of the Input and Output Variables of Proposed Model

4. Methods and Materials

This research is based on a mixed method research which is both explanatory and exploratory in nature. It focusses on environmental sustainability of production-oriented business organizations. The mixed method approach consists of formulation of research hypotheses, survey design, and hypothesis testing through Structural Equation Modeling (SEM), factor analysis and cluster analysis. In this research, cluster analysis explores the trend of SSCM adoption in different industries. This phase is exploratory in nature because it utilizes limited sample size (Bhutta et al 2013). Prior to SEM and cluster analysis, factor analysis is conducted to confirm the dimension reduction required to eliminate collinearity in the SEM.

A mixed methods research approach is proposed to test the research hypotheses outlined in the literature review section. The mixed methods research consists of designing a survey instrument, collecting data from a sample of organizations that are in production or services industries, developing a Structural Equation Model (SEM) and conducting a Cluster Analysis (CA). Consequently, the research study is aimed at establishing the strength of linkages between the theoretical underpinnings and practical implications in Pakistan. Summary of the proposed SEM approach is depicted in Fig. 2. The details of the proposed research framework are shared in the following sub-sections.

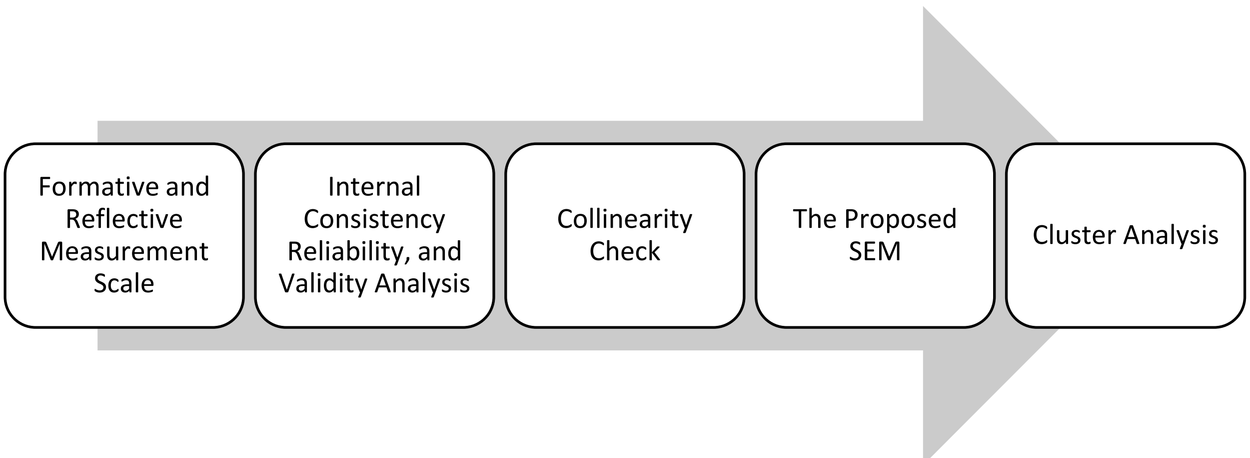

Figure 2: Summary of the proposed SEM Model

4.1. The Survey

Data were collected using a survey instrument. The survey instrument was designed to collect information about how manufacturing and service organizations of Pakistan perceive the adoption of sustainable supply chain strategies at the corporate level and about the status.

4.2. Data Collection

A purposive sampling technique was employed, which is more appropriate in the context of Pakistan, and as the subject of sustainability is still a relatively new phenomenon and organizations are not inclined towards supply chains sustainability in most of the cases (Etikan et al. 2016. In this regard, literature suggests it is fundamentally important to make sure that respondents in the sample size should have a basic level of knowledge and orientation about the focus of the research project (Creswell and Clark, 2011). Moreover, the compliance of respondents and ability to understand the terms in the questionnaire are critical for the proper and reliable data acqusition. Therefore, in this study two assumptions are important for sampling: 1) Organziations must have high bargaining power in the market; and 2) there must be an awareness about the sustainability among the top management of organizations.

The sample size consists of Pakistani owned multinationals and large domestic business organizations. Departmental heads and CEOs from such large organizations were contacted in person and via social media including electronic mail, LinkedIn, and Skype. The questionnaire (SI) was distributed to 137 organizations in the country. During the survey deployment stage, 137 potential firms were contacted, 73 agreed to take the survey, and finally 57 valid responses were collected for the analysis which translates into a response rate of 78.1%. As indicated by Roscoe, (1975), such a sample size is appropriate for a behavioral research project. It is worth mentioning that based on the stringent criterion of selection, only 137 firms were shortlisted from the industies data provided by Chamber of Commerce and Industries. We selected those firms which have high market power such that other supply chain members just act according to these firms supply chain decisions. These firms owning to their high market power, drive the overall demand and eventually creates a virtually integrated supply chains. So, data collection from such firms was challenging especially when it relates to their sustainable practices in innovation, stakeholder relationships and cleaner production. Even from these 137 firms, only 73 agreed to respond. First, the information required is highly confidential and second, the respondents could not accurately grasp the implications for their firms. The code of conduct and research ethics were explained to eradicate concerns and hesitations to participate. However, managers were still reluctant to take the responsibility of sharing information. The total respondents for the study were 57 from various service and production industries. A 5-point Likert scale was used as similar survey instruments have previously used in several studies (Rao and Holt, 2005; Hamia et al., 2016).

We used Smart-PLS to implement SEM instead of AMOS or LISREL because of two important reasons. Firstly, Smart-PLS does not require assumption of normality of data and secondly, it works well with smaller sample size provided it is more than 30 (Hair et al., 2017). So, SEM in Smart-PLS is suitable when the size sample size is limited and still accuracy is important for predicting the statistical model. (Wong, 2013). The software package used in this analysis was Smart PLS, which uses a component-based estimation procedure rather than the traditional covariance-based AMOS-type approach. The main benefit is that we do not have to assume that the data is normal. PLS-SEM is a powerful technique that not only analyzes but also validates complex models. When the sample size is small and you are predicting a new relationship theoretically, PLS-SEM is recommended (Dwaikat et al., 2018; Hair et al., 2016).

When using Smart PLS, the sample size should be ten times the largest number of independent variables influencing the dependent variable in the proposed model (Chin and Newsted, 1999). Because the maximum number of independent variables (Innovation capacity, stakeholder relationships and cleaner production system) in this model are only three which affect the dependent variable of environmental sustainability, only a sample size of 30 is required. Moreover, as per Hair et al. (2006), for PLS-SEM, sample size of 50 provides valid results.

4.3. Respondents Profile

The unit of analysis is a large organization. The term “large” is not considered only in terms of assets and number of employees; large organizations in this study are referred to organizations having high bargaining power among all its supply chain partners. However, even number of employees and assets wise, every respondent fulfills the criteria of large organization in the context of Pakistan. An organization is assumed as a large enterprise with having more than 250 employees, paid up capital of more than 25 million rupees (roughly US$ 162,000) and more than 250 million rupees (Roughly US$ 16,200,000) in annual sales (SMEDA Pakistan, 2007). The respondent organizations were vertically integrated with high negotiating authority in other words bargaining power in the domestic market. The rationale for selecting respondents with this was that since an organization could be quite influential to make a paradigm change within the organizational and operational behavior of its supply chain partners if its suppliers are vulnerable and/or submissive to the large organizations with strong financial dominance (Geylani et al., 2007). Such organizations are also considered to be drivers of positive change as the majority of the high-impact organizations that adopt SSCM stragegies in the U.S. are among the fortune 500 list (Hashmi et al. 2015). Repondent profile is summarized in Table 1.

Table 1. Respondent Profile

		Frequency	Percent	Valid Percent	Cumulative Percent
Industry	Production	22	38.6	38.6	38.6
	Textile	18	31.6	31.6	70.2
	IT Industry	5	8.8	8.8	78.9
	Services	12	21.1	21.1	100
	Total	57	100	100	

The total population is divided into 4 clusters namely production, textile, hi-Tech and services. The production sector comprises of pharmaceutical, automotive, chemical and food companies. The production cluster is dominant with 38.6% of overall respondents, followed by textile (31.6%), services (21.1%) and hi-Tech (8.8%) of overall respondents. It was decided to keep the production and textile clusters separate since Pakistan is the 4th largest producer of cotton and has 30% share in yarn production and with 8% share in fabric trade in the overall world market (Pakistan Textile Journal, 2016).

4.4. The proposed structural equation model (SEM)

In the first step of the proposed SEM approach, category of measurement is assessed and identified. There are two categories of measurement in SEM, formative and reflective. The measurement is formative if indicators in the data set are not interchangeable, whereas the measurement is reflective if indicators show high correlation among each other (Petter et al. 2007). In this case, reliability and the validity of the data is observed carefully. The second phase consists of internal consistency, reliability, and validity analysis. The internal consistency reliability is checked through reliability numbers in the composite reliability table. In the case of exploratory research, as in this case, the value of 0.6 or higher is sufficient (Bagozzi and Yi, 1988). However, the value of 0.7 or higher is acceptable to confirm the internal consistency reliability in all other cases (Wong , 2013). In this, the values of composite reliability tables are higher than 0.7 for all the variables, hence that shows a level of reliability in internal consistency. For the convergent validity, the value in Average Variance Extracted (AVE) should be analyzed. AVE value of 0.5 or above represents that the requirement of convergent validity is fulfilled (Bagozzi and Yi, 1988). To check the discriminant validity, the square root of AVE value in the latent variables is used, if the value of the square is greater than the values of correlations among all the latent variables, then the discriminant validity is supposed to be achieved (Fornell and Larcker, 1981).

The third phase is collinearity check. The Variance Inflation Factor (VIF) value is used to check the collinearity issue among the latent variables as being the common approach in the state of art. To check the collinearity issue among the latent variables, usually 10 is the cut off value to illustrate the degree of separation among the latent variables (Aburatani et al. 2005). Common method bias (CMB) was evaluated through Harman's one-factor test, one of the widely used statistical tests for measuring CMB (Podsakoff et al., 2003). The total variance for one factor was 42.3 % and thereby suggests that CMB is not a threat in this study.

The fourth phase is where the proposed SEM is built and explained and, the fifth phase focuses on cluster analysis. For the purposes of this research, the researchers divided the respondents into 2 clusters identified as "Production" and "Services". The rationale of generating these two clusters is to explore the level of adoption of sustainability practices between these two clusters. The sample size of service industries is relatively small; hence it is not appropriate to generate meaningful results, which led to the aggregation of the services industries as a whole and compare with the manufacturing industries. This approach is used to explore the level of adoption of sustainability in the clusters as identified in the study of lean management (Doolen & Hacker, 2005). This method is successfully used in the Pakistani Lean context by Bhutta et al. (2013). The sample sizes of services industry and production industry are 15 and 42, respectively.

5. Results

5.1. Data Analysis

The data collected was analyzed using confirmatory factor analysis, structural equation modeling (SEM) and cluster implementation techniques. Smart-PLS was used for the structural equation modeling and confirmatory factor analysis steps. SEM is a multivariate data analysis technique that is used to test the linear and causal models (Haenlein and Kaplan, 2004). SEM technique is especially useful in having a better visual understanding about the relationships among variables (Wong, 2013). SEM technique is primarily used to assess the model fit of underlying constructs in the research. First, we provide the descriptive statistics of the survey responses are provided in Table 2.

The mean value for each variable is greater than 3 which shows a positive trend towards the adoption of sustainable supply chain practices in Pakistan. The variable of customer relations has the highest mean with the value of 4.06 and industrial relationships has the lowest mean value of 3.41. An interesting observation in this table is that the lower mean values between 3.4 and 3.5 have a relatively high standard deviation of 0.85 and 0.93 as compared to the higher mean values between 4.0 and 4.1, which have a relatively lower standard deviation of 0.71 and 0.74. This means that the variables with low means are both positively and negatively rated by the respondents, whereas the variables with high mean values are more persistently rated high by the respondents with relatively lower standard deviation.

Table 2. Descriptive Statistics of Survey Responses

Variable	Mean	Standard Deviation
Employee Relationships	3.74	0.84
Supplier Relationships	3.49	0.85
Customer Relationships	4.08	0.74
Community Relationships	3.67	0.87
Industrial Relationships	3.41	0.93
Cleaner Production	4.06	0.71
Eco Efficiency	3.68	0.89
Closed Loop Production	3.66	0.91
Product Innovation	3.86	0.74
Process Innovation	3.85	0.75
Organizational Innovation	3.82	0.89
Marketing Innovation	3.76	0.65
Environmental Sustainability	3.98	0.77

The difference between the responses of early and late respondents is referred to as non-response bias (Tenenhaus et at., 2005). The questionnaires were ranked according to the data completion dates, as defined by Armstrong and Overton, (1977) and Chen and Paulraj, (2004). We divided the data into two groups and compared the early respondents (first 30%) to the late respondents (last 30%). We used an independent sample T-test with a 95% confidence interval to compare these two groups for eight randomly selected variables. We found no statistically significant difference, so non-response bias was not an issue in our study.

5.2. Abbreviations used for items of different variables used in the proposed model

We provide the abbreviations for all the items and variables used in our proposed model in Table 3.

Table 3. Abbreviations Used in the Proposed Model

Variable	Abbreviations
Employee Relationships (ER)	ER1, ER2, ER3, ER4, ER5
Supplier Relationships (SR)	SR1.SR2.SR3.SR4.SR5.SR6
Customer Relationships (CR)	CR1, CR2, CR3, CR4, CR5
Community Relationships (ComR)	ComR1, ComR2, ComR3
Industrial Relationships (IR)	IR1, IR2, IR3, IR4, IR5
Cleaner Production (CP)	CP1, CP2, CP3, CP4, CP5, CP6
Eco Efficiency (EE)	EE1.EE2.EE3.EE4.EE5
Closed Loop Production (CLP)	CLP1, CLP2, CLP3, CLP4
Product Innovation (ProdI)	ProdI1, ProdI2, ProdI3, ProdI4, ProdI5
Process Innovation (ProcI)	ProcI1, ProcI2, ProcI3, ProcI4, ProcI5
Organizational Innovation (OrgI)	OrgI1, OrgI2, OrgI3
Marketing Innovation (MI)	MI1, MI2, MI3, MI4, MI5
Environmental Sustainability (ES)	ES1, ES2, ES3, ES4, ES5, ES6

5.3. Factor Analysis

Factor analysis is conducted to confirm the dimensions. Items with factor loading of less than 0.7 were excluded. Factor loading of items in the constructs are provided in Table 4. Out of 63 items, 56 items show substantial loading for the latent constructs. All 13 constructs are verified and confirmed through confirmatory factor analysis (CFA). However, there were 7 items with factor loading less than 0.7 and were excluded from the model. Excluded items include ER5, SR3, CR5, IR1, MI1, ES1 and ES6. Conclusively, the CFA analysis shows the confirmation of constructs in the SSCM under the context of Pakistan. The confirmed latent variables through confirmatory analysis are vital in establishing the proposed hypotheses.

Table 4. Factor Loadings for Confirmatory Factor Analysis

Variable	Items	Loading	Variable	Items	Loading
Closed Loop Production			**Employee Relationships**		
	CLP1	0.834		ER1	0.747
	CLP2	0.83		ER2	0.86
	CLP3	0.903		ER3	0.77
	CLP4	0.863		ER4	0.775
Cleaner Production			**Eco Efficiency**		
	CP1	0.793		EE1	0.762
	CP2	0.799		EE2	0.83
	CP3	0.833		EE3	0.852
	CP4	0.773		EE4	0.719
	CP5	0.864		EE5	0.804
	CP6	0.836			
Community Relationships			**Organizational Innovation**		
	ComR1	0.877		OrgI1	0.906
	ComR2	0.903		OrgI2	0.849
	ComR3	0.822		OrgI3	0.822
Customer Relationships			**Industry Relationships**		
	CR1	0.763		IR2	0.889
	CR2	0.86		IR3	0.824
	CR3	0.778		IR4	0.834
	CR4	0.727		IR5	0.847
Market Innovation			**Supplier Relationships**		
	MI2	0.794		SR1	0.71
	MI3	0.829		SR2	0.865
	MI4	0.719		SR4	0.8
	MI5	0.816		SR5	0.771
				SR6	0.818
Process Innovation			**Product Innovation**		
	ProcI1	0.797		ProdI1	0,770
	ProcI2	0.884		ProdI2	0.786
	ProcI3	0.871		ProdI3	0.797

	ProcI4	0.745		ProdI4	0.775
	ProcI5	0.806		ProdI5	0.806
Environmental Sustainability					
	ES1	0.823			
	ES2	0.819			
	ES3	0.856			
	ES4	0.86			

5.4. The Proposed SEM

In this section, the results of the proposed SEM approach are provided based on the phases depicted in Figure. 2.

In the next subsection, we first provide indices and statistical test for internal reliability, discriminant validity and convergent validity. Later, we provide the collinearity statistics and model fit analysis. We also provide the path analysis for hypothesis testing and the last subsection provides insights about the qualitative clustering for manufacturing and services industries.

5.4.1. Internal Consistency Reliability, Convergent Validity and Discriminant Validity

The total number of items used in the survey instrument is 63. The overall Cronbach Alpha value was found as 0.973, which indicates a very high level of internal consistency of the scale. Moreover, the Cronbach Alpha values of individual variables were also measured to investigate the internal reliability in the research data.

Results of consistency, reliability and validity are provided in Table 6. We can see that the Cronbach Alpha value of each variable was found to be greater than 0.80. The value of 0.80 or higher provides a credible internal reliability of the scale (Tavakol and Dennick, 2011). The highest value of individual Cronbach Alpha was for cleaner production (0.899).

Results of AVE value shows that the requirement of convergent validity is fulfilled as the value of AVE for each variable was found to be above 0.5 (Hair et al. 2016).

Table 6. Construct Reliability and Validity for SEM Model

	Cronbach Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Cleaner Production	0.901	0.906	0.923	0.667
Closed Loop Production	0.883	0.894	0.919	0.74
Community Relation	0.84	0.874	0.902	0.754
Customer Relation	0.789	0.796	0.864	0.614
Eco Efficiency	0.854	0.876	0.895	0.632
Employee Relation	0.801	0.81	0.868	0.623
Environmental Sustainability	0.863	0.867	0.907	0.709
Industrial Relation	0.872	0.892	0.912	0.721

Marketing Innovation	0.808	0.85	0.869	0.625
Organizational Innovation	0.873	0.899	0.921	0.795
Process Innovation	0.88	0.892	0.912	0.676
Product Innovation	0.85	0.869	0.89	0.619
Supplier Relation	0.853	0.858	0.895	0.631

Average Variance Extracted (AVE) is used to test discriminant validity according to the Fornell-Larcker criterion by comparing the AVE of each variable with its squared correlation with the remaining variables. The diagonal in Table 7 shows the values of the AVE square root, while the others are correlations between constructs. These correlations are stronger in each case, indicating adequate discriminant validity (Hair et al., 2016).

Table 7: Fornell-Larcker Criterion for Discriminant Validity

	CLP	CP	CR	ComR	EE	ER	ES	IR	MI	OrgI	ProdI	ProcI	SR
CLP	0.86												
CP	0.62	0.817											
CR	0.69	0.611	0.783										
ComR	0.424	0.543	0.471	0.868									
EE	0.696	0.559	0.712	0.632	0.795								
ER	0.456	0.711	0.601	0.532	0.476	0.789							
ES	0.645	0.692	0.643	0.398	0.566	0.636	0.842						
IR	0.667	0.568	0.685	0.563	0.719	0.487	0.527	0.849					
MI	0.428	0.377	0.412	0.413	0.431	0.336	0.349	0.432	0.791				
OrgI	0.554	0.648	0.513	0.557	0.57	0.55	0.623	0.513	0.602	0.892			
ProdI	0.574	0.376	0.52	0.574	0.45	0.42	0.342	0.421	0.564	0.553	0.787		
ProcI	0.57	0.74	0.74	0.658	0.67	0.72	0.606	0.535	0.61	0.726	0.541	0.822	
SR	0.599	0.637	0.718	0.37	0.56	0.7	0.67	0.515	0.345	0.418	0.406	0.64	0.794

As another measure of discriminant validity, we compute the Heterotrait-Monotrait ratio. Furthermore, the Heterotrait-Monotrait (HTMT) ratio is calculated and must be less than 0.85. (Henseler et al., 2015). The HTMT ratios for each construct are shown in Table 8.

Table 8: HTMT Criterion for Discriminant Validity

	CLP	CP	CR	ComR	EE	ER	ES	IR	MI	OrgI	ProdI	ProcI
CP	0.688											
CR	0.822	0.714										
ComR	0.478	0.596	0.573									
EE	0.793	0.62	0.857	0.746								
ER	0.522	0.786	0.855	0.614	0.531							
ES	0.714	0.775	0.765	0.441	0.626	0.735						
IR	0.74	0.611	0.809	0.645	0.808	0.556	0.578					
MI	0.514	0.421	0.5	0.516	0.496	0.389	0.378	0.511				

OrgI	0.612	0.704	0.605	0.629	0.63	0.64	0.701	0.548	0.724			
ProdI	0.676	0.41	0.649	0.671	0.54	0.49	0.364	0.483	0.711	0.616		
ProcI	0.642	0.812	0.889	0.769	0.77	0.83	0.682	0.582	0.709	0.824	0.635	
SR	0.698	0.717	0.869	0.417	0.66	0.82	0.762	0.587	0.385	0.473	0.488	0.73

5.4.2. Collinearity Statistics

The Variance Inflation Factor (VIF) values of all variables are less than 10, which demonstrates the absence of collinearity in the model. The proposed SEM is valid in terms of collinearity check. The VIF values are provided in Table 9.

Table 9. Variance Inflation Factors (VIFs) for Collinearity check

Latent Variable	VIF	Latent Variable	VIF
Cleaner Production	3.69	Industrial Relation	3.177
Closed Loop Production	3.544	Marketing Innovation	2.261
Community Relation	3.223	Organizational Innovation	2.961
Customer Relation	5.044	Process Innovation	6.337
Eco Efficiency	3.859	Product Innovation	2.675
Employee Relation	3.583	Supplier Relation	2.907

5.4.3. Model Fit Analysis

In the proposed SEM (Fig. 3), the value of R Square in the Environmental Sustainability is essential to evaluate. It shows that 67.8% of variance in Environmental sustainability is explained by the latent variables.

In terms of model fit, Standardized Root Mean Square Residual (SRMR) was 0.069 which is less than the threshold of 0.08 proposed by Hair et al. (2017). The Goodness of Fit (GOF) test was proposed by Tenenhaus et al. (2005). Moreover, the GOF index is also calculated based on the entire model to ensure that it adequately explains the empirical data (Hair et al., 2016). It is the geometric mean of the weighted mean of the AVE and the median R-square. According to Wetzel et al. (2009), a value of 0.36 and above indicates a good model fit for social sciences. The following relationship is used to calculate the GOF (Tenenhaus et al., 2005):

$$GOF = \sqrt{Average(AVE) * Average(R^2)} \tag{1}$$

We took the average of AVEs provided in Table 6 and used equation (1) to calculate the GOF. The average AVE is 0.630 and R-square is 0.678 which gives a GOF value of 0.653. The value of GOF ranges from 0 to 1 and are interpreted as small, medium, and large indicators of model fit. Value in the range of 0.10 represents small, value up to 0.25 shows medium, and value above 0.36 validates substantial model fit. Our value of 0.653 shows that our model is a substantial fit (Henseler et al., 2015).

5.4.4. Measurement Scale Assessment

The measurement is reflective as the data set shows a high correlation among the variables. Therefore, internal consistency reliability, convergent validity and discriminant validity are checked thoroughly in this research. The value of R^2 was found to be 0.678, which provides a substantial evidence to justify the proposed hypotheses. Practice in the state of art typically suggest maintaining a minimum value of R^2 to be 0.25 (Wong, 2013). Therefore, the proposed SEM model explains the 67.8 % of the variance by the relationship among environmental sustainability and innovation, stakeholder relationships and sustainability practices. Results of path coefficients are provided in Table 5. The results indicate that only two constructs show significant impact on environmental sustainability. These constructs are organizational innovation and supplier relations. All other constructs show an insignificant effect in the model with the P-value above .05 as shown in Table 5.

Table 5. Path Coefficients for SEM Model

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Cleaner Production -> Environmental Sustainability	0.17	0.178	0.188	0.904	0.367
Closed Loop Production_ -> Environmental Sustainability	0.264	0.261	0.174	1.511	0.131
Community Relation -> Environmental Sustainability	0.035	0.003	0.175	0.198	0.844
Customer Relation -> Environmental Sustainability	0.189	0.177	0.274	0.689	0.491
Eco Efficiency -> Environmental Sustainability	0.005	0.028	0.185	0.025	0.98
Employee Relation -> Environmental Sustainability	0.141	0.128	0.186	0.76	0.448
Industrial Relation -> Environmental Sustainability	-0.096	-0.107	0.177	0.543	0.588
Marketing Innovation -> Environmental Sustainability	0	-0.002	0.157	0	1
Organizational Innovation -> Environmental Sustainability	**0.39**	**0.339**	**0.2**	**1.95**	**0.05**
Process Innovation -> Environmental Sustainability_	-0.231	-0.158	0.26	0.887	0.376
Product Innovation -> Environmental Sustainability	-0.218	-0.179	0.193	1.131	0.259
Supplier Relationships -> Environmental Sustainability	**0.275**	**0.25**	**0.151**	**1.828**	**0.05**

Supplier relations and organizational innovation are two important factors in achieving environmental sustainability in manufacturing and services industries. The statement that a company is no more sustainable than its suppliers by Krause et al. (2009) seems to be applicable and is confirmed in this case since supplier relations positively affect environmental sustainability. Unless suppliers are not environmentally geared up or are not supportive to environmental initiatives, the organization will not be able to achieve sustainability. In developing and emerging economies, the first step towards sustainability is thus developing the sustainable supplier relations. Sustainable practices adopted by suppliers are the most important facet of achieving overall environmental sustainability.

The second dimension of organizational innovation suggests that environmental sustainability requires a firm to innovate and make changes at an organizational level instead of innovating at the product or functional level. At the initial stage, the organization addresses innovation at a wider perspective and in the later stage it trickles down to product and functional levels. This is an important contribution of the current study in the context of developing economies.

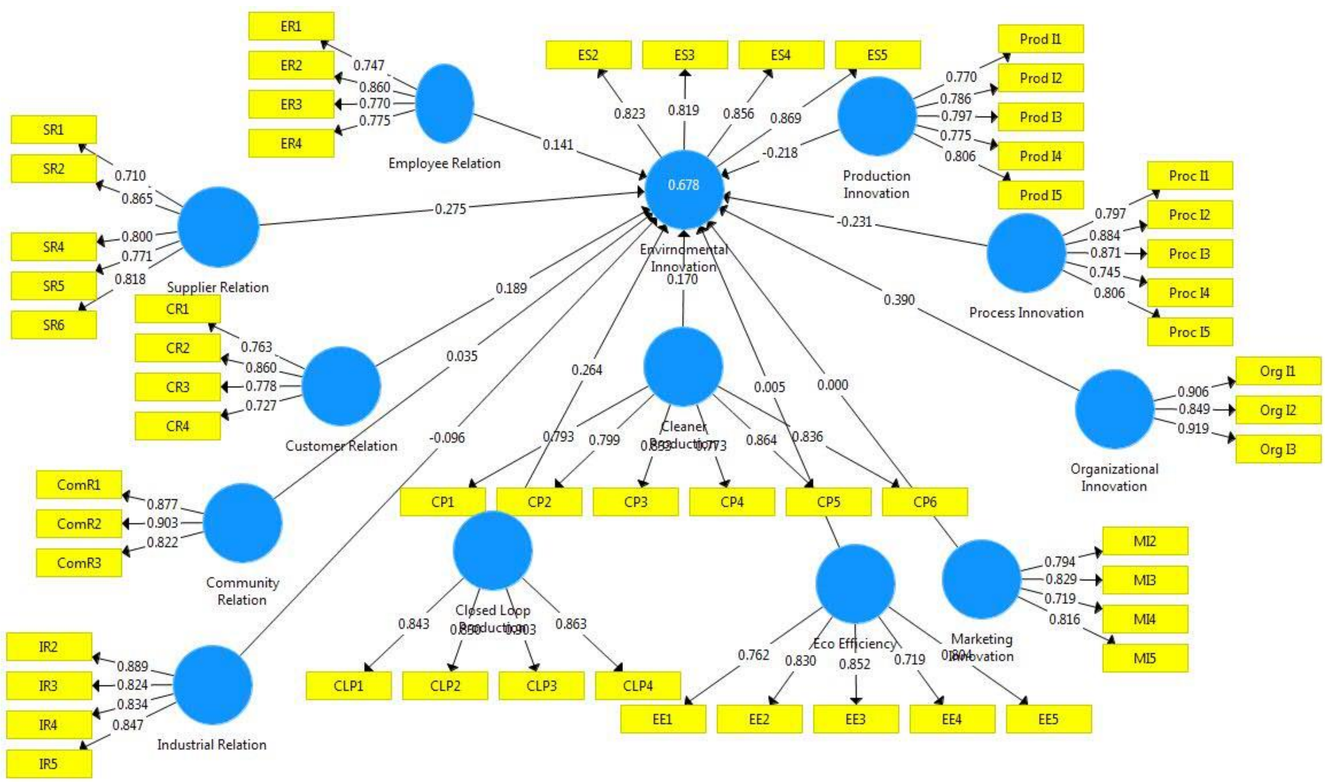

Figure 3: The Proposed SEM Model implementation in Smart-Pls

5.4.5. Implementation Clusters (Cluster adoptions of sustainability practices)

Cluster analysis is used to compare the service sector with the manufacturing sector, and it is exploratory in nature. According to Bhutta et al. (2013), cluster analysis is used to explore the internal homogeneity in the group or cluster and heterogeneity between the clusters. Macia, (2015) also mentioned the extensive use of clustering for qualitative data analysis. In Table 8, the mean values of items are given against each of the clusters. The observation from the outputs clearly show that services industry is in a better adoption stage towards SSCM compared to the production industry. Especially, in the areas of innovation and environmental sustainability, services industry has established a clear understanding and the implementation of sustainable supply chain operations. However, considering all other factors and findings of this research, the services industry is still in the emerging phase in the context of SSCM. On the contrary, production sector of Pakistan seems to fall behind in application of SSCM. As a result, services industry is labeled as emerging cluster, whereas the production sector is categorized as lagging cluster.

Table 10. Cluster Analysis for Production and Services Clusters

Impact Areas	**Items**	**Cluster 1: Production (Lagging)**	**Cluster:2 Services (Emerging)**	**Impact Areas**	**Items**	**Cluster 1: Production (Lagging)**	**Cluster:2 Services (Emerging)**
Employee Relations				Closed Loop Production			
	ER1	4.19	4.2		CLP1	3.62	4.27
	ER2	3.98	3.67		CLP2	3.67	4
	ER3	3.52	3.73		CLP3	3.38	3.6
	ER4	3.5	3.87		CLP4	3.6	3.8
	ER5	3.57	3				
Supplier Relations				Product Innovation			
	SR1	3.62	3.6		ProdI1	3.88	3.93
	SR2	3.19	3.73		ProdI2	3.83	3.87
	SR3	3.31	3.27		ProdI3	3.76	4.07
	SR4	3.5	4.13		ProdI4	3.83	4.07
	SR5	3.48	3.93		ProdI5	3.79	3.93
	SR6	3.24	3.87				
Customer Relations				Process Innovation			
	CR1	3.83	4.13		ProcI1	3.86	4.13
	CR2	3.76	4.47		ProcI2	4	4.27
	CR3	3.95	4.27		ProcI3	3.71	4
	CR4	4.02	4.33		ProcI4	3.86	3.87
	CR5	4.33	4.6		ProcI5	3.52	3.87
Community Relations				Organizational Innovation			
	ComR1	3.9	3.73		OrgI1	3.67	3.87
	ComR2	3.43	3.33		OrgI2	3.81	3.8
	ComR3	3.76	3.73		OrgI3	3.83	4.2
Industry Relations				Marketing Innovation			
	IR1	3.31	3.47		MI1	4.02	4.27
	IR2	3.31	3.47		MI2	3.67	4
	IR3	3.31	3.2		MI3	3.64	3.67
	IR4	3.19	3.67		MI4	3.6	4
	IR5	3.69	3.87		MI5	3.55	3.73
Cleaner Production				Environmental Sustainability			
	CP1	3.81	3.87		ES1	3.93	4
	CP2	4.02	4.07		ES2	3.79	3.8
	CP3	3.9	4.2		ES3	4.02	4.13
	CP4	4.1	3.93		ES4	3.95	4.07
	CP5	4.07	4.4		ES5	3.88	4.4
	CP6	4.24	4.53		ES6	3.98	4.2
Eco Efficiency							
	EE1	3.71	3.2				
	EE2	3.64	3.6				
	EE3	3.6	3.93				

EE4	3.93	3.87
EE5	3.6	3.61

5. Conclusion, Discussions, and Future Work

This research provides significant insights into the development of sustainable supply chain practices in Pakistani industries. The purpose of the study was to investigate the relationship between environmental sustainability, innovation capability, stakeholder relationships of business organizations in the context of a SSCM framework. The latent dimensions of SSCM are studied in the case of Pakistani services and manufacturing industries. The sustainability phenomenon must not be presumed as a regulation or business reputation builder; sustainability must be recognized and anticipated as a competitive advantage. As Krause et al. (2009) succinctly put it as in addition to cost, quality, innovation, flexibility, and delivery; sustainability should be acknowledged as the firm’s sixth competitive advantage. External factors influencing supply chains and business operations in Pakistan are not conducive to achieving cost, flexibility, and delivery advantages. However, sectors can gain a competitive advantage by combining sustainability and innovation. The study's findings show that supply chains in Pakistan's services and manufacturing sectors are important in terms of innovation for sustainability. Managers should develop such strategies to create synergy between these two to gain a competitive advantage. Such initiatives would be critical in reviving Pakistan's business sector.

5.1 Theoretical and Practical Implications

This research contributes to the existing literature of SSCM by identifying the important areas to achieve environmental sustainability in developing countries. In the case of Pakistan, SSCM was discovered to be in its early stages of development and implementation. According to the findings of this study, industries in Pakistan are emerging in most areas of sustainability. So, supply chain managers should focus on such areas in the pursuit of achieving overall supply chain sustainability. The orientation of sustainability as a concept is limited in sustainable supply chain. The latent variables confirmed through confirmatory factor analysis provide valuable contribution to the extant literature in SSCM. The findings indicate that organizational innovation and supplier relationships have a significant relationship with environmental sustainability; however, other dimensions related to SSCM are still in their infancy and require attention from top management.

Practically speaking, to achieve overall supply chain sustainability, industries should focus on a holistic approach of integrating innovation capacity in terms of marketing, process, product and organization with cleaner production and stakeholder relationships such as suppliers, customers, and employees. From the cluster analysis, we conclude that the services industry appeared to be better and more effectively aligned in terms of environmental sustainability compared to the manufacturing sector. This creates both challenges and opportunities; it fosters the development of sustainability elements in the manufacturing sector, as well as the exploration of areas where appropriate tactics for improved adoption are needed. For example, only a few of the respondents used sustainability as a strategy to gain a competitive advantage. Potential benefits in competitive advantage in the industry may be better realized if marketing and business strategies were better matched to establish sustainability (Crittenden et al. 2011).

There are some limitations of this research. Firstly, a total of 57 questionnaires have been collected. Although the sample size is acceptable for the study as there was a stringent criterion of market power, still the response rate is relatively low. So, the results are limited to specific type of manufacturing and service industries. Secondly, the limitation of current study is that the proposed approach is implemented in a developing region of the world, which could be extended in a comparative study with a different country. The findings of SSCM are expected to be different in terms of conclusions and strategies due to other factors such as social factors (culture, literacy levels, education quality, background of decision makers, etc.) and the national economic strategy of the country. Majority of the SSCM literature has been focused on the developed parts of the world, while developing regions need to be considered in academic research as they are impacted more by the limitations of the culture, social dynamics, and economic volatility of the markets. Adoption of SSCM strategies and tools from one country to another does not lead to a successful implementation without considering differentiating factors and contrasts of cultural differences. In this regard, the World Trade Organization (WTO) has long prioritized sustainability in international trade. (WTO, 2001). WTO is forcing sustainability through regulatory actions and have made it mandatory to consider sustainability in all business practices. In Pakistan, practitioners should incorporate sustainability strategies in their operations and supply chains to differentiate and compete in the global markets.

As a future work, the research team aims to work on a more comprehensive model to improve and validate social sustainability dimension. Future research should also incorporate longitudinal trends as well as a comparison between domestic and multi-national firms in Pakistani industries. Similarly, a comparative study between government and private organizations could be conducted to realize the role of government and regulatory authorities in attaining the sustainable supply chain practices. Pakistan is going through a new economic development period with the China-Pakistan Economic Corridor (CPEC), which is a collection of wide-range infrastructure projects, worth about US$62 Million. It would also be interesting to study the SSCM paradigm in the context of private and government construction industries.

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