frontiers | Frontiers in Environmental Science

TYPE Original Research
PUBLISHED 06 January 2023
DOI 10.3389/fenvs.2022.1006029

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Environmental Economics and Management, a section of the journal Frontiers in Environmental Science

RECEIVED 28 July 2022
ACCEPTED 08 December 2022
PUBLISHED 06 January 2023

CITATION
Men F, Yaqub RMS, Yan R, Irfan M and Haider A (2023), The impact of top management support, perceived justice, supplier management, and sustainable supply chain management on moderating the role of supply chain agility.
Front. Environ. Sci. 10:1006029.
doi: 10.3389/fenvs.2022.1006029

The impact of top management support, perceived justice, supplier management, and sustainable supply chain management on moderating the role of supply chain agility

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Sustainable supply chain management (SSCM) is a new area of interest to scientists and industrial practitioners through which to maintain productivity, reduce costs, and enhance agility. SSCM is especially important to protect the environment and reduce pollution by heavy industries. It considers the environment the main stakeholder in minimizing the carbon footprint during production, lowering emissions of dangerous gases, and reducing industrial pollution. Considering the aforementioned purposes, the aim of this study was to explore the relationships between top management support, perceived justice, supplier management, and SSCM and assess the moderating role of supply chain agility. This quantitative study was conducted in the vast textile sector in Pakistan. We collected data through a questionnaire and found that top management support, perceived justice, and supplier management are positively and significantly associated with SSCM. However, there was no significant moderating effect of supply chain agility on the independent variables and SSCM. These findings have practical implications for production managers and top management in enhancement of their roles in promoting environmental wellbeing. By developing rules at the organizational and governmental levels that consider the role of top management, perceived justice, and improved supplier management, the sustainability of the supply chain can be improved. This analysis provides academics who study the supply chain a practical prescription and adds to the body of knowledge about the validity of top SSCM pillars.

KEYWORDS

sustainable supply chain management, supply chain agility, perceived justice, top management support, supplier management

1 Introduction

1.1 Background

The corporate government's excessive production activities have endangered the environment. The rise in carbon levels, depletion of the ozone layer, rapid changes in weather conditions, and pollution (air, water, land, noise, light, and plastic) have stressed the leadership of developed and developing countries equally. The recent massive flooding in Pakistan is strong evidence of environmental effects of industry. Corporations, due to social and environmental pressures, are forced to make their production activities more sustainable and environmentally friendly. This intense pressure has forced companies to rethink converting their conventional supply chain (SC) operations to include use of more sustainable and environmentally friendly methods. In this regard, the prominent roles of top management support (TMS), supplier management (SM), and perceived justice (PJ) among the employees have been identified as crucial factors to consider for adjustment or transformation to support sustainable practices. Utilizing raw resources in ways that are easier on the environment is one good example, as corporations are more focused on collaborating, in their supply chain management (SCM), with suppliers of raw materials who are ethically and environmentally responsible. One more illustration of this is the drive toward renewable sources of energy and spending as little of the available operational funds as possible. This includes choosing greener and cleaner energy options, such as solar and wind power, rather than fossil fuels. The State Bank of Pakistan has come up with more renewable energy financing options to help corporations at large reduce their carbon footprints (State Bank of Pakistan, 2022). The demand for social, environmental, and financial accountability is what drives the concept of sustainability in organizations. Many multinational corporations that made this pledge were met with opposition from suppliers that did not adhere to sustainability rules. The issue of sustainable supply chain management (SSCM) was not addressed in the prior decade, yet new techniques have been created over time. The SC notion has evolved from its conventional understanding to one that emphasizes sustainability. Zeng et al. (2022) found that leadership should plan for the long term and put more focus on the environment while devising their SC strategies. This field, in contrast to traditional SCM methodologies, has a lot to offer the industry. According to Narimissa et al. (2020), it is critical to verify the dimensions of an SC. Over the last decade, academics have put far too much emphasis on the study of SSCM. According to Fahimnia et al. (2015), there have been numerous studies that explain SC sustainability. Pakistan's citrus industry became focused on SSCM for various reasons (Naseer et al., 2019). Today, SSCM is a well-known topic of global interest. Pakistan's establishment and economy are dependent on several different sectors and industries, including the textile industry. Pakistan, as a developing country, aims to execute new ideas, improve industry infrastructure, and build policies and programs for environmental growth. Top management includes the top-ranking members or leaders of a company or organization, including the chairman, chiefs, directors, president, and managers (Hadli, 2017). The support of upper management is essential for functional SCM since it is critical to the success of their attempts to improve operational performance through increased effectiveness and efficiency (Abraham et al., 1999). Top management should be viewed as a cohesive entity that is trying to increase the company's bottom line (Larson et al., 2007). According to Konovsky (2000), considering the concept of perceived fairness is necessary when analyzing a person's attitude or behavior about a certain event. The concept of PJ may be broken down into four distinct subcategories: interactional justice, procedural justice, distributive justice, and informational and interpersonal components of fairness. Interpersonal justice and informational justice are the two categories of justice that may be found within the sphere of interactions (Griffith et al., 2006).

Many businesses and the suppliers who serve them have grown too dependent on one another because of the increased prevalence of outsourcing, consolidation, and a narrower supply base (Trent and Monczka, 1998). When looking for a reliable source of raw materials and supplies from among the thousands of suppliers available, businesses frequently rely on monitoring, auditing, and selecting a supplier as their primary methods. This is carried out to guarantee that there are no hiccups in the SC and to cultivate a positive working relationship with the supplier. When a company possesses these characteristics, it is better able to manage its inventory and acquisitions in a manner that conforms to the intricate set of needs and constraints imposed by the SC (Choy and Lee, 2003). In today's unpredictable business climate, supply chain agility (SCAG) is essential (Sangari and Razmi, 2015). Mamirkulova et al. (2020) found that the Silk Road will enhance the quality of life in the region. Jaffar et al. (2019) found that corporate social responsibility plays a pivotal role in sustainability. Women contributed well to their family income during the COVID-19 pandemic (Ge et al., 2022), and technology adoption has been a good source of online purchasing during the pandemic (Al Halbusi et al., 2022). The overall performance of the SC has improved because of agility, which is beneficial for a variety of processes, including procurement, manufacturing, outsourcing, production, and delivery (Khalili-Damghani and Tavana, 2013).

Given that Pakistan is still considered a developing nation, the concept of sustainability is still in its infancy there. The production sector, the textile industry, and agriculture are only a few of the industries that are concerned with sustainability (Nazam et al., 2019). There is a dearth of high level studies on SSCM in Pakistan's textile and agriculture industries (Naseer et al., 2019). Without the support of higher management,

establishing an SSC may be difficult, which is another reason why SSCM is so difficult (Tobescu and Seuring, 2015).

The results of this study demonstrate how upper management may assist businesses in making their SCs more environmentally friendly. Without the existence of justice in the SC, it is impossible to efficiently regulate the interactions between buyers and suppliers. Regrettably, this area has, thus far, received limited and incomplete attention from researchers (Griffith et al., 2006). Few studies have been conducted in this area. To have a complete understanding of the demand for fairness in the SC business, further research is required (Lee and Ha, 2020). Pakistan comes in at number four on the list of worldwide suppliers. The textile industry contributes close to 8.5% of Pakistan's overall gross domestic product. The manufacturing of textiles requires a total of 440 spinning units, 1220 ginning units, 125 large spinning units, and 424 small spinning units (Ahmed, 2008). In addition, clothes account for approximately 60% of total exports, making the textile industry a powerhouse in the export market. Nevertheless, the textile industry has a detrimental impact on the natural world and the environment as one of the most polluting industrial sectors (Aftab et al., 2000).

The modern business world faces a growing number of environmental issues. For environmentalists, ensuring that companies operate sustainably on a global scale is of utmost importance. There is great cause for alarm due to erratic weather, lack of predictability in the rainy seasons, increased frequency and severity of floods, and depletion of the ozone layer. Recently, significant flooding in Pakistan affected three out of four provinces, prompting many to question the environmental performance of corporations in industrialized countries. The importance of a sustainable supply chain cannot be overstated. An environmental audit of the manufacturing process is now essential. Inspiration for this study came from a neglected and underexplored field. In developing countries, the authority to implement changes in infrastructure within the firm and green the SC rests primarily with the top management. SC sustainability may lead to decreased carbon emissions, thereby lessening the greenhouse effect; it may also lead to fewer carcinogenic pollutants, less noise, water, air, and land pollution, greater happiness and wellbeing, and more sustainable cities. Today is the day for business leaders to prioritize environmental safeguards like these. Due to the lack of comprehensive study on topics like supplier monitoring, supplier selection, and supplier auditing, this assessment of the literature on SM focuses on a single item. More emphasis is placed on these factors within SSCM (Seuring and Müller, 2008). Some academics challenge this notion, while others support it. Researchers have had mixed reactions to the book (Seuring and Müller, 2008). In addition, the study will determine how SSCM relates to SM. There is research on information sharing as a moderating variable of SCAG, even though many have advocated for and acknowledged that agility has a favorable influence (Nagel and Dove, 1991; Akkaya and Qaisar, 2021). This research, therefore, addresses the knowledge gaps in these areas. Furthermore, most prior research in this field has been conducted in rich nations, whereas very little has been conducted in developing nations. The textile industry in Pakistan was the focus of this research. Many textile factories in Pakistan are still using antiquated production methods and distribution networks. There are various practical and theoretical applications for this topic. It will facilitate the development of eco-friendly enterprises and the realization of sustainable urban plans. It will aid in the evolution of production methods toward those that are more adaptive, productive, and secure and more conducive to a healthy human society. Our research questions include investigating the roles of top management support (TMS), supplier management (SM), and perceived justice (PJ) in making the supply chain (SC) more sustainable.

2 Literature review

2.1 Sustainable supply chain management

SSCM defines how to manage the flow of capital, materials, and all types of information related to the SC. It also defines cooperation and collaboration between the partners of the SC, including customers and stakeholders (Seuring and Müller, 2008). The purpose of SSCM is to execute all goals that are similar among stakeholders in the triple bottom line, including environmental, economic, and social dimensions. Additionally, most firms concentrate on economic, social, and environmental goals surrounding the complete SCM of the company. This is essential for the development of the company's sustainable results related to SCM. It is possible to evaluate the effectiveness of an organization's environmental policy by observing the degree to which it can cut pollution, reuse and recycle materials, and make productive use of its resources (Rao and Holt, 2005). The accounting and marketing endeavors of the firm make up the entirety of the company's economic performance (Golicic and Smith, 2013). A company's accountability for its acts in the fields of labor law, child labor, child abuse, and any human rights is referred to as "social performance," and the term is used to define the company's actions (Yawar and Seuring, 2017).

Even though there is a growing body of research in management on the topic of SSCM, it is obvious that there is a lack of research from non-Asian and non-Western sources (Bartley, 2010). Today, sustainability must be a major consideration for all SC operations, and practically all firms are making concerted efforts to shift from traditional SCM to SSCM (Govindan et al., 2016). In recent years, there has been a rise in the number of academic and professional studies on the topic of green and sustainable SCM (Soleimani et al., 2017).

Companies in the developing world do not apply SSCM to the same extent as companies in more affluent countries (Kim

and Min, 2011). Pakistan is sixth on the list of countries ranked by population. Every year, Pakistan is responsible for the disposal of almost 20 million metric tons of trash. Many deaths occur annually in Pakistan because of exposure to this trash, and there is presently no efficient solution to reduce the amount of trash that is produced (Puertas et al., 2014). In a similar vein, logistical and transport constraints have posed difficulties for industrial enterprises in Pakistan regarding their operational effectiveness, and these bottlenecks were generated by solid waste (Ehsan et al., 2018). Companies may be able to decrease their influence on the natural world, take advantage of government efforts to protect the planet's natural resources, and foster a green economy if they include environmental responsibility in their practices for managing the SC. Now is the time for academics and practitioners to investigate gaps or obstacles that prevent SSCM processes from being used in impoverished nations; to this end, implementation in Pakistan was investigated in this study.

2.2 Top management support and sustainable supply chain management

The phrase "top management" refers to the executives at the very top of an organization who work together to make important decisions and improve the bottom line of a business (Sandberg and Abrahamsson, 2010). This group includes executives with titles such as chief executive officer (CEO), director, partner, president, and manager. The goal of TMS is to provide all company employees with the tools and direction they require to realize their full potential in terms of their unique identities, levels of agency, levels of self-confidence, and levels of professional performance (Ryan and Tipu, 2013). The managers at the very top of the corporation are the ones who are responsible for the success or failure of the business (Hadli, 2017). According to Ilyas et al. (2020), green SCM, environmental sustainability, and community-based sustainable development goals (SDGs) all benefit from assistance from senior management. The provision of financial aid by the government strengthens the connection between TMS and environmentally responsible SCM. Through this study, we make the case for increased engagement by SMEs in environmentally responsible SC practices and sustainable development goals. Investigation of the role that senior management plays in the management of SCs is still in preliminary stages (Sandberg and Abrahamsson, 2010). In their research, Shee et al. (2018) found that using cloud computing led to enhanced SC coordination. They also observed that SC visibility offered by the cloud has a positive correlation with SC performance, which in turn affects the sustainability of businesses. Kumar et al. (2019) indicated that the dedication of senior management is the most significant component, among causative soft factors, influencing the effective adoption of green SCM.

The involvement of senior management acts as a moderating factor in the connection between SC performance and internal integration, external integration, and internal integration with suppliers. Social value creation is good for environmental sustainability (Li et al., 2022). The community will develop well under the China–Pakistan Economic Corridor (Aman et al., 2022; Hussain et al., 2019; Jaffar et al., 2020). In addition, people should be discouraged from tax avoidance to make organizations more sustainable (Li et al., 2022).

Recognizing, engaging in, and effectively managing such problems are necessary to make the most of the enormous potential for achievement that lies in the integration of many different facets of sustainability. According to the findings of Abraham et al. (1999), endorsement by top-level management is the primary factor moving businesses and organizations toward the adoption of effective SCM. As several researchers and industry professionals have emphasized, senior management commitment is one of the most important factors in the capacity to achieve and maintain long-term SCM success (Oke et al., 2009). When managers seek to address numerous conflicting SSCM components at the same time, they face a range of challenges. For long-term SC projects, top-level management's understanding of potential dangers and opportunities is necessary (Giunipero et al., 2012). After controlling for factors such as organization size, perspective on national regulations, cost pressure by the organization, and industry practices at various levels, Suryanto et al. (2018) found that organizational learning mechanisms, organizational support, and adoption of GSCM practices had positive and significant relationships with one another. The effects and implications of inefficient logistics management have been carefully studied. An analysis by Sajjad et al. (2020) demonstrated instrumental and normative rationale for employing SSCM. The findings also demonstrated that normative logic and instrumental logic are not mutually exclusive; rather, that they may coexist.

Both TMS and SSCM have been subjects of discussion among academics and industry professionals. According to the findings by Dou et al. (2018), assistance from upper-level management was identified as a crucial and essential fundamental facilitator. It is heartening to see how SC participants view proximity to one another as a key facilitator of the network's success. After 2 years, review and feedback on these enablers suggested that the mapping of enablers had been successful. The green multi-tier (MT) SM practices of the target organization improved dramatically when the company's leadership concentrated on the most crucial enablers. According to Saeed et al. (2019), the most prominent drivers of SSCM and the adoption of sustainability measures are regulatory pressures and market forces. To prioritize sustainability-related initiatives and implement sustainable practices across the entire SC network, practitioners and decision-makers may find it helpful to divide

the SSCM drivers into primary and secondary categories. It is then necessary to quantify the association between TMS and SSCM in the scenario to confirm the relevance of prior research in the context of a developing country.

Hypothesis 1. Top management support has a significant positive relationship with sustainable supply chain management (SSCM).

2.3 Perceived justice and sustainable supply chain management

Multidisciplinary studies, especially those grounded in the social sciences, have examined justice in organizations (Colquitt, 2001). It is generally accepted that there are three types of PJ, namely, procedural justice, interactional justice, and distributive justice. An empirical study shows that all three components of corporate justice are critical in shaping employee behavior and attitude. Previous research has shown that when people feel they have been treated fairly at work, it improves their sense of mission and purpose, which in turn has a ripple effect across the business. Inputs like time and effort from workers are rewarded with perks and pay from their employers (outcomes). A worker's sense of social fairness or injustice might be influenced by making comparisons to other groups or individuals. The United Arab Emirates served as the location for this study. Organizational justice, in the form of employee devotion, has been found to affect SSCM, according to published studies (Matopoulos et al., 2019). Although there is a strong positive correlation between perceived procedural and distributive fairness and embeddedness, perceived unfairness does not have any direct impact on knowledge sharing. A significant positive correlation between perceived fairness and embeddedness has been found (Zhou et al., 2020). Knowledge exchange is very important, but embeddedness also has a substantial impact on green innovation within a sustainable SC. Similarly important is the problem of integration. Using the organizational justice theory as a foundation, Alghababsheh et al. (2020) argued that suppliers' perceptions of buyers' justice (i.e., distributive, procedural, and interactional) can drive the social justice displayed by suppliers as an alternative and complementary vehicle to the conventional approaches to governance of sustainability.

When it comes to SCM, doing what is right is crucial, since it is only through strong internal collaboration that companies in the SC can truly succeed (Gundlach and Achrol, 1993). Although numerous studies have looked at the role of justice in interpersonal relationships, very few have investigated it in the context of a business's SC (Griffith et al., 2006). Research on the relationship between justice and SCs has been scarce, given the importance of justice in SC interactions (Luo, 2007). Interactional justice, distributive justice, and procedural justice are the three aspects of justice examined here. Research into the role of justice in improving the SC is still in its preliminary phases, even though it is of paramount relevance in SC interactions. Justice has the potential to be used more extensively, recommending likely activities that managers should take to promote social justice across the SC; most of the practices that were investigated by Jabbour et al. (2020) were religious in nature. Many significant positive correlations also exist between the investigated procedures. These associations may foretell the presence of possible linkages, thereby exposing routines that might benefit from widespread adoption through joint efforts. Wei et al. (2020) found that trust in the IT-enabled SC information integration implementation process was correlated with higher levels of interactional justice and procedural justice. When it comes to issues of fair distribution, however, the views of corporate leaders are not important. Two perceptions among partners, the commitment to network resources and fairness of network resources distribution, influence the sharing behaviors of an organization, as stated by, who integrated the three issues to examine their influence on SC collaboration and, consequently, realized firm performance. The perceived fairness of network resource distribution depends on several factors. Each of these two approaches to the SC is an attempt to better understand the value of social capital and the difficulties it presents.

When an employee is compensated fairly, by other members of the company, for the effort put in, it is distributive justice (Adams, 1965). Fairness in the decision-making process is measured by a concept known as "procedural justice" (Chan Kim and Mauborgne, 1998). When we talk about "interactional justice," we're referring to the employees' and customers' impressions of the amount of empathy, kindness, fair treatment, sensitivity, and care that was put into the scenario. Interactional justice may be broken down into two categories: informational and interpersonal. Perceived fairness in interpersonal interactions is known as interpersonal justice, whereas fairness in the exchange of knowledge is known as informational justice (Colquitt, 2001). Kshetri (2021) examined the quality of products, environmental accounting, and social impact measurement in several case studies of blockchain systems applied to SCs in developing countries. In this study, we explore how blockchain technology may help improve upon the many shortcomings of previous attempts to build sustainable SCs in developing countries. The theories tackle a wide range of problems, such as a hostile institutional setting, prohibitive prices, technological limitations, uneven power distribution among SC partners, and a lack of transparency in the distribution of value. Lee and Ha (2021) investigated the impact of interactional justice on information quality and SSCM, drawing parallels between Korean and multinational pharmaceutical enterprises. Insights into the connection between interpersonal justice and informational justice were provided. Interpersonal justice, informational justice, and

informational quality all had a strong positive association. Overall, the positive effect of information quality on the sustainable performance of SCM was shown to be independent of a company's location. Ikram et al. (2019) observed that CSR performance was much higher for companies that used an EMS compared to those that did not. Businesses that adopted an EMS had a positive and substantial effect on financial security, environmental safeguarding, justice, and societal contribution, whereas those that did not adopt an EMS had a positive and significant effect on employee contentment and economic output. In conclusion, companies may find that implementing an EMS helps them combat economic, social, and environmental challenges. This is one of the reasons why implementing an EMS appears to be a practical means of developing and improving CSR activities and other business objectives. There is a pressing need for more research into the function of justice in SCM. The following hypothesis was formulated based on the aforementioned information.

Hypothesis 2. Perceived justice has a positive significant relationship with SSCM.

2.4 Supplier management and sustainable supply chain management

Over the past few years, SCM has emerged as an essential strategy for managing both processes and inventories. The complex interplay of the system's many moving parts has resulted in a shift in the power balance among distributors, wholesalers, retailers, and manufacturers (Poirier, 1997). As a result of increased outsourcing, consolidation, and reduction in the supply base, most businesses and their suppliers are highly dependent on one another (Trent and Monczka, 1998). Sarkar et al. (2021) looked at a three-stage SC that consisted of a single supplier, a single manufacturer, and many retailers. If the early setup costs of the provider can be brought down, the model has a higher degree of accuracy. Because it is impossible to ensure that a supplier will consistently provide high-quality goods, manufacturers are required to make estimates on the cost of defects. It is the primary responsibility of the manufacturer to improve product quality while simultaneously reducing carbon emissions to ensure the long-term financial health of the organization. Qualitative content evaluation of a large sample of multinational companies by Dahlmann and Roehrich (2019) was carried out using data from the carbon disclosure project's climate change SC project. They found that companies placed a high priority on effectively understanding and managing information ambiguity related to larger sustainability problems, even though they depended on SC partners to reduce information uncertainty around indirect emissions data. This was a surprising finding given prioritized understanding and managing of information ambiguity related to sustainability. In addition, their research demonstrated that organizations engage with their suppliers, customers, and other partners in the SC in ways that are fundamental and transactional, as well as collaborative. To identify the most productive constellations for deploying MT-SSCM, Sauer and Seuring (2018) developed a three-dimensional framework that is centered on supply and demand uncertainties and the expectations for sustainability enforced by the supplier's immediate surroundings. We also reviewed the implications of our findings and potential future research paths related to the modification of imperfect planetary alignments.

For financial reasons, the retail chain has modelled its operations around the manufacturing method. Numerical trials have shown that the model reduces carbon dioxide emissions to their absolute minimum when the optimum values for the decision parameters are used. Koberg and Longoni (2019) conducted an extensive literature review to define SSCM in global SCs and to synthesize the relationship between configurations, governance systems, and sustainability results. They did this to answer the research questions presented in the previous sentence. There are an increasing number of people who believe that it is beneficial for a company's long-term success to have an organizational structure that emphasizes personal ties between the parent firm and numerous tiers of suppliers. This is the case regardless of whether those suppliers are controlled internally or by an external party. According to Khalid et al. (2019), the desires and pressures of customers are what are driving the creation of third parties (NGOs, certification organizations, or intermediaries). Enhanced communication and decreased expenditure are two objectives that are being addressed. It is possible to reconsider and reinterpret the findings by using the contingency analysis as a guide. The essential demands for environmental and social concerns can be addressed by the early participation of the third party in environmental risk management. Maintaining open lines of communication and working together with suppliers are two of the most effective ways to produce win-win results with your suppliers and avoid having to make concessions, which is the purpose of completing supplier audits and performance monitoring. According to Rentizelas et al. (2020), mandating socially responsible business practices leads to less inventiveness on the part of enterprises than does compliance. In addition, policymakers should keep in mind that firms usually do the bare minimum to fulfill government responsibilities, which limits the rate of improvement in social sustainability performance.

It is quite likely that the application of these strategies will result in an improvement in product quality. To fulfill the requirements of globalization, which call for the distribution of items of superior quality at reasonable prices, it is becoming increasingly important to have SCs that are both quick and reliable. This is crucial because it enables businesses to compete on an even playing field for a longer period. The degree of adaptability of the SC is influenced by both the firm and the

suppliers to the company (Wong and Wong, 2008). As a direct consequence, effective vendor management has come to be considered essential in the framework of sustainable growth (Harms et al., 2013). According to research conducted by Jum'a et al. (2022), four factors have a significant impact on managers' decisions on the implementation of GSCM: suppliers, the environment, consumers, and costs. Both the connection between the external market/financial variables and GSCM adoption and the link between internal factors and GSCM adoption were significantly affected by the size of the business. The size of the firm was a significant determining factor.

Therefore, SCM is challenging not only because of the intricate global distribution paths of services and commodities but also because of the great distances that exist between numerous suppliers (Reuter et al., 2010). Even though businesses are required to take responsibility for both themselves and the SCs that they operate, they are confronted with a variety of challenges and dangers on a social, environmental, and economic level (Cousins et al., 2004). This is especially true for vendors originating from emerging and developing markets, which regularly find themselves in challenging social, economic, and political circumstances (Beske et al., 2008). The importance of effective SM to successful business operations is generally acknowledged by SCM (Prajogo et al., 2012). Data from a study of 119 United Kingdom manufacturers were studied by Alghababsheh and Gallear (2021), who concluded that collaborative tactics were more effective than assessment processes in convincing suppliers to enhance their social performance. However, after relational and structural capital have been realized in the partnership, evaluation methodologies become necessary for driving suppliers' social performance. They also observed that the benefits of engaging in cooperative endeavors were amplified when both relational and cognitive capital were developed simultaneously. The effectiveness of the vendor is necessary for the operation of a successful SC (Forslund, 2014). Zhang et al. (2022) investigated the enablers of upstream green supply chain integration (GSCI), assessed the contingent influence of supplier development on upstream GSCI, and gave theoretical and practical contributions by integrating and balancing the interests of suppliers in green integration. Their findings suggested that the growing number of suppliers mediates not only the connection between relational governance and upstream GSCI but also the connection between senior leadership endorsement and upstream GSCI. In addition, it was shown that the link between upstream GSCI and supplier expansion was influenced by several different causes and that this correlation was significantly impacted by both cost-driven and customer-related factors. Alzoubi et al. (2020) presented the triple bottom line paradigm as a method for companies to evaluate their performance from a variety of viewpoints and improve their relationships with partners in the SC by being more transparent and forthcoming with information. The paradigm was developed as a means for businesses to review their performance. They demonstrated how organizations may improve their social and environmental impact by working in this manner and connecting SC collaboration with sustainable SC strategies. This was carried out to show how SC collaboration can be used. SC integration improved the firm's performance on all indicators, including both financial and non-financial indicators (Zhang et al., 2022). The following hypothesis was developed based on the information provided.

Hypothesis 3. Supplier management has a positive significant relationship with SSCM.

2.5 The moderating role of supply chain agility

When it comes to doing business, agility is described as the seamless integration of all components and competitive advantages, which may include, but are not limited to, speed, profitability, innovation, adaptability, and quality (Yusuf et al., 1999). A company's agility may be measured by its ability to create a wide range of items in a short amount of time at a low cost and in compliance with the requirements set out by its clientele (Fliedner and Vokurka, 1997). Altay et al. (2018) studied how the organizational culture of a company influences the performance of SCAG. According to the findings, the agility of the SC is an essential dynamic skill that has a significant influence on performance just before the onset of a crisis. As a result of rivalry on a worldwide scale, several different businesses have been forced to pick up the pace from a relatively relaxed to a more hectic one (Esper et al., 2007). Due to the complexity of the current competitive market and the unpredictability that it produces, businesses are becoming more agile in their operations to provide a better level of service to their clients and consumers (Gunasekaran et al., 2008). Researchers and practitioners in the field of SCM can investigate the when, where, and why of the relationship between lean, agile, resilient, and green practices and the qualities of capabilities, sustainability, and performance by theorizing and executing moderated mediation analysis (Shrouf et al., 2020).

By adopting a more agile mindset, companies may be able to overcome the obstacles to satisfying the demands of their customers. According to Lee (2004), supply networks need to have some degree of adaptability. In both the real world and the academic world, it is generally acknowledged that agile practices are beneficial (Nagel and Dove, 1991). The effectiveness of the SC is affected by how quickly production, sourcing, and delivery can be conducted (Khalili-Damghani and Tavana, 2013). Salandri et al. (2022) investigated two separate occurrences. They started by looking at the connection between ecologically friendly practices and the final product. They eventually learned that agility functions as a moderator in interactions of this kind and

that it influences both parties. The results of their preliminary inquiry led to two significant discoveries: 1) organizations that prioritize environmentally friendly business practices linked to the circular economy, particularly recycling, recovery, and reuse, see improved levels of operational performance; and 2) the use of eco-materials and environmentally friendly packaging does not have a significant impact on operational performance. Second, it was found that adopting a more flexible mindset may potentially eliminate the negative impact on productivity that is linked with turning green. Recycling, material recovery and product reuse are not as likely to improve business operations as the use of eco-materials and ecologically friendly packaging. The capacity to adapt has a potential role as a moderator. If businesses want to improve their operational performance in a way that is both sustainable and long-term, they will need to make significant investments in the training and development of their workforce. Akkaya and Qaisar (2021) found that agility serves as a moderating factor.

It is generally accepted that SCAG exerts a substantial amount of pressure on the strategic competitiveness of a business. Although there is some disagreement, most specialists think that agility is good. No research can definitively indicate whether SCAG plays a moderating effect in the relationship between SSCM, TMS, perceived fairness, and SM. The findings of this study have implications for how we understand the regulatory role that SCAG plays in the information-sharing process.

Hypothesis 4a. Supply chain agility moderates the relationship between top management support and SSCM.

Hypothesis 4b. SCAG moderates the relationship between perceived justice and SSCM.

Hypothesis 4c. SCAG moderates the relationship between supplier management and SSCM.

2.6 A conceptual model with the underpinning resource-based theory

The resource-based view (RBV) theory refers to the competitive benefits of a company based on the relationship between societal needs that begin to arise for enhanced performance of the environment and deployment of assets of the company to maintain three strategic abilities: product management, prevention of pollution, and sustainable development (Hart, 1995). Consequently, we believe that the RBV theory may describe the development of resource capabilities and the economic side of the firm. In this study, RBV is best for conceptual thinking related to sustainable SC performance. The following diagram consists of a graphical explanation of the variables in the study. The conceptual model in Figure 1 highlights TMS, PJ, and SM as independent variables (IVs) and SCAG as a moderator, whereas SSCM is the dependent variable (DV).

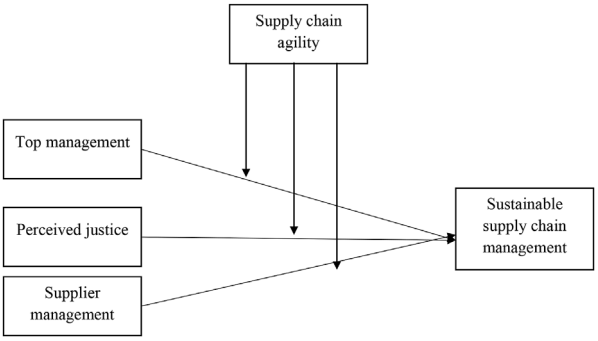

FIGURE 1
Theoretical framework.

3 Research methods

This study involved quantifiable emphasis and objectives, with statistical or numerical techniques for data analysis. Therefore, we carried out empirical research using a quantitative approach. The data were scientifically collected through a structured survey and analyzed using robust and rigorous methods. The interference of the researchers was limited during the study, as it was conducted in a non-contrived setting. A non-contrived setting has an advantage over a contrived setting in that findings from the former are more generalizable, having been derived from an empirical study conducted in a natural setting. Manipulation of the exogenous constructs by the researchers was minimal in the non-contrived setting. Hence, an explanatory study type was used to examine the exogenous and endogenous constructs in the model.

3.1 Measurements

The researchers used the adopted validated scales listed in the following table from previous empirical investigations to collect data from respondents. The study used a questionnaire, composed of 59 measurement items anchored on a five-point Likert scale, which requested respondents to select their opinion, with 5 indicating "strongly agree" and 1 indicating "strongly disagree," in relation to the corresponding statement. A closed-ended questionnaire is a convenient way to collect data; it restricts the respondents to the given options and results in highly relevant data. Use of a survey makes it possible to analyze the characteristics of a wider population by analyzing a

TABLE 1 Sources of adopted scales.

Construct	Source	No. of items
Top management support	Hadli (2017)	6
Perceived justice	Kim and Chai (2019)	10
Supplier management	Hadli (2017)	4
Supply chain agility	Eckstein et al. (2015)	9
Sustainable supply chain management	Kot (2018)	30

representative sample (Li et al., 2019; Lei et al., 2022; Li, Y. et al., 2022). Table 1 indicates the sources of adopted scales.

3.2 Data collection and analysis

Participants in this study were drawn from the upper and middle management levels of textile mills in Pakistan. The population included all the upper and middle level managers working in the textile sector of Faisalabad and was nearly 40,000 in number. The rule of thumb was used to determine the appropriate study sample size, as recommended by Hair et al. (2011). The proposed sample size was determined by multiplying the total items in the questionnaire by 10; therefore, an adequate sample size was 590. Moreover, the sample size was validated using G-Power software. Out of all the textile mills, only those mills located in Faisalabad city of Pakistan were selected. The city is referred to as Manchester of Pakistan, as it has long been famous for its textile industry. Faisalabad was selected due to the fact that approximately 40% of all textile industry workers in Pakistan are in this city. The results of the study can be then be generalized to all of Pakistan, as the country's textile sector is well-represented by the industry in Faisalabad. Mills were selected with consideration of their age, size, ownership structure, number of employees, profitability, leadership types, and geographic locations. Initially, the respondents were selected based on their designations. Designations ranged from middle-line managers to top managers. In Pakistan, top management includes directors of the company, executive vice presidents, senior vice presidents, regional managers, mill managers, and zonal managers. Middle-line managers include marketing managers, team leaders, finance managers, production managers, human resource managers, and supply chain managers (Abbasi and Tufail, 2021; Farzadfar et al., 2022; Schmidt et al., 2022). Many leaders in the textile industry were unwilling to fill out the questionnaires; therefore, it was difficult to collect data using strict sampling methods. We resorted to using a non-probability sampling method called convenient sampling. Informed consent from all the respondents was obtained, and they were ensured that all data would be confidential and used only for academic purposes.

For data analysis, we used the Partial Least Square (PLS) and Statistical Package for the Social Sciences (SPSS) programs. SPSS version 26 and "SmartPLS" version 3.3.7 software programs were used to analyze the data and determine whether they were complete and accurate. SPSS was used for descriptive analysis. The PLS-SEM technique was applied to evaluate the hypothesized relationships that exist between the exogenous and endogenous constructs. PLS-SEM was best suited for data analysis in our model as it has been successfully applied in a similar study (Li et al., 2019). When evaluating measurement and structural models, SmartPLS is superior to SPSS as it can evaluate the entire model in a single instance.

The findings of the study have important implications for creating an environmentally friendly SC that is sustainable overall. The reduction of production costs, enhancement of productivity, lessening of environmental harm, and lessening of pollution all have promise for benefitting both companies and the workers employed by those companies. Ultimately, staff employees will enjoy working in a more secure environment. Logistics and the SC are significant pillars of support for the manufacturing sector. Everyone in the SC, from the company's suppliers to its ultimate customers, must be considered when making decisions on the products or services to offer. Evaluation of the feasibility of the SC in our study demonstrated increased environmental benefits along with increased conscientiousness, which, in turn, leads to increased social benefit.

4 Results

4.1 Demographic analysis

This section consists of demographic information about respondents, such as gender, age, and salary. We distributed 590 questionnaires and received 383 completed surveys with accurate data; the response rate was 66.6%. The collected data were representative of the overall population. From the data collected, we found that 74.5% of the respondents were male and 25.5% were female. The greatest number of respondents was in the age group of 30–35 years or older, at 31%. In this study, the population was selected from top and middle management,

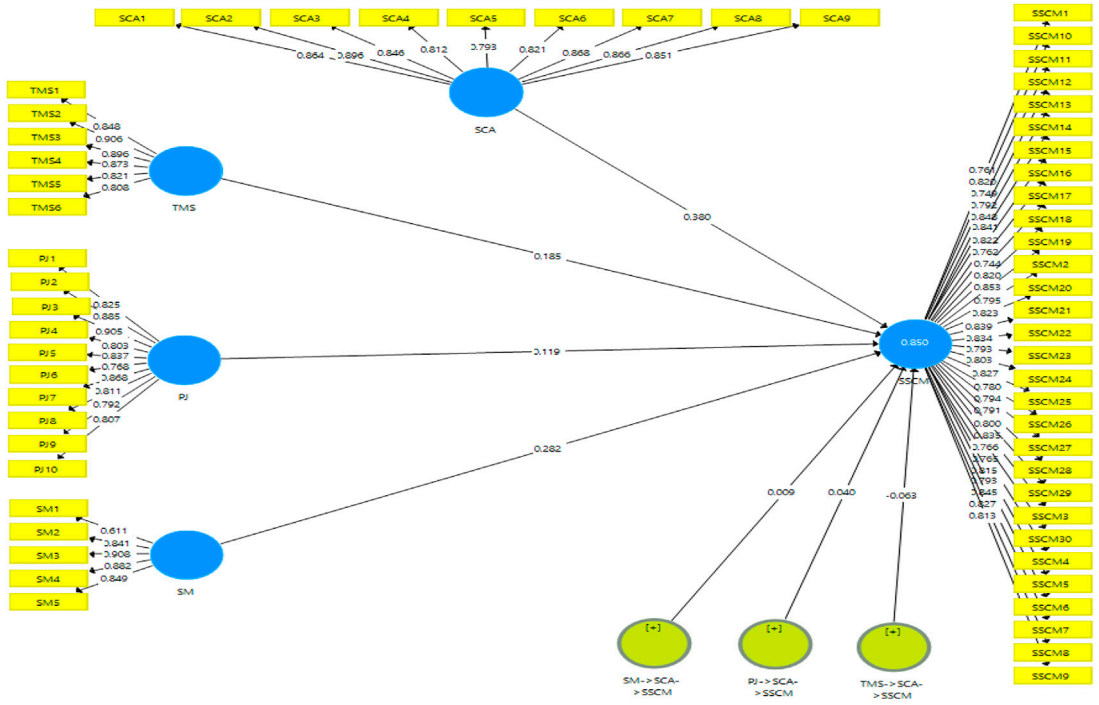

FIGURE 2
Measurement model.

therefore 50.70% of respondents were in middle management and 49.30% were in top management.

4.2 Measurement model

The measurement model was evaluated to examine the quality of the construct. The analysis of the criteria of quality begins with the outer loadings, followed by the examination of the reliability of the construct and the validity of the construct.

4.2.1 Factor loadings and construct reliability

Factors or outside loadings are defined as the extent to which each of the items in the correlation matrix correlates with a given principal component (Pett et al., 2003). In this investigation, there were no items discovered to be less than the value of 0.50, a criteria indicated by (Hult et al., 2018). As a result, no items were eliminated from the study. The essence of reliability is repeatability. A reliable instrument delivered repeatedly would yield the same results. In our study, the composite reliability ranged from 0.913 to 0.982, whereas Cronbach's alpha ranged from 0.878 to 0.950. Both composite reliability and Cronbach's alpha imply dependability that exceeds the recommended level of 0.70 (Hair et al., 2011). The results of factor loadings are shown in Figure 2.

4.2.2 Convergent validity

When the value of the average variance extracted (AVE) is equal to or exceeds 0.50, the underlying construct is measured through item convergence (Fornell and Larcker, 1981). Results of convergent validity are dependent on statistics of AVE. Table 2 demonstrates that all variables met the required threshold values. Therefore, convergent validity was established.

4.2.3 Discriminant validity—Fornell and Larcker criterion

Multiple collinearities can be prevented by evaluating the discriminant validity of the investigation when latent variables are added. The Fornell and Larker (1981) criterion is the method most used for this purpose. The criterion developed by Fornell and Larcker (1981) has been widely used to measure the degree of correlation of latent variables of the model. According to this criterion, the composite reliability (CR) and the mean extracted variance (AVE) are good predictors of the convergent validity of the measurement model. However, a new method, known as the heterogeneous correlation ratio method (HTMT), has been developed to establish discriminant validity. Although there are no universally accepted criteria for discriminant validity, a score of less than 0.70 indicates that discriminant validity is present between two scales. Consistent with the results of the

TABLE 2 Convergent validity of constructs.

Construct	Item code	Statement	Loadings	α	CR	AVE
Perceived justice	PJ1	We deal fairly with our suppliers	0.83	0.95	0.96	0.69
	PJ2	We fully explain our criteria to our suppliers	0.89			
	PJ3	We apply consistent decision-making standards in our dealings with our suppliers	0.91			
	PJ4	Our suppliers contribute significantly to our commitments	0.80			
	PJ5	Our suppliers receive high performance or rewards for their commitment to us	0.84			
	PJ6	We receive high performance or rewards from our commitment to our suppliers	0.77			
	PJ7	We agree on what is important in our commitments to our suppliers	0.87			
	PJ8	Resolve any disagreements quickly	0.81			
	PJ9	We will exchange information as soon as possible	0.79			
	PJ10	We will keep you informed of any changes that may affect the other party	0.81			
Supply chain agility	SCA1	Changes in technology (e.g., revisions of existing technologies)	0.86	0.95	0.96	0.72
	SCA2	Changes in competition (e.g., fluctuations in competitors' product pricing)	0.90			
	SCA3	Changes in demand (e.g., demand fluctuations)	0.85			
	SCA4	Changes in supply (e.g., changes in suppliers' offers)	0.81			
	SCA5	Reducing manufacturing throughput times	0.79			
	SCA6	Adjusting production processes	0.82			
	SCA7	Reducing delivery times	0.87			
	SCA8	Reducing replacement times of purchases	0.87			
	SCA9	Adjusting order of goods and services in the short-term	0.85			
Supplier management	SM1	Reliance on a few suppliers; selection of suppliers based on quality	0.61	0.88	0.91	0.68
	SM2	Development of long-term relationships with suppliers	0.84			
	SM3	Clear specifications provided to suppliers	0.91			
	SM4	Assessment of suppliers' capabilities and performance	0.88			
Top management support	TMS1	Offer of innovation and continuous improvement policies	0.85	0.93	0.94	0.74
	TMS2	Provision of necessary resources for processes	0.91			
	TMS3	Promotions of partners' involvement in the firm's activities	0.90			
	TMS4	Participation of top management in the supply chain improvement process	0.87			
	TMS5	Review of supply chain issues in top management meetings	0.82			
	TMS6	Responsibility for operational performance	0.81			

(Continued on following page)

TABLE 2 (*Continued*) Convergent validity of constructs.

Construct	Item code	Statement	Loadings	α	CR	AVE
Sustainable supply chain management	SSCM1	Cooperation in inventory and logistics management	0.76	0.98	0.98	0.65
	SSCM2	Use of information technologies to increase the efficiency of communication	0.80			
	SSCM3	Building long-term relationships based on established guidelines	0.84			
	SSCM4	A common clear vision of supply chain management	0.77			
	SSCM5	Use of the "just in time" concept/as a tool for enhancing competitiveness	0.82			
	SSCM6	Exchange of production information regularly, for e.g., through sales and operation planning meetings	0.79			
	SSCM7	A general overview of benchmarks and performance metrics	0.85			
	SSCM8	Standardization of quality policies for both products and processes with established guidelines	0.83			
	SSCM9	Product, supply, and distribution strategy aligned with the supply chain strategy	0.81			
	SSCM10	Information exchange on customer requirements and design plans	0.82			
	SSCM11	Use of supply chain concepts in product, process, and packaging design	0.75			
	SSCM12	A common procedure for obtaining feedback from customers participating in the development of a product	0.79			
	SSCM13	Environmentally friendly production process	0.85			
	SSCM14	We will try to reduce the amount of garbage	0.84			
	SSCM15	Participate in production processes that do not emit hazardous substances	0.82			
	SSCM16	Use of renewable resources in production	0.76			
	SSCM17	Material reuse/recycling	0.74			
	SSCM18	Recycling of defective products and waste	0.82			
	SSCM19	Selection of supply chain partners based on environmental guidelines	0.85			
	SSCM20	Involve workers in environmental protection programs	0.82			
	SSCM21	We apply a code of ethical conduct to our employees and contractors	0.84			
	SSCM22	We apply fair employment practices in our communities	0.83			
	SSCM23	Supply of safety and health equipment	0.79			
	SSCM24	Investment in infrastructure facilities	0.80			
	SSCM25	Timely and lawful payment of taxes and fees due	0.83			
	SSCM26	Tax base liquidation	0.78			
	SSCM27	Apply ethical standards of business and commerce	0.79			
	SSCM28	Investment in poverty reduction programs	0.79			
	SSCM29	Contribution to community charitable donations	0.80			
	SSCM30	Contribution to regional and supra-regional development initiatives	0.77			

current study, the correlations of AVE and R2 between the construct and the other structure were weaker than those between the same constructs. Kline (2011) suggested a threshold of 0.85. As a result, the discernment greatly improves confidence. Table 3 shows the values per the established standards.

TABLE 3 Discriminant validity by the Fornell and Larcker criterion.

	SCA	SM	SSCM	TMS	PJ
SCA	0.889				
SM	0.871	0.881			
SSCM	0.847	0.862	0.865		
TMS	0.831	0.793	0.830	0.859	
PJ	0.825	0.821	0.860	0.839	0.841

4.3 Structural model

The next stage in SEM is to assess the proposed hypotheses by evaluating the hypothesized relationships.

4.3.1 Hypothesis testing

The findings for Hypothesis 1 (H1) demonstrated in Table 4 that PJ had a substantial influence on SSCM (β = 0.236, t = 3.209, p = 0.001). Therefore, H1 can be accepted. Hypothesis 2 (H2) investigated whether SM had a substantial beneficial impact on SSCM. The data indicate that SM had a substantial influence on SSCM (β = 0.442, t = 6.327, p = 0.000). As a result, H2 was supported. The question explored in Hypothesis 3 (H3) was whether TMS had a substantial beneficial effect on SSCM. Table 4 shows that TMS had a substantial influence on SSCM (β = 0.282, t = 4.687, p = 0.000). As a result, H3 may be trusted.

4.3.2 Moderating analysis

Based on the findings shown in Table 5 and Figure 3, the moderating effect of SCAG on the association between TMS and SSCM was insignificant (β = −0.063, t = 1.341, p = 0.181). Likewise, the moderating effect that SCAG had on the association between PJ and SSCM was not statistically significant (β = 0.004, t = 0.669, p = 0.504). It was also found that there was no moderating effect of SCAG on the connection between SM and SSCM (β = 0.009, t = 0.156, p = 0.876).

Table 6 suggests reasons for these results based on the current context in Pakistan.

4.4 Discussion

People are becoming increasingly concerned about climate change, unexpected weather changes, and ecosystem destruction on a worldwide scale. Most environmentalists and scientists concur that the principal causes of this degradation are the rising use of fossil fuels and the prevalence of ecologically unfavorable business practices. The usage of chlorofluorocarbons in manufacturing processes, which results in excessive carbon emission, is detrimental to both the environment and public health. Chlorofluorocarbons are utilized in the manufacturing of goods. As a result, there is an increasing amount of pressure on the governments of both wealthy and developing nations to pass environmental protection legislation. The Security and Exchange Commission of Pakistan, which is responsible for overseeing the development and operation of businesses in Pakistan, is also cognizant of the impact that product manufacturing and maintenance processes have on the local environment. It is also playing an important role in social media (Wang et al., 2021; Zhou et al., 2022; Geng et al., 2022; Zhang et al., 2022). Considering the preceding facts, further investigations have led to the discovery of a viable solution in the form of protocols for the management of sustainable SCs in Pakistan's industrial and service sectors. This sector accounts for the highest total exports, particularly in the upper Punjab and other cities that are prominent textile industry hubs. We chose the textile industry to examine the factors that lead to ecologically responsible SCM. As a developing nation, Pakistan has much to gain from the environmental protection and green movement experiences of more industrialized nations. From our study, we found a strong positive link between TMS and SSCM. These findings are consistent with previous studies (Ilyas et al., 2020; Sandberg and Abrahamsson, 2010; Kumar et al., 2019). There was a strong positive link found between PJ and SSCM, and our findings support the previous studies of Colquitt (2001), Zhou et al. (2020), and Alghababsheh et al. (2020). As mentioned by Sauer and Seuring (2018) and Wong and Wong (2008), suppliers have a key role to play in developing a SSCM system. Our study validated the previous research in this regard. Several rules and government bodies in Pakistan closely regulate and monitor the environmental footprints left by the country's manufacturing sector. There are ongoing conversations and debates in Pakistan about ways to lessen reliance on fossil fuels and develop environmentally friendly products. It has been an acknowledged practice in this country for an exceedingly long time that those in positions of authority influence what happens to businesses, therefore it was crucial to study how top management supports the development of SSCM. In Pakistan, the highest level of management has the authority to decide on environmental protection measures, formulate policies, allot financing, and require progress reports on SSCM. Therefore, we began by examining the assistance offered by senior management and discovered a substantial correlation concerning environmentally responsible SCM. If upper management is dedicated to sustainability goals, they must be extremely helpful in maintaining the SC, in addition to committing their efforts to the health and safety of people and the environment. We also examined the perception of justice as we feel employees in Pakistan must believe that their jobs, responsibilities, efforts, and performance systems are fair. In this regard, we discovered a strong positive correlation between a sense of justice and the capacity to manage the SC effectively.

TABLE 4 Hypothesis outcome.

Hypothesis	Path	β	S. D.	*t*-value	*p*-value	Result
H1	PJ - > SSCM	0.236	0.074	3.209	0.001	Supported
H2	SM - > SSCM	0.442	0.070	6.327	0.001	Supported
H3	TMS - > SSCM	0.282	0.060	4.687	0.001	Supported

TABLE 5 Moderation hypothesis outcome.

Hypothesis	Path	β	S. D.	*t*-value	*p*-value	Result
H4a	PJ - > SCAG - > SSCM	0.004	0.059	0.669	0.504	Not supported
H4b	SM - > SCAG - > SSCM	0.009	0.059	0.156	0.876	Not supported
H4c	TMS - > SCAG - > SSCM	-0.063	0.047	1.341	0.181	Not supported

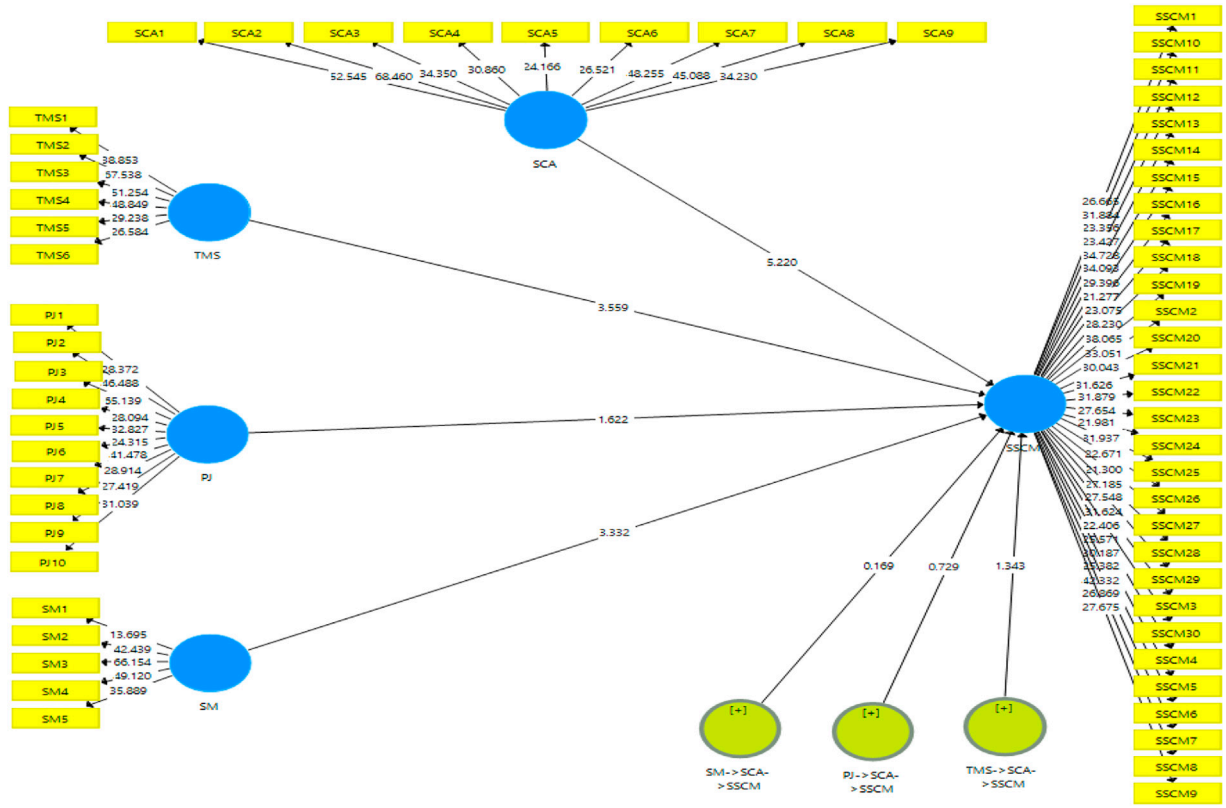

FIGURE 3
Structural model of moderation.

How employees see the justice, effort, and performance systems influences their capacity to design environmentally friendly techniques for SCM, which will in turn influence the organization's environmental protection efforts. Numerous wholesalers and distributors are the third most significant component.

TABLE 6 Overall hypothesis outcomes.

Hypothesis	Result	Probable reason
1. Top management support has a positive significant relationship with sustainable supply chain management	Accepted	In Pakistan, the highest level of management is responsible for making decisions. For any significant endeavor, members of the top management are responsible for making choices, as well as for approval of funding and decisions regarding human and technical resources. Sustainable supply chain management is largely dependent on the interests of top management
2. Perceived justice has a positive significant relationship with sustainable supply chain management	Accepted	If everyone gets what they deserve, it boosts morale all along the supply chain. Perceived justice at the middle and lower levels of management functions as an incentive for keeping middle and lower management laser-focused on their sustainable supply chain management objectives. This is true at the bottom of the range
3. Supplier management has a positive significant relationship with sustainable supply chain management	Accepted	The success of a supply chain transformation is dependent on the suppliers, just as quality is dependent on the suppliers. When dedicated to being environmentally friendly, all the companies that supply a corporation with raw materials, spare parts, and machines are thoroughly monitored. This results in a more sustainable and ecologically friendly supply chain
4a. Supply chain agility moderates the relationship between top management support and sustainable supply chain management	Not accepted	The process of transformation along the supply chain is slowed down by agility, speed, or haste. In addition to this, it has the potential to instill a sense of uneasiness in the workforce of a nation that is experiencing a crisis, which may render all efforts to maintain a sustainable supply chain futile
4b. Supply chain agility moderates the relationship between perceived justice and sustainable supply chain management	Not accepted	In a community that places a strong emphasis on maintaining its cultural traditions, rapid changes in the supply chain are not welcomed. People are notoriously slow to accept change. The worker requires some amount of time to get familiar with the advantages that sustainable supply chain management presents to both them and society in general
4c. Supply chain agility moderates the relationship between supplier management and sustainable supply chain management	Not accepted	The transformation of the supply chain takes time, and this is true not just for the suppliers but also for themselves. Time and effort are required to develop environmental awareness among the suppliers who are not directly controlled by management. The benefit of the effort is negated by speed

It is commonly believed that suppliers dictate the quality standard. Even while top management has no direct influence over suppliers, a company can nevertheless, through revised contracts, obtain high-quality raw materials from them and persuade them to conduct more environmentally friendly activities. We opted to investigate this link because it was unclear how suppliers fit into the process of managing a company's SC. We discovered a significant correlation between effectively managing suppliers and maintaining the SC of a business. One of the most important lessons from this research is that higher management should establish clear communication channels with external suppliers and involve them in their goals of saving the environment. Even though a company may be able to employ a variety of strategies to encourage its suppliers to go green, significant effort will be required because Pakistan has a low education level; most of its workforce is uneducated and thus unaware of the environmental impact of their actions. Therefore, it is vital to educate the floor staff regularly on the potential negative effects their actions may have. As our final area of inquiry, we investigated the value of SC flexibility. In contrast to the findings of past studies, we could not uncover any correlation between our independent variables of TMS, perceived fairness, SM, and the preservation of the company's SC. This discovery contradicts the vast body of research undertaken throughout the world. Pakistani society likely has deeply ingrained customs that make bringing about change extremely difficult, especially when engaging with individuals with lower levels of education. Changing SCM to make it more environmentally responsible and sustainable is a gradual process. This study has broader implications for the corporate sector in developing countries, and it provides advice for the senior management of organizations that are serious about strengthening the sustainability of their SC and supporting the green movement. When the SC is sustainable, waste is reduced, carbon emissions are reduced, fossil fuel consumption is reduced, and the environment for workers and the public is made safer and healthier. Long-term, the fact that a corporation will produce fewer dangerous items for consumers will result in more revenue for the company and improvement in the standard of living for the general population.

Conclusion

The objective of this study was to evaluate the relationship between successful long-term SCM and top-level management support, SM, perceived fairness, and how well suppliers are managed (SSCM). Our findings demonstrated that TMS had a

positive influence on SSCM (β = 0.282, t = 4.687, p = 0.001), which supports results found in the published literature. In addition, we discovered a correlation, both positive and statistically significant, between the concept of justice and the management of sustainable SCs (β = 0.236, t = 3.209, p = 0.001). In the context of SCM, justice encourages connection creation by having a beneficial influence on the perspective of SCM regarding the value of maintaining such ties over time. In addition, SM has a favorable and statistically significant influence on SSCM (β = 0.442, t = 6.327, p = 0.001). SM is affected by a wide variety of additional variables. One of these additional variables is the context of the company, which affects the core functions of the SC and, as a result, has a significant impact on SC performance. Academics and working professionals agree that agility results in a plethora of favorable outcomes. It has been established that agility has a moderating effect. The results of the test to identify the presence of moderating factors were: β = 0.0127, t = 3.27, and p = 0.012. In our study, the reliability and validity of the instruments were established, but the hypotheses regarding the moderating impact of organizational SCAG on the relationships between the independent variables and SSCM were not validated. This suggests that the theories lack support. According to our findings, the moderating effect of SCAG on the relationships between TMS, PJ, SM, and SSCM is not remarkable. This is due to the cultural context of a developing nation. Individuals inside organizations are not particularly kind and accommodating, and they are slow to adopt new ideas. Sustainable SCM is an innovative strategy that combines environmental issues throughout the entire SC, from the manufacturer to the end consumer. Moreover, a previous study was conducted on small and medium-sized manufacturing companies in both Turkey and Malaysia, both of which are developed nations. Both Turkey and Malaysia have developed and implemented sophisticated systems for their supply networks, and businesses in both nations employ agile methodologies in their operations and SCs. In contrast, the vast majority of enterprises in Pakistan either lack a SC system or outsource the management of their SC. Our study addressed the established research questions regarding the significance of TMS, PJ, and SM in the process of achieving a sustainable SC. The results of this study will be useful for policymakers who are attempting to design sustainable and efficient supply networks. Improvement of the SC will make the organization nimbler, and, as a result, it will lower the cost of manufacturing by reducing waste along the SC. Our findings will help expand the knowledge of SC members regarding SCM and is applicable to businesses in developing nations.

The public and private sectors of many countries should be the key focus of future research. This study focused on factors that influence SCM, such as support from top management, PJ, and SM. Additional research should focus on other factors, including the innovation of work processes, the application of information technology, the collaboration of SC members, interactional justice, social responsibility, environmental dynamism, and SC dynamic capabilities. This study was conducted in textile mills; however, additional research conducted in agricultural settings, healthcare settings, educational settings, logistics, and transportation settings, among others, would be beneficial.

Data availability statement

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Bahauddin Zakariya University. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

RY and FM contributed to the conception and design of the study. MI organized the database. RMY performed the statistical analysis. AH wrote the first draft of the manuscript. RY, FM, and MI wrote sections of the manuscript. All authors read the manuscript and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Abbasi, K. R., and Tufail, M. (2021). Revisiting electricity consumption, price, and real gdp: A modified sectoral level analysis from Pakistan. *Energy Policy* 149, 112087. doi:10.1016/j.enpol.2020.112087

Abraham, M., Crawford, J., and Fisher, T. (1999). Key factors predicting the effectiveness of cultural change and improved productivity in implementing total quality management. *Int. J. Qual. Reliab. Manag.* 16. doi:10.1108/02656719910239910

Adams, J. S. (1965). Inequity in social exchange. *Adv. Exp. Soc. Psychol.* 2, 267–299.

Aftab, Z., Ali, C. L., Khan, A. M., Robinson, A., and Irshad, I. A. (2000). *Industrial policy and the environment in Pakistan*. Karachi: United Nations Industrial Development Organization. (UNIDO) Report. Industrial Policy and Environment (NC/PAK/97/018).

Ahmed, Y. (2008). *Textile industry of Pakistan*. Lahore: Horizon Securities.

Akkaya, B., and Qaisar, I. (2021). Linking dynamic capabilities and market performance of SMEs: The moderating role of organizational agility. *Istanbul Bus. Res.* 50 (2), 0. doi:10.26650/ibr.2021.50.961237

Al Halbusi, H., Al-Sulaiti, K., and Al-Sulaiti, I. (2022). Assessing factors influencing technology adoption for online purchasing amid COVID-19 in Qatar: Moderating role of word of mouth. *Front. Environ. Sci.* 10, 942527. doi:10.3389/fenvs.2022.942527

Alghababsheh, M., Gallear, D., and Rahman, M. (2020). Balancing the scales of justice: Do perceptions of buyers' justice drive suppliers' social performance? *J. Bus. Ethics* 163 (1), 125–150. doi:10.1007/s10551-018-3993-0

Alghababsheh, M., and Gallear, D. (2021). Socially sustainable supply chain management and suppliers' social performance: The role of social capital. *J. Bus. Ethics* 173 (4), 855–875. doi:10.1007/s10551-020-04525-1

Altay, N., Gunasekaran, A., Dubey, R., and Childe, S. J. (2018). Agility and resilience as antecedents of supply chain performance under moderating effects of organizational culture within the humanitarian setting: A dynamic capability view. *Prod. Plan. Control* 29 (14), 1158–1174. doi:10.1080/09537287.2018.1542174

Alzoubi, H., Ahmed, G., Al-Gasaymeh, A., and Kurdi, B. (2020). Empirical study on sustainable supply chain strategies and its impact on competitive priorities: The mediating role of supply chain collaboration. *Manag. Sci. Lett.* 10 (3), 703–708. doi:10.5267/j.msl.2019.9.008

Aman, J., Shi, G., Ul Ain, N., and Likun, G. (2022). Community well-being under China-Pakistan Economic Corridor: Role of social, economic, cultural, and educational factors in improving residents' quality of life. *Front. Psychol.* 12, 816592. doi:10.3389/fpsyg.2021.816592

Naseer, M. A. U. R., Ashfaq, M., Hassan, S., Abbas, A., Razzaq, A., Mehdi, M., et al. (2019). Critical issues at the upstream level in sustainable supply chain management of agri-food industries: Evidence from Pakistan's citrus industry. *Sustainability* 11 (5), 1326. doi:10.3390/su11051326

Bartley, T. (2010). Transnational private regulation in practice: The limits of forest and labor standards certification in Indonesia. *Bus. Polit.* 12 (3), 1–34. doi:10.2202/1469-3569.1321

Beske, P., Koplin, J., and Seuring, S. (2008). The use of environmental and social standards by German first-tier suppliers of the Volkswagen AG. *Corp. Soc. Responsib. Environ. Manag.* 15 (2), 63–75. doi:10.1002/csr.136

Chan Kim, W., and Mauborgne, R. (1998). Procedural justice, strategic decision making, and the knowledge economy. *Strategic Manag. J.* 19 (4), 323–338. doi:10.1002/(sici)1097-0266(199804)19:4<323::aid-smj976>3.0.co;2-f

Choy, K., and Lee, W. B. (2003). A generic supplier management tool for outsourcing manufacturing. *Supply Chain Manag. An Int. J.* 8, 140–154. doi:10.1108/13598540310468742

Colquitt, J. A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. *J. Appl. Psychol.* 86 (3), 386–400. doi:10.1037/0021-9010.86.3.386

Cousins, P. D., Lamming, R. C., and Bowen, F. (2004). The role of risk in environment-related supplier initiatives. *Int. J. Operations Prod. Manag.* 24, 554–565. doi:10.1108/01443570410538104

Dahlmann, F., and Roehrich, J. K. (2019). Sustainable supply chain management and partner engagement to manage climate change information. *Bus. Strategy Environ.* 28 (8), 1632–1647. doi:10.1002/bse.2392

Dou, Y., Zhu, Q., and Sarkis, J. (2018). Green multi-tier supply chain management: An enabler investigation. *J. Purch. Supply Manag.* 24 (2), 95–107. doi:10.1016/j.pursup.2017.07.001

Eckstein, D., Goellner, M., Blome, C., and Henke, M. (2015). The performance impact of supply chain agility and supply chain adaptability: The moderating effect of product complexity. *Int. J. Prod. Res.* 53 (10), 3028–3046. doi:10.1080/00207543.2014.970707

Ehsan, S., Nazir, M., Nurunnabi, M., Raza Khan, Q., Tahir, S., and Ahmed, I. (2018). A multimethod approach to assess and measure corporate social responsibility disclosure and practices in a developing economy. *Sustainability* 10 (8), 2955. doi:10.3390/su10082955

Esper, T. L., Fugate, B. S., and Davis-Sramek, B. (2007). Logistics learning capability: Sustaining the competitive advantage gained through logistics leverage. *J. Bus. Logist.* 28 (2), 57–82. doi:10.1002/j.2158-1592.2007.tb00058.x

Fahimnia, B., Sarkis, J., and Davarzani, H. (2015). Green supply chain management: A review and bibliometric analysis. *Int. J. Prod. Econ.* 162, 101–114. doi:10.1016/j.ijpe.2015.01.003

Farzadfar, F., Naghavi, M., Sepanlou, S. G., Saeedi Moghaddam, S., Dangel, W. J., Davis Weaver, N., et al. (2022). Health system performance in Iran: A systematic analysis for the global burden of disease study 2019. *Lancet* 399 (10335), 1625–1645. doi:10.1016/s0140-6736(21)02751-3

Fliedner, G., and Vokurka, R. J. (1997). Agility: Competitive weapon of the 1990s and beyond? *Prod. Inventory Manag. J.* 38 (3), 19.

Fornell, C., and Larcker, D. F. (1981). *Structural equation models with unobservable variables and measurement error: Algebra and statistics*. Los Angeles, CA: Sage Publications Sage CA.

Forslund, H. (2014). Exploring logistics performance management in supplier/retailer dyads. *Int. J. Retail Distribution Manag.* 42, 0020. doi:10.1108/IJRDM-01-2013-0020

Ge, T., Ullah, R., Sadiq, I., Zhang, R., and Zhang, R. (2022). Women's entrepreneurial contribution to family income: Innovative technologies promote females' entrepreneurship amid COVID-19 crisis. *Front. Psychol.* 12, 828040. doi:10.3389/fpsyg.2022.828040

Geng, J., Ul Haq, S., Ye, H., Shahbaz, P., Abbas, A., Cai, Y., et al. (2022). Survival in pandemic times: Managing energy efficiency, food diversity, and sustainable practices of nutrient intake amid COVID-19 crisis. *Front. Environ. Sci.* 13, 945774. doi:10.3389/fenvs.2022.945774

Giunipero, L. C., Hooker, R. E., and Denslow, D. (2012). Purchasing and supply management sustainability: Drivers and barriers. *J. Purch. Supply Manag.* 18 (4), 258–269. doi:10.1016/j.pursup.2012.06.003

Golicic, S. L., and Smith, C. D. (2013). A meta-analysis of environmentally sustainable supply chain management practices and firm performance. *J. supply chain Manag.* 49 (2), 78–95. doi:10.1111/jscm.12006

Govindan, K., Seuring, S., Zhu, Q., and Azevedo, S. G. (2016). Accelerating the transition towards sustainability dynamics into supply chain relationship management and governance structures. *J. Clean. Prod.* 112, 1813–1823. doi:10.1016/j.jclepro.2015.11.084

Griffith, D. A., Harvey, M. G., and Lusch, R. F. (2006). Social exchange in supply chain relationships: The resulting benefits of procedural and distributive justice. *J. operations Manag.* 24 (2), 85–98. doi:10.1016/j.jom.2005.03.003

Gunasekaran, A., Lai, K., and Edwincheng, T. (2008). Responsive supply chain: A competitive strategy in a networked economy. *Omega* 36 (4), 549–564. doi:10.1016/j.omega.2006.12.002

Gundlach, G. T., and Achrol, R. S. (1993). Governance in exchange: Contract law and its alternatives. *J. Public Policy & Mark.* 12 (2), 141–155. doi:10.1177/074391569101200201

Hadli, H. (2017). *The determinants of firm operational performance*. Malaysia: SSRN. Available at SSRN 2988730.

Hair, J. F., Ringle, C. M., and Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *J. Mark. Theory Pract.* 19 (2), 139–152. doi:10.2753/mtp1069-6679190202

Harms, D., Hansen, E. G., and Schaltegger, S. (2013). Strategies in sustainable supply chain management: An empirical investigation of large German companies. *Corp. Soc. Responsib. Environ. Manag.* 20 (4), 205–218. doi:10.1002/csr.1293

Hart, S. L. (1995). A natural-resource-based view of the firm. *Acad. Manag. Rev.* 20 (4), 986–1014. doi:10.5465/amr.1995.9512280033

Hult, G. T. M., Hair, J. F., Proksch, D., Sarstedt, M., Pinkwart, A., and Ringle, C. M. (2018). Addressing endogeneity in international marketing applications of partial least squares structural equation modeling. *J. Int. Mark.* 26 (3), 1–21. doi:10.1509/jim.17.0151

Hussain, T., Wei, Z., and Nurunnabi, M. (2019). The effect of sustainable urban planning and slum disamenity on the value of neighboring residential property: Application of the hedonic pricing model in rent price appraisal. *Sustainability* 11 (4), 1144. doi:10.3390/su11041144

Ikram, M., Zhou, P., Shah, S. A. A., and Liu, G. Q. (2019). Do environmental management systems help improve corporate sustainable development? Evidence from manufacturing companies in Pakistan. *J. Clean. Prod.* 226, 628–641. doi:10.1016/j.jclepro.2019.03.265

Ilyas, S., Hu, Z., and Wiwattanakornwong, K. (2020). Unleashing the role of top management and government support in green supply chain management and sustainable development goals. *Environ. Sci. Pollut. Res.* 27 (8), 8210–8223. doi:10.1007/s11356-019-07268-3

Jabbour, C. J. C., Janeiro, R. C., de Sousa Jabbour, A. B. L., Junior, J. A. G., Salgado, M. H., and Jugend, D. (2020). Social aspects of sustainable supply chains: Unveiling potential relationships in the Brazilian context. *Ann. Operations Res.* 290 (1), 327–341. doi:10.1007/s10479-017-2660-7

Jaffar, A., Mahmood, S., Ali, H., Ali Raza, M., Ali, G., Aman, J., et al. (2019). The effects of corporate social responsibility practices and environmental factors through a moderating role of social media marketing on sustainable performance of business firms. *Sustainability* 11, 11123434. doi:10.3390/su11123434

Jaffar, A., Zhang, Q., Hussain, I., Akram, S., Afaq, A., and Shad, M. A. (2020). Sustainable innovation in small medium enterprises: The impact of knowledge management on organizational innovation through a mediation analysis by using SEM approach. *Sustainability* 12 (6), 2407. doi:10.3390/su12062407

Jum'a, L., Ikram, M., Alkalha, Z., and Alaraj, M. (2022). Factors affecting managers' intention to adopt green supply chain management practices: Evidence from manufacturing firms in Jordan. *Environ. Sci. Pollut. Res.* 29 (4), 5605–5621. doi:10.1007/s11356-021-16022-7

Khalili-Damghani, K., and Tavana, M. (2013). A new fuzzy network data envelopment analysis model for measuring the performance of agility in supply chains. *Int. J. Adv. Manuf. Technol.* 69 (1-4), 291–318. doi:10.1007/s00170-013-5021-y

Kim, I., and Min, H. (2011). Measuring supply chain efficiency from a green perspective. *Manag. Res. Rev.* 34, 1169–1189. doi:10.1108/01409171111178738

Kim, M., and Chai, S. (2019). Impact of justice in the supply chain relationship on implementing supply chain integration. *Int. J. Supply Chain Manag.* 8 (6), 1199.

Kline, R. B. (2011). *Principles and practice of structural equation modeling*. Third Edition. New York: The Guilford Press.

Koberg, E., and Longoni, A. (2019). A systematic review of sustainable supply chain management in global supply chains. *J. Clean. Prod.* 207, 1084–1098. doi:10.1016/j.jclepro.2018.10.033

Konovsky, M. A. (2000). Understanding procedural justice and its impact on business organizations. *J. Manag.* 26 (3), 489–511. doi:10.1177/014920630002600306

Kot, S. (2018). Sustainable supply chain management in small and medium enterprises. *Sustainability* 10 (4), 1143. doi:10.3390/su10041143

Kshetri, N. (2021). Blockchain and sustainable supply chain management in developing countries. *Int. J. Inf. Manag.* 60, 102376. doi:10.1016/j.ijinfomgt.2021.102376

Kumar, A., Mangla, S. K., Luthra, S., and Ishizaka, A. (2019). Evaluating the human resource-related soft dimensions in green supply chain management implementation. *Prod. Plan. Control* 30 (9), 699–715. doi:10.1080/09537287.2018.1555342

Larson, P. D., Poist, R. F., and Halldorsson, A. (2007). Perspectives on logistics vs. SCM: A survey of SCM professionals. *J. Bus. Logist.* 28 (1), 1–24. doi:10.1002/j.2158-1592.2007.tb00230.x

Lee, C., and Ha, B.-C. (2020). The impact of interactional justice and supply-chain collaboration on sustainable SCM performance: The case of multinational pharmaceutical firms. *J. Asian Finance, Econ. Bus.* 7 (2), 237–247. doi:10.13106/jafeb.2020.vol7.no2.237

Lee, C., and Ha, B. C. (2021). Interactional justice, informational quality, and sustainable supply chain management: A comparison of domestic and multinational pharmaceutical companies. *Sustainability* 13 (2), 998. doi:10.3390/su13020998

Lee, H. L. (2004). The triple-A supply chain. *Harv. Bus. Rev.* 82 (10), 102.

Lei, M., Deeprasert, J., Li, R. Y. M., and Wijitjamree, N. (2022). Predicting Chinese older adults' intention to live in nursing homes using an integrated model of the basic psychological needs theory and the theory of planned behavior. *Front. Public Health* 10, 947946. doi:10.3389/fpubh.2022.947946

Li, R. Y. M., Tang, B., and Chau, K. W. (2019). Sustainable construction safety knowledge sharing: A partial least square-structural equation modeling and a feedforward neural network approach. *Sustainability* 11 (20), 5831. doi:10.3390/su11205831

Li, X., Dongling, W., Baig, N. U. A., and Zhang, R. (2022). From cultural tourism to social entrepreneurship: Role of social value creation for environmental sustainability. *Front. Psychol.* 13, 925768. doi:10.3389/fpsyg.2022.925768

Li, Y., Al-Sulaiti, K., Dongling, W., Abbas, J., and Al-Sulaiti, I. (2022). Tax avoidance culture and employees' behavior affect sustainable business performance: The moderating role of corporate social responsibility. *Front. Environ. Sci.* 10. doi:10.3389/fenvs.2022.964410

Luo, Y. (2007). The independent and interactive roles of procedural, distributive, and interactional justice in strategic alliances. *Acad. Manag. J.* 50 (3), 644–664. doi:10.5465/amj.2007.25526452

Mamirkulova, G., Mi, J., Mahmood, S., Mubeen, R., and Ziapour, A. (2020). New Silk Road infrastructure opportunities in developing tourism environment for residents better quality of life. *Glob. Ecol. Conservation* 24, e01194. doi:10.1016/j.gecco.2020.e01194

Matopoulos, A., Didonet, S., Tsanasidis, V., and Fearne, A. (2019). The role of perceived justice in buyer-supplier relationships in times of economic crisis. *J. Purch. Supply Manag.* 25 (4), 100554. doi:10.1016/j.pursup.2019.100554

Nagel, R. N., and Dove, R. (1991). *21st-century manufacturing enterprise strategy: An industry-led view*. Darby: Diane Publishing.

Narimissa, O., Kangarani-Farahani, A., Molla-Alizadehand Zavardehi, S. (2020). Evaluation of sustainable supply chain management performance: Dimensions and aspects. *Sustain. Dev.* 28 (1), 1–12. doi:10.1002/sd.1959

Nazam, M., Hashim, M., Randhawa, M. A., and Maqbool, A. (2019). "Modeling the barriers of sustainable supply chain practices: A Pakistani perspective," in International Conference on Management Science and Engineering Management, Switzerland AG, 20 June 2019 (Springer).

Oke, A., Munshi, N., and Walumbwa, F. O. (2009). The influence of leadership on innovation processes and activities. *Organ. Dyn.* 38 (1), 64–72. doi:10.1016/j.orgdyn.2008.10.005

Pett, M. A., Lackey, N. R., and Sullivan, J. J. (2003). "Interpreting factors and generating factor scores," in *Making sense of factor analysis: The use of factor analysis for instrument development in health care research* (California, United States: sage journals), 207–225.

Poirier, C. C. (1997). Evolving to the ultimate level of performance through supply chain management. *Natl. Prod. Rev.* 17 (1), 11–23. doi:10.1002/npr.4040170105

Prajogo, D., Chowdhury, M., Yeung, A. C., and Cheng, T. (2012). The relationship between supplier management and firm's operational performance: A multi-dimensional perspective. *Int. J. Prod. Econ.* 136 (1), 123–130. doi:10.1016/j.ijpe.2011.09.022

Puertas, R., Marti, L., and Garcia, L. (2014). Logistics performance and export competitiveness: European experience. *Empirica* 41 (3), 467–480. doi:10.1007/s10663-013-9241-z

Rao, P., and Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? *Int. J. operations Prod. Manag.* 25, 898–916. doi:10.1108/01443570510613956

Rentizelas, A., de Sousa Jabbour, A. B. L., Al Balushi, A. D., and Tuni, A. (2020). Social sustainability in the oil and gas industry: Institutional pressure and the management of sustainable supply chains. *Ann. Operations Res.* 290 (1), 279–300. doi:10.1007/s10479-018-2821-3

Reuter, C., Foerstl, K., Hartmann, E., and Blome, C. (2010). Sustainable global supplier management: The role of dynamic capabilities in achieving competitive advantage. *J. supply chain Manag.* 46 (2), 45–63. doi:10.1111/j.1745-493x.2010.03189.x

Ryan, J. C., and Tipu, S. A. (2013). Leadership effects on innovation propensity: A two-factor full range leadership model. *J. Bus. Res.* 66 (10), 2116–2129. doi:10.1016/j.jbusres.2013.02.038

Saeed, M. A., and Kersten, W. (2019). Drivers of sustainable supply chain management: Identification and classification. *Sustainability* 11 (4), 1137. doi:10.3390/su11041137

Sajjad, A., Eweje, G., and Tappin, D. (2020). Managerial perspectives on drivers for and barriers to sustainable supply chain management implementation: Evidence from New Zealand. *Bus. Strategy Environ.* 29 (2), 592–604. doi:10.1002/bse.2389

Salandri, L., Rizzo, G. L. C., Cozzolino, A., and De Giovanni, P. (2022). Green practices and operational performance: The moderating role of agility. *J. Clean. Prod.* 375, 134091. doi:10.1016/j.jclepro.2022.134091

Sandberg, E., and Abrahamsson, M. (2010). The role of top management in supply chain management practices. *Int. J. Retail Distribution Manag.* 38, 57–69. doi:10.1108/09590551011016331

Sangari, M. S., and Razmi, J. (2015). Business intelligence competence, agile capabilities, and agile performance in the supply chain: An empirical study. *Int. J. Logist. Manag.* 26, 356–380. doi:10.1108/ijlm-01-2013-0012

Sarkar, B., Sarkar, M., Ganguly, B., and Cárdenas-Barrón, L. E. (2021). Combined effects of carbon emission and production quality improvement for fixed lifetime products in a sustainable supply chain management. *Int. J. Prod. Econ.* 231, 107867. doi:10.1016/j.ijpe.2020.107867

Sauer, P. C., and Seuring, S. (2018). A three-dimensional framework for multi-tier sustainable supply chain management. *Supply Chain Manag. An Int. J.* 23, 560–572. doi:10.1108/scm-06-2018-0233

Schmidt, C. A., Cromwell, E. A., Hill, E., Donkers, K. M., Schipp, M. F., Johnson, K. B., et al. (2022). The prevalence of onchocerciasis in africa and Yemen, 2000-2018: A geospatial analysis. *BMC Med.* 20 (1), 293. doi:10.1186/s12916-022-02486-y

Seuring, S., and Müller, M. (2008). Core issues in sustainable supply chain management–a Delphi study. *Bus. strategy Environ.* 17 (8), 455–466. doi:10.1002/bse.607

Soleimani, H., Govindan, K., Saghafi, H., and Jafari, H. (2017). Fuzzy multi-objective sustainable and green closed-loop supply chain network design. *Comput. industrial Eng.* 109, 191–203. doi:10.1016/j.cie.2017.04.038

Shrouf, H., Al-Qudah, S., Khawaldeh, K., Obeidat, A., and Rawashdeh, A. (2020). A study on relationship between human resources and strategic performance: The mediating role of productivity. *Management Science Letters* 10 (13), 3189–3196. doi:10.1016/j.cie.2017.04.038

State Bank of Pakistan (2022). SBP financing scheme for renewable energy. Available. https://www.sbp.org.pk/smefd/circulars/2019/C10-Annex-I.pdf.

Suryanto, T., Haseeb, M., and Hartani, N. H. (2018). The correlates of developing green supply chain management practices: Firms level analysis in Malaysia. *Int. J. Supply Chain Manag.* 7 (5), 316.

Tobescu, C., and Seuring, S. (2015). "Internal enablers for the implementation of sustainable supply chain risk management systems," in *Logistics management* (Cham: Springer), 17–26.

Trent, R. J., and Monczka, R. M. (1998). Purchasing and supply management: Trends and changes throughout the 1990s. *Int. J. Purch. Mater. Manag.* 34 (3), 2–11. doi:10.1111/j.1745-493x.1998.tb00296.x

Wang, D., Su, Z., and Ziapour, A. (2021). The role of social media in the advent of COVID-19 pandemic: Crisis management, mental health challenges and implications. *Risk Manag. Healthc. Policy* 14, 1917–1932. doi:10.2147/RMHP.S284313

Wei, S., Ke, W., Lado, A. A., Liu, H., and Wei, K. K. (2020). The effects of justice and top management beliefs and participation: An exploratory study in the context of digital supply chain management. *J. Bus. Ethics* 166 (1), 51–71. doi:10.1007/s10551-018-04100-9

Wong, W. P., and Wong, K. Y. (2008). A review on benchmarking of supply chain performance measures. *Benchmarking An Int. J.* 15, 25–51. doi:10.1108/14635770810854335

Yawar, S. A., and Seuring, S. (2017). Management of social issues in supply chains: A literature review exploring social issues, actions and performance outcomes. *J. Bus. Ethics* 141 (3), 621–643. doi:10.1007/s10551-015-2719-9

Yusuf, Y. Y., Sarhadi, M., and Gunasekaran, A. (1999). Agile manufacturing:. *Int. J. Prod. Econ.* 62 (1-2), 33–43. doi:10.1016/s0925-5273(98)00219-9

Zeng, H., Li, R. Y. M., Zeng, L., and Chen, H. (2022). Evaluating green supply chain performance based on ESG and financial indicators. *Front. Environ. Sci.* 1669. doi:10.3389/fenvs.2022.982828

Zhang, X., Husnain, M., Yang, H., Ullah, S., and Zhang, R. (2022). Corporate business strategy and tax avoidance culture: Moderating role of gender diversity in an emerging economy. *Front. Psychol.* 13, 827553. doi:10.3389/fpsyg.2022.827553

Zhou, M., Govindan, K., and Xie, X. (2020). How fairness perceptions, embeddedness, and knowledge sharing drive green innovation in sustainable supply chains: An equity theory and network perspective to achieve sustainable development goals. *J. Clean. Prod.* 260, 120950. doi:10.1016/j.jclepro.2020.120950

Zhou, Y., Draghici, A., Mubeen, R., Boatca, M. E., and Salam, M. A. (2022). Social media efficacy in crisis management: Effectiveness of non-pharmaceutical interventions to manage COVID-19 challenges. *Front. Psychiatry* 12 (1099), 626134. doi:10.3389/fpsyt.2021.626134