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The Influence of Green Supply Chain Management on Sustainable Performance

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Article History	ABSTRACT

This study examines the influence of green supply chain management on sustainable performance. The natural resource-based theory was tested on manufacturing firms in Karachi, Pakistan. A quantitative approach was adopted for this study, and a multi-item measurement scale was adapted from previous studies. A structured questionnaire was developed to collect primary data—the total number of 224 responses collected from textile manufacturing firms. Structural equation modeling was applied for hypothesis testing. The findings supported three hypotheses with positive and significant results, whereas two were rejected. This research study can be helpful for supply chain managers and decision-makers. It gives them guidance for enhancing sustainability performance. It provides a framework for manufacturing firms to enhance environmental sustainability to reduce global warming and nature destruction.

Keywords: *Green purchasing, Green Design, Green manufacturing, Green packaging, Green marketing, Sustainable performance*

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1. Introduction

Global warming is increasing rapidly and causes environmental as well as economic effects, and this increasing global warming shifts the world towards impending hazards (Tseng et al., 2019). These environmental hazards include environmental pollution, global warming and a reduction in organic diversity, which may also affect the environmental balance (Cankaya et al., 2019). In various industries, the concept of a green supply chain is considered a critical issue for achieving competitiveness and changing the landscape of competitiveness. For creating a value-added element in the product and firm process, a few demands, which include ecological and industrial sustainability & sustainable innovation, have increased the consideration of the concept of a green supply chain (Tseng et al., 2019; Hashmi et al., 2020b). Therefore, the concept of GSCM has been integrated as an innovative strategy of an organization that ultimately helps the firm to achieve competitive benefit in the market (Bititci et al., 2012; Yu et al., 2019). As a result of various research studies, organizations implement the concept of GSCM and expect positive results in the form of the firm's adequate financial and environmental performance (Khan & Qianli, 2017; Zhang & Yang, 2016). Consumers' knowledge and awareness about the environment have increased in the last few decades. Organizations are also facing enormous pressure to reduce the release of chemicals and dangerous gas emissions by implementing green practices in their whole supply chain system (Kumar et al., 2014). For the last 40 years, the supply chain of manufacturing firms has been damaging the atmospheric condition as it requires more strategic development to synchronize business processes. To effectively respond to the customers' demands, the firms need to join their business process with sustainable or green practices of SC (Çankaya & Sezen, 2019). Green practices involve purchasing, designing, manufacturing, packaging, and marketing products and services (Islam et al., 2017). Every green practice that the practitioners in firms implement has its capability and uniqueness with various implementation methods to enhance the firm performance level (Zaid et al., 2018).

As discussed above, living beings face many environmental issues, and these ecological matters have been significantly concentrated. Along with increasing these problems, organizations should adopt strategies and practices in their operations to resolve these social and environmental problems to protect nature. Moreover, despite the successful attractiveness and acceptance of green supply chain management in various industrial countries, it still does not exist in some countries due to a lack of awareness and positive influences on the environment and society (Green et al., 2012). The perceptive of sustainable supply chain management has gained considerable interest from supply chain practitioners and academicians. Different factors support its acceptance, such as social pressure on reputation and corporate image, environmental concerns related to pollution, governmental legislation, stakeholder request, heightened customer expectations and scarcity of natural assets (Jia et al., 2018; Pakdeechoho & Sukhotu, 2018). For the last few decades, organizations have been trying to find a method that helps firms deal with challenges (economic, environmental and social) associated with the supply chain (Carter et al., 2019). Ecological sustainability and pollution are worldwide concerns that influence the manufacturing industries of developed and developing countries. Generation of waste and use of natural resources are mainly attributed to manufacturing which contributes to dreadful ecological conditions (Islam et al., 2017). As mentioned in the above discussion, various manufacturing companies are contributing to harm and affecting the earth's life by creating wastes in the form of harmful material and pollution. Therefore, all these issues and challenges related to the environment make the organization take serious actions while running their businesses. It was also found that there is no more research related to resolving these issues through adopting a sustainable/green supply chain and enhancing environmental performance (Masoumi et al., 2019). The present study will incorporate this problem. To resolve this issue, it will provide a framework for having a relationship between sustainable supply chain practices and their impact on organizational environmental performance. The present research study will focus on this problem to give awareness and practices which organizations should adopt through developing a framework.

1.2 Research Objectives

The following specific objectives were derived to determine the effect of green supply chain management practices on sustainability performance,

- *To examine the influence of green purchasing on sustainability performance.*
- *To examine the influence of green packaging on sustainability performance.*
- *To examine the influence of green manufacturing on sustainability performance.*
- *To examine the influence of green design on sustainability performance.*
- *To examine the influence of green marketing on sustainability performance.*

1.3 Research Questions

Based on the research problem and research objectives, the following research questions will be considered in this study:

RQ1: To what extent does green purchasing influence sustainability performance?

RQ2: To what extent does green packaging influence sustainability performance?

RQ3: To what extent does green manufacturing influence sustainability performance?

RQ4: To what extent does the green design influence sustainability performance?

RQ5: To what extent does green marketing influence sustainability performance?

2.1 Literature Review

2.1.1 Green supply chain management practices

The concept of green supply chain management (GSCM) is a new and developing phase of supply chain management. GSCM has various practices, including external as well as internal green practices (Shaheen, 2022). Green practices include green procurement, green retailing (Alam, 2022), the orientation of the environment, sustainability (Muzammil, 2022), and reverse logistics (Asif, 2022;). Through studies, it was observed that green practices of supply chains have a positive influence on the performance of an organization. But on the other hand, it was also found that various green SC practices were studied and levels of performance have been explained in differentiated ways by the researchers (Uddin, 2022). Those practices that are eco-friendly and less harmful to the environment highly influence the performance that mainly depends on the type of GSCM because the reactive consequence has a positive influence.

In contrast, proactive strategies have no noticeable impact (Ayaz, 2022). The influence of green practices on a firm's performance is positively affected by the vendors. In contrast, the influence of low-cost strategies decreases the influence of green practices on performance (Anwar, 2022). The performance of an organization based on the implementation of green practices consist of operational, economic, organizational and ecological (Green et al., 2012). The launching of green practices has two primary dimensions that include ethical and the other economic & political. Economic and political constraints are considered external constraints, while the other ethical dimension mainly comes from responsibility, which is also considered an internal dimension (Amjad, 2022). The cause for encouraging the political dimension is that sustainable practices are practical economic and social activities (Hunaid et al., 2022). The firm's supply chain partners can also encourage the outline of green supply chain practices that mainly involve enhancing collaboration.

The scope and trend of green, healthy and sustainable products and the environment of firms are increasing daily, which plays an immense role in minimizing negative influences on the environment and other activities (Rasheed, 2022). The green practices of SC range from the practice of green purchasing that continues from suppliers to manufacturers and then their customers, which is mentioned as the term "Closing the Loop". According to the researcher, there are three-fold effects that include influence on the firm's ecological, financial and operational performance.

Internal practices of ecological operations management for enhancing the efficiency of the environment are planned to transform the input of any services into the end results through various steps, processes and flows of activities (Victory et al., 2022). Researchers believe that the level of adoption of green practices is somehow not trending at the economic, operational and ecological levels. To a research study, it is believed that manufacturers will be forced to apply green practices in their organizations if the laws, legislations and internal drivers are applied in the business environment. Green practices help organizations minimize handling costs and expensive efforts or inputs. Precise production is achieved through the utilization of new technologies and creative and innovative ideas and processes that directly enhance the quality of the product. Green supply chain practices fulfil the objectives based on ecological performance and improve the public image of organizations (Ali, 2022). For selling products, firms need unique techniques for selling their products and services. However, in most scenarios, the primary objective of all organizations is to protect the environment from the harmful effects of the firm's processes (Baloch & Rashid, 2022). A few green practices under consideration in this study include green manufacturing, green purchasing, green packaging, green design & green marketing. However, more studies come under the umbrella of green supply chain practices, including reverse logistics, green information systems, green procurement and green distribution of products.

2.1.2 Sustainable firm performance

In the management of every organization, the performance factor is significant. Every organization's performance involves financial and non-financial results based on the mutual results of different business applications, which include activities, processes, policies & resources (Rasheed, 2022). Firm performance is considered a problematic construct that contains various dimensions like ecological, social, and economic performance. On the other hand, to measure firm performance, items covering financial and market performances are used to measure the performance of an organization. The term financial performance considers the accountability of an organization towards its partners or shareholders with the determination of achieving profit enhancement. Return on investment (ROE), earning per share (EPS) & profits margin is usually used to determine the performance of an organization at its level of financials. Several researchers define market performance as the degree to which an organization achieve and maintains results related to the performance of the market. A rise in market and sales growth are the mainly used construct that helps determine and measure the market's performance. Few research studies considered the construct of profit margin and earning per share as the items required for measuring the firm's financial performance level. The existing literature of the study suggested that the adoption and implementation of green practices in a firm's supply chain help the organization create a competitive edge for the firm and ultimately enhance the access level of the firm to the new market that may advance the firm performance. Further, ongoing doubtful opinions about the impact of green supply chain practices in accomplishing financial and market performance require a further search on this subject. However, various studies observed that organizational performance at the social and environmental level seems to be secured and tied with the concept of green practices. In addition, it is easy to access the data related to a firm's finances and market performance (Rasheed et al., 2022).

2.2 Theoretical Background

2.2.1 Natural resource-based view theory

The theory of natural-resource-based view (NRBV) was first given by (Hart, 1995). According to this theory, an organization can achieve its superior performance through preserving natural resources

(i.e. decreasing environmental pollution), and the form can also gain a competitive advantage through association with natural ecology. Three strategic competencies are connected; these capabilities include pollution stoppage, product stewardship and the development of sustainability. The first 'pollution prevention' strategy stated that firms eliminate or diminish discharge, wastes and emissions by modifying their operations. The second strategy, 'product stewardship,' is connected with the previous strategy. However, in this stage, every step of the value chain, from raw material to finished product, each process should have environmental impacts such as proper wastage disposition. The third strategy stated that; the previous two aspects covered the prevention form pollution and selection of raw material, respectively. This strategy referred to resolving the negative influences on the natural ecosystem and economic activity in developing activity. This NRBV theory was based on the theory of resource-based view. The conceptual framework for NRBV is given in figure 1.

A Natural-Resource-Based View: Conceptual Framework

Strategic Capability	Environmental Driving Force	Key Resource	Competitive Advantage
Pollution Prevention	Minimize emissions, effluents, & waste	Continuous improvement	Lower costs
Product Stewardship	Minimize life-cycle cost of products	Stakeholder integration	Preempt competitors
Sustainable Development	Minimize environmental burden of firm growth and development	Shared vision	Future position

Figure 1: Natural-resource-based view: a conceptual framework
Source: Hart (1995)

According to the literature, various studies adopted this theory and provided various frameworks for environmental sustainability (Chin et al., 2015; Cankaya et al., 2019). Moreover, Wong et al. (2012) also adopted NRBV and referred to these environment-friendly strategies as green operations (GO) with suppliers with high and low environmental management capabilities. Through these green operations, an organization can attain business performance along with environmental sustainability/performance. The current study is also based on NRBV theory, Choi and Hwang (2015) considered GSCM practices as a strategic resource that can positively relate to organizational performance through applying these environmental strategies. On the other hand, the author also describes that these green operations are a challenging source of imitation by competitors because they are working on their knowledge and experience. For instance, a positive existence of any organization through GSCM is not a resource that competitors in the market can easily copy because these practices work based on experience.

2.3 Hypothesis Development

2.3.1 Green purchasing and sustainable performance

In recent research that mainly relates to sustainability, the topic of green SCM practices and their association or linkage is one of the most searched and popular topics in SCM studies and the field of knowledge management. A wide range of measures is found in studies that relate to firm performance. Those measures mainly include ecological and economic performance. Nearly all the previous studies on supply chain show a significant and positive association between green practices of supply chain and performance of the environment. However, only a few research studies openly highlight the linkage between the capability of green purchasing and ecological performance. For that, it is very essential to investigate the effect of green purchasing capability on its firm performance. Earlier research studies based on Green SCM practices have divided the management of the environment into two internal & external management of the environment. The external management of the environment mainly focuses on the greening of suppliers or their sustainability. On the other side, the concept of internal ecological management refers to the green innovation that can be achieved through product and process innovations (Hart, 1995; Hunaid, 2022). Consequently, ecological performance is evaluated on the basis of external and internal management of environmental

performance. Meanwhile, green purchasing capabilities are divided into two categories: operational and dynamic. Researchers predict that the capability of green purchasing has a differentiated influence on the environment's performance.

The concept of green purchasing arises as an awareness worldwide that provides awareness related to the increasing environmental issues. Through green purchasing, the organization's managers ensure attention towards the issues that mainly relate to the environment, social, ethical and economic. Therefore, it is believed that the process of green purchasing plays a considerable role and acts as an enabler of green SCM that help the organizations to decrease the ecological influence of chosen products and services. While the concept of green purchasing is new for many organizations, some leading firms implemented eco-friendly practices in their processes since they are aware of their social and ecological responsibility as a part of corporate social responsibility. The concept of green purchasing has enough potential to either damage the firm's reputation or also have enough capacity to help the organization achieve a competitive advantage.

H1: Green purchasing has a positive influence on sustainable performance.

2.3.2 Green packaging and sustainable performance

The concept of green packaging is recognized as the source of conveying duty or responsibility towards the maintainability of environmental activities of firms and green practices in the marketplace. Green packaging is considered as the encouragement and utilization of packaging through following the concept of green and sustainability that ultimately help the firm increase the level of manageability of products/items. Green packaging suggested that containers do not disturb the life of future generations and should not minimize the level of utilization of underground resources. The concept of green packaging enforces the needs and requirements of humans as far as salaries are concerned and provides good working conditions. The concept of green packaging includes three essential characteristics, first is to lessen the usage of packaging that takes many ties to decompose. The green packaging concept enhances the usage of packaging with low energy consumption & using eco-friendly packaging that ultimately enhances the sustainability of the environment and increases the performance level of a firm. The subject of green packaging often comes into consideration which helps firms establish commitment and ecological sustainability and also helps to increase the popularity of the brand. The practice of green packaging involves minimization of size, weight & shape of packaging of products and the utilization of eco-friendly material. It seems to be considered a firm's strategy for its item packaging to reduce its environmental influence (Rasheed, 2022; Sabeen, 2022).

H2: Green packaging has a positive influence on sustainable performance.

2.3.3 Green manufacturing and sustainable performance

The terminology of Green manufacturing has defined the organization which contains the products and its growing activities. It also enhances the effort to increase the effectiveness of resources. In comparison, the green manufacturing system incorporates manufacturing activities that use raw materials and have a low environmental influence. It combines the objective procedure of refining the efficiency of production with the procedure of production and also reduces unwanted pollution. On the other hand, many authors have discussed the activities of production and green manufacturing that saves uncommon resources and energy, decreasing waste by minimizing the pollution of the environment. It also minimizes the threat at any step in manufacturing an environment. (Chuang & Yang, 2014; Rehman et al., 2013; Zhou et al., 2013). Likewise, also as many authors, Qureshi et al. (2015) categorizes the definitions of green manufacturing as the quick enhancement of technology in the current period and also the knowledge of the green philosophy.

Accepting the green procedure can sort out or decrease pollution and global warming. The researcher Paul et al. (2014) discussed that in the manufacturing process, green operations work on clarifying related to the quality as well as the environment by getting the friendly output (i.e. carbon

release and waste disposal) of an environment and also by adding some input. Furthermore, the performance of an environment; the activities mentioned above also increase the performance financially. The researcher that is Bhattacharya et al. (2015) also focused on the primary objectives of applying green activities in the development of their supply chain to raise the performance of an environment, the use of use by the recycling process and also by-products, and minimization of carbon impression. One of the primary objectives of the supply chain is to increase the performance of logistics, supplying the products that have quality by saving money and time and attaining the quality and time that is expected—the policy-maker of an environment to restyle the manufacturing structure of an organization. Rather, repayment in the case of restyling the structure of manufacturing. Furthermore, it also confirms that the lean manufacturing system acts as a system of green production because lean manufacturing has an objective which is to minimize the excesses in all steps, so this skeletal system provides a standard for accepting green activities effectively. It also offers an outcome that has no adverse effect on the ecosystem (Nallusamy et al., 2015). Also, it was invented that the application of the structure of green manufacturing is a significant problem for the managers of an organization's production and the operational authorities and the ordinary workers for green manufacturing. These include the preservations of an environment, agreement of rules, a market trend, customer demand and the firm's image (Govindan et al., 2015). Likewise, in the research study done in Malaysia, the practice of green manufacturing has a beneficial effect on the performance of an environment, so the govt. Malaysia has created a green manufacturing policy for the automobile industry and other subdivisions (Sabeen, 2022). Furthermore, Cankaya and Sezen (2019) have taken green manufacturing as the green supply chain and found its effect that is suitable for the performance or sustainability of an environment. From the above discussion, the hypothesis is as follows:

H3: Green manufacturing has a positive influence on sustainable performance

2.3.4 Green design and sustainable performance

In the whole product lifecycle, a sustainable or green product is measured based on its influence on environmental conditions. Introducing sustainable and green product innovation with environment-friendly product design enhances organizations' manufacturing capabilities. The majority of organizations implement and apply the concept of green design in their systems. In that way, they differentiate themselves from their rivalries. The application of green design practices has the capability and potential to improve the product and processes of the firm. The green design protects the environment from harmful activities that can harm the environment and increase the firm's sustainability level. The product based on green design positively influences the firm's performance, where customers can pay for sustainable & ecological products that do not harm and save the environment. There is another concept called green marketing that can enhance sustainability in firm performance (Sabeen, 2022; Ayaz, 2022). Precious studies observed a direct association between green marketing & success of new products that, in turn, enhance a firm's market share.

H4: Green design has a positive influence on sustainable performance.

2.3.5 Green marketing and sustainable performance

The marketing theory explains the procedures or activities like promotional, placement, price and production. It is based on strategies that are not harmful to the environment and has a positive image of environmental performance through customer satisfaction enhancements. (Kordshouli et al., 2015). According to the researcher Çankaya and Sezen (2019), green marketing has taken as an aspect to enhance environmental performance. The researcher also explained that green marketing is optimistic about the stability of the environment. Dangelico and Vocalelli (2017) say that green marketing combines the 4 Ps, that is, the marketing strategies with the stability of the environment; the author also explains that the organization will exist entirely about the environmental stability by getting their strategy of marketing. For example, by getting the marketing strategies from the organization that the market segments will become a target to sell its products with the difference of the offering of a green

product then, the customer will pay, as they will get effectively to know from the green product. China is where this research has taken place, in which the marketing area is completely covered as green marketing. It stated the strategy of green consumerism and the strategy of green marketing in the heading of green marketing. Although, the legislation of china creates the policy for the sustainability of an environment by accepting and applying the strategy of green marketing in the supply chain as well as in the development of products (Gouvea et al., 2013). The performance of an environment plays a vital role in the economy and boosts the level of the market of an organization in a country, likewise China (Zhu & Sarkis, 2016). With the strategies of green marketing and the strategy of the green marketing mix, the aspects are the satisfaction of green customers, loyalty to the green brand, green trust as well as the image of the green brand.

All the viewpoint of marketing is relatable to the sustainability of an environment. While green marketing sufficiently plays the effectiveness of the eco resources. Research done by Choudhury et al. (2019) discussed the encouragement and enterprise of green marketing that the strategy of planned green marketing is used in electronic commerce, and it quickly boosts the performance of an organization by decreasing the cost of paper. Furthermore, the researcher also invents that by the absence of awareness of an environment, the countries that are rising have supposed that the reason will be the acceptance of green activities. Suppose the performance of an organization is decreasing. In that case, they do not invest in activities that are not harmful to the environment, and the attention is not to be given. Another researcher stated that the performance of an environment plays a role in green activities and the firm's financial performance as a moderator. It means that green activities have a link that is not harmful to the performance of an environment. While, the financial performance of an organization is enhanced by its performance (Rasheed, 2022; Rashid & Rasheed, 2022). However, discovering green activities is valuable for an organization and the environment. As per given above discussion through literature, the following hypothesis was developed:

H5: Green marketing has a positive influence on sustainable performance.

2.4 Conceptual Framework

The given below Figure 2 illustrates the proposed conceptual framework for this study. It has four independent variables; green purchasing (GP), green packaging (GP), green marketing (GMKT), green design (GD), and green manufacturing (GM). On the other hand, there is only one dependent variable: sustainable performance (SP).
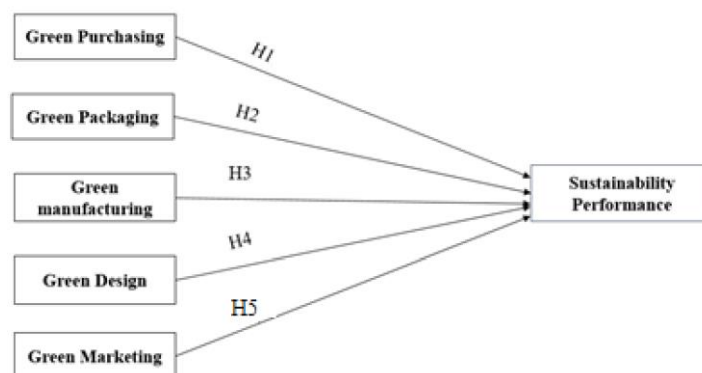

Figure 2: Research model

3. Research Methodology

3.1 Research Approach

The research approaches stated the method of research and nature of the research. These two critical approaches to research study; the qualitative approach and the other is quantitative approach (Alrazehi et al., 2021; Das et al., 2021; Hashmi & Mohd, 2020; Rashid et al., 2020; Rashid et al., 2021). If a researcher wants to explore a new concept or develop a new theory, then he/she adopts a qualitative approach. In a qualitative study, data is gathered by conducting interviews, and the responses are in descriptive form. On the other hand, if the objective of any study will be to explain or test existing theories, then the researcher will adopt a quantitative approach, whereas, in a qualitative approach, the data will be collected in numbers form that is further analyzed by applying statistical tests (Hashmi et al., 2020a). However, the objective of this study was to test the existing theories, so a quantitative approach was used for this study.

The procedure of data collection is stated as the source of data collection. There are two sources of data collection, one is primary sources, and the other is a secondary source of data collection (Saunders et al., 2009). As primary source emphasizes by its name that in this source, data has not been collected previously, while in the secondary source; the researcher collects data that was previously collected for some other objective, and the researcher uses that data for fulfilling his research objective (Rashid et al., 2021). Primary sources include surveys, observations, experiments and interviews, whereas secondary sources include books, annual reports, internet sources, research articles, journals and other secondary sources. In the current study, the data was collected by primary source because the data used in this study will be newly collected and collected by a survey questionnaire.

3.2 Target Population and Sampling

The population contains a whole pool of individuals that is related to research. However, the most related individuals are termed the target population, known as the subset of the population. In the case of this research study, the population are the employees related to the textile sector. In contrast, the target population are employees working/related to the supply chain department. According to Saunders et al. (2009), it is difficult to collect data from the whole population because of the availability of limited resources whole population is not reachable, so the author suggests that the observer should take some samples from targeted respondents.

Further, the author also stated the sampling procedures that consist of two sampling methods i.e. probability sampling and non-probability sampling. In probability sampling, the author has a fixed chance of selecting a participant for the sample. Further, this type is divided into four types: random, stratified, cluster, and systemic (Saunders et al., 2009; Rashid et al., 2021). On the other hand, in non-probability sampling, there are no pre-defined chances of selecting a participant for sample size; every individual can be a part of the sample (Rashid, 2016; Rashid & Amirah, 2017; Rashid et al., 2019). It is also divided into various types, i.e. convenience, judgment, and quota. In the present study, non-probability sampling was used for sampling. In contrast, the convenient sampling type was used because, in the current study, a structured questionnaire was distributed to a suitable participant who was requested to respond to that survey (Khan et al., 2022a).

As discussed above, the sample size is a subset of the target population, and the sample size should be reliable for accurate outcomes. This study calculated the sample size using G*power software (Faul et al., 2009). German professors and researchers developed this software for calculating reliable sample sizes. Its calculation is based on a statistical test and several predictors—the G*power software, which illustrates that the calculated sample size is 138 respondents (minimum). A structured questionnaire was developed by adapting items from existing studies on a five-point Likert scale (Hashmi et al., 2021).

4. Data Analysis

The statistical tests include standard deviation, skewness, kurtosis, reliability analysis, and structural equation modeling. These tests were applied for data examination. Data analysis was performed using IBM Statistical Package for Social Science (SPSS) version 22.0. The descriptive and inferential statistical analysis was carried out to test the study hypothesis. For analysis of the demographic variables, which include Gender (Male/Female), Age, and logistics experience. The total number of respondents was 200 from supermarkets across Pakistan, 135 (67.5%) male and 65 (32.5%) female. 60 (30%) respondents were between the age of 25 to 30 years, 85 (42.5%) respondents were between the age of 31 to 35 years, and 55 (27.5%) respondents were between the age of 36 to 40 years this indicates less number of supply-chain experienced professionals with 10+ years are present in the industry. Whereas 42.5% are young supply-chain professionals who are gaining experience from others' experience had been in the industry for around 6-10 years, and 30% are the entrants to this profession due to its growing demand are between 01-05 years of experience.

The descriptive statistics were accumulated to examine the univariate normality of data. It contains mean, standard deviation, skewness and kurtosis. The acceptable range of skewness and kurtosis is +2.5 (Black & Babin, 2019). The consolidated outcomes for descriptive statistics are presented in table 1. The calculated outcomes presented in given above table indicate that the construct green manufacturing (Mean= 3.51, S.D= 0.763) has the maximum skewness value (sk=0.794), whereas, the construct green marketing (GMKT) (Mean= 3.57, S.D= 0.617). Beside this, the maximum value of kurtosis (k=0.751) is for construct green manufacturing (Mean= 3.51, S.D= 0.763) while the least value of kurtosis (k=0.057) is for construct green design (Mean=3.53, S.D=0.754). Since these outcomes indicate that the skewness and kurtosis value for all constructs are not greater than +2.5, the univariate normality was established.

Table 1: Descriptive statistics

Construct	Mean	Std. Dev.	Skewness	Kurtosis
Green purchasing	3.31	0.728	-0.559	0.166
Green packaging	3.52	0.722	-0.427	0.354
Green marketing	3.57	0.617	-0.376	0.595
Green design	3.53	0.754	-0.637	0.057
Green Manufacturing	3.51	0.763	-0.794	0.751
Sustainable performance	3.50	0.741	-0.441	0.395

Source: SPSS output

4.1 Reliability Analysis

For the internal consistency of data, reliability analysis was ascertained. The acceptable reliability value is at least 0.70 or greater (Agha et al., 2021; Haque et al., 2021). Table 2 illustrates the summarized outcomes for reliability analysis, where the maximum reliability value (Cronbach Alpha = 0.851) is for construct green purchasing, while the minimum reliability value (Cronbach Alpha = 0.828) is for construct green packaging. Therefore, all reliability values are more significant than 0.70, so all adapted constructs are reliable for this study.

Table 2: Reliability analysis

Construct	α
Green purchasing	.851
Green packaging	.828
Green marketing	.842
Green Design	.830
Green Manufacturing	.842
Sustainable performance	.830

Source: SPSS output

4.2 Construct Validity

Construct validity is related to the test. The measurement scales are used to measure some concepts that cannot be evaluated through numbers or in quantity, i.e. if a researcher wants to measure emotional intelligence, then a measurement scale (construct) is required. But it should be necessary to examine that measurement's accuracy to get accurate results. (Hashmi et al., 2020c) stated that the construct validity can be analyzed through convergent and discriminant validity.

4.2.1 Convergent validity

Check the relationship of items that explain the construct as the convergent validity. The convergent validity has three acceptance standards: factor loading, composite reliability and AVEs. Factor loading value should not be below 0.40 (Hsieh & Hiang, 2004; Hashmi et al., 2021), values of composite reliability should not be less than 0.70 (Hashmi et al., 2021; Khan et al., 2022b); and the value of AVEs for each construct should be at least 0.50 (Fornell & Larcker, 1981; Khan et al., 2022c). The summarized outcomes for the three criteria mentioned above are presented in table 3. The summarized results illustrate that the highest factor loading value is (0.85) and the most negligible factor loading is (0.62), which means no factor loading is less than 0.40. Secondly, the minimum value of composite reliability is (0.773) which means all constructs are fulfilling the CR standard. Lastly, the AVEs for all constructs are also not less than 0.50, which indicates that all constructs are achieving the acceptable standard of AVE. Since the outcomes are fulfilling all three criteria, convergent validity was established.

Table 3: Convergent validity

Construct	Items	Factor loading	AVE	Composite reliability(CR)
Green purchasing	GP1	0.753	0.545	0.826
	GP2	0.752		
	GP3	0.810		
	GP5	0.625		
Green packaging	GPAC1	0.669	0.548	0.828
	GPAC2	0.789		
	GPAC3	0.773		
	GPAC4	0.724		
Green marketing	GMKT2	0.656	0.533	0.773
	GMKT3	0.741		
	GMKT5	0.788		
Green Design	GD1	0.764	0.608	0.861
	GD2	0.789		
	GD3	0.854		
	GD4	0.706		
Green Manufacturing	GM1	0.704	0.517	0.842
	GM2	0.753		
	GM3	0.711		
	GM4	0.652		
	GM5	0.768		
Sustainable performance	SP1	0.722	0.532	0.819
	SP3	0.705		
	SP4	0.723		
	SP5	0.766		

Source: SmartPLS out

4.2.2 Discriminant validity

In any research study, a questionnaire has one or more constructs, so the researcher needs to examine the discrimination among these constructs. In contrast, the discrimination states that for the validity of these constructs, the items of one construct should not be highly correlated with items of another. This type of validity is known as "Discriminant Validity". In this research study, divergent validity was checked by the method explained (Fornell & Larcker, 1981; Khan et al., 2021). According to this method, the square root of AVEs should be higher than the correlation among each construct

pair. The consolidated outcomes are presented in table 4. The diagonal values show the square root of AVE. The results shown in table 4 illustrate that the minimum diagonal value (square root of AVE) is (0.719). In contrast, the maximum correlation value is (r=0.595), which is not greater than the minimum diagonal value so that all diagonal values are more excellent correlation among each pair of variables. Therefore, al; the adapted construct discriminant is valid for this study and also measure distinct concept.

Table 4: Discriminant validity

Construct	T_GD	T_GM	T_GMKT	T_GPAC	T_GP	T_SP
Green Design	0.780					
Green Manufacturing	0.569	0.719				
Green marketing	0.481	0.385	0.730			
Green packaging	0.490	0.482	0.419	0.740		
Green purchasing	0.404	0.338	0.458	0.550	0.738	
Sustainable performance	0.527	0.595	0.444	0.519	0.481	0.729

Source: SmartPLS out

4.3 Testing Overall Model SEM

The proposed model has five independent variables: green purchasing, green packaging, green marketing, green design and manufacturing. At the same time, this model has one dependent variable: sustainable performance. The output of the estimated path model is presented in Figure 3.
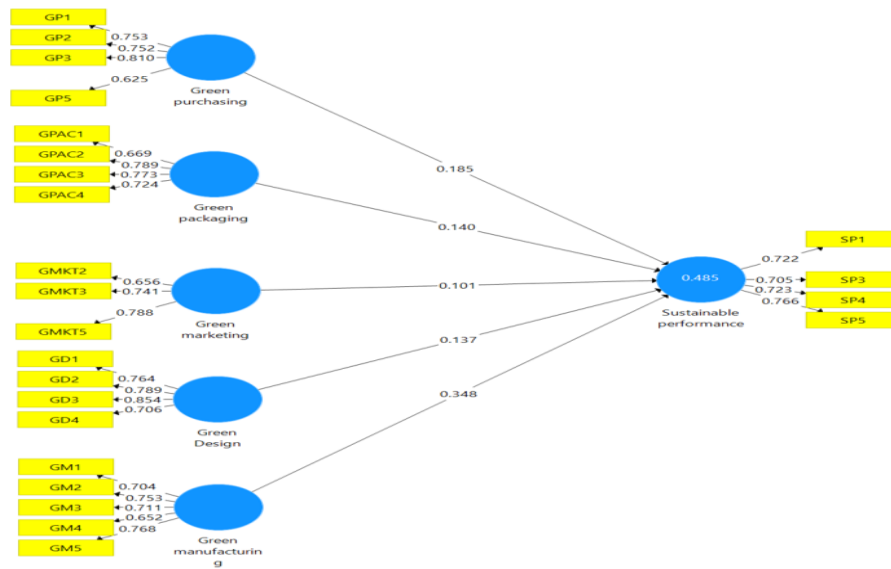

Figure 3: SEM path diagram

4.4 Assessment of Structural Model

The proposed, tested model has five independent variables: green purchasing, green packaging, green marketing, green design and green manufacturing. At the same time, this model has one dependent variable, which is sustainable performance. This model was tested using Smart PLS, and the outcomes and significance of the overall model are shown in table 5.

Table 5: Results of the significance of the structural model

Construct	Adjusted R-Square	T- statistics	P-value
Sustainable Performance	0.474	9.762	0.000

Source: SmartPLS out

Table 6 shows the value of the adjusted R-square, that is (0.474), and the *p-value* is 0.000, less than 0.05. These values indicate a significant relationship between dependent and independent variables. In comparison, the value of adjusted R-square illustrates that the predictors of green purchasing, green packaging, green marketing, green design and green manufacturing can predict a 47.4% variance in sustainable performance. According to the path model, factor loading for each item are at least 0.40 and greater (Hsieh & Hiang, 2004). Additionally, p-values for factor loading are less than 0.05, so all items are at statistically significant outcomes. PLS path analysis illustrates that green purchasing significantly and positively influences sustainable performance (β=0.185, *p-value* <0.05), so hypothesis one was retained. Green packaging and marketing results were found to have insignificant outcomes, so the second and third hypotheses were rejected. Results for green design indicate that green design has a positive and significant relationship with sustainable performance (β=0.137, *p-value* <0.05), so hypothesis four were retained. Lastly, results for green manufacturing were also significant, and it positively influenced sustainable performance (β=0.384, *p-value* <0.05). Thus, hypothesis five was also retained.

Table 6: Results of the structural model.

Path	Path coefficient	T statistics	P-value	Hypothesis	Support
Green purchasing -> Sustainable performance	0.185	2.395	0.017	H1	Yes
Green packaging -> Sustainable performance	0.14	1.892	0.059	H2	No
Green marketing -> Sustainable performance	0.101	1.578	0.115	H3	No
Green Design -> Sustainable performance	0.137	2.208	0.028	H4	Yes
Green manufacturing -> Sustainable performance	0.348	4.798	0.000	H5	Yes

Source: SmartPLS out

5. Discussion

All the proposed hypothesis was consistent with existing studies as three hypotheses were also retained while two hypotheses were rejected. The hypothesis that "green purchasing significantly and positively influences sustainability performance" was retained. The findings match with existing literature. For instance, researchers explained that through green purchasing, the organization's managers ensure attention towards the issues that mainly relate to the environment, social, ethical and economic. Therefore, it is believed that the process of green purchasing plays a considerable role and acts as an enabler of green SCM that help the organizations to decrease the ecological influence of chosen products and services. The hypothesis that "green design significantly and positively influences sustainability performance" was retained. For instance, the findings explained that introducing sustainable and green product innovation with an environment-friendly product design enhances organizations' manufacturing capabilities. The majority of organizations implement and apply the concept of green design in their systems. In that way, they differentiate themselves from their rivalries. The application of green design practices has the capability and potential to improve the product and processes of the firm. The hypothesis that "Green manufacturing significantly & positively influences sustainability performance" was retained. For instance, in the research study done in Malaysia, the practice of green manufacturing has a positive effect on the performance of an environment, so the govt. Malaysia has created a policy of green manufacturing in the automobile industry and other subdivisions. Furthermore, Cankaya and Sezen (2019) have taken green manufacturing as the green supply chain and found its effect suitable for environmental performance or sustainability.

5.1 Conclusion

The current research was conducted to study the impact of green SCM practices on sustainability performance. Mainly the research was conducted on the firms in the textile sector located in Karachi, Pakistan. The research is based on the existing theory, the natural resource-based view (NRBV) theory. In this research, sustainability performance was measured by the predictors that include (green purchasing, green packaging, green marketing, green design and green manufacturing. The quantitative method was applied to conduct this research study. Data was collected from the textile firms' supply chain department employees. A structured questionnaire was developed and circulated

among 250 employees, from which only 224 responses were achieved and considered for analysis. After collecting data from the respondent, data were analyzed using several statistical techniques, including descriptive statistics, reliability analysis, bivariate correlation, and construct validity. Overall variables and hypotheses were tested through SEM path analysis. After the data analysis, it was observed that three hypotheses (*H1, H4, H5*) are retained and are positively linked with sustainability performance. Nevertheless, on the other hand, it was found that two hypotheses (*H2 and H3*) were rejected. From all of the hypotheses, it was observed that green manufacturing and green purchasing significantly impact textile firms' sustainability performance as they have path coefficients of 0.348 and 0.185, respectively, which is higher than all the values of the hypothesis. Moreover, it is concluded that these results may vary from region to region as its concept is mainly based on the awareness level of society, orientations of organizations and preferences related to green environmental policies.

5.2 Limitations and Recommendations

This research was conducted based on only one Pakistan-based industry with relatively low sample size. A future research study can use a large sample size to cover more industries. Research has five independent and one dependent variable in its research framework. Future research should be considered by expanding the research framework by adding more related variables, for example, green inventory, customer cooperation, reverse logistics and information system. The primary aim of the research was to mainly focus on implementing green SC practices in firms in Karachi. Future research can be done in a better way by applying the same framework and concept to the business sectors of other countries.

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