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Editorial Note

I am pleased to introduce the "**South Asian Management Review**" (SAMR), a peer-reviewed journal under SAG Publishing. We have been started in the year 2022 and are growing continuously. We are pleased to announce that our current issue has been published on time. All published articles in this journal are included in the indexing and abstracting coverage of various scientific databases. The submissions to the journal are subject to the peer review process by two (minimum) external subject experts. The complete editorial processing of the manuscript is done through the SAG Publishing submission system (OJS) for greater transparency and faster article throughout. During this calendar year 2022, Editorial Board and Advisory Board comprises prominent expert Editors and Reviewers who joined *SAMR* and contributed their valuable services towards the journal's quality.

I would like to express my gratitude to all the authors, reviewers, the SAG publishing, Assistant Editors, and the Editorial Board of *SAMR*. With their support, we have released Vol. 1 and Issue 1 for the calendar year 2022. This is the first issue in Vol. 1, and we look forward to bringing out the next issue in December 2022.

Aamir Rashid *(Ph.D.)*
Editor
South Asian Management Review (SAMR)
(ISSN: 2958-2482)
Contact Email: editor@sagpb.com
Website: www.journal.sagpb.com

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Supply Chain Integration, Flexibility, and Operational Performance

Syed Qasim Uddin[1*]

[*1] *Research Scholar, Department of Business Administration, Iqra University, Karachi, Pakistan*

**Corresponding Author Email: syedqasimuddin@ymail.com*

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ABSTRACT

This study aims to establish the impact of supply chain integration and flexibility on operational performance. Moreover, the resource-based view theory was tested on pharmaceutical 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 structure questionnaire was developed to collect primary data. A total number of 236 responses was collected from Karachi-based manufacturing companies. Regression analysis was applied for hypothesis testing. The findings confirm that all the proposed hypotheses were retained, and all independent variables (internal information integration, external information integration, reactive supply chain flexibility, and proactive supply chain flexibility) have positive and significant results. However, these results vary from one dimension to another, but all the adopted dimensions positively affect operational performance. This research study can be helpful for supply chain managers and decision-makers. It gives them a guide for enhancing operational performance. It provides a framework for manufacturing firms to enhance their operational performance by enhancing quality.

Keywords: *Internal information integration, External information integration, Reactive supply chain flexibility, Proactive supply chain flexibility, Operational performance.*

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Supply Chain Integration, Flexibility, and Operational Performance

1. Introduction

Recently the markets all over the world have been unstable because of interrelations that exist between various countries and their economies. For that reason, one country's economy can affect another country's economy because of interrelationships. The trade practices followed nowadays are the most impactful in front of unexpected market conditions. Some conditions are mainly considered during international business affairs, including technological developments, business culture, business communication and political conditions (Zeibote et al., 2019). Moreover, the tough completion in the world of businesses pushes the firms to effectively coordinate their business processes and operations like supply, marketing and production across borders (Ristovska & Ristovska, 2014; Rosnerova & Hraskova, 2020). In that way, the firms need to know how to make strategies for the supply chain that ultimately helps firms to achieve competitiveness in the market. The concept of the supply chain is explained as the relationship between the value chains (Vandchali et al., 2021). The practitioners observed that the organization with enhanced SC capabilities could effectively play a role in helping the decision makers and provide dynamic solutions to the problems (Hong et al., 2018). Therefore, the firms must be flexible in their SC operations to quickly respond to their problems and issues (Moon et al., 2012).

Supply chain flexibility is the mixture of SCM theories and dimensions of flexibility (Delic & Eyers, 2020). In the area of the supply chain, the concept of flexibility is described as the firm's capability to boost the effectiveness of SC and increase performance levels (Rojo et al., 2018). Few past researchers found that organizations must have the SC flexibility to stay competitive in the market for effectively facing uncertain conditions that afterwards result in the financial and operational performance of the firm (Jermsittiparsert & Srisawat, 2019; Tigga et al., 2021). However, the main question is how to achieve adequate SC flexibility through outbound/inbound logistics, internal firm design / external establishment of relationships. Few research studies propose that internal and external integration are the primary source of flexibility in the supply chain. It was also found that integration in the supply chain can affect the flexibility performance of a firm (Ataseven & Nair, 2017).

1.1 Problem statement

In past research studies, the author Dubey et al. (2017), the association between Sustainable supply chain systems and advanced information technology has been shown through the collaboration of strategic suppliers. It is still unclear whether smart SCM and information system flexibility directly impacts each other. The irregular flow of information and data requires a flexible arrangement and a proper medium to transfer the information within the firm or between two organizations. In past research studies, the importance of the digital system in firms is described to gain a significant level of responsiveness in their processes (Gligor et al., 2020). It was also observed that agile SC structure in organizations is vital in facing uncertain and unexpected market conditions. Digital systems in firms provide the opportunity to transform foreign boundaries into smart cities. The researcher Chatterjee et al. (2018) display the significance of significant data sources utilized. These sources include the Internet of Things (IoT), which plays an immense role in building smart cities with intelligent machines, equipment and technologies. This kind of mixed results obtained from past studies opposes the high-level utilization of integration to reach flexibility of SC in business practices to some extent. Organizations and various businesses are trying to enhance their competencies to face uncertain ecological conditions by executing integration concepts in firm operations and information systems of their SC (Rojo et al., 2018). The food industry is an excellent example of a dynamic atmospheric condition in which customers have high expectations about food safety and sustainability of produced food products. Also, customers demand that the firms must have knowledge and information about the food production process and food delivery to the customers (Hong et al., 2018). Investigation and exploration of the relationship between SC integration, SC flexibility and performance level of an

organization are critical in a theoretical and practical context. In the current research, a new study on this topic will concentrate on information integration and simplify its part in activities and performance related to the element of flexibility in a firm. The research outcomes will further guide in producing impactful integration approaches for the managers in SCM. Current research explains the influence of information integration in the supply chain on both perspectives of flexibility, proactive and reactive, which was not thoroughly described in past studies. Therefore, firms are motivated to enhance their competencies in dealing with environmental variations by modifying various processes. This research also examines the influence of SC flexibility on the association between SC information integration and operational performance. Consequently, this research work can provide a deep knowledge to the firms about improving their operational performance through implementing SC flexibility.

1.2 Research objective

The main objective of this study is to delve into the relationship between organizational resources and capabilities and how the organization get advantages from the optimum synergy of resources and capabilities. In addition, there are some following specific research questions for this study:

RO1: To determine the effect of internal information integration on operational performance.
RO2: To determine the effect of external information integration on operational performance.
RO3: To determine the effect of reactive supply chain flexibility on operational performance.
RO4: To determine the effect of proactive supply chain flexibility on operational performance.

1.3 Research Questions

The following research questions are considered in this research study:

RQ1: Does Internal information integration has a significant effect on operational performance?
RQ2: Does external information integration has a significant effect on operational performance?
RQ3: Does reactive supply chain flexibility has a significant effect on operational performance?
RQ4: Does proactive supply chain flexibility has a significant effect on operational performance?

2. Literature Review

2.1 Supply Chain Integration

The concept of supply chain integration is defined as the extent to which an organization cooperates and coordinates with its supply chain members and mutually manages processes and functions that occur between two firms or within the firms in order to achieve an adequate level of integration (Shou et al., 2018; Alam, 2022; Asif, 2022). This concept of integration in a supply chain system arises and acts as an essential field of interest that involves the strategic arrangement of various supply chain processes and functions within an organization or between supply chain partners (Kumar et al., 2017). A firmly integrated SC system involves collaborations and interactions that exist between suppliers, customers, and organizations that highly depend on the exchange of quality information, joint actions and dependence between SC partners (Huang & Huang, 2019; Ivanov & Dolgui, 2020; Anwar, 2022; Amjad, 2022; Hunaid et al., 2022). The cross-functional border integration of various activities, functions and processes that includes suppliers and customers in SC is believed to be the main element for accomplishing competitive benefits in the business field (Cámara et al., 2015). Alternatively, to obtain the full potential results after implementing supply chain integration, it is essential to assimilate all the functions, processes, technologies and supply chain partners working in the supply chain network

(Alzoubi, 2018). An organization achieves the elements of integration through sharing of information and integration of its financials and physical elements (Rai et al., 2006).

As a single entity, the firms must apply the concept of integration within the firm also in between their partners & in the overall supply chain system (Ashby et al., 2012). However, it was observed by the practitioners that organizations are not entirely successful in obtaining effective results after implementing the integration concept in their supply chain (Mejza & Wisner, 2001; Zhu et al., 2017). Few research studies highlight that weak external integration occurs when firms face a low level of integration in their internal functions (Rasheed, 2022). Strong integration within the firm is the initial stage for a more comprehensive integration all over the supply chain network (Ali, 2022). A primary hurdle came into the researcher's observation that acts as an obstacle to achieving an adequate level of integration inflow of information and other materials throughout the supply chain which is the insufficiency of the internal management systems in those organizations that work as an individual entity. For that reason, to attain effective integration within the firm, the firm needs to ensure a high level of coordination between processes & functions, which is critical (Victory et al., 2022). Therefore, supply chain integration aims to avoid the boundaries of a firm between functions. Also, it is responsible for breakdown down the obstacles between two supply chain firms.

2.2 Supply Chain Information Integration

In this research study, the term supply chain integration is related to the concept of transformation of integration through the electronic medium. Many researchers highlight that an effective integrative system in the supply chain enhances an organization's operational performance (Lu et al., 2018; Munir et al., 2020). The literature of various studies shows that the association between integration n the supply chain and a firm's operational performance is not always the same as it depends on the arrangement of interlinked elements of the firm (Lu et al., 2018; Rashid & Rasheed, 2022). Supply chain information integration is the concept that plays an immense role for firms in lessening the chances of uncertainty in their processes and idle time in all phases of supply chain processes (Wong et al., 2015). The firm's functions, capabilities, and resources can enforce internal integration to reduce the risk of duplicate tasks and ensure the product's quality level and design (Huo et al., 2014). Information sharing occurs at all functions; for example, sharing information and knowledge occurs in planning, predicting and implementing or replenishing processes (Agyabeng-Mensah et al., 2019; Wong et al., 2015). Few research studies highlight the benefits of lessening the inventory levels, lead time and attaining competitive benefits between supply chain members (Ha et al., 2017). However, at the same time, other authors highlight the limitation of accumulated risk and cost spent on sharing information between supply chain members (Lu et al., 2018). Many research studies show that the efficiency of the supply chain system is highly affected by the implementation of integration among members of the supply chain and within the firms (Munir et al., 2020).

A theoretical study has displayed that supply chain integration is more effective in sharing accurate and quality information between partners than the association between the partners that do not share their quality information (Agyabeng-Mensah et al., 2019). An organization's ability to accept knowledge and information related to their customers and supplier’s production planning and predictions, for example, can increase their quality of planning and forecasting. Accurate planning and forecasting about their production lead to minimizing their inventory, lowering the cost of inventory, and reducing the transportation cost, ultimately improving the firm's operational performance. Consequently, enhancement in performance level and variations in supply chain operations happens due to the information integration (Ataseven & Nair, 2017). Operational performance is the construct that acts as an output construct for this particular research study. Through the literature of studies, supply chain information integration is considered the main element that enhances operational performance (Huo et al., 2016).

2.3 Supply Chain Flexibility

The term supply chain flexibility is considered a firm's competency that helps an organization to effectively respond to uncertain conditions and unforeseen variations in the demands and requirements of the customers. Supply chain flexibility also enables the firm to know competitors' moves in the dynamic atmosphere of the business field. Several scholars believe that flexibility is the crucial component that acts as an essential element to achieving proficiency, competency and sustainability in the firm (Chaudhuri et al., 2018; Delic & Eyers, 2020; Rojo et al., 2018). A scholar named Martinez-Sanchez and Lahoz-Leo (2018) mentioned five dimensions of SC agility: effectiveness, visibility, velocity and flexibility. The technology for business operations can be attained. However, the firms need to develop enough knowledge and information in their internal business environment to train their managers to extract quality data and information and utilize it for complex decision-making. Few researchers believe that organizations are still incapable of assessing and enriching technology users' skills, which are a significant obstacle to getting positive technology results at their optimum level. The competency of an information system of the firm increases the flexibility in a structure that, in response, enhance the SC adaptability to cater for the continuously changeable business environment (Christopher & Holweg, 2011). Most organizations show their capacity and ability to announce a business intelligence model in the electricity market to make their SC system more intelligent, efficient and agile (Božič & Dimovski, 2019). Variations in technology and variations in people's attitudes and behaviour act as crucial elements for generating the elements of flexibility in their operations (Daher & Anabousy, 2020). From a broader viewpoint, the concept of supply chain flexibility can be obtained by installing a system of information technology through a structure with flexibility that provides an opportunity to obtain the features of an intelligent SC system through properly implementing information theory.

2.4 Underpinning Theory

This study is based on the theoretical groundings of supply chain compatibility and supply chain process integration, so the base theory for this research study is a resource-based view (RBV). The organizational resource-based view recommends that organizations can achieve a competitive position in their market sector through the valuable, rare, and non-substitutable capabilities and resources that organizations own. By utilizing these resources, organizations can make and implement effective strategies in their firm, which are difficult for the firm's competitors to implement the same strategies in their firm. Valuable capabilities and resources enable the organization to compete with other firms effectively and efficiently (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984; Hashmi et al., 2020). By following the Resource-based view, an organization can be explained as a bundle of capabilities, competencies and resources, and this perspective can be proven to be an effective and impactful theoretical framework for knowing and understanding how competitive advantage and high level of financial performance are achieved (Corbett & Claridge, 2002). Usually, the element of capabilities mainly links to the abilities of an organization to utilize its assets and resources "to affect the desired end" and are equivalent to the intermediate goods that are produced or manufactured by the organization through various firm processes to deliver "improved resource productivity" (Amit & Schoemaker, 1993). In opposition to resources, capabilities are surrounded by the interactions of more than one source of knowledge and information. They are more specific to the organization and less exchangeable, which ultimately leads to the firm's competitive advantage. Organizational competencies and capabilities can be enormously categorized into those competencies utilized to perform basic functional processes and those used to guide the improvement of existing functional activities (Collis, 1994). Concerning utilizing resources, the Resource-based view holds a perspective that organizations have various levels of capabilities and resources. The survival of an organization depends on creating new and rare resources that build upon existing competencies or capabilities of the firm to make them more incomparable (Peteraf, 1993).

2.5 Hypothesis Development

2.5.1 Internal Information Integration & operational performance

In the concept of supply chain integration, supply chain information integration mainly consists of external and internal information integration (Ataseven & Nair, 2017). Internal integration is related to how organizations can develop their organizational practices, behaviours and methods into a cooperative, coordinated, and manageable processes to meet the demands and requirements of the firm's products and services (Ayoub et al., 2017; Tavana et al., 2019). Through the use of ERP medium internal information integration mainly includes information system integration (Tarigan et al., 2021). However, on the other hand, other technological platforms transfer and share exact and accurate searching of inventory and other information related to their operations across all the functions that occur within an organization (Oghazi et al., 2018).

Practical information and knowledge management are essential to improve the process management level (Nazifa & Ramachandran, 2019). Internal information management provides a capability to the employees to imagine and explore the opportunities for minimizing the level of variations in process management and time laps of the production process that ultimately result in the enhancement of firm performance (Huang & Huang, 2020). Internal information system allows organizations to integrate their several process-related activities and functions like production, distribution of material and product, and supplier management, so, in that way, they allow firm to enhance their level of improvement in their systems. For instance, the ERP system that is installed in various firms enables them to transfer the correct information at the right time within an organization that increases the process quality level of process management, which is required to deliver competencies and capabilities of the lean production (Aljawarneh & Al-Omari, 2018). Correspondingly, organizations are enabled to effectively run their functions by implementing, monitoring and controlling the process. That is needed to deliver the services and goods within an organization through efficient access to detailed information and knowledge that enables the firm to perform its cross-functional communication in an effective manner (Sutduean et al., 2019). Therefore, it is believed that internal management and process integration highly depends on the high quality of information sharing process based on on-time data, reliable & trustful knowledge and information.

An effective information system in the organization allows the firm to deliver the correct data on time and ensure the availability of information about its inventory in real-time (Mouhib et al., 2018). The effective ERP system and advanced computerized system of information in firms act as a capability that helps organizations build contact with their SC partners effectively; organizations successfully implement the concept of integration in their firms or in between SC firms (Murdihardjo et al., 2020). Management of information in internal functions of a firm provides a facilitator for organizations to save their real-time data and deliver it to the most relevant member of the supply chain. That is why effective management of external processes and internal integration of the firm may be required for completing the product distribution process, transport system and warehousing effectively (Amoako et al., 2020). Overall, the efficient information system allows the firm to ensure the constant flow of accurate information within the firm to transfer it to their SC partners, which play a massive role in the management and integration of external processes smoothly and on a timely basis (Kim, 2018). Therefore, we hypothesize as follows:

H1: Internal information integration has a significant effect on operational performance

2.5.2 External Information Integration & operational performance

According to the perspective of the resource-based view, the concept of external information integration is the degree to which relationships that are based on electronics are developed for sharing accurate information and for communication through the process that exists between two individual firms (Amoako et al., 2020; Yuen & Thai, 2017). The practice of external integration is mainly known in which firms develop their association with their supply chain partners to develop various strategies, methods, practices, and behaviours into joint and manageable processes (Siagian et al., 2020). The external integration of firms includes associations with customers and suppliers mainly based on strategies (Alshurideh et al., 2019; Gu et al., 2017). The concept of external information integration can

be distributed to two extents: customer information integration and supplier information integration (Gu et al., 2017).

Supplier information integration occurs when firms work and operate with their suppliers to exchange knowledge, data and information and build a cooperative and coordinated flow of information (Duhaylongsod & De Giovanni, 2018). A firm and its suppliers need a system that uses information by linking and integrating essential resources of an organization's resource planning system, warehouses of data and other applications of the firm into a mutual platform through the computer system. An organization can develop performance metrics according to the task performance and their final results and learn about complex environmental variations through the normalization of models based on data and query languages, mutual applications developments and direct contact with suppliers through the computer medium. That enables an organization and their suppliers to organize the process of production and delivery of the product and enhance the level of forecasting and planning (Zhang et al., 2018) that, ultimately allowing the firm to develop the actual performance of valuation throughout the supply chain system (Cai et al., 2010; Paulraj & Chen, 2007). The exchange of information to the suppliers mainly relates to the scheduling, forecasting, shipment notices and estimating sales to suppliers. This allows an organization to enhance its inventory management level and renewal planning (Lai et al., 2012). In response, it helps the firm minimize its cost of operations, risk of transactions, and cost of coordination and communication and increases productivity. Therefore, we propose that.

H2: External information integration has a significant effect on operational performance

2.5.3 Reactive Supply Chain Flexibility & Operational Performance

Supply chain flexibility is a crucial strategy applied to effectively deal with uncertain conditions in the supply chain system of a particular firm. Various research studies have discussed various strategies to increase flexibility capability (Singh et al., 2019). Rojo et al. (2018) stated that the capability of flexibility could be reactive or proactive. The reactive flexibility addresses the ecological uncertainty that occurs both external and internal, which is faced by the firm (Alikhani et al., 2021). The flexibility with proactive nature enables an organization to define the uncertainties.

Safety stock is the strategy and a common approach used in firms to enhance flexibility when firms face uncertain conditions related to supply and demand (Singh et al., 2020). With the safety stock approach, an organization can minimize the risk of inventory shortage (Darom et al., 2018). Safety stock also enhances the level of responsiveness in the firm (Gonçalves et al., 2020). Scholars argued that safety stock is a reactive strategy as this particular strategy only responds to the recent uncertain condition whiteout, trying to proactively minimize the uncertain condition (Aldrighetti et al., 2019; Panda & Ramteke, 2018). Another strategy discussed in various literature on flexibility is flexible capacity, mainly used to cope with uncertainty (Nasiri et al., 2021). However, it is also observed that in various conditions, it is a costly deal or sometimes it is difficult to energetically adjust the capacity level of the firm (Elluru et al., 2019). Therefore, to attain adequate flexibility, the organizations need to set the level of capacity higher than the average level of demand. In that way, they can avoid many scarcities during peak times. Moreover, supplier backup is also considered a reactive strategy as it is believed that a firm's single supplier can create a risky situation for the firm (Aldrighetti et al., 2019; Hosseini et al., 2019). That is why organizations mainly maintain more than one supplier that guarantees their presence, but they increase the cost level most of the time. Hiring multiple suppliers by the firm to enhance flexibility in supply chain operations has been widely discussed in the literature (Yoon et al., 2018). Therefore, we propose that;

H3: Reactive supply chain flexibility has a significant effect on operational performance

2.5.4 Proactive Supply Chain Flexibility & Operational Performance

The concept of proactive supply chain flexibility states that a firm's capability to endure and sustain its functions like internal disturbance and external disruptions. On the other side, y applying a

proactive strategy in the firm, organizations can persistent their functions and operations instead of disturbances and interruptions (Sharma et al., 2017), whereas the firm can easily adjust in significantly less time to deal with the uncertain and unexpected market condition through reactive strategies (Saenz et al., 2015; Töyli et al., 2013). In addition, due to the rapid increase in uncertain disruptions, the manufacturing organizations must have the capability and competency to make reactive & proactive strategies for dealing with the uncertain situation of the firm as well as environmental uncertainties (Kamalahmadi & Parast, 2016; Töyli et al., 2013).

The supply chain system of firms requires proactive capabilities to be flexible for handling interruptions in their system (Mackay et al., 2020). Proactive flexibility is a capability of the supply chain system to identify, anticipate and protect against the continually changing shape of risk before any negative result (Yu et al., 2018). Tenhiälä & Salvador (2014) highlight the requirement for a formal communication network to effectively manage disturbance and interruptions and improve the firm's flexibility level. Various theoretical types of research in the supply chain highlight several proactive capabilities like flexibility, robustness, adaptability, collaboration, integration, market strength, variety and efficiency to measure supply chain resilience (Sinthupundaja et al., 2019). Organizations are now applying various proactive strategies through which they successfully redesign their product & processes. Proactive strategies also include reducing the setup time as the long production period cannot create volume in their production and mix the flexibility level. Therefore, we propose that.

H4: Proactive supply chain flexibility has a significant effect on operational performance

2.6 Conceptual Framework

The proposed conceptual framework of this study is shown in Figure 1. The framework shows that internal information integration (III) and external information integration (EII), reactive supply chain flexibility (RSCF) and proactive supply chain flexibility (PSCF) act as independent variables and the operational performance (OP) act as the dependent variable.

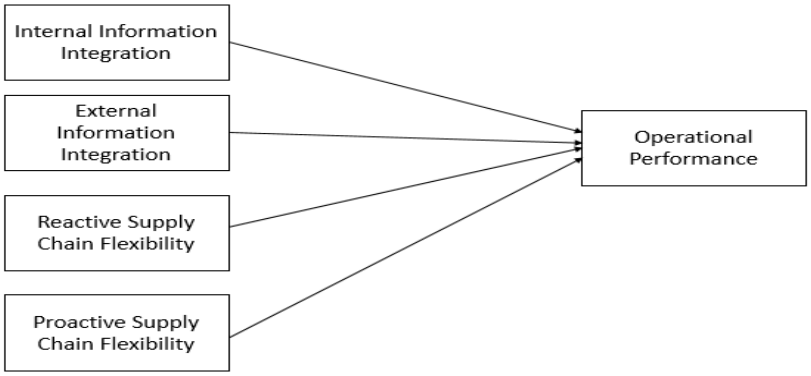

Figure 1: Conceptual framework

3. Research Methods

Globally, every research study exists in two main types of research approaches that are qualitative research approach and quantitative research approach (Creswell & Creswell, 2017). Besides this, the combination of these two approaches is termed the mixed approach, such that research is based on both types of data, descriptive and numbers (Rashid et al., 2021). The qualitative study aims to discover new concepts or develop a new theory. In contrast, a quantitative study examines the association among various developed concepts or theories. In the case of the current research study, the objective was to test the association between dependent and independent variables. In contrast, these variables were based on existing theories, so a quantitative approach was used for conducting this study (Hashmi et al., 2020).

3.1 Data Collection Source

Saunders et al. (2009) defined two significant sources of data collection; primary source and secondary source of data collection. In primary source data, the data is in real-time and is collected explicitly by the researcher for thorough research. Primary data include surveys, observations, experiments, focus groups, and interviews. On the other hand, secondary sources include books, newspapers, journals, annual reports, websites, and research articles. The current research study uses the primary source in its collection process because the data will be new and collected using a questionnaire (Hashmi & Mohd, 2020).

3.2 Population and Target population

The pool of people who can be part of research and participate in research is known as the population of the study (Hashmi et al., 2020a). In this study, the population will be the employees working in manufacturing firms because the main objective of this study is to enhance operational performance by adopting flexibility factors in supply chain factors. In addition, it is not necessary that the whole population can be highly related to fulfilling this objective. Hence, the author specifies that population by target population to target the employees specifically related to supply chain and working in manufacturing firms of various sectors. The sectors covered in this study were the cement, pharmaceutical, textile and printing & packaging sectors.

3.3 Sample and Sampling Procedure

After setting the target population, the next step is to collect data. However, it is not feasible and possible to cover the whole target population because a researcher has limited resources. So Saunders et al. (2009) recommend sampling a targeted pool of individuals to take a sample of a few respondents representing the whole population. There are two essential sampling techniques; probability sampling and non-probability sampling techniques. These two sampling methods are further divided into numerous types. In probability sampling, the researcher chooses participants for a response based on predefined procedures, i.e. random, systematic, stratified, and cluster sampling. Besides this, in non-probability sampling, the researcher has no predefined chances of sample selection, but everyone can participate in the study and respond. It is further divided into various types such that it is divided into types which include convenience sampling, quota, snowball and purposive sampling (Rashid et al., 2021). In the current study, the sample was selected based on non-probability sampling, and a convenient sampling approach was used.

3.4 Sample Size, Instrument, and Statistical Tools

The sample size stated that the subset of the target population represents the whole population. The sample size should be reliable for getting accuracy in results. However, in the present research study, the sample size was selected 236 respondents. As a sample, more than 200 respondents are adequate to generalize the research findings (Hashmi et al., 2020b). The instrumentation used to measure variables was developed by adapting construct from existing studies. A close-ended 5-point Likert scale questionnaire was developed using the study constructs (Rashid, 2016; Rashid et al., 2020). The next step (after data collection) was to manage the collected data through data management strategies. In the current study, the data were entered into an MS excel sheet and then transferred to the SPSS worksheet for coding and statistical inferences (Rashid & Amirah, 2017). Some preliminary tests were ascertained to eliminate the errors during the data collection (Rashid et al., 2019).

The objective of this study was to test the association between independent and dependent variables, so the appropriate statistical model for hypothesis testing is regression analysis (Tabachnick & Fidell, 2007). Moreover, there were some preliminary tests applied to examine the data. These tests include descriptive statistics, reliability analysis and bivariate correlation analysis. These tests were performed using IBM SPSS version 22.

4. Data Analysis

The 300 questionnaires were distributed in various manufacturing firms, and the supply chain department was explicitly focused on questionnaire responses. The responses reverted were 236, 78.6% of the total questionnaire. Table 1 shows the demographic attributes of the respondents: a far more significant proportion was single (154, 77%)than married (46, 23%); the majority were aged 25–30 years (151, 64%), followed by aged less than 25 years (48, 20.3%), then 36–40 (27, 11.4%), and above 40 (10, 4.2%); almost all were male (202, 85.6%), with very few females (34, 14.4%); their experience, in descending order of numbers, ranged from 121 (51.3%) with less than three years, 81 (34.3%) with 6–10 years, 17 (7.2%) with 7-10 years, and 17 (7.2%) over ten years of experience; and finally, 12 (5.1%) completed diploma, while 70 (29.7%), 85 (36%), 57 (24.2%), and 12 (5.1%) earned their intermediate or less, graduation, and master's degrees, respectively.

Table 1: Demographic profile

Demographic variable	Category	Frequency	Percentage
Gender	Male	202	85.6
	Female	34	14.4
Age	Less than 25 years	48	20.3
	25- 30 years	151	64.0
	36-40 years	27	11.4
	Above 40 years	10	4.2
Experience	less than three years	121	51.3
	3 to 6 years	81	34.3
	7 to 10 years	17	7.2
	above ten years	17	7.2
Education	Diploma	12	5.1
	Intermediate or less	70	29.7
	Graduation	85	36
	Masters	57	24.2
	M Phil/PhD	12	5.1

4.1 Descriptive Statistics

Descriptive statistics were performed to test the univariate normality of data. It contains mean, standard deviation, skewness and kurtosis. The acceptable value of skewness and kurtosis is $\pm$2.5 (Hair et al., 2009). The consolidated results are presented in table 2. The given results illustrate that the maximum skewness value (sk=0.770) is for construct Proactive supply chain flexibility (PSCF) (Mean= 3.50, S.D=0.64), while the minimum skewness value (sk= 0.271) is for construct External information integration (EII) (Mean= 3.53, S.D=0.63). Beside this, the maximum kurtosis value (k=1.335) is for construct proactive supply chain flexibility (PSCF) (Mean= 3.50, S.D=0.64), whereas, the minimum kurtosis value (k=0.014) is for construct reactive supply chain flexibility (RSCF) (Mean= 3.57, S.D=0.77). These findings illustrate that all the skewness and kurtosis values are not greater than +2.5, so all adapted constructs are achieving the acceptable requirement of univariate normality.

Table 2: Descriptive statistics

Construct	Mean	Std. Dev.	Skewness	Kurtosis
External information integration	3.53	.63	-.271	.333
Reactive supply chain flexibility	3.57	.77	-.664	-.014
Proactive supply chain flexibility	3.50	.64	-.770	1.335
Operational performance	2.88	.66	-.753	1.104

4.2 Reliability Analysis

Reliability analysis was tested to examine the data's internal consistency, which emphasizes the error related to data collection. The consolidated outcome for reliability analysis is presented in table 3. According to the results presented, the highest reliability value (α= 0.790) is for constructing External information integration (EII), and the minimum reliability (α = 0.751) is for constructing reactive supply chain flexibility (RSCF). These outcomes show that all constructs have at least (0.70) reliability value,

so all adapted constructs are reliable for this study, and there is no issue with internal consistency (Hashmi et al., 2021; Khan et al., 2022; Khan et al., 2022; Baloch & Rashid, 2022; Shaheen, 2022).

Table 3: Reliability analysis

Construct	Standardized Cronbach's Alpha s
External information integration	.790
Reactive supply chain flexibility	.751
Proactive supply chain flexibility	.779
Operational performance	.756

4.6 Correlation Analysis

The correlation analysis was ascertained to check the strength of the inter-construct relationship, and the acceptable value is from ±0.30 to ±0.90 (O'Brien & Scott, 2012). Summarized outcomes are shown in table 4. The consolidated results shown in table 4 indicate that the most vital relationship (r=0.562) is between operational performance (OP) and proactive supply chain flexibility (PSCF). Besides this, the weakest relationship (r=0.350) is between proactive supply chain flexibility (PSCF) and External information integration (EII), as these results are fulfilling the acceptable range of correlation values. Hence, all adapted constructs show the association with each other.

Table 4: Bivariate correlation

Construct	T_III	T_EII	T_RSCF	T_PSCF	T_OP
Internal information integration	1				
External information integration	.446**	1			
Reactive supply chain flexibility	.468**	.470**	1		
Proactive supply chain flexibility	.403**	.350**	.482**	1	
Operational performance	.466**	.388**	.562**	.549**	1

** correlation is significant at the 0.01 level (2-tailed).

4.7 Construct Validity

Construct refers to the measurement scale, but this scale is different from other scales such as ordinal, nominal, and ratio scales. They are usually known as latent factors, which explain the unobservable variables through different valid items. The convergent, discriminant and convergent were carried out to examine construct validity for this study (Agha et al., 2021; Haque et al., 2021; Khan et al., 2021; Khan et al., 2022).

4.7.1 Convergent validity

The convergent validity checks the relationship among all items in one construct. These all should measure different concepts (Hair et al., 2009). So to check the convergent validity, three criteria were applied: factor loading, composite reliability (CR) and average variance extracted (AVE). The factor loading should be at least (0.40) (Hashmi et al., 2021; Khan et al., 2022), CR should not be less than 0.70 (Fornell & Larcker, 1981), and the AVE not be less than 0.50 (Alrazehi et al., 2021; Das et al., 2021). The summarized outcomes for mentioned above three criteria are presented in table 5. The summarized results suggest that the factor loading for all items is not less than 0.40. The AVE for each construct is more significant than 0.50, and the CR for each construct is also not less than 0.70 (Hashmi et al., 2021). Thus all adapted construct has no issue in convergent validity.

Table 5: Convergent validity

Construct	Items	Factor loading	AVE	Composite reliability(CR)
Internal information integration	III2	0.745	0.593	0.814
	III3	0.767		
	III5	0.979		
External information integration	EII1	0.820	0.573	0.801
	EII2	0.740		
	EII3	0.707		
Reactive supply chain flexibility	RSCF1	0.676	0.553	0.86
	RSCF2	0.739		
	RSCF3	0.760		
	RSCF4	0.841		
	RSCF5	0.691		
Proactive supply chain flexibility	PSCF1	0.700	0.535	0.821
	PSCF2	0.762		
	PSCF3	0.758		
	PSCF4	0.705		
Operational performance	OP3	0.785	0.631	0.837
	OP4	0.822		
	OP6	0.775		

4.7.2 Discriminant validity

The discriminant validity has been ascertained to test the uniqueness of the measurement scales used in this study (Hulland, 1999). According to Fornell & Larcker's (1981) method, the square root AVE for each construct should be greater than the correlation among each pair of variables. Table 6 shows the summarized results for discriminant validity. The diagonal of the given above matrix shows the square root of AVEs. According to calculated results, the square root AVEs is greater than the correlation among each pair of constructs. Thus the discriminant validity stated was established.

Table 6 Discriminant validity

Construct	T_C	T_CO	T_IE		T_INT
External information integration	0.757				
Internal information integration	0.388	0.77			
Operational performance	0.350	0.480	0.794		
Proactive supply chain flexibility	0.293	0.417	0.50	0.732	
Reactive supply chain flexibility	0.360	0.489	0.529	0.507	0.744

4.8 Testing Overall Model SEM

The proposed, tested model has four independent variables, which are internal information integration (III) and external information integration (EII), reactive supply chain flexibility (RSCF) and proactive supply chain flexibility (PSCF). In contrast, there is one dependent variable: Operational performance (OP). The give below Figure 2 shows the SEM path model:

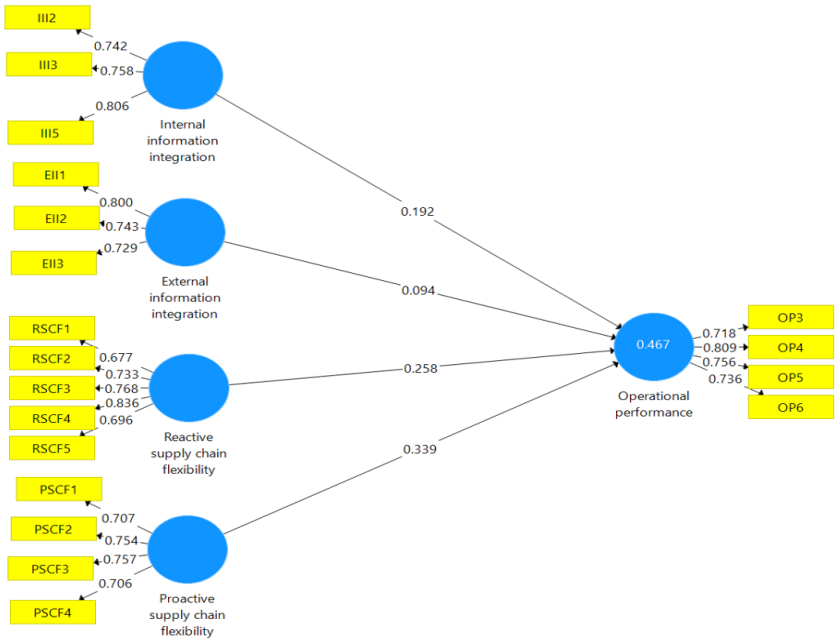

Figure 2: SEM path diagram

4.8 Assessment of Significance of the Structural Model

The model has independent variables: internal information integration, external information integration, reactive supply chain flexibility, and proactive supply chain flexibility. In comparison, there is one dependent variable: Operational performance (OP). The significance of the relationship among these variables was tested by applying to bootstrap using PLS. The results presented that internal information integration (III) and external information integration (EII), reactive supply chain flexibility (RSCF) and proactive supply chain flexibility (PSCF) have a significant effect on operational performance (OP). However, the value of the adjusted R-square was (0.389), which means all predictors can predict a 38.9% variance in operational performance.

According to the calculated path coefficient values in table 7, internal information integration significantly and positively influences operational performance (β=0.207, *p-value* <0.05), which supports the first hypothesis. External information integration positively and significantly influences operational performance (β=0.101, *p-value* <0.05, which supports hypothesis 2. Reactive supply chain flexibility also has a significant and positive relationship with operational performance (β=0.264, *p-value* <0.05) that supports hypothesis three. The path coefficient results for Proactive supply chain flexibility also show that Proactive supply chain flexibility has a positive and significant relationship with operational performance (β=0.251, *p-value* <0.05), which supports hypothesis four. Hence, *H1*, *H2*, *H3*, and *H4* are supported.

Table 7: Results of the structural model

	Path coefficient	T statistics	P-value	Hypothesis	Support (Yes/No)
III -> OP	0.207	2.761	0.006	H1	Yes
EII -> OP	0.101	1.982	0.048	H2	Yes
RSCF -> OP	0.264	4.117	0.000	H3	Yes
PSCF -> OP	0.251	4.075	0.000	H4	Yes

5. Discussion

All the proposed hypotheses were tested and were found consistent with previous research studies as all the proposed hypotheses were retained. The recent results and outcomes of the research study are further discussed as hypothesis one, "Internal information integration has a significant effect

on operational performance", was retained. Moreover, answer to research question one: Does Internal information integration positively affect operational performance? Was it match with existing literature? For instance, Internal information management provides a capability to the employees to imagine and explore the opportunities for minimizing the level of variations in process management and time laps of the production process that ultimately result in enhancement of firm performance (Huang & Huang, 2020). Internal information system allows organizations to integrate their several process-related activities and functions like production, distribution of material and product, and supplier management; in that way, they allow the firm to enhance their level of improvement in their systems.

Hypothesis two, "External information integration has a significant effect on operational performance, " was retained and answered to research question two: Does External information integration have a positive relationship with operational performance? Was it match with existing literature? For instance, external integration is mainly known in which firms develop their association with their supply chain partners to develop various strategies, methods, practices, and behaviours into joint and manageable processes (Siagian et al., 2020). The external integration of firms includes associations with customers and suppliers mainly based on strategies (Alshurideh et al., 2019; Gu et al., 2017). The concept of external information integration can be distributed to two extents: customer information integration and supplier information integration (Gu et al., 2017). Whereas hypothesis three, "reactive supply chain flexibility has a significant effect on operational performance, " was retained and answered to research question three: Does reactive supply chain flexibility have a positive relationship with operational performance? Was it match with existing literature? For instance, reactive flexibility addresses the ecological uncertainty that occurs both external and internal, which is faced by the firm (Alikhani et al., 2021). The flexibility with proactive nature enables an organization to define the uncertainties of the market again or to define an impact that customers have come to imagine from a particular industry.

Hypothesis four, "Proactive supply chain flexibility has a positive relationship with Operational Performance, " was retained and answered research question three: Does proactive supply chain flexibility have a significant effect on operational performance? Was it match with existing literature? For instance, the concept of proactive supply chain flexibility states that a firm's capability to endure and sustain its functions like internal disturbance and external disruptions. On the other side, y applying a proactive strategy in the firm, organizations can persistent their functions and operations instead of disturbances and interruptions (Sharma et al., 2017), whereas the firm can easily adjust in significantly less time to deal with the uncertain and unexpected market condition through reactive strategies (Saenz et al., 2015; Töyli et al., 2013). In addition, due to the rapid increase in uncertain disruptions, the manufacturing organizations must have the capability and competency to make reactive & proactive strategies for dealing with the uncertain situation of the firm as well as environmental uncertainties (Kamalahmadi & Parast, 2016; Töyli et al., 2013).

5.1 Implications

This particular research work highly participates in the literature on supply chain management in the following way: practitioners can easily understand the concepts and adopt them in their firm according to the requirement as organizations need to enhance and improve their competencies and capabilities to survive successfully in the vibrant working environment. Which highly requires the adjustment reactively and proactively in the firm processes (e.g. development & manufacturing of products, purchasing of materials and product distribution. The firm needs to enhance internal and external information integration to perform all processes well. The ERP system that is considered the technique of internal information integration can also play its role in making solid and flexible capabilities as its long-term influence still depends on whether the employees effectively coordinate with each other or only spend money on buying expensive hardware. In that way, the firms need to develop an information integration with external partners through the adoption traceability system to effectively integrate with their network members, further enhancing the organization's operational performance. Organizations with high uncertainties should develop the element of supply chain

flexibility in their firm. The managers and practitioners should also focus on the continuous changes in the external environment and improve their capabilities to proactively and reactively regulate their supply chain-related activities.

5.2 Limitations, Recommendations, Conclusion

This particular research mainly focused on the manufacturing firms of Karachi, Pakistan. So to enhance this study, it is recommended to perform this research on another geographical region to test the validity of this research model. The variable of information integration is multi-dimensional as it also influences variably. In future studies, various other dimensions of information integration can be considered. The difference between supplier and customer information integration and their influence on operational performance can be discussed in detail. To enhance the strength and scope of this research, the future needs to increase the sample size in that manner; researchers can attain much reliable and accurate study results. To explore the mediating effect of this model, it is recommended for the future to add a mediating variable such as environmental uncertainty through which the influence of information integration can be tested on operational performance.

This particular research study was established to investigate the relationship between organizational resources and capabilities and how the organization benefits from the optimum synergy of resources and capabilities. This research was mainly based on the existing theories, such as the Resource-based view theory. The research model of this research was mainly applied to all of the manufacturing firms that are located in Karachi, Pakistan. A structured questionnaire was developed to collect the data through questionnaires from all of the employees that belong to the SC departments of the firm. Three hundred questionnaires were circulated among employees, but only 236 results of questionnaires were considered for analyses and obtaining results. The results are obtained through the SEM model & found that all of the proposed hypotheses are retained and have a significant and positive relationship with operational performance. It was confirmed that from all of the variables, reactive supply chain flexibility significantly impacts operational performance. This study mainly highlights the difference that exists between the aspects of internal and external SC information integration. The integration of information internally or externally that inconsistently influence the firm's operational performance. For example, the effect of external information integration is considerably weaker than the other type of information integration on the firm's operational performance. Therefore, through this study, policymakers and practitioners can understand the influence of firm capabilities and resources on operational performance. In that way, they can easily manage their issues and achieve competitive performance.

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Relationship between Green Supply Chain Management, Supply Chain Quality Integration, and Environmental Performance

Javeria Ayaz[1*]

[*1]*Research Scholar, Department of Business Administration, Iqra University, Karachi, Pakistan*

**Corresponding Author: Email: javeria.11571@iqra.edu.pk*

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ABSTRACT

This study aims to investigate the relationship between green supply chain management and supply chain quality integration on environmental performance. A quantitative approach was adopted for this study; a multi-item measurement scale was adapted from previous studies to collect primary data—the total number of 212 responses from supply chain professionals were collected. Descriptive analysis along with the correlation examination was utilized to test the hypothesis. It was observed that all the hypotheses (H^1, H^2, H^3, and H^4) were supported. Customer green purchasing, green customer cooperation, supplier quality integration, and customer quality integration were found significantly related to the environmental performance. So the study concluded that implementing green supply chain management practices in the firm is beneficial and it enhances the firm's environmental performance. This detailed research analysis will play an active role for the supply chain executives in taking effective decisions that will ultimately enhance environmental performance. This research study will facilitate the managers and all decision makers by providing directions and guidance for improving the level of performance of the environment.

Keywords: *Supplier quality integration, Customer quality integration, Green purchasing, Customer green cooperation, Sustainability*

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Relationship between Green Supply Chain Management, Supply Chain Quality Integration, and Environmental Performance

1. Introduction

Awareness related to environmental stability is now increasing day by day in the societies of the whole world. To ensure the protection of the environment, the government of various countries has developed different approaches like the development of strict ecological regulations, supporting cleaner production and endorsing ISO 14001 (Tran et al., 2020; Uddin, 2022). Nowadays, in manufacturing industries, it is essential to highlight ecological protection and sustainable production, which act as a priority in manufacturing firms. It was observed that the internal operation of manufacturing firms causes many environmental issues. These issues are also related to upstream and downstream supply chain operations (Saeed et al., 2018; Wu, 2013; Asif, 2022). The ecological programs and proactive initiatives need collaboration in the supply chain. An element of awareness related to the capabilities of the environment and its protection is also essential among supply chain members (Li et al., 2016). To create a sustainable and green image of the environment, the firms need to reduce the pollution from the atmosphere by enthusiastically collaborating with their vendors & customers to effectively implement the concept of green SCM. GSCM mainly supports integrating ecological thinking into SCM (Zaid et al., 2018). It also includes selection and sourcing of material, product design, manufacturing process, delivery of the final product to the end customers and the product end-of-life management after the product's useful life (Singh et al., 2018). Two leading green practices include in green supply chain management; those practices involve green cooperation from customers and green purchasing (Jabbour et al., 2014; Teixeira et al., 2019)

The ecological problems have been considered as the natural addition of quality problems. The low quality of products and firm processes can result in adverse environmental outcomes (Wu, 2013; Alam, 2022). Moreover, there are so many problems and issues that occur in SC operations. Through the combination of supply chain integration and quality management concept, another term is achieved called supply chain quality integration (SCQI). Through this, organizations can improve and enhance the quality level of their product and firm processes (Yu & Huo, 2018; Zhang et al., 2022; Baloch & Rashid, 2022). SCQI can be explained as the extent to which internal functions of firm and external SC members strategically and operationally cooperate to mutually manage quality-related linkages (Huo et al., 2013; Yu & Huo, 2018). The quality integration of suppliers and customers are the two leading practices to develop organizational strategies and practices into a cooperative process that relates to quality to meet the requirements and expectations of customers (Zhang et al., 2019). The quality management system in organizations has been considered a critical tool in reducing the level of pollution in the environment. It can also provide an opportunity for organizations to adopt the concept of GSCM in their firm and positively link it with effective environmental performance (Tran et al., 2020). Though the mechanism through which the impact of SC quality integration on the environment's performance is not defined, few researchers have associated SCQI with environmental performance and Green supply chain management.

Due to the highly competitive market and to achieve a competitive advantage, quality has become a vital tool for any company's operations (Hien et al., 2019; Kura et al., 2020). Nevertheless, market competition's attention is no longer limited to inter-organizational supply chain practices. Quality management practices have become a focal point for companies and can efficiently affect the inter-organizational functions and external supply chain partners (Ha et al., 2016). By inducting a green supply chain, the organizations are willing to enhance environmental performance (Çankaya & Sezen, 2019). Thus, quality has become an important and focal point for supply chain management to achieve a competitive advantage. So the problem statement of this study is to integrate supply chain integration and quality management. The present study will incorporate this problem statement and test the relationship between supply chain quality integration and environmental performance by adopting

green supply chain practices mediating between quality integration and environmental performance. Therefore, there are a few following particular research questions as given below:

RQ1: What is the relationship between green purchasing and environmental performance?

RQ2: What is the relationship between customer green cooperation and environmental performance?

RQ3: What is the relationship between supplier quality integration and environmental performance?

RQ4: What is the relationship between customer quality integration and environmental performance?

2. Literature Review

2.1 Theory of Supply Chain Quality Integration

Supply chain quality integration (SCQI) comes from connecting the management of quality with the integration of SC, the concept of SCQI can be explained as the extent to which a firm's internal role/functions and external partners of the supply chain (SC) collaborate operationally and tactically (Huo et al., 2013). The definition of integration in SC highlights customer-value orientation and presents the potential to join quality management with supply chain integration (Foster & Ogden, 2008; Khan & Wisner, 2019). Literature based on supply chain integration has found the connection or relationship between quality management (QM) and integration of SC but the results or outcomes have been mixed. A researcher found that the intensity of integration in SC significantly influenced the delivery quality and reliability of products (Rosenzweig et al., 2003). However, in another study, it is recognized that supplier, customer, and internal integration significantly affect the quality performance of the firm (Wong et al., 2011). Another researcher believed that supplier integration significantly influences quality performance but on the other hand customer integration did not show any effect (Devaraj et al., 2007).

The concept of SCQI includes three dimensions; customer quality integration, supplier and internal quality integration used in the context of the internal supply chain and external (Sila et al., 2006; Yu & Huo, 2018). Research believed that collaboration or development of a relationship with supply chain partners for managing the firm's quality standards ultimately improves results related to the firm's performance (Huo et al., 2013; Lin et al., 2005; Sila et al., al., 2006; Yeung, 2008). Moreover, many studies reveal that integration with suppliers and customers may contribute to affecting outcomes about the performance of the organization's SC in different ways (Zhao et al., 2013). Many academics related to the management of quality fail to recognize the unique influence of internal, customer, and supplier quality integration on the competitive performance of organizations (Flynn et al., 2010). Moreover, minimal studies explain how to develop an integrated system infirm to advance the quality performance of the SC firm (Zhang et al., 2019).

2.2 Conceptual Framework

The given below Figure 1 illustrate the proposed conceptual framework for this research study. It contains two independent variables, which include supplier quality integration (SQI), customer quality integration (CQI), green purchasing (GP) and customer green Cooperation (CGC). On the other hand, it has one dependent variable: environmental performance (EP).

2.2.1 Supply Chain Quality Integration (SCQI)

The term SC quality integration is explained as the extent to which internal functions of a firm and external SC members collaborate in both contexts, strategically and operationally. This concept allows organizations to effectively all kinds of associations, procedures & communications related to

the quality between two firms or within the organization to achieve desired goals related to quality in a low-cost frame (Huo et al., 2014). SCQI is also categorized into two sections external quality integration and internal quality integration (Huo et al., 2014; Huo et al., 2016; Yu et al., 2017; Yu & Huo, 2018; Zhang et al., 2019). Internal quality integration mainly focuses on joining the quality-related processes of a firm's internal supply chain functions. Internal quality integration also supports forming its practices, functions and strategies into cooperative and coordinated processes to meet the customers' requirements in the context of quality. On the other hand, external quality integration is elaborated as the extent to which a firm incorporates with their supply chain members the development of inter-organizational strategies, procedures and practices into the cooperative process to fulfil the quality-related demands of the customers (Huo et al., 2014). External integration is also considered as the extension and expansion of internal quality integration to the downstream customers and upstream suppliers with the involvement of customer and suppliers quality integration that also essential and is considered as the main quality-related capabilities for synchronizing complex SC members (suppliers & customers) (Huo et al., 2014; Yu & Huo, 2019; Shaheen, 2022).

2.2.2 Customer quality integration (CQI)

CQI is the concept that also plays a vital role in creating sustainable competitive benefits for the firm. Developing and maintaining intense contact with the customers not only allow firms to get effective feedback about the quality of the products but also act as an encouraging factor for sharing quality information about demand and mutually solving issues related to the quality of product among two parties, in that manner the helping firms provide products with high quality and also provide reliable, trusted and fast delivery services by maintaining flexible production at a minimum level of cost. The information collected from customers in the form of product feedback provides much help to the firms for further improvement in the quality standards of their products. Customers' contribution also helps firms form a new product by providing the correct information about the requirements of the product. It also helps firms to involve in customer-driven product development, in that way firms effectively enhance the rate of product success and minimize the risk of innovation. According to an empirical study, customer focus positively influences the operational performance of an organization (Xu et al., 2020). Another researcher indicated that SCQM plays an immense role in the enhancement of the quality level of the final product (Soares et al., 2017). From past research, it was also observed that customer quality integration significantly improves the product delivery unction and minimizes the cost of product in the context of quality (Huo et al., 2014; Anwar, 2022).

2.2.3 Supplier quality integration (SQI)

The concept of SQI is identical concept of CQI. SQI is a robust dynamic competency that helps firms to create sustainable competitive benefits (Yu & Huo, 2019). For organizations, the sharing of quality information, and coordination of processes with suppliers act as a beneficial activity that can enhance the effectiveness of quality management. In that way, organizations promote their process of production and performance related to quality (Huo et al., 2016). The contribution of manufacturers in the enhancement of quality standards provides excellent support to the suppliers to meet requirements related to the quality, which ultimately enables suppliers or vendors to provide suitable material and mechanisms. In this manner, helping and coordinating manufacturers or firms increase the quality of services and their products (Yu & Huo, 2017). On the other hand, in developing a new product, the involvement of suppliers enables the organizations to generate products quickly by minimizing the product manufacturing cost (Yu et al., 2017). Vendors' authorization helps the supplier strengthen and understand the quality requirements and provisions to ensure that the raw material and other elements fulfil the requirements. Authorization also stops suppliers' opportunistic attitude in dealings to successfully minimize the supply risks. In that way, manufacturers ensure the excellent quality standards of products and lessen the chances of a product recall. In various past research studies, the association between supplier quality integration and a firm's operational performance has been observed in various contexts. For instance, it was observed by the authors' definitions that a vast network of firm supply chains could increase their capacity to meet the expectations of their end customers. Past studies found that supplier quality control highly supports the supplier in forming new products in that manner. They

contribute to improving product quality (Ali, 2022). Another study clarifies by their study that suppliers' quality management positively and significantly affects the operational performance of a firm (Soares et al., 2017; Victory et al., 2022). Mardani et al. (2020) specified in their research work that practices of quality management, like the selection of suppliers and their participation, particularly in designing products, improvement seminars and programs, directly enhance the firm's operational performance.

2.2.4 Green supply chain management (GSCM)

The concept of green SCM is considered an encouraging concept that mainly focuses on the firm's environment while managing other supply chain functions. To a large extent, green SCM highly put efforts to gain effective results related to the atmosphere by adopting the method of the life cycle from selection of material, design of product, production and end sales of product and its recovery. Mainly the term green SCM is explained as the integration of environmental concepts into the field of SCM by including product design, sourcing of raw material, manufacturing process, delivery of the final product to the end customers and end of product life cycle after its useful life (Tseng et al., 2019). In addition, green SCM practices are considered as the bundle of activities that are joined with ecological problems into SCM to ensure atmospheric compliance s and enhance the capabilities and effectiveness of the supply chain environment (Lee, 2015). The results of the implementation of green SCM must be displayed in various contexts, including ecological, economic and social perspectives, to ensure sustainable development and performance (Alayón et al., 2017; Amjad, 2022)

2.2.5 Green purchasing (GP)

The term green purchasing is explained as it is the eco-friendly purchasing practice that minimizes the cause of wastage and enhances the process of recycling material and recovery of purchased material without badly affecting the material performance requirements. The practice of GSCM integrates the concept and thinking of atmosphere with the supply chain system, including purchasing of material, product design, selection of suitable material, product manufacturing process, delivery of the final product to the end consumers and end of the product life management after useful product life (Çankaya & Sezen, 2019; Tseng et al., 2019). The material purchasing process is one of the essential processes that comes at the very first stage of manufacturing activities by the firms where purchasing of materials highlights impactful ecological management that is required for implementing green purchasing behaviour in firms (Foo et al., 2019; Rasheed, 2022). Like many other researchers, Hsu et al. (2014) explain that the concept of green purchasing is considered the most responsible way of the material purchasing process that occurs through following both social and ecological concerns. On the other hand, it participates in activities that minimize and recycle the material that precise the ecological preferences through the supply chain system.

2.2.6 Environmental performance (EP)

The level of awareness about environmental performance is increasing daily, and measures and different policies have been formed to improve the environmental condition at various stages. Many government and non-government organizations & international NGOs and also the United Nations putting efforts to make eco-friendly policies. The implementation of ecological strategies is increasing daily to lessen the ecological disruptions and enhance the factors of a healthy environment. The strategies implemented in firms to maintain the better condition of the environment include minimization of CO^2 gas, the release of a chemical, minimizing the level of energy consumption, recycling of products and keeping control on pollution, reducing the wastage and purification of water. The association between ecological performance and an organization's firm performance has been studied (Fujii et al., 2013; Hunaid et al., 2022). Figure 1 illustrates the research model.

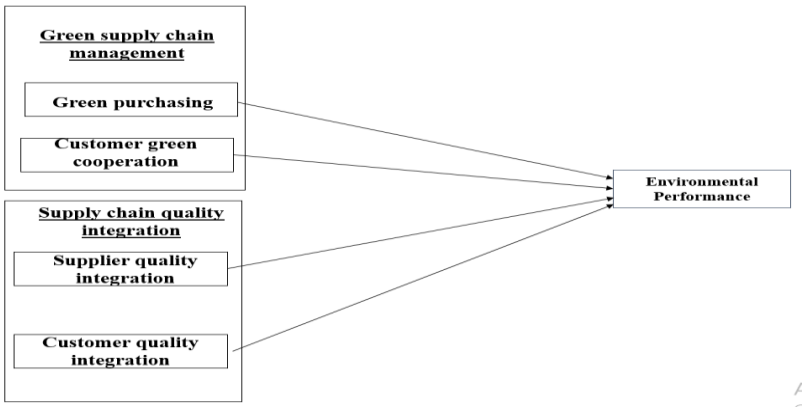

Figure 1: Conceptual framework

2.3 Hypothesis Development

2.3.1 Green purchasing and environmental performance

The purchasing process is considered one of the primary strategic business processes many manufacturers and organizations use to perform a bundle of activities 5 6. The purchasing process plays an immense role in selecting the right product in the form of raw material, core components and other supplies that are used to form a complete desired product (Jabbour et al., 2017). In that way, suitable suppliers are also an essential part of the business that mainly help provide the suitable material to the industrialists. Quality suppliers also improve the purchasing process of the firm by reducing the risk and enhancing the overall value to the buyer firm (Zhang et al., 2018).

Purchasing process highly contributes to a significant ecological threat in the form of rejected packaging material. However, with time, awareness about ecological issues has been increasing worldwide; therefore, many organizations are focusing on greening their purchasing system. Purchasing initiatives that are according to the environmental concerns include procurement of particular products and services that strongly meet objectives related to the atmosphere (Seman et al., 2019). The concept of green purchasing help organizations reduce the adverse effects on the environment in the firm's manufacturing process and prevent transportation by using durable and reusable material. The organizations that are applying environmental strategies in their purchasing process get benefits in the form of saving costs, a good image of their service in public and minimizing the level of liability (Abdel-Baset et al., 2019). Those organizations that can leverage their green supply chain system with low cost, improved quality, and ecological concern features to impact their structure of total cost and quality of their services and products have a competitive benefit in their business market (Al-Ghwayeen & Abdallah, 2018).

H1: Green Purchasing has a significant relationship with environmental performance.

2.3.2 Customer green cooperation and environmental performance

The practice of customer green cooperation is critical in the business field as it allows organizations and manufacturers to organize projects based on ecological improvements to minimize pollution in the downstream supply chain (Zailani et al., 2012). Customer green cooperation makes a manufacturer capable of fulfilling all the environmental regulations and policies in various markets to enhance their operational performance and competitive benefits in the business market (Yang et al., 2013). By maintaining contact with the clients to support ecological purposes, an industrialist can implement the concept of green in of product, transportation process, wastage of water, solid wastages, minimization of carbon emission and utilization of dangerous material that is used in downstream supply chains (Green et al., 2012). Firms' collaboration with their customers on designing eco-friendly products, cleaner production and green eco-friendly packaging allows the manufacturers capable them

to enhance the level of production to minimize the level of pollution and utilization of energy and enhance ecological performance (Jabbour et al., 2014; Yang et al., 2013). Therefore, we propose that

H2: Customer green cooperation has a significant relationship with environmental performance.

2.3.3 Supplier quality integration and environmental performance

The concept of supplier quality integration links with the suppliers, internal processes, and projects that help firms improve their quality standards. An extensive structural model of supply chain quality management and firm performance (Quang et al., 2016; Yu & Huo, 2018). Manufacturers and vendors can maintain their quality in the decision-making process and in setting objectives related to performance through building long-lasting, strategic and stable relationships. Through long-term association, organizations form eco-friendly strategies, most notably when firms face awareness about atmospheric conditions from different business investors. Decision-making and planning or other processes done with coordinated behaviour will speed up the suppliers and manufacturers to mutually manage the processes of material purchasing, including technological design and workflow of manufacturing firms (Flynn et al., 2010). A quick exchange of information and knowledge allows the manufacturers to provide the specifications of products and various other processes to the suppliers by following the ecological requirements. Effective communication among manufacturers and suppliers enhances the atmospheric image (Wiengarten & Pagell, 2012; Yu et al., 2019). Mutual efforts to solve the problems play an immense role in making manufacturers and suppliers more familiar, ultimately helping producers and suppliers synchronize for the material purchasing process (Zhang & Yang, 2016). Therefore, it is clear that the concept of supplier quality integration can encourage the producers to work with the suppliers to enhance green purchasing (Yen & Yen, 2012).

Supplier quality integration highly certifies that vendors provide eco-friendly products with high-quality standards that can substantially enhance the satisfaction level of customers, which ultimately allows the suppliers to actively corporate with the manufacturers in accomplishing ecological objectives (Huo et al., 2013; Yu & Huo, 2019). The industrialists are also more enthusiastic about spending more money to avoid the level of pollution in the downstream SC of a firm. In that way, they enhance the green corporation with customers, resulting in SQI (Blome et al., 2014). Therefore, quality integration with suppliers provides a foundation for accomplishing solutions to minimize the ecological effect of the material flows with customers (Zhang & Yang, 2016).

H3: Supplier quality integration has a significant relationship with environmental performance.

2.3.4 Customer quality integration and environmental performance

The practice of customer quality integration enhances the firm's quality capabilities by collaborating and cooperating with customers on the designing of products and enhancing the quality and learning from customers about the product of their requirement (Huo et al., 2014; Lo et al., 2018). The quality integration of customers helps the industrialists use less harmful materials and improve the production process of firms that implement green purchasing. In the upstream supply chain, customer integration is valuable in cleaner production, product recycling, and green packaging (Jermsittiparsert et al., 2019). Through cooperating planning with customers in the delivery of products process and production, the concept of green purchasing is much more likely to be executed because it is essential to make products according to the customers' requirements. Moreover, to satisfy the requirement of the customers, manufacturers actively seek suppliers' support, ultimately promoting the cooperation and linkage between the manufacturers and suppliers to arrange better environmental objectives (Yu et al., 2019). The industrialists will provide product design, including the ecological requirements for purchased material, to the vendors and apply eco-labelling (Zhang & Yang, 2016).

When the industrialists and vendors achieve quality integration in their processes, green capabilities and innovation competencies increase at both sides' suppliers & manufacturers (Seman et al., 2019). Industrialists can share quality information and knowledge and develop green strategies with their customers (Flynn et al., 2010). The contribution of customers to a firm's projects that they initiate for quality improvement also acts as a key to solving the problems jointly like recycling of products, less consumption of energy during delivering products to the end customers that ultimately facilitate the concept of green customer cooperation (Burki et al., 2019). In addition, customer quality integration encourages manufacturers and industrialists to increase investment in buying and implementing technology that helps firms control pollution. It also supports firms to implement an ex-post control which is an ecological management program that is an environmental management program that actively participates in the enhancement & increase of customer green cooperation (Santos et al., 2019)

H4: Customer quality integration has a significant relationship with environmental performance.

3. Research Methods and Materials

The research approach is based on the objective of the research (Creswell & Creswell, 2017; Alrazehi et al., 2021; Das et al., 2021). According to Creswell & Creswell (2017), there are two primary research approaches one is the qualitative approach and the second is the quantitative approach. The quantitative research study is based on existing theories and concepts, while the qualitative study is based on exploring new concepts and theories. As the current study is based on the existing theories and the objective of this study was to test the relationship among these variables so quantitative approach was used for this study (Rashid et al., 2019; Agha et al., 2021; Haque et al., 2021).

3.1 Data Collection Source

The data collection sources include the primary source and secondary source of data (Saunders et al., 2009; Rashid, 2016). Primary data is newly collected data initially collected for the research. On the other hand, the secondary source of data collection stated that the gathered data is already collected for other purposes. The data is arranged from newspapers, annual reports, journals, books and other internet sources. Besides this, the primary data sources include surveys, questionnaires, experiments, observations and interviews (Rashid & Amirah, 2017). In the current study, the data will be collected using a questionnaire survey technique, so the primary source of data collection will be used in this study.

3.2 Population and Target population, Sampling Technique, and Sample Size

The pool of all individuals that can be part of the research is termed the population of the study, i.e. in the current study, all employees related to pharmaceutical companies were the population of the study (Saunders et al., 2009). In contrast, the researcher specifies this population that is more related to the research objective that is termed the target population. In the current study, the target population will be employees related to the supply chain department in manufacturing firms.

It is impossible to collect data from the whole population because of its feasibility and limitation of time for research. So Saunders et al. (2009) stated that to resolve this issue; the researcher should take samples from the target population representing the whole population. Moreover, the author also develops a sampling procedure divided into two types of sampling techniques. One is probability sampling and the other is non-probability sampling. In probability sampling, the researcher knows the chances of selecting participants for a survey, whereas, in non-probability sampling, all participants can be part of the sample. In the current study, non-probability sampling will be used. Further, this non-probability sampling is divided into more types: convenience, purposive, quota, and snowball. In the current study, convenience sampling will be used because the data will be collected from the available participants.

Hair et al. (2018), later cited by Rashid and Amirah (2017), stated that the subset of the target population is the sample. For the sake of accuracy in results, the sample size should be reliable and calculated using a reliable source. Thus, in the current study, the sample size was calculated by using G*power software. This software was specifically designed to calculate sample size and samples based on a statistical model number of variables. The calculated sample size is 129 respondents (minimum). However, the study collected data from 212 respondents, which adequately generalizes the research findings (Hashmi et al., 2021).

3.3 Instrumentation

A structured close-ended questionnaire was developed by adapting constructs from existing studies. It has five constructs which include four items for supplier quality integration, four for customer quality integration, five for green purchasing, four for green customer cooperation, and five for environmental performance (Yu et al., 2019).

4. Data Analysis

This study aims to determine the relationship between the dependent and independent variables. Therefore, IBM SPSS version 22.0 was used to test the study hypotheses. A total of 300 questionnaires were distributed to targeted respondents. The selected companies were FMCG and packaging companies. These companies were also interlinked because the packaging firms supply packaging materials to FMCG firms. A total of 220 responses were responded to, eight were dropped due to missing values, and 212 responses (i.e. 70.6%) were kept for data analysis.

4.1 Demographic Profile of Participants

Data analysis was performed using IBM Statistical Package for Social Science (SPSS) version 22. The demographic analysis was carried out to test the demographic attributes of the respondents. For analysis of the demographic variables, a summarized result is presented in table 1, which includes Gender (Male/Female), Age, and experience. The total number of respondents was 212, of which 182 (85.8%) were male and 30 (14.2%) female. 64 (30.2%) respondents were less than the age of 25 years, 119 (56.1%) respondents were between the age of 25-31 years, and 29 (13.7%) respondents were between the age of 36 to 40 years. There were fewer supply-chain experienced professionals with 7-10 years of experience (24,11.3%) and more with 3-6 years (117, 55.2%). 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.

Table 1: Demographic profile

Demographic variable	Category	Frequency	Percentage
Gender	Male	182	85.8
	Female	30	14.2
Age	Less than 25 years	64	30.2
	25- 30 years	119	56.1
	36-40 years	29	13.7
Experience	less than three years	117	55.2
	3 to 6 years	71	33.5
	7 to 10 years	24	11.3

Source: SPSS output

4.2 Descriptive Statistics

The descriptive statistics were ascertained to check the univariate normality of the data. These values include skewness and kurtosis and the value of skewness should be -3 to +3 (Hair et al., 2018). Table 2 shows the summarized results for descriptive statistics. This indicate that the maximum value of skewness (sk=0.88) is for construct green purchasing (GP) (Mean =3.49, St. Dev. =0.72) while the

least skewness value (sk=0.52) is for construct Supplier quality integration (SQI) (Mean =3.38, St. Dev. =0.68). On the other hand, the maximum kurtosis value (k=1.19) is for construct environmental performance (EP) (Mean =3.46, St. Dev. =0.78). In contrast, the least kurtosis value (k=0.09) is for construct Supplier quality integration (SQI) (Mean =3.38, St. Dev. =0.68). Since these outcomes indicate that all the results are fulfilling the acceptable range, all adapted constructs have no issue with univariate normality.

Table 2: Descriptive statistics

Construct	Mean	Std. Dev.	Skewness	Kurtosis
Supplier quality integration	3.38	0.68	-0.52	-0.09
Customer quality integration	3.54	0.62	-0.64	0.30
Green purchasing	3.49	0.72	-0.88	0.80
Customer green cooperation	3.46	0.74	-0.64	0.53
Environmental performance	3.46	0.78	-0.79	1.19

Source: SPSS output

4.3 Reliability Analysis

For the internal consistency of data, the reliability analysis was applied. The acceptable reliability value for each construct should not be less than 0.70 (Hair et al., 2018; Khan et al., 2021; Khan et al., 2022; Hashmi et al., 2020b). Given below Table 3 illustrates consolidated outcomes for reliability analysis. The summary shows that the minimum reliability value is (0.860) for construct green purchasing (GP). Thus, these results indicate that all the reliability values are not less than 0.70, so all adapted constructs have no internal consistency issue and no error related to data collection (Rashid et al., 2021; Khan et al., 2022; Khan et al., 2022).

Table 3: Reliability analysis

Construct	Cronbach's Alpha s
Supplier quality integration	.884
Customer quality integration	.862
Green purchasing	.860
Customer green cooperation	.843
Environmental performance	.854

Source: SPSS output

4.4 Correlation Analysis

The bivariate correlation was applied to test the relationship among each pair of constructs. These relationship strengths determine the uniqueness of constructs, which means that each construct measured a different concept. According to Hair et al. (2018), the value for correlation should be not greater than $\pm$0.90 and less than $\pm$0.30. The summarized results are presented in table 4. According to the results in table 4, the relationship among each pair of constructs is statistically significant. Moreover, the strangest association (0.770) is between environmental performance (EP) and customer quality integration (CQI). At the same time, the weakest relationship (0.482) is between environmental performance (EP) and Supplier quality integration (SQI). Since these results illustrate that all correlation values are fulfilling the acceptable range with a significant *p* value less than 0.01 (2-tailed).

Table 4: Bivariate correlation

Construct	T_SQI	T_CQI	T_GP	T_CGC	T_EP
Supplier quality integration	1.00				
Customer quality integration	0.617	1.00			
Green purchasing	0.498	0.614	1.00		
Customer green cooperation	0.558	0.634	0.665	1.00	
Environmental performance	0.482	0.591	0.670	0.770	1.00

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output

5. Discussions

All the proposed hypotheses were consistent with existing studies, and the findings for the hypothesis that "green purchasing has a significant relationship with environmental performance" was retained and answered research question one: What is the relationship between green purchasing and environmental performance? It was matched with existing literature. For instance, the organizations that are applying environmental strategies in their purchasing process get benefits in the form of saving costs, a good image of their service in public and minimizing the level of liability (Abdel-Baset et al., 2019). The hypothesis that "customer green cooperation has a significant relationship with environmental performance" was retained and answered to research question two: What is the relationship between customer green cooperation and environmental performance? It was consistent with existing literature. For instance, customer green cooperation makes a manufacturer capable of fulfilling all the environmental regulations and policies in various markets to enhance their operational performance and competitive benefits in the business market (Yang et al., 2013). By maintaining contact with the customers to support ecological objectives, an industrialist can implement the concept of green in products, transportation processes, wastage of water, solid wastages, minimization of carbon emission and the utilization of dangerous material that is used in downstream supply chains in downstream SC (Green et al., 2012). The hypothesis that "customer quality integration has a significant relationship with environmental performance" and "supplier quality integration has a significant relationship with environmental performance" were retained. The findings are consistent with existing literature.

5.1 Conclusion

This study was conducted to investigate the association of SC quality integration &green SC management with environmental performance. This particular research was done in the context of manufacturing firms (FMCG & Packaging) that are located in Karachi, Pakistan. The theory of supply chain quality integration is the base of this research study. For the environmental performance, certain variables were adopted from previous research studies, including supplier quality integration, customer quality integration, green purchasing and green customer cooperation. The research population was all pharmaceutical firms located in Karachi, Pakistan, while the targeted population was all of the employees that belong to the supply chain departments. A sample size of 129 respondents from the targeted population was measured through G*power software. For data collection, the questionnaire survey technique was applied to collect primary data from respondents. A structured questionnaire was circulated among 300 respondents, from which only 212 responses were considered for analysis. Data were analyzed to obtain the results, and all the hypotheses were retained.

5.2 Limitations and Recommendations

Each research has a few limitations and recommendations for future research. First, the data that was collected for this research was gathered from only manufacturing firms in Karachi, Pakistan. In that way, future researchers could reproduce this research in other regions and countries with different businesses by applying this topic to culture and institutional environments to achieve a broad view of research outcomes. Secondly, this particular research study investigated the relationship of GSCM & SCQI with ecological performance. Future empirical studies could also examine the association of GSCM with SCQI in the presence of environmental performance. Third, research was mainly concentrated on the primary influence of GSCM & SCQI practices on ecological performance. For future research studies, scholars could study the moderating impact of internal and external factors like strategic orientation and influential environment.

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Evaluating the Factors to Improve the Organizational Performance

Muhammad Muzammil [1*] *[*1]Research Scholar, Department of Business Administration, Iqra University, Karachi, Pakistan*

**Corresponding Author: Email: muhammad.muzammil1@gmail.com*

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ABSTRACT

This study aimed to develop a theoretical framework to identify and evaluate the factors that improve organizational performance as several ways to increase operational performance have been introduced. The survey in this paper comprised 111 respondents who were drawn from various organizations across Pakistan. The deductive approach followed by the quantitative research method was used to test the study hypotheses through IBM SPSS version 22.0 as a statistical tool. Data analysis was performed by evaluating the regression model. The findings demonstrate that all the hypotheses were supported and significantly contributed to organizational performance. Further, this study will help practitioners to identify and shape their businesses for enhanced organizational performance. Future research can be done on the other factors that could influence organizational performance and can be tested using other research techniques.

Keywords: *Supplier chain, Integration, Quality management, sustainability, organizational performance, green supply chain*

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Evaluating the Factors to Improve the Organizational Performance

1. Introduction

SCM applies the integrated management concept to all firms involved in the process, from raw material suppliers to final customers. Supply chain management and organization have faced new opportunities and problems due to increased competition, economic globalization, and the need to improve organizational competitiveness through operational efficiency. The understanding of how quality management and SCM are related in a given organization and the influence that integration has on organizational performance is currently restricted. (Hunaid et al., 2022). As a result, SCM appears to be a vital tool for gaining a low-cost competitive advantage in the market. As it allows for the establishment of a link between the market, the distribution network, the manufacturing process, and procurement activities, allowing customers to receive high-quality service at a low cost. Quality management (QM) promotes an organization's competitiveness similarly. Customers are growing more demanding, and as a result, they are becoming more demanding. As a result, QM impacts company performance, customer happiness, and other stakeholders. Organizations that pursue quality and supply chain goals gain a competitive edge (Bozarth et al., 2009). Other researchers reported conflicting results regarding the impact of QM on supply chain performance.

According to research, SCM, which includes acts, significantly influences the organization's skill to gain a competitive advantage. As the dispute escalated into more than one firm and the supply chain, businesses realized that focusing solely on improving internal standards within their organization was not enough. Many firms have learned that SCM is critical to maintaining their products and services competitive edge in a crowded market. According to various types of research, quality management and procurement should be combined. As a result, a more focused strategy for assessing quality management concerns (QM) inside internal and external supply chains is needed. According to research, one factor for the rise of SCM literature is organizations' competitive advantage. In the supply chain, quality is of utmost importance. Establishing a quality-based culture throughout the supply chain can help improve operational efficiency, customer satisfaction, financial performance, and more. (Amjad, 2022). SCM focuses on coordinated activities, information exchange, and trust, allowing enterprises and suppliers to develop strong, collaborative partnerships for viable advantage. (Amjad, 2022).

To address the growing demand for customer guidance and the growing globalization of industrialization, many organizations have embraced supply chain strategy as their business strategy. Quality management has faced additional challenges as a result of this strategy. Although there has been much focus on supply chain management thinking, very little attention is paid to how it relates to quality management, which leads to a second concern to be considered. While the necessity of holistic QM is well understood, its extent and significance necessitate extensive research in the SCQM domains in order to examine quality management concerns involving the provision of assets to domestic or foreign organizations. Numerous authors define SCM as a broad method that can be used at multiple levels, including procurement and Supply, logistics, and logistics, industrial organization, marketing, quality management, and strategic management are just a few examples. Companies in earlier decades had to focus not only on improving quality and meeting consumer expectations but also on competing faster and more effectively in quickly changing worldwide marketplaces. As a result, a supply chain management concept has been created, combining collaborations between organizations and integrating strategic steps and incremental processes and processes to achieve maximum business performance. Customer satisfaction from the quality of goods or services is one of the most critical results used in common with other issues, and this satisfaction is seen as a value for the firm (Asif, 2022).

Many firms face resource constraints and a lack of knowledge about improving supply chain performance. (That is, what should be measured, how should performance be controlled, and how should performance be improved). According to research, even large firms often use key performance indicators (KPIs) to evaluate their performance. These measures often fail to capture the most critical

aspects of organizational performance or customer behaviour. In addition, regardless of the industry, this concept can be used to address issues such as product memory, product delivery delays, and more. Many businesses struggle with the resources and information needed to manage supply chain quality operations effectively (e.g., quality compliance, timely customer delivery (OTD), and poor quality costs, among other things). However, according to the author, one of the primary issues with supply chain metrics is that "they are, in fact, about internal logistics performance measurements" and do not reflect how the supply chain as a whole has done. While performance across the supply chain may affect indicators such as order completion rate, it ultimately reflects organizational performance rather than multidisciplinary performance (Rasheed, 2022). The goal is to evaluate the factors that improve organizational performance. Based on the research problem and objectives, the study will evaluate the factors and their impact on organizational performance.

2.1 Literature Review

2.1.1 SC network integration and organization performance

To oversee the entire supply chain, the notion of integration is built on relationships inside and outside of the company. SCI has been audited to better the company's performance. As a result, there was a need for a comprehensive review of the literature. SC network integration: The joining conduct to the extent that anybody knows is gigantic SCM bosses as the whole cycle should be seen as one construction (Anwar, 2022). The SCM network board oversees various business processes from the top to the bottom of the river. It finds those options for all familiar SCM network members with the single goal of maximizing the benefits of chain linking and covers all activities related to customer satisfaction. Everything considered in SCM network coordination is depicted as how much all valuable exercises inside an alliance and the practical exercises of its providers, clients and other SCM network collaborators are related and combined (Anwar, 2022).

Supply chain integration is one of the most critical aspects of improving supply chain performance (SCI). It is sparked by the recent increase in attention that the two sectors of SCI and SCP have received, as well as the increased competitive pressure that enterprises face. Effective SCI is required for supply chain practitioners to realize the present potential. The existing literature needs to be consolidated. This article's goal is to achieve just that and identify future research directions for the future. We present a comprehensive assessment of the SCI, SCP, and SCM literature. Companies have traditionally judged their performance primarily from a financial standpoint. However, over the last two decades, scholars have established various criteria to consider when building a performance measuring system, recognizing the flaws and ambiguity of earlier management approaches. What we cannot measure, we cannot improve. Managers must measure performance to improve company decision-making without first grasping the current state of affairs. Internal integration is the essential factor in cost reduction, whereas supplier integration is the best technique for achieving SC reliability. Since the beginning of the SC literature, the possibility of exploitation of supply chain integration as a competitive business strategy has been investigated. These studies are on the relationship between SCI and SCP; if they are not, they will be rejected.

> *H1: There is a significant relationship between supply chain network integration and organization performance.*

2.1.2 Quality management and organizational performance management

There are two parts to this category. The concept of SCQM is being investigated first. Then research studies are looked at to see if there are any research gaps in the literature. Previous research has attempted to explain SCQM in a few concepts. SCQM brings together all members of a network of assets that work together to progress all processes, assets, facilities, and work culture, among other things. As a result, productivity, competitiveness, and customer satisfaction will improve. The addition, integration, and efficiency of quality services among SC members is called SCQM. Efficiently controlling product quality and processes determines competitive advantage, customer delight, and market share. SCQM is an SCM extension that aims to assist businesses in establishing a competitive supply chain by implementing quality management techniques. (Amjad, 2022). In short, SCQM is the process of directing, implementing, and coordinating all activities in a supply chain. It aids in enhancing product performance, quality, and customer happiness. Quality and supply chain management should be integrated, according to some studies. However, the scope of this approach is still limited. As a result, a more targeted strategy for dealing with quality management concerns (QM) across both interior and outside supply chains is required. The activities of supply chain quality management (SCQM), which are aimed at enhancing supply chain quality, are the topic of this study. Examining these links is critical because it allows us to learn more about how SCQM processes affect performance. This study is also intended to give helpful information for monitoring and implementing SCQM practices and spur further research in the field. There have been many studies on overall quality management and supply chain management, but they have primarily focused on the two fields as independent entities, with only a few studies looking into their integration and combination models (Amjad, 2022; Shaheen, 2022).

Further, the previous findings reveal positive relationships and outcomes in health care and medical organizations where the two strategies are integrated. The findings and conclusions of this research revealed that QM has a significant impact on SC development at many levels. In construction projects, SCM and QM are integrated. During their search, they found. They concluded that adopting total quality management as one of the SC components can increase the overall presentation of the supply chain. The variables that affect supply chain quality were explored, and it was discovered that the variables identified during the quality variables phase impacted supply chain performance. Demand and unpredictability have little effect on the network's reliability to provide, continue, or operate effectively; instead, the quality of the supply chain determines.

> *H2: There is a significant relationship between quality management and organization performance.*

2.1.3 Sustainability management and organization performance

This paper examines the latest literature on two areas of governance, as well as sustainability management, from an integrated perspective: QM with an internal emphasis on the organization and administration of a series to provide an idea for organizational integration. Contains a descriptive study and integration of the current QM team, sustainability, and integration of the procurement organization. Sustainability is a rapidly emerging topic, with multi-dimensional (financial, ecological, and social) approaches urgently needed for more sustainable supply chains. (Uddin, 2022; Asif, 2022). Because of SCM's strategic position and perceived direct implications on key stakeholders, sustainability research streams have included triple bottom line issues into SCM methodology, resulting in a fast-growing sustainable supply chain management (SSCM) study path. Several recent literature reviews on the integration of SCM and sustainability were undertaken. (Baloch & Rashid, 2022), QM with sustainability (Alam, 2022; Uddin, 2022); and QM with SCM (Rasheed, 2022), establishing knowledge bases on research themes.

According to the literature, organizations and businesses must engage in activities that promote environmental and social values that support long-term viability. To achieve a long-term performance improvement, intensive research, case studies, and literature reviews advise that techniques from a three-point strategy should be applied across the supply chain. Rendering to emerging economic studies,

sustainable solutions and management collaborations are required to reduce supply chain losses and improve business performance. The SSCM researches strategies to execute SSCM policies in emerging economies and has been drawn to government laws and stakeholder expectations. According to the literature review, there is evidence of rising interest in addressing sustainability programmers. As a result, it is necessary to compile and summarize the SSCM strategies mentioned in the literature review. These strategies are integrated into an 11-step SSCM framework that assists organizations in implementing SSCM. First, government regulations help drive factories to create a minimum of environmentally friendly jobs (Ayaz, 2022; Rashid & Rasheed, 2022). Second, businesses should evaluate the financial benefits of sustainable operations and develop a strategy to assist them in creating an effective SSCM and participating in the sustainability program. Establishing partnerships between SSCM operations and improved economic performance will encourage businesses to adopt SSCM. SSCM needs to build trust between partners. SSCM rules, they feel, can also support and promote industrial practice in a more sustainable environment. It is important to alert consumers and suppliers to obtain the benefits of SSCM implementation. Organizations should involve their stakeholders in the SSCM development process as they are essential to success. Monitoring and evaluating program planners will assist organizations in correcting their behaviour and developing and updating their systems to achieve SSCM. Environmental program development (Rasheed, 2022; Victory et al., 2022; Ali, 2022).

H3: There is a significant relationship between sustainability and organization performance.

2.2 Underpinning Supporting Theories/Models:

Stakeholder engagement is fundamental to quality management (QM), which shares the same end goal as supply chain management (SCM): customer happiness. (Rasheed, 2022). The concepts of QM are intended to satisfy or surpass not only customer expectations but also the expectations of other key stakeholders in the business's long-term success. Public, government entities, and service providers, for example. The importance of quality management in long-term corporate development was emphasized, and firms were recommended to investigate QM methods and procedures to aid in their long-term viability. SCQM is a new research topic that combines the processes of SCM and QM. to improve customer satisfaction by improving business collaboration and generating efficient and current operations. As a result of which, high-quality goods and services are produced. Customer base, distribution network, internal business processes, and supply chain integration are all possible with SCM management; as a result, SCM approaches substantially impact organizational performance, sustainability, and external stakeholder perception. In today's globalized world of increasing competition, SCM is well-positioned as a practical management approach for organizational sustainability performance because it focuses on the strategic management of all external and internal stakeholders, from raw material suppliers to end users. (Ayaz, 2022; Rashid & Rasheed, 2022). The sustainability research streams featured three times the basic principles in SCM strategy, resulting in the rapid development of the research process for a sustainable supply chain due to the strategic nature of SCM and the immediate repercussions on critical stakeholders. Material, information, and capital movements, as well as collaboration among enterprises throughout the supply chain, must all be managed while taking into account goals from all three dimensions of sustainable development, namely economic, environmental, and social, as well as customer and stakeholder needs. Figure 1 illustrates the conceptual framework of this research.

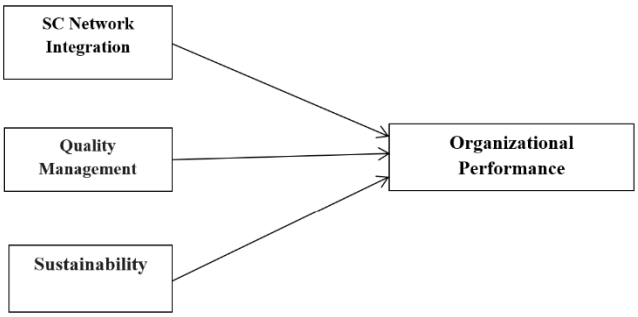

Figure 1: Conceptual framework

3. Research Methodology

According to Rashid et al. (2021), the quantitative and qualitative approaches are the two primary sorts of research approaches. The investigator has chosen the quantitative technique to follow a line of investigation to conduct this research. In carefully controlled situations, quantitative research can establish cause and effect by looking at the relationship between variables. The strength of this technique is that it allows the investigator to assess the data collected from the respondents using numerical or statistical techniques. On the other hand, approaches to research are the tools used in each study to collect data from groups of people (Hashmi et al., 2020a).

The nature of the research design is explanatory. The quantitative-based strategy was used to develop the study (Hashmi et al., 2020b). The research design refers to the entire process of integrating the various aspects of the research logically and understandably, and it establishes the strategy for gathering, estimating, and exploring data. It can be used to identify whether there is a strong or weak relationship between two variables and a positive or negative association between two variables. It also demonstrates the influence of independent variables on dependent variables (Hashmi et al., 2020c).

3.1 Sampling Design

The target audience is collecting people from whom the data is gathered to compute and analyze the precise information (Hashmi & Mohd, 2020). The target population was constituted of supply chain professionals from various manufacturing firms in Pakistan. The sample size was 111 respondents, which is more than 100 and is adequate to generalize the study findings (Rashid et al., 2021). Sampling is one of the most critical aspects of determining the correctness of the survey/research outcome. The outcome will reflect if something goes wrong with the sample. Sampling is instrumental in research. The two types of sampling processes are probability and non-probability sampling, with non-probability sampling being more common (Hashmi et al., 2021). This study's data was gathered to explain the findings or conclusions; the research was conducted using purposive sampling in a non-probability context. Purposive sampling, also known as judgmental, selective, or subjective sampling, occurs when researchers pick persons from the general community to participate in their research based on their assessment (Rashid et al., 2021). Different investigations supporting the estimation necessities for this examination have embraced the review instrument utilized in this exploration. The instrument estimates a diverse degree of the board discernment on a 5 Point Likert Scale of assembling ventures (Rashid et al., 2020; Khan et al., 2022a; Khan et al., 2022b). It has been organized in an arrangement sorting the builds making it understood and understandable for the respondents. Everything is expressed according to the respondents' insights simplifying it for the respondents to reply as indicated by their degree of concurrence with every assertion (Khan et al., 2021; Khan et al., 2022c). A five Point Likert Scale for everything goes with every assertion.

4. Data Analysis

Supply chain integration, quality management, and sustainability are the independent variables, while organizational performance is the dependent variable. The regression analysis is used to analyze

the results through SPSS software. In the descriptive statistics, the value of the mean of organizational performance was 3.6505 with a standard deviation (SD) of 0.63902 (*N=100).* The mean value of supply chain integration was 3.6937 (SD = 0.68481). The mean value of sustainability was 3.7459 (SD = 0.59449). Meanwhile, the mean value of quality management was 3.7459 (SD = 0.59449). The results showed the relevance of the responses. In the correlation results, the value of Pearson correlation is SCI = 0.648, QM = 0.714, and SM = 0.714, which is around 0.70, which shows a moderate relationship with OP *p-value<0.01*, respectively (Rashid, 2016; Rashid & Amirah, 2017; Rashid et al., 2019).

Further, the method used for independent and dependent variables was the *"Enter method"*. The Cronbach's Alpha value of the variables was 0.923, which is greater than 0.70 and shows that the data is reliable and acceptable (Alrazehi et al., 2021; Das et al., 2021; Hashmi et al., 2021; Rashid & Rasheed, 2022; Agha et al., 2021; Haque et al., 2021). Besides, the model summary results illustrated that *the* R^2 value was 0.582, which means that our independent variables (SM, SCI, and QM) caused a 58.2% change in the dependent variable OP. The *Adjusted* R^2 value of the variables is 0.574, which shows that 57.4% of the variance is explained, and the value is 57.4% which is acceptable. In the above ANOVA results, the regression sum of squares was 26.134, and the degree of freedom of regression was 2. The mean square of regression was 13.067, which is adequate. The *F* value of regression was 75.129 > 1.00. There the hypothesis was supported with a *p-value<0.05.* The sum of squares of residual (18.784), the degree of freedom of residual (108), the mean square of residual was 0.174, and the total sum of squares was 44.917, which means a large number of variability is within the data set.

In Unstandardized coefficients, the *β-value* of a constant was 0.517, which means it strongly affects the variables. In Unstandardized coefficients, the Std. The error value of a constant is 0.259, which means less sample spread than the population mean. The *t-value* of the constant is 1.999, which is more significant than 1.96, which means the null hypothesis is rejected. The Sig. value of constant is. 0.048>0.05. In Unstandardized coefficients, the *β-value* of supply chain integration is 0.222 and sustainability 0.617, which means it strongly affects the variables. In Unstandardized coefficients, the Std. Error value of supply chain integration is .083, and sustainability was 0.095, which means less the spread of sample mean to the population mean. The *β-value* is 0.574, which means it has a linear effect on the variables. The *t-value* is 6.465 and 2.681, which is greater than 1.96, which means the hypotheses were accepted at the significant value of 0.000 and .009 > 0.05, respectively. The VIF value was 2.038, which is less than five, which means there is no multicollinearity issue in the variables.

5. Discussions

The findings and conclusions reveal that supply chain integration, quality management, and sustainability majorly impact organizational success. The independent variables influence organizational performance. From the analysis, the independent variables play an important role in enhancing organizational performance. The findings also related to the prior studies that supply chain integration, quality management, and sustainability is useful and important not only in industries but also in maintaining IT systems for supply chain management and helping the organization achieve organizational goals. It increases their performances for providing better output concerning the function of intra-organizational relationships and interactions among persons and groups to facilitate, strengthen, and leverage this process to achieve competitiveness, supply chain integration, quality management, and sustainability is considered as a strategy to establish and retain a competitive edge. According to the findings of hypothesis testing, supply chain integration has a statistically significant impact on organizational performance. Integrating with consumers allows the company to spot market gaps and changes in the external environment and identify client demands and wants. As a result, the firm develops new methods to respond to changes, empower consumers, and ultimately engage them in attaining corporate goals. Furthermore, connecting with consumers enables businesses to distinguish successful from non-profitable clients, which benefits both parties.

5.1 Implications, Limitations, and Recommendations

Implementing SCQM and Sustainability on organizational performance enhances performance and resolves the issues or errors occurring in its performance. Supply chain integration, quality management, and sustainability contribute to solutions for organizational performance. Supply chain integration, quality management, and sustainability provide a solution to the organizational performance to improve their inventory management so that there should always be a balance between demand and supply factors. It helps the organizational performance to protect their goods or stocks by providing innovative technologies and robust storage equipment. The ability to prevent things from being damaged improves transparency, which increases efficiency, production, and effectiveness. It also helps organizational performance to enhance performance by providing advanced technologies to work more efficiently. It assists in providing suitable information quality, as well as the level of information sharing, quality, and best practices.

A few limitations of this study were faced because of the time duration that caused data collection from 111 respondents only. However, the sample size can go further. Only regression analysis is used, and other analyses can be done. There was a scarcity of prior studies on SC integration, quality management, sustainability, and organizational performance. Lastly, this research delivers practical and valuable answers for future SCI, QMI, sustainability, and organizational performance research. The results and findings of this study help the organizational performance to overcome their problems by implementing supply chain integration, quality management, and sustainability processes so that projects using real-time, transparent communication result in long-term operational gains. It also aids in developing associated research studies on the relationship between SCI, QM, sustainability, and organizational performance.

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The Influence of Green Supply Chain Management on Sustainable Performance

Abdul Basit [1*]

*[*1]Research Scholar, Department of Business Administration, Iqra University, Karachi, Pakistan*

**Corresponding Author: Email: chabdulbasit33@gmail.com*

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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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The Influence of Green Supply Chain Management on Sustainable Performance

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).

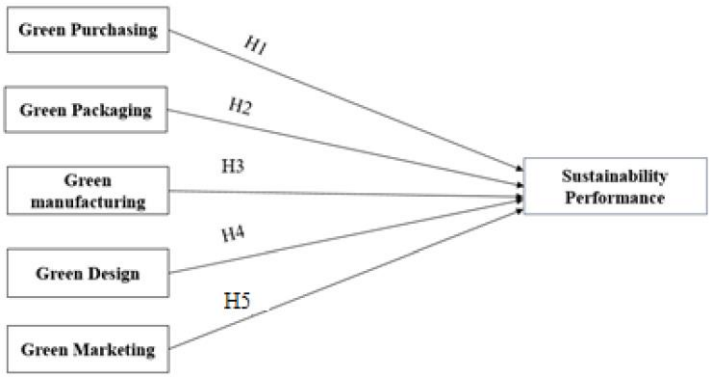

Figure 2: Research model

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.

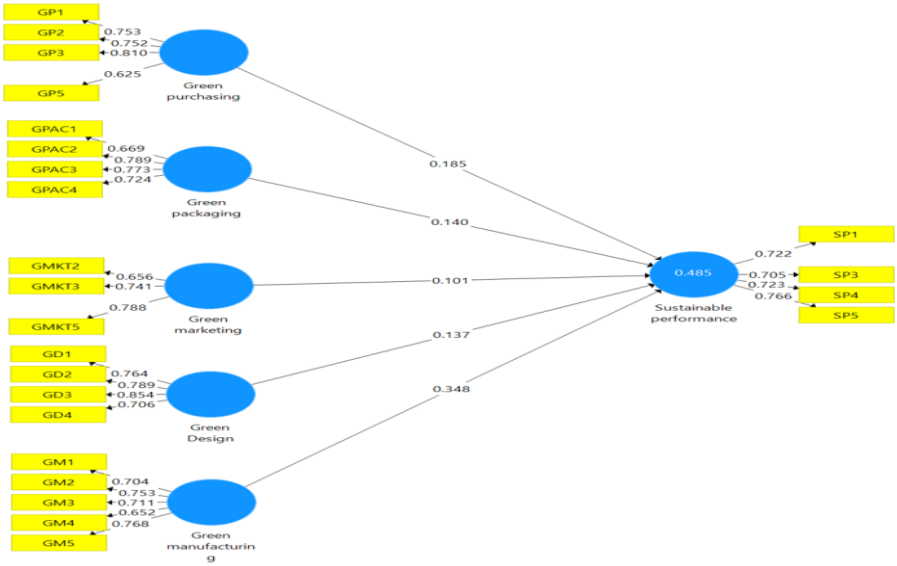

Figure 3: SEM path diagram

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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Lean Manufacturing and Supply Chain Performance

Sarang Abdullah[1*]

[*1]*Research Scholar, Department of Business Administration, Iqra University, Karachi, Pakistan*

**Corresponding Author Email: engineer_sarang@hotmail.com*

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ABSTRACT

This researcher aimed to identify the relationship between lean production, modern technology, technology integration, and supply chain performance. A quantitative approach was adopted for this study with a multi-item measurement scale adapted from previous studies to collect primary data—a total of 100 responses were collected. Descriptive analysis, along with the correlation examination, was utilized to test the hypothesis. It was observed that hypotheses *H1* and *H2* were supported, whereas hypothesis *H3* was rejected. The findings from the analysis identified that there is a significant relationship between lean manufacturing on the performance of the supply chain in the fertilizer industry. It is found that lean manufacturing can efficiently overcome supply chain challenges and improve efficiency, leading to improved overall performance. Further, the technology integration in SCM processes must be studied and analyzed. The businesses are recommended to develop further strategies to integrate technology into the SCM process and improve productivity and performance.

Keywords: *Lean production, technology, integration, modern technology, Organizational performance, Fertilizer industry*

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Lean Manufacturing and Supply Chain Performance

1. Introduction

The activities involved in the supply chain of any business depend on the nature of products and services offered to customers. The strength of supply chain management is essential to be noticed and encouraged by the company to achieve the goal of competitive advantage in the intense market (Singh et al., 2019). The importance of supply chain management in a fertilizer company is high due to its operations of production to distribution of products (Baloch & Rashid, 2022). The use of natural resources, including gas, is high in the production function of a fertilizer company. The requirement to strengthen the supply chain in this type of company is essential to reduce the abundant use of natural resources. Waste reduction is mandatory to overcome environmental challenges, as it is the implied responsibility of a company. The protection of the environment is also included in the sustainable objectives of a fertilizer company (Singh et al., 2019). Lean production is the best way to strengthen the supply chain so that unnecessary or waste material can be omitted from it. The lean production process is essential in the fertilizer business as it eliminates the activities that do not add value to the products (Abisourour et al., 2020; Shaheen, 2022). In other words, lean production enables the company to increase its production rather than produce waste. The developments in science and technology have enabled fertilizer companies to strengthen their business operations by ensuring effectiveness in their supply chain (Agrawal et al., 2017; Alam, 2022). The use of advanced technological products is mandatory to reduce waste, which is vital for the sustainability objective of a company. The adoption and implementation of advanced technologies have enabled companies to reduce the time and cost of their operations (Smith et al., 2018; Asif, 2022;). Lean production also an essential role in managing the supply chain management of fertilizer companies as it enables a company to reduce the waste from the whole supply chain process (Avadí et al., 2021; Uddin, 2022). The integration of technologies in the existing supply chain process, along with the factor of lean production, is a critical task that requires the expertise and experience of the organizational leaders. The entire supply chain process requires the leaders' extraordinary attention to minimize the risk of loss.

In the initial stages of globalization, businesses opted for foreign direct investments seeking low-cost manufacturing or production. The researchers have helped to highlight that most cases witnessed disappointments in terms of low quality, issues with sustainability, and productivity challenges. To overcome the challenges and issues, the emergence of lean production is considered to help globalized businesses and local businesses to improve the supply chain and production matters (Mefford, 2010; Ayaz, 2022). The essentiality and importance of lean production and modern technologies can be seen in many studies (Abisourour et al., 2020; Anwar, 2022). The need is to prepare relevant strategies that can improve the fertilizer companies' existing supply chain (Smith et al., 2018; Amjad, 2022;). The research is required to review and analyze the critical factors for bringing the improvements (Baloch & Rashid, 2022). However, the main requirement is to prepare an exploratory study while discussing the impact of moving towards lean production with the support of modern technologies. Comprehensive research is required on this problem or issue to recommend specific changes in the supply chain process. The research is considered to benefit in developing a significant understanding of the subject with relevance to the fertilizer industry in Pakistan. This researcher aimed to identify the relationship between lean production, modern technology, technology integration, and supply chain performance.

2. Literature Review

2.1 Lean Manufacturing and SC Performance

Researchers have focused on determining the relevance and significance of lean production in the current competitive business environment and on the extent to which the application of lean production can benefit to achieve efficiency in the Supply Chain practices of a business. The findings of the research by Agus and Hajinoor (2012) help to identify a positive relationship between the application of lean production, the performance of businesses, and the quality of products. The time required to adopt and implement lean manufacturing is considered to significantly impact the relationship between the mentioned aspects/ elements of the businesses. Also, the researchers share that to enhance performance, the efficiency of lean production is required (Agus & Hajinoor, 2012; Muzammil, 2022). Research studies also help identify that the application of lean-based supplier integration can be critical for improvements in competitiveness, profitability, and enhancing customer satisfaction (Basit, 2022; Huq et al., 2016). The step towards offshoring of production to avail cost benefits has shown an increasing trend in the global market. An offshore decision's outcomes are majorly disappointing regarding sustainability, quality of products and services, and production inefficiencies (Jorgensen & Knudsen, 2006). The businesses are focused on making strategic developments and decisions to ensure that significant challenges can be overcome and enhance their brand reputation and performance. Implementing lean production is also a significant step towards prosperity as businesses can effectively maintain the supply chain processes. Implementing lean manufacturing and supply chain processes is also found to reach sustainable and economic performance benchmarks (Mefford, 2010).

2.2 Modern Technology, Technology Integration, and SC Performance

The role of supply chain management as a competitive benefit and production improvement has long been discussed. The businesses consider effective management of supply chain management as a strategic initiative that is found to have a significant positive impact on operational performance and profitability. The adoption of strategic and technological to efficiently manage the supply chain is long discussed and is found to be positively correlated (Rashid & Rasheed, 2022). Businesses in the current times are focused on maintaining effective, collaborative, technologically improved, and more innovative relationships with suppliers. The relationship and working have helped businesses improve SCM's scope, leading to the integration of suppliers and the business. The role of technological advancement is more strategic and has shifted from being passive and general to a more controlling and monitoring process. The application of technologies has helped to assess the overall processes and can be considered beneficial to identify and highlight the activities that are efficient and others that require improvements. In recent times, the most applicable and known benefit of technology in the supply chain is that it offers timely, reliable information, accurate results, and more efficient integration of the processes (Gunasekaran et al., 2001). Literature analysis helps to extract that adoption of information systems and supply chain management are majorly interlinked and merged with the latest technologies. The findings help to extract the viewpoint that both the performance and sustainability of the processes are improved (Shee et al., 2018; Hunaid et al., 2022). The recent application of cloud-based technology to the supply chain affects the SCI and positively adds to sustainable performance. The outcomes of the research help to identify that the top management has a significant role in understanding and putting their efforts into the proper execution of the plans to adopt technology; furthermore, their role is essential in integrating the supplier, as well as inter-organizational supply chain processes to avail better outcomes. The role of adequate supply and demand synchronization through inventory replenishment is a significant step toward improvements (Coyle et al., 2016; Victory et al., 2022). The researchers Coyle et al. (2016) proclaim that the advancement in technology and its efficient adoption is considered to improve the global supply chain management challenges for customer demands and needs. Researchers help to highlight the effectiveness of adopting technology and supply; chain improvements are not majorly discussed in the literature. The researchers state that e-Business technologies can benefit the overall performance of businesses with effective management of customer relationships, supply chain, and supplier integration (Ali, 2022; Devaraj et al., 2007; Rasheed, 2022).

The detailed assessment of the literature helps to extract helpful information related to the subject. Lean management practices are effective for businesses to maintain a better supply chain image and operational efficiency. Based on the literature, it is also identified that supply chain management practices and their investigation specifically for the fertilizer industry in Pakistan are not evident, which leads to highlighting a research gap. It is also identified that technological advancements and their integration within the processes are found to be most critical for firstly, improving the supply chain practices and providing the opportunity to businesses to effectively manage the control and maintenance of the activities. The research also reveals that a literature gap is evident since no specific research studies deal with innovations and their relevance to the fertilizer industry in improving supply chain aspects. The research framework is highlighted and extracted from the literature findings/ gaps and is beneficial to understanding the overall pathway for carrying out the research. Therefore, the following hypotheses were developed to address the research objectives:

H1: There is a significant relationship between lean manufacturing and supply chain performance.

H2: There is a significant relationship between modern technologies and supply chain performance.

H3: There is a significant relationship between technology integration and supply chain performance.

3. Research Methods

Two main types of approaches, deductive and inductive, have distinct characteristics. Under the inductive approach, a new theory is proposed based on observations for a specific purpose (Rashid et al., 2021; Hashmi et al., 2021). At the same time, the deductive approach involves testing theories presented by different authors (Khan et al., 2022a, b; Agha et al., 2021; Haque et al., 2021; Khan et al., 2021). The selected approach for the current study is deductive based on hypothesis testing. The approach has helped in preparing the design of this comprehensive study. Research may be quantitative, qualitative, or mixed, depending on the objectives and research questions. Under the quantitative study, there is an involvement of numeric data to present the outcomes effectively (Hashmi et al., 2020c). The options are provided to participants to select the most appropriate one according to their knowledge and experience. The data transformation is the main benefit of a quantitative study to achieve the outcomes without having complexities. On the other hand, qualitative research is based on opinion in a narrative form while collecting responses. The population decided for the current study are managers working in fertilizers companies located in Karachi. The rationale for selecting this population is that they can provide relevant and reliable information regarding the impact of lean production and the use of advanced technology in the existing supply chain. The sample size finalized for the current study is 100 to ensure the reliability and acceptability of the current research. The rationale for selecting 100 participants for the current study is that it is quantitative research, which contains outcomes in numbers. The sample size helps test the hypothesis and achieve the objective of the current research. Random sampling is used to collect information from managers in the Karachi fertilizers companies (Hashmi et al., 2020a; Alrazehi et al., 2021; Das et al., 2021). The main benefit of this sampling technique is that it reduces the time and cost of the author finding relevant participants (Hashmi et al., 2020b; Rashid et al., 2020).

The data collection process is critical in exploratory research as the conclusions will be based on the gathered information. It has been decided that the author will use a survey questionnaire to gather the information for this comprehensive study (Hashmi & Mohd, 2020; Rashid et al., 2021). The collected information was evaluated in SPSS for testing the impact of variables. The first step was to check whether the data was reliable or not (Agha et al., 2021; Haque et al., 2021; Khan et al., 2021). The value of the reliability test was more than 0.7, indicating that the data is reliable and can be used. Descriptive testing is carried out by finding the data's mean, median, and mode. The correlation analysis was also used to determine the relationship between independent variables and dependent variables

(Rashid, 2016; Rashid & Amirah, 2017; Rashid et al., 2019).

4. Data Analysis

For gender, the results showed that male participants were significantly higher than female participants. The values help to determine that 91 (out of 100) male participants participated in the survey questionnaire, whereas nine female respondents participated. It shows that the management of fertilizer businesses comprises male domination. The values predict that majority of the respondents were aged between 31 to 40 years (a total of 54 participants), 23 with aged 20 to 30 years, 20 participants with age between 41 to 50 years, and finally, 3 participants aged above 50 years (51 to 60 years). The responses help identify a significant contribution from mature individuals, and the experience of the individuals is expressed in the table below. The participants' educational background is essential to identify the capability of the participants to answer the questions effectively. Seventy participants had bachelor's degrees, 24 with master's level education, and 6 completed their postgraduate degrees. The results help to identify that most bachelor's level education holders are part of the fertilizer business's management, followed by Masters' and Postgraduate degree holders.

The reliability statistics are carried out, which helped to provide detail and justification on the consistency, validity, and reliability of the responses to the questionnaire. The results from the "reliability statistics" identified the value of Cronbach's Alpha as more significant than 0.70 (0.772) (Khan et al., 2022c). Further, the correlation analysis results were utilized to identify the relationship between a dependent variable and all other independent variables. The results found a significant and weak to strong relationship between the variables (Pearson Correlation value of 0.010 to 0.738 with significance values less than 0.05 for all except one item (LP5=0.920 insignificant value). Additionally, the in-depth analysis of the relationship helps to extract that modern technology has a strong relationship with SCM (Pearson Correlation value of 0.738 at a significance value of .000). It reflects the increase in the adoption of modern technologies leading to improvements in SCM by 73.8%. Also, the moderate relationship between technology integration and SCM is identified (Pearson Correlation value of 0.575 with significance values of .000). It can be reflected/interpreted that the increase in technology integration by businesses is expected to increase SC performance by 57.5%. The application of technology integration by the industry at large is found to have a significant moderate relationship with SC performance (Pearson Correlation value of 0.425 with a significance value of 0.000). It can be stated from the results that the increase in industry-level adoption of technology can provide increased performance for SC performance by 42.5%. Finally, lean production by businesses is found to have a significant and weak to moderate impact on SC performance (Pearson Correlation value of 0.010 to 0.686 with a Significance value less than 0.05 for all except (0.920). From the results, it can be interpreted that the increase in lean production by businesses can improve SC performance.

5. Discussion and Conclusion

The findings from the analysis identified that there is a significant relationship between lean manufacturing on the performance of the supply chain in the fertilizer industry. The literature suggests that lean production in businesses can efficiently overcome supply chain challenges and improve efficiency, which leads to improved overall performance (Singh et al., 2019; Abisourour et al., 2020). Agrawal et al. (2017) added that there is a significant possibility for businesses to improve productivity and enhance the overall efficiency of their business operations. On the other hand, the results from the literature state that the effective adoption of lean production with a focus on modern technologies can help to improve the overall firm performance (Abisourour et al., 2020). Furthermore, technological advancements in supply chain management can help businesses outperform (Gunasekaran et al., 2004). The findings from the current research suggest that adopting modern technology does not have any significant and positive impact on the overall performance of SCM. Therefore, it is stated that firms in the fertilizer and other industries must possibly initiate strategies adoption of modern technologies in a better way to enhance operational and financial benefits as found in the literature. The results indicate an insignificant impact of technology integration on supply chain performance. The findings contradict Huq

et al. (2016), which suggested that supplier-related operations can be improved through integrating technologies and efficiency, competitiveness, and profitability can be enhanced in the short and long run.

It is recommended for businesses to enhance efficiency through the application/adoption of modern technologies and lean production. The results can be further improved for companies if the efficiency level can be enhanced. The technology integration in SCM processes is required to be further studied and analyzed. The businesses are recommended to develop further strategies to integrate technology into the SCM process and improve productivity and performance.

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