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Impact of green manufacturing, green purchasing, and eco-design on organizational performance in the FMCG sector of Pakistan

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ABSTRACT

Global warming, air pollution, and natural resource depletion have severely changed how businesses manufacture and provide goods and services. Greening supply chains have attracted the attention of practitioners in several nations in this context. Carbon taxes, for example, have been made a legal necessity in various countries. However, green supply chain management methods and their influence on company performance are still in their early stages of adoption. Firms frequently require the engagement of their supply chain participants to meet rising stakeholder demands for ecologically friendly goods and processes. GSCM is a collection of managerial approaches that include environmental concerns in the supply chain. Green supply chain management may help a company gain a competitive edge while improving its environmental sustainability. The overarching goal of this thesis is to add to the conversation on green supply chain management methods by examining their drivers and performance implications for the FMCG sector of Pakistan. FMCG company's supply chain must be prioritized to be efficient and effective in GSCM because these products are essential for everyone. This study aims to raise awareness about the importance of GSCM practices for the advantage of society and long-term economic and environmental development. The respondents of the 136 helped in the collection of data. They use SPSS and techniques like ANOVA, regression analysis, and correlation. All of the three hypotheses were accepted.

Keywords: *Green supply chain management, Organizational performance, Green Purchasing, Green manufacturing, Eco-design, Sustainability.*

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1. Background of the Study

This chapter provides a background for the subject and summarizes various concepts of green supply chain management (GSCM) from the perspectives of academics and organizations. Subsequently, the impact of GSCM practices on organizational performance in terms of environmental, financial, and operational aspects is discussed. The purpose and significance of this research are also pondered in this chapter. This chapter elaborates on the various aspects of green supply chain management, their links to organizational performance, and the research issue.

Over the last 40 years, supply chain management (SCM) has become increasingly fragile. There has been a requirement for strategic alignment and integration of end-to-end business chain processes to meet the demands of the final customers in the supply chain (Green et al., 2012; Ho et al., 2002; Rashid et al., 2024a). GSCM entails taking a more environmentally friendly approach to all supply chain activities, from green purchasing to the return of recyclable scrap to the organization (Rashid et al., 2024b). Today, organizations are reevaluating their organizational strategies, including operations and business performance, because of environmental regulation and the economic pressure placed on industry. Companies like P&G (Procter & Gamble), Unilever, Nestle, etc., are investing in green practices, hoping to impact their organization's environmental and financial performance positively.

The international efforts to green organizations and the entire supply chain are because of climate change, depletion of natural resources, and environmental pollution (Lee et al., 2013; Rashid et al., 2024c). The impacts of the environment can occur at all stages in the product's life cycle, including production and supply. Hence, GSCM has appeared as an essential model for organizations to gain profit and market share objectives by reducing environmental risks and their impacts and increasing their ecological efficiency (Gupta et al., 2011).

1.1 Problem Statement

As consumers' understanding of environmental issues has grown in recent decades, organizations have been under increasing pressure to reduce toxic substances and pollution and introduce green practices around the supply chain (Kumar et al., 2014; Rashid et al., 2024d). Adopting green practices requires high technological investments; hence, environmental practices have been perceived to drain an organization's profitability (Rashid et al., 2024e).

Therefore, environmental concerns and their consequences for organizational performance thus create vast opportunities for bridging the rising and evolving gap in how environmental issues affect the value-adding process in manufacturing and service firms individually and collectively (Kassinis & Soteriou 2015) comprehensively recognized this gap. These authors sum up that there still needs to be more knowledge of the practical impacts of environmental factors, how to manage them, and what impact the green practices service firms have on their performance. Recognizing this gap encourages us to look into the interlink between green practices and an organization's financial performance in the fast-moving consumer goods (FMCG) sector.

Three schools of thought have different views on organizational performance when implementing the GSCM practices. The first school of thought believes that implementing GSCM practices can negatively impact the organization. It also involves considerable investments in return for less or negligible profits (Zhu et al., 2008). The second school of thought claims that there is no correlation between environmental and economic performance and that it is merely a trade-off between them. Those of the third school of thought argue that implementing GSCM practices can have many positive impacts on organizational performance, like reduced operational costs, increased customer satisfaction, etc. (Orlitzky et al., 2003; Kleindorfer et al., 2005; Rasheed et al., 2024). This

creates ambiguity in the practical field and creates opportunities for researchers to study the overall impact on organizational performance.

Therefore, after considering these gaps in research studies and making a practical note in implementing GSCM practices, different firms in Pakistan that are leading manufacturers of FMCG products have been selected for this study. The GSCM practices are measured by four independent variables: green manufacturing, eco-design, environmental cooperation, and reverse logistics. This study will add to the empirical and managerial literature as a dependent variable in organisational performance construct by considering environmental, operational, and financial dimensions.

1.2 Research Questions

As mentioned above, the views of different researchers and academicians related to implementing green practices lack consensus in the field as to whether these practices improve or weaken organizational performance. Along with this scenario, balancing economic and environmental performance has become essential for organizations facing competitive, regulatory, and societal pressures (Shultz-Lockyear et al., 1999; Rashid & Rasheed, 2024). As a result, this study's research question is: To what extent is the impact of green supply chain management practices on organizational performance? In detail, the research seeks to identify which dimension(s) of organizational performance are mainly impacted by certain GSCM practices in the fast-moving consumer goods (FMCG) sector. Additionally, one more question has been focused on in the research, *i.e.,* what are the implications of implementing GSCM practices in different organizations with different geographical locations? Previous research studies have been done within specific geographical locations and in particular industries (Saad et al., 2019).

1.3 Purpose of the Study

This study aims to find the impacts of green supply chain management (GSCM) practices on organizational performance in the context of fast-moving consumer goods (FMCG) firms in Pakistan. The objective is also to reveal the challenges of successfully implementing green practices in organizations' supply chains. The focus will be on the independent variables that can impact organizational performance in terms of environmental, operational, and financial dimensions. Also, which of these dimensions has the highest impact on which of the independent variables of green practices?

1.4 Significance of the Study

The findings of this study are significant for managers in manufacturing organizations who want to improve their green supply chain management (GSCM) practices and gain a strategic advantage in the industry. The study investigates the impact of four different variables on organizational performance. Subsequently, this study adds to the knowledge base in the fast-moving consumer goods (FMCG) sector in the context of green practices and their impact on firms’s performance. Findings from this study can help organizations achieve a more sustainable supply chain, as reducing waste can also lower the total cost of business while enhancing the organisation's reputation. Also, to improve the supply to meet consumer needs, the study focuses on decision-making and cooperation, which are significant for entering new markets or achieving special abilities.

1.5 Outline of Study

The structure of this report is organized into five chapters: Literature Review discusses the main grounded theories in green supply chain management and the hypothesis development based on the previous studies. Also, we put forward a theoretical research framework to explain the correlation between GSCM practices and organizational performance, along with a discussion on dependent and independent variables. The next chapter is Research Method, which describes the method used in the research and the qualitative approach used. It also shows the data collection procedure. Chapter four

contains the results and findings from the data, a hypothesis test, and a summary of the hypothesis assessment. In the end, the Conclusion, Discussion, Implications, Limitations, and Recommendations are discussed, where previous research is linked. Also, some limitations in the study are provided to address the scope for future research.

1.6 Definitions

Before beginning this study, it is necessary to define specific terms to identify some basic concepts. Later, in the next chapter, the core operational concepts and theories are explained. The essential terms that we need to know are:

1.6.1 Green supply chain management

The term green supply chain management is also known as environmental supply chain management (Walker et al., 2008; Albhirat et al., 2024), which manages environmental problems at every point of the supply chain and aims to cut down on resource consumption, safeguard the environment, and maintain the growth of the economy and environment. Table 1 below represents the definition of GSCM.

Table 1: Definition Of GSCM

Definitions	Author/S
GSCM is incorporating a green component into SCM, which consists of green operations, green manufacturing, eco-design, reverse logistics, etc.	Srivastava (2007)
GSCM is a strategy for optimizing the performance of processes and materials by environmental regulations.	Hsu et al. (2013)
GSCM is a management strategy to reduce a product's or service's environmental and social impacts.	Rettab et al. (2009)
The practice of tracking and optimizing environmental performance in the supply chain is referred to as GSCM.	Godfrey and Manikas (2009)
GSCM refers to activities in which a company applies environmental standards to the production and operations of its suppliers.	US-Asia Environmental Partnership (2003).

Source: Literature

1.6.2 Organizational performance (dependent variable)

Organizational performance in an industry is the ultimate performance evaluated in terms of environmental, operational, and financial performance. Environmental performance includes reductions in air emissions, wastewater, solid wastes, hazardous substances, etc. (Rashid & Rasheed, 2023; Rashid et al., 2023). Operational performance includes timely goods, inventory levels, scrap rates, product quality, etc. (Melnyk et al, 2018). Financial performance consists of the cost of materials purchased, energy consumption, water treatment or discharge, investment and training expenses, etc. (Calvete & Gale, 2010).

1.6.3 Independent variables

Green manufacturing: Green manufacturing entails using the best resources and has a sustainable advantage in the long term by delivering high-quality goods at a low cost. Green manufacturing technology, green systems, and lean production initiatives helped companies save costs and remove waste from the system (King & Lenox, 2001; Zhu & Sarkis, 2004). Green and lean manufacturing are also aimed at reducing waste, reducing manufacturing measures, increasing production quality (Prajogo & Olhager, 2012), and improving a company's reputation and image.

ECO design: Eco-design is a critical green supply chain initiative because it determines every product component, including the form of raw material used, the amount of energy consumed, and the amount of waste generated. Eco-design refers to the steps taken during the product's production period to reduce its environmental effects over its entire life cycle (Johansson, 2002). Regarding environmental impact, product design can be seen to touch every stage of the supply chain, from manufacturing to

consumption and eventually to disposal (Eltayeb & Zailani, 2009).

Green purchasing: In GSCM practices, green purchasing is an environmental effort to guarantee that acquired items and materials match the purchasing firm's sustainability goals, such as minimizing waste sources and increasing recycling, reuse, and material substitution. Green purchasing is gaining traction worldwide, and companies are increasingly scrutinizing their suppliers' environmental records before making purchase decisions (Zhu & Sarkis, 2004; Baloch & Rashid, 2022).

2. Literature Review

A brief exposition of the theories underlying this research is addressed below to provide context to the literature evaluation and to set the tone for the upcoming discussion.

2.1 Green Supply Chain Management

Green supply chain management is a concept that has been perceived since early and is also an executive idea. GSCM is receiving favours because of its environmental approach. Many countries worldwide are adopting the GSCM approach, showing devotion to sustaining the environment. In the context of supply chain management, environmental sustainability is considered by multinational and national firms due to the demand of the public to gain refined products. Consumers, regulating authorities, and communities that work for the environment were increasing pressure on firms to revise their SCM strategy to make it eco-friendly as green supply chain management (GSCM).

According to Zhu & Sarkis (2004), green supply chain management is a mixed supply chain method that comprises customers, manufacturers, and suppliers and reverses logistics management. Green supply chain management is a new concept that has gained tremendous popularity, depicting GSCM-like Integration of an environment-saving approach among supply chain management involves manufacturing operations, raw material procuring and sorting, product form, delivery of finished goods to end customers, and also looking into the end-life management of goods afterwards the usable life of them. Moreover, Hervani et al. (2005) explained that GSCM is like green supply chain management, including green purchasing, manufacturing, materials management, distribution, marketing, and reverse logistics.

As per Bowen et al. (2006), Green supply management can be divided into two categories: greening the supply chain and product-based green supply. Greening the supply chain refers to changes made to a company's supplier control practices to account for environmental concerns. Furthermore, product-based green supply relies on product modifications and tries to control the by-products of provided inputs. According to Pagell and Wu (2006), logistics and supply chain department leaders should balance low cost and creativity while ensuring good environmental efficiency.

Green supply engagement comes from a strategic sustainability strategy and management commitment to environmental problems, which increases the likelihood of green supply deployment (Green et al., 2012; Rasheed & Rashid, 2023). However, according to Bowen et al. (2006), if the firm's resources need to be improved to start a green supply chain, the impetus for applying the GSCM process may exceed the firm's usual supply management process. According to the policy literature, environmental sustainability may play a vital role as both a social obligation and an essential organizational task (Arlow & Gannon, 1982).

2.2 Definition of the Green Supply Chain

Before going into depth about GSCM, it is essential to define some of the definitions of GSCM that are found in the literature. According to Sarkis (2003), GSCM is a combined scheme that caters to product design, manufacturing processes, distribution, and all elements of reverse logistics. Although highlighted, the hindmost importance. Therefore, Beamon (1999) added a way GSCM is an

extension of the conventional supply chain, which comprises stages that directly overcome the hazardous impact on the environment during the product cycle, like green design, material saving, reduction of harmful material, recycling of the product, and reuse of it.

Further on, Kumar and Putnam (2008) recommended that the end-to-end supply chain operation, which was formerly known as cradle to grave in the early 1980s, be renamed cradle to cradle, implying that the commodity must be returned to its source (the manufacturer) to be reused or properly disposed of. Besides this, Srivastava (2007) believes that green supply chain management activities can be applied across the whole supply chain, including raw material procurement, product design, production procedures, finished product distribution, and product recycling during its useful life.

2.3 Grounded Theories in Green Supply Chain Management

Several organizational theories have been used to investigate green supply chain management (Sarkis et al., 2011; Hashmi, 2022; Rasheed et al., 2023). To account for the internal and external drivers of GSCM activities, the institutional theory, transaction cost economics, stakeholder theory, resource-based view, and resource dependency theory are considered the most suitable for this thesis.

2.3.1 Institutional theory

Di Maggio and Powell (1983) stated that external pressures significantly impact organizational decision-making, according to institutional theory. These writers also argue that a robust social power will push a company's behaviour in a specific direction. Any social drivers, such as tradition, legislation, or rules, may create such a force. Bals and Tate (2018) argue that as businesses work to satisfy societal and legal standards, institutional theory applies to the implementation of GSCM activities. Moreover, Zhu and Sarkis (2004) discovered that companies want to gain social integrity and market resilience rather than productivity while implementing green supply chain management practices. Delmas and Toffel (2008) state that governments, consumers, rivals, societies, environmental advocacy groups, and business associations will likely pressure companies to behave environmentally friendly.

Groenewegen and Vergragt (1991) state that government legislation is one of the most essential structural reasons driving companies to adopt green supply chain practices. As a result, companies in certain countries, such as Europe and the United States, where environmental regulations are more rigorous, follow GSCM policies more often than businesses in other regions where environmental laws are less stringent. Hall (2000): External stakeholders put much pressure on large, high-profile companies to boost their environmental efficiency. However, smaller suppliers or suppliers farther upstream from the end customer have less apparent incentives.

Di Maggio and Powell (1983) state that within institutional theory, three types of institutional mechanisms affect managerial decisions: coercive, normative, and mimetic pressures. Such organizations that the focal firm relies on and societal and cultural norms impose coercive leverage. Hoejmose et al. (2014) explain that coercive forces are commonly applied at two levels: market-level pressures determine what kind of behaviour is demanded of a given industry, and firm-level pressures are explicitly used for specific firms. Di Maggio and Powell (1983) and Hoejmose et al. (2014) describe uncertainty as causing mimetic stresses. Firms can copy and imitate their effective competitors due to technological or environmental instability or a need for clear objectives. Sarkis et al. (2011) argue that firms are compelled to adhere to demands through normative forces to be viewed as possessing valid organizational operations. Industry norms, best practices, and widespread consensus are examples of normative influences (Milstein et al., 2011; Hashmi, 2023; Khan et al., 2022).

Institutional theory has been applied in various research fields, including overall quality control, quality loops, and business continuity planning (Lin & Sheu, 2012). According to Lin and

Sheu (2012), institutional drivers may be internal, such as using ISO 9000 to boost operating efficiency, or external, such as demands to introduce TQM to gain credibility. Institutional philosophy can help understand whether such efforts for social fitness are externally or internally motivated and whether they can result in improved success.

2.3.2 Transaction cost economics theory

TCE (transaction cost economics) studies how much time and money it takes for two parties to perform a business transaction (Sarkis et al., 2011). Skjoett-Larsen et al. (2003) said that the costs of forming contact with a potential trading partner (searching costs), the costs of agreeing to a new deal with the partner (bargaining costs), and the costs of completing the transaction can be separated into three categories. Control expenses include tracking the partner's contract fulfilment.

Bals and Tate (2018) describe knowledge costs as synonymous with learning about emerging technology, ideas, and competitive landscapes and assessing the costs of acquiring competency in a particular arena when it comes to environmental activities. Bargaining costs rise primarily due to the time and resources required to negotiate and develop a compromise (Bals & Tate, 2018). The time spent negotiating limits the time required for primary roles (Pearce, 2008). Finally, transaction expenses are incurred by tracking the success of vendors' sustainability (Carter & Rogers, 2008). Bals and Tate (2018) describe that it should also be remembered that if the transaction costs for satisfying a particular buyer's environmental conditions are too high, the supplier will not be able to participate in deepening the relationship, which is considered excessive. TCE theory describes which transactions should be carried out internally by the firm and which practices should be carried out outside of the firm through market processes, as well as why.

Environmental challenges should be addressed using the conventional make-or-buy decision. Firms might propose outsourcing certain environmentally harmful operations to minimize responsibility, clean-up, or image costs or to acquire environmental knowledge (Sarkis et al., 2011). Environmental speciality firms can have competencies and expertise in ecological restoration, hazardous material shipping, and environmental product design. In contrast, outsourcing firms can focus on core competencies rather than devote time to learning new skills (Sarkis et al., 2011). On the other hand, this outsourcing method can result in higher monitoring and control costs. Vachon and Klassen (2008) explained that GSCM activities can also be looked at through the lens of TCE. In order to increase environmental efficiency outside of its operations, an organization should either internalize or externalize environmental supply chain practices without spending large quantities of its own resources.

2.3.3 Stakeholder theory

Stakeholder theory is one of the first works in the area of organizational success and arguably the most influential and well-known theory of market strategy. Any company performs to support and please its stakeholders, who include the government, donors, political parties, consumers, vendors, societies, labour unions, and workers, he claims. Frooman and Murrell (2005) stated that as a result, companies are increasingly implementing GSCM practices in order to adapt to diverse demands from various stakeholder groups, such as staff, customers, environmental organizations, and government organizations, many of which control decision-making in these organizations.

Recently, he revised his stakeholder theory. Freeman (2022) argued that companies must consider the interests of their stakeholder groups and entities who may influence or be influenced by the organization's mission and life in addition to optimizing shareholder capital. Those stakeholders are treated as possible winners or bearers of any danger the company could face. As a result, Freeman concludes that nine beneficiaries should be reclassified as owners and granted appropriate decision-making authority on par with the company's executives (Wernerfelt, 2013). Furthermore, Freeman (2022) claims that each of these stakeholder classes has the right not to be treated as a means to an end, and as a result, they must share in deciding the potential course of the company in which they

have a stake.

Stakeholder philosophy is closely linked to corporate responsibility and should be used to evaluate the organization's interaction with society and guide the firm's managers. In summary, Freeman sought to clarify the firm's relationship to its external climate and its actions within that environment, which was claimed by Vachon and Klassen (2008). The author compiled a list of essential actors and partnerships to empower the communities and individuals concerned.

2.3.4 Resource-based view

Wernerfelt (2013) introduced the resource-based view (RBV), which saw a company as a larger collection of resources than the conventional view, which only accounts for categories like labour, money, and property. On the other hand, the future value of capital was recognized even earlier. Economists like Edward Chamberlin and Joan Robinson emphasized firm heterogeneity in the 1930s (Fahy, 2000). Ayuso et al. (2014) expanded on the concept, arguing that a company's internal resources significantly affect its development. A resource is described as anything that may be considered a firm's strength or weakness. As per Barney (1991), a company's capital can be used to gain a strategic edge.

The RBV has been widely extended to the natural resource-based view (NRBV) and used to clarify why companies use GSCM. Markley and Davis (2007) state that the RBV has been widely extended to the natural resource-based view (NRBV). Used to clarify why companies use GSCM. According to the NRBV, policy and planning are essential. Capabilities that facilitate can be used to gain a strategic edge. Commercial practices are financially friendly. According to Foerstl (2015), a resource must have three characteristics to be important: it must be rare, inimitable, and non-substitutable, causally uncertain, socially fluid, firm, and explicit.

On the other hand, Dyer and Singh (1998) stated that the criterion for firm-specificity has been questioned. According to the relational perspective, organizational skills can be built outside organizational limits by integrating expertise from various supply chain members. Since these tools are causally vague and socially fluid, rivals find it impossible to mimic them. To claim that environmental control in the supply chain will generate strategic benefits, the relational perspective has been merged with the NRBV (Hashmi et al., 2021a). Environmental cooperation, for example, will contribute to creating knowledge-sharing routines and the ability to incorporate external tools (Hashmi et al., 2021b).

Testa and Iraldo (2010) offered that RBV is often used to describe more competitive reasons for GSCM adoption, such as why companies operating in the same sector (or industry) follow separate GSCM strategies while facing common institutional pressures. Improvements in several performance metrics may demonstrate skills advancement (Sarkis et al., 2011; Rashid et al., 2022a). According to previous studies, GSCM adoption has increased. Moreover, the improved appearance and credibility result can be considered a valuable resource (Sarkis et al., 2011). However, Shi et al. (2013) state that it is still unclear how particular forms of GSCM activities convert into a firm's strategic capital, resulting in competitive advantage and improved efficiency.

2.3.5 Resource-dependence theory

According to Awaysheh and Klassen (2010), to resource dependency theory (RDT), businesses rely on others to supply essential tools, components, or capabilities. Emerson (1962) describes the dominance of one group as based on the dependency of the other. As a result, companies with more bargaining power will exert leverage over smaller parties (Crook & Combs, 2007). The power generation component of the resource dependence theory can be used to describe the diffusion of environmental practices in the supply chain (Sarkis et al., 2011).

Hollos et al. (2012) found that firms have many opportunities for accessing environmental

services, depending on their ability to manage resources and possible alternatives. Sarkis et al. (2011) describe that the willingness of a procurement company to persuade suppliers to enter into environmental alliances normally depends on the supplier's reliance on the customer. Large, powerful consumers are more likely to demand that their smaller vendors follow environmentally sustainable practices (Hall, 2000; Sarkis et al., 2011).

Caniëls et al. (2013) faction with the most market leverage will sway the sustainability policy and practices of other supply chain participants, as well as compel supplier involvement in green supply chain actions that may not be directly advantageous to them. Brockhaus et al. (2013) discovered that rather than developing long-term comparative leverage for the supply chain as a whole, their case industries tended to focus on efforts led by dominant firms and then push on the poorer upstream participants. However, manufacturers are likely to adhere, but only to meet minimum specifications reactively (Barney, 1991; Brockhaus et al., (2013). Since this strategy may not be optimal in the long term, organizations may be hesitant to expand their reliance on other businesses. Sarkis et al. (2011) stated that the resource dependence theory also shows that companies without the necessary resources are more likely to form partnerships with others to obtain them. Due to a scarcity of funding and expertise, smaller businesses attempt to compete with their more significant partners' environmental standards in order to maintain access to services in the supply chain (Caniëls et al., 2013). Foerstl et al. (2015) found that many suppliers have a good reason to invest in and signal proactivity in sustainability-related activities to be chosen for joint ventures, given that producers have augmented their collaborative strategies with selected first-tier suppliers to meet industry demands.

Competitive rewards, in which suppliers are rewarded for current and potential business depending on their performance compared to other suppliers, usually in an arm's length arrangement and mutual incentives, in which buyers and suppliers share the advantages of improved performance in a dyadic buyer-supplier relationship based on their shared performance (Terpend & Krause, 2015). As a result, environmental impact is primarily motivated by competitive incentives, while environmental cooperation is primarily motivated by mutual incentives.

2.4 Green Supply Chain Management Practices in Manufacturing

Terpend and Krause's (2015) term green supply chain practices are widely used in the literature to refer to a range of actions a company carries out to reduce its environmental effects. Using the opportunity to self-correct based on input from the external world, supply chains aim to ensure internal well-being and environmental protection. There is no question that any organization must use capital effectively and efficiently (Dheeraj & Vishal, 2012). Manufacturing companies, in particular, play an important role because, as opposed to service-oriented firms, they have a more remarkable ability to have a detrimental effect on the environment.

Firms should use their influence to impose environmental requirements and conditions on their manufacturers, ensuring that suitable raw materials are supplied for manufacturing with the most negligible environmental impact. From a global perspective, Muma et al. (2014) found that many industrial companies have also adopted GSCM activities to ensure long-term sustainability. Multinational companies adapt to these procedures by properly aligning and coordinating all business activities, including sourcing, processing, marketing, logistics, customer attention, etc.

The following research results aid in determining to what degree GSCM activities are being implemented in businesses worldwide, with a greater emphasis on environmental conservation and long-term sustainability. Diab et al. (2015) found that practices such as cleaner processing, environmental protection systems, and eco-quality have been modified to be environmentally sustainable, according to a detailed analysis of the Jordanian food industry. In addition, the government has been debating enacting renewable investment and other green-related legislation to support the economy.

In addition to Trivellas et al. (2020) results, four GSCM activities specific to the Kenyan tea processing industry have been identified: green buying, green sourcing, green material handling, green delivery, and reverse logistics. According to Diab et al. (2015), food and beverage companies are more likely to rely on GSCM principles like internal environmental sustainability, green sourcing and warehousing, and green construction. On the other hand, this research shows that eco-design and manufacturing activities have little adverse effects on the environment.

Companies in the paper and pulp industry conclude that economic and financial benefits affect their adoption of GSCM activities. Huang et al. (2021) further state that other sectors, such as logistics, are likelier to adopt GSCM practices if they believe doing so would improve their efficiency and credibility. The above literature from numerous research studies shows that companies have different GSCM activities.

2.5 Green Supply Chain Management Practices (GSCM)

Several researchers have established multiple dimensions in GSCM practices. Following a thorough analysis of the literature, it became apparent that researchers often use such dimensions to assess the impact of GSCM activities. Zhu et al. (2008) argue that organizations should adopt GSCM practices, which have environmental supply chain management protocols, to incorporate GSCM. Numerous reports have attempted to classify GSCM activities in organizations, including internal processes such as environmental and quality control systems. Internal environmental management is essential for an organization's environmental performance to improve. According to Zhu and Sarkis (2004), quality control can facilitate GSCM implementation. They argue that by learning from the results of their quality management systems, organizations can improve their sustainability practices under strict quality control.

This analysis considers the most widely used dimensions by academics in calculating the degree of GSCM practice adaptation. Green purchasing, eco-design, green manufacturing, and reverse logistics are all examples of green purchasing.

2.5.1 Green Purchasing

Asif Salam (2011) defines green procurement as environmental buying, which includes practices such as resource elimination, reuse, and recycling during the purchasing process. Salam (2017) states it is a workaround for environmentally conscious and cost-conscious businesses. This idea uses food variety to reduce environmental effects. According to Xiao et al. (2007), research on environmental awareness and dedication among companies, governments, and individuals has prompted the establishment of procurement and purchasing policies that integrate environmental criteria. Green purchasing is purchasing goods or resources with a lower environmental footprint over their whole life cycle. Green purchasing often entails incorporating environmental concerns into price, performance, and quality-based buying decisions. Environmental effects must be considered more relevant when making these assessments to reduce waste and emissions. As you can see below table 2, Nicolas recommended the following elements for a conventional green purchase:

Table 2: Items Of Recycled Material

Energy-saving products and standby control systems are available.
Substitute fuel vehicles, elective power, and eco-friendly vehicles.
Biodegradable goods
Substances that do not deplete the ozone layer
Priority chemicals for environmental protection

Source: Literature

These planned components aid in sourcing products for the production phase, but supply selection is critical in green purchasing. Supplier Selection: Only green partners can be used to buy products and components (Zhu et al., 2008). Only ISO 14000-certified suppliers should be considered (Sarkis et al., 2003). A provider that manages toxic chemicals in the workplace and has earned a green

certificate may be effective. 3 Rs in Purchasing: In the purchasing phase, reuse, recycle, and refurbish. According to Zhu et al. (2008), the paper pieces in the bins can be reused. Instead of using paper, emails can be used to place orders (Sarkis et al., 2003). Furthermore, Diab et al. (2015) describe green buying as long-term environmental plans for a company's material, part, or eco-system needs. In the green manufacturing process, changing the inputs is an essential method. Major or small ingredients or inputs may be used in the manufacturing process. Changes in small inputs have a significant effect on the environment.

2.5.2 ECO-design

The increase in solid waste significantly impacts environmental development; to address this problem, the green packaging process is used, which covers the whole packaging life cycle (Jiang & Sheng, 2009). Diab et al. (2015) describe that companies that perform eco-design and manufacturing aim to produce goods and packaging with the least materials and energy consumption. Firms are also urged to make components and pieces easier to reuse, recycle, and restore. According to Hariharan (2015), green packaging can be practised using green packaging materials, encouraging recycling and reuse schemes, and cooperating with vendors to standardize packaging. System assessment indicators monitor and control the packaging method (Liu & Zhang, 2011). Furthermore, according to reports, early eco-design work largely focused on technological changes to goods and processes to reduce environmental costs (Kumar et al., 2014). However, today's businesses recognize that more than the manufacturer's design stage would result in an environmentally sustainable product. Therefore, businesses need to rely on partnerships with both direct and indirect actors, such as manufacturers, customers, recyclers, and government agencies.

2.5.3 Green Manufacturing

Green manufacturing is characterized as production processes that use low-impact inputs, are highly productive, and produce very little waste and pollution. According to Huang et al. (2021), green technology seeks to change production processes and goods over time to mitigate or avoid air, water, and soil emissions. He also indicated that threats to humans and other animals could be reduced by making these changes. Green manufacturing has a large number of definitions. To begin, manufacture refers to a product's life cycle. As a result, the term manufacture is used here to refer to a broad definition. Environmental issues affect all aspects of the manufacturing process. Many important topics are discussed, like green architecture, ecological process planning, green manufacturing, etc. Finally, GM is a complex machine engineering problem. It must be examined from the standpoint of device engineering. Green manufacturing is a concept that refers to manufacturing processes that do not affect the environment at some point during the process. It emphasizes production practices that are environmentally friendly and do not affect customers, workers, or other community members. Green manufacturing will lower raw material costs, improve production quality, and lower environmental and workplace safety costs. Zhu et al. (2008) stated that using green production processes will reduce power usage to a greater degree. Green packaging raises environmental awareness through the 3Rs. Table 3 shows the shift in reliance on human intervention.

Table 3: The reliance on human intervention shifts

Batch processing is favoured over continuous processing.
Changing the essence of the manufacturing process's phases.
Eliminating phases in the manufacturing process.
Cleaning procedures are evolving.

Source: Literature

The following modifications can be linked to green production: As a result, green production choices exist. Green manufacturing emphasizes the industry's path map for improving production through sustainability growth and its effect on corporate competitive outcomes.

2.6 Organizational Performance in Manufacturing Companies

A firm's performance is one of its most important performance metrics in a given context. Performance is a metric for determining how well a company achieves its goals. Organizational performance encompasses three distinct fields of firm outcomes: financial performance, commodity demand performance, and shareholder value. Income, return on investment (ROI), and return on assets (ROA) are used to calculate financial success, while market share is used to compare performance against competitors.

2.7 Green Supply Chain Management Practices and Organizational Performance

Most recent research on the impact of GSCM studies on success has shown that the two structures have a favorable relationship. The following are some of the main results from the report: Muma et al. (2014) stated that there is a favorable association between GSCM activities and environmental success in the Kenyan tea processing industry. Diab et al. (2015) discovered similar findings in their study on the Jordanian food industry. According to the findings, three main GSCM activities, namely eco-design, consumer collaboration, and reverse logistics, may positively affect economic efficiency and contribute to improved organizational performance. A clear relationship between green supplier evaluation and partnership and environmental efficiency. Furthermore, it has been discovered that greening suppliers leads to green creativity and strategic advantage, yielding better results. Numerous studies have attempted to relate GSCM activities to firm results. While some research, such as Zhu and Sarkis (2004) and Green et al. (2012), found good relationships, Lee et al. (2014) found no such relationship. Pagell and Wu (2006) discovered a mix of positive and negative partnerships, while Zhu and Sarkis (2004) suggested that manufacturers' highest priority should be economic efficiency.

2.8 Research Gaps

According to Sarkis et al. (2011), many studies have examined the association between incorporating various green supply chain management strategies and various aspects of organizational success. Many studies have been devoted to evaluating the green supply chain in terms of economic and recycling considerations. However, more theoretical and realistic literature should be about applying green supply chain best practices for corporate efficiency. Furthermore, research should have examined the effect of the four major GSCM activities (eco-design, green purchasing, green manufacturing, and reverse logistics) on corporate efficiency. This research aims to see how adopting green supply chain management strategies affects organizational performance within Karachi's FMCG context. It looks at how the four major green supply chain management approaches outlined above affect organisational performance: eco-design, green purchasing, green manufacturing, and reverse logistics. This work advances industry practice by enhancing our knowledge of which aspects of GCSM activities have a favourable or direct effect on success and how much positive impact can be better realized within an organization. The analysis approaches will also help researchers who want to learn more about the factors influencing organizational performance.

2.9 Conceptual Framework and Development of Hypotheses

The framework depicted in Figure 1 was created to analyse the study's primary objectives: determine the effect of GSCM practices on organizational performance in the FMCG sector.

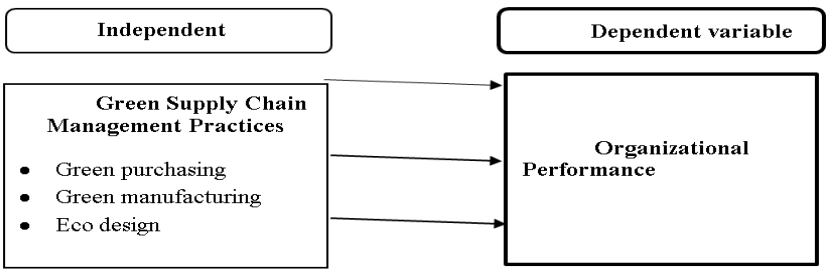

Figure 1: Conceptual framework

Source: Author's work

In the light of the above conceptual framework, hypotheses are developed. The hypotheses of this research are observed under the umbrella of research objectives.

Hypothesis 1: Green purchasing significantly impacts the Organizational Performance of the FMCG sector.

Hypothesis 2: Green manufacturing significantly impacts the Organizational Performance of the FMCG sector.

Hypothesis 3: Eco-design significantly impacts the Organizational Performance of the FMCG sector.

According to the above literature findings, there is no published literature on the impact of GSCM activities on organizational performance in Pakistan's FMCG sector. However, a large number of research studies show that there is a favourable association between GSCM practices and firm success in the Asian context (Laosirihongthong et al., 2013; Zhu & Sarkis, 2004; Hashmi et al., 2020a; Rashid & Amirah, 2017; Rashid et al., 2019).

3. Research Methodology

Given the deductive idea of the investigation, which proposes a model with a causal relationship between green inventory network rehearsals and corporate execution that requires approval utilizing exact information, a quantitative methodology is embraced in this investigation in the primary occurrence, utilizing data assembled through an overview survey to get the unmitigated information required for the factual testing. Given the deductive nature of the research, which proposes a paradigm with a causal association between green supply chain activities and corporate success that needs empirical evidence for validity, this study takes a quantitative approach in the first place, using information gathered from a survey questionnaire to collect categorical data used for statistical testing (Hashmi et al., 2020b; Rashid, 2016). According to Creswell (2003), a mixed-methods approach is a technique in which the researcher develops realistic knowledge of the subject matter by collecting data concurrently or sequentially to explain and analyze the research issue. Many scholars in the area have used a quantitative approach, such as Lee et al. (2013), who used a quantitative approach to analyze the direct and indirect influences linking GSCM implementation and market success. Similarly, using quantitative methods, Laosirihongthong et al. (2013) investigated the effect of positive and reactive green practices on the firm's observable and intangible efficiency dimensions. Diabat et al. (2015) used a quantitative approach to investigate the association between GSCM procedures and success results. This thesis is based on causal research to determine the cause of GSCM practices in the FMCG sector of Karachi. Positivism and constructionist paradigms in social science are used in this analysis. According to Golicic and Davis (2012), the positivist theory suggests that the universe is external and empirical, that events are observable, and that studies can rely on evidence and seek causality using quantitative techniques. The constructionist theory is based on the metaphysical premise that understanding is found in people's interpretations and that knowledge is learned from people learning about their interpretations. A single online survey instrument developed especially for this research was used to gather quantitative and qualitative data. To generalize the relationship between GSCM and firms' performance, the quantitative data collected over the survey were first analyzed to distinguish relationships among the independent and dependent variables. Collecting and analyzing quantitative data gives fact- and logic-based results. Also, it fulfils the requirement of hypotheses (Rashid et al., 2020; Khan et al., 2023a).

3.1 Sampling

The method is choosing a small group from a larger group and analyzing the small group (the sample) to learn about the large group. There are two kinds of sampling: probability sampling and

non-probability sampling. The latter is used when the researcher does not know the likelihood of choosing some case or element from the population. Probability sampling, on the other hand, occurs when the researcher is aware of the likelihood of choosing some item from the population. Probability sampling can be divided into four categories. Any member of the population has a fair probability of being chosen for the sample; random sampling as groups is established within a population; stratified sampling is used; and random sampling is used within each group. Systematic sampling is used when any n number of a population is chosen for inclusion in the sample (Rashid et al., 2021).

The population consisted of FMCG production companies in Karachi. The target respondents were the organization's top management (owner, general manager, operations manager, and supply chain manager). Manufacturing was chosen because it is one of the most significant causes of pollution and resource degradation, according to Zhu and Sarkis (2004). Many studies, such as Green et al. (2012), have focused on the packaging sector and used common contingent and independent variables. Zhu et al. (2008) investigated the effect of GSCM activities on various manufacturing company success outcomes in China. A representative group of 136 people was chosen for this research, which covers a wide range of industries such as food and beverage, snacks, spices, and other FMCG companies across Karachi. Finally, for this research, simple random sampling is being used to gather the data. The survey was administered using online tools via an open link.

3.2 Research Instrument of Data Collection

For this quantitative research study, the instrument will be an online survey through a questionnaire. The survey consisted of closed-ended questions (Amirah et al., 2024). The items of the questionnaire will be measured on a five-point Likert scale ranging from 1=strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, and 5 = strongly agree (Khan et al., 2023b; Rashid et al., 2022b). The study uses an online survey method of data collection. An online survey instrument will be Google Forms to collect the raw data needed for this quantitative study. The statistical technique used for this study will be finding ANOVA, correlation, and regression analysis.

4. Results and Findings

4.1 Introduction

This chapter focuses on the findings and data analysis using SPSS and selected techniques to identify the results and effects of the structured model. The data is collected through a constructed questionnaire and analyzed using SPSS and different techniques. These techniques comprise ANOVA, correlation, and regression analysis. Also, demographic data was analysed through SPSS.

4.2 Demographic Survey Analysis:

Feedback was collected from 136 respondents to assess the influence of green manufacturing, green purchasing, and eco-design on organizational performance. These respondents are from a variety of professional backgrounds and organizations. Each has a professional perspective on the theory in question. The questionnaire begins with demographic information about the informants, such as their age, gender, marital status, and educational qualification.

Table 4: Genders

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	Female	51	37.5	37.5	37.5
	Male	85	62.5	62.5	100.0
	Total	136	100.0	100.0	

Source: SPSS output

According to Table 4, 85% of males (or 62.5%) and 51 women (or 37.5%) answered the survey.

Table 5: Education Of Respondents

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	Graduate	70	51.5	51.5	51.5
	Intermediate	3	2.2	2.2	53.7
	Iti Diploma Wireman	1	.7	.7	54.4
	Masters	57	41.9	41.9	96.3
	Matric	3	2.2	2.2	98.5
	Mphil Education	1	.7	.7	99.3
	PhD	1	.7	.7	100.0
	Total	136	100.0	100.0	

Source: SPSS output

Moreover, in the above five tables, the majority of the respondents had a bachelor's degree, with 70 of the 136 respondents having a master's degree, 3 having an intermediate, 3 having matriculation, 1 having a diploma, one having a having an MPhil, and also 1% having a PhD.

Table 6: Marital Status

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	Married	28	20.6	20.6	20.6
	Unmarried	108	79.4	79.4	100.0
	Total	136	100.0	100.0	

Source: SPSS output

However, in the above six tables, 136 respondents (28%%) are married, and 108 are unmarried.

Table 7: Age Of Respondents

		Frequency	Per cent	Valid Percent	Cumulative Percent
Valid	18-25	40	29.4	29.4	29.4
	26-35	82	60.3	60.3	89.7
	36-50	14	10.3	10.3	100.0
	Total	136	100.0	100.0	

Source: SPSS output

In addition, table 7 shows that 40 of the 136 respondents are between the ages of 18 and 25, accounting for 28.4 per cent of the total; 82 are between the ages of 26 and 35, accounting for 60.3% of the total; and then 14 respondents are between the ages of 36 and 50, accounting for 10.3% of the total.

4.3 Validation of the Model

All variables were tested for reliability to ensure the model was reliable. Cronbach's alpha is the primary determinant of dependability; according to Baltacioglu et al. (2007) and Hofmann et al. (2019), quantitative research has much value. Cronbach's alpha is a frequently used reliability estimate that considers how nearly a group of indicators within a research measure are connected, showing the measure's consistency (Rashid & Rasheed, 2022).

4.4 Reliability Analysis

Cronbach's alpha should be 0.60 or 0.70, according to Hashmi and Mohd (2020), suggesting vital construct dependability. To attain the appropriate Cronbach's alpha value and ensure acceptable construct reliability, modifying research methods and limiting the number of measurement items is occasionally essential.

4.4.1 Reliability test of GM

The value of Cronbach's alpha for GM variables is 0.755, larger than 0.700, as shown in Table 8. As a result, all GM-independent variables are consistent with one another.

Table 8: Reliability Of Respondents

Cronbach's Alpha	N Of Items
.755	5

Source: SPSS output

4.4.2 Reliability test of GP

The value of Cronbach's alpha for GP variables is 0.697, larger than 0.600, as shown in Table 9. As a result, all GP-independent variables are consistent with one another.

Table 9: Reliability Of GP

Cronbach's Alpha	N Of Items
.697	5

Source: SPSS output

4.4.3 Reliability test of ED:

The value of Cronbach's alpha for ED variables is 0.859, larger than 0.700, as shown in Table 10. As a result, all ED-independent variables are consistent with one another.

Table 10: Reliability Of ED

Cronbach's Alpha	N Of Items
.859	5

Source: SPSS output

4.4.4 Reliability test of OP

The value of Cronbach's alpha for variables of OP, 0.848, is more significant than 0.700, as shown in Table 11. As a result, all of OP's independent variables are consistent.

Table 11: Reliability Of OP

Cronbach's Alpha	N Of Items
.848	5

Source: SPSS output

4.5 Hypothesis Testing

Hypotheses are evaluated using SPSS software and linear regression analysis.

The R-value of 0.738 in Table 12 below reveals that the dependent and independent variables have a significant association. R-square measures the precision of regression, and its value indicates that independent variables account for 54.5% of the variance in the dependent variable. The unadjusted R-square verifies the unbiased regression among the variables. Furthermore, the obtained adjusted R-square value is 0.534, indicating good unbiased regression accuracy.

Table 12: Model Summary

Model	R	R Square	Adjusted R Square	Standard. Error Of The Estimate	Change Statistics		
					R Square Change	F Change	Df1
1	.738[a]	.545	.534	.44811	.545	52.606	3

Source: SPSS output

Table 13: Model Summary Anova[a]

Model		Sum Of Squares	Df	Mean Square	F	Sig.
1	Regression	31.691	3	10.564	52.606	.000[b]
	Residual	26.507	132	.201		
	Total	58.197	135			

A. Dependent Variable: Op

B. Predictors: Constant, Ed, Gm, Gp

Source: SPSS output

According to research, the significant value in the model summary table 13 will be less than 0.05, as You et al. (2017) stated. Furthermore, the sig. In the tested data, the value of the measured variables, i.e., ED, GP, and GM, is 0.000, which is less than the required value. The independent variables are relevant to the dependent variable, which is OP.

Table 14: Coefficients

model		unstandardized coefficients		standardised coefficients	t	sig.
		b	std. error	beta		
1	(constant)	1.582	.200		7.929	.000
	gm	.177	.081	.204	2.192	.030
	gp	.197	.073	.266	2.692	.008
	ed	.271	.080	.338	3.393	.001

Source: SPSS output

Table 15: COEFFICIENTS

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	GM	.400	2.502
	GP	.352	2.837
	ED	.347	2.879

a. Dependent Variable: OP

Source: SPSS output

All variables have significance, according to the sig values in Table 14 above. Similarly, every dependent variable affects the dependent variable. All of the sig values are below 0.05. The VIF value from collinearity table 15 reveals that all independent variables have a value less than 10, indicating that there is no multicollinearity, that perhaps the impacts given by the model are pure, and that the influence of other independent variables do not harm one's effect.

4.6. Regression Model

The above table shows a linear regression was created, which is shown below:

OP = 1.582 + 0.177 GM + 0.127 GP + ED 0.271

4.7 Results of Hypothesis

Table 16 below shows which hypotheses have been accepted or rejected.

Table 16: Results Summary

Hypothesis	Results
H1: Green purchasing significantly impacts the organizational performance of the FMCG sector.	Accepted
H2: Green manufacturing has a significant impact on the organizational performance of the FMCG sector.	Accepted
H3: Eco-design significantly impacts the organizational performance of the FMCG sector.	Accepted

Source: Based on SPSS output

5. Conclusion, Discussion, Implications, Limitations, and Recommendations

5.1 Discussion

The study evaluated and analysed the impact of green purchasing, green manufacturing, and eco-design on organizational performance. A total of three hypotheses were suggested, and data was collected from 136 respondents, who almost all belonged to the FMCG sector of Pakistan. The respective data was analyzed using SPSS to identify the validity of the given hypotheses. It was found that green manufacturing, green purchasing, and eco-design affect organizational performance in the FMCG sector. Organizations and our environment need to make this change in every sector to be eco-friendly. In particular, implementing green chain supply techniques adds to diverse competitive advantages. It leads to enhanced environmental performance, as evidenced by lower greenhouse gas

emissions, water consumption ratios, wastewater output, solid waste, dangerous substance use, and ecological accident frequency. Organizations may benefit from green supply chain processes by lowering costs, increasing market share, and increasing profits. The most crucial benefit of businesses implementing green supply chain processes is increased market share growth. The data imply that environmental restrictions, regional environmental advocacy, and green movement activism have pushed FMCG companies to embrace green supply chain procedures.

According to the data, there is a significant positive link between green supply chain practices and organizational performance in the FMCG sector of Pakistan, according to the structural model. Based on these findings, the FMCG sector is interested in green supply chain management. In the FMCG context, the greener supply chain methods are used, the better the organization's performance will be. Furthermore, it is stated that the greener supply chain techniques are used, the better the environmental, operational, and financial performance will be.

5.2 Implications

This study is essential for management and organizations, and it also contributes to growing sales by understanding green supply chain management and reaping its most significant benefits. The greener supply chain practices are used, the better the organizational performance will be. As a result, in order to cope with harsh competition that is dynamic, managers must create and implement robust supply chain management strategies. According to the findings, green supply chain management strategies are becoming increasingly vital for businesses in an ever-changing business environment.

5.3 Limitations and Recommendations

There are several limitations to this study. To begin with, the small number of in-depth case studies prevents further generalization of the findings. Because of the extended time since the main data was collected, the picture of the situation in FMCG companies may be skewed. Unfortunately, it was not able to return to the firms to update the data and check whether there had been any development or if there had been any regression. This study also has the restriction that it only looked at companies in the FMCG industrial sector of Pakistan. These results may not be relevant to other sectors in Pakistan's context since they are particular to the FMCG manufacturing sector.

There must be greater collaboration between the various administrative divisions in a business in order to get the most out of implementing green supply chain management principles. The organization should continue coordinating amongst the various administrative levels to execute the green supply chain according to certain guidelines. They must seek out the most environmentally friendly raw materials and continue to invest in environmental design and packaging safety, develop an annual training plan based on worker training requirements associated with the green supply chain, increase funding for scientific research in the field of the green supply chain, and, finally, initiate government rules and regulations to ensure environmental safety.

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