

## Impact of low carbon supply chain practices and corporate social and environmental reporting on economic performance

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### ABSTRACT

Globally, the idea of low-carbon supply chain is becoming more and more prevalent. It is an effective technique for many companies to show that they are committed about sustainability. But in order for green supply chain planning strategies to be completely embraced by all enterprises, there must be evidence that these actions enhance economic performance. This research was based on theory testing; explanatory research method was used to test the impact of firm's sustainability practices on company's EP. Deductive approach was used in this research to develop and test hypotheses. In this study, probability sampling technique was used and by its simple random method a sample of 151 firms in Karachi, Pakistan, was chosen to examine potential connections between economic performance and environmentally friendly supply chain management. A conceptual model was created for this aim using literature sources and information gathered from businesses in Karachi, Pakistan, via a structured questionnaire. The analysis found that creating an integrated green supply chain by greening its various stages and increasing visibility through social and environmental reporting results in greater economic performance. To enable comprehensive investigations, Future studies should empirically examine the links proposed in this work in different regions. Thorough sector-by-sector comparisons, which are not achievable in the framework of this study, would also be conceivable with a larger sample size.

**Keywords:** *Economic performance, Low carbon supply chain management, Corporate social and environmental reporting*

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## **Impact of low carbon supply chain practices and corporate social and environmental reporting on economic performance**

### **1. Introduction**

Global warming is a serious threat to the world and human practices specifically manufacturing industries are contributing in a great amount in the form of burning fossil fuels. An environmentally sustainable economy is the need of the industries for their long-term survival. Industries need to adopt the practices and processes to reduce the carbon emission and greenhouse gases. Low carbon supply chain practices need to be included in the whole process from purchasing of raw material, its manufacturing process and product design, warehousing, transportation, recycling or disposal. Stakeholders are the main influencers on the decisions regarding adoption of low carbon supply chain practices. While many corporations think environmental management reduces the size of enterprises' revenues, certain companies think it has created a win-win situation between environmental protection and economic performance. Firms need to develop internal strategies for the successful implementation of environmentally sustainable practices. This requires the top management support and strategies development and contracts with the external bodies. The flow of information and awareness regarding low carbon practices is also necessary to attract the financiers for investment in emission reductions plans of firms. Consumers awareness regarding climate change and products impacts on the environment are also increasing drastically and they are moving towards the products which helps in energy saving. Perception of a corporation can all suffer significantly from improper adherence to green policies (Pinto, 2020; Rashid et al., 2019).

### **1.2 Background of Study**

One of the primary causes of global warming is The top management of the companies are also very well educated on this issue, and are more attentive towards the strategies which focuses on implementing the greener processes, and products. Although, the implementation of low carbon supply chain practices are still in its initial stages due to deficiency or non-availability of proper knowledge regarding its impacts on organization's economic performance (Mumtaz et al., 2018) e. The competitiveness, economic performance, reputation, public, the release of greenhouse gases and manufacturing industries are the major source of GHG (das & Jharkharia, 2019; Rashid & Amirah, 2017). The global average temperature is most likely to be increased due to the anthropogenic greenhouse gas concentration. Environmental management is a complicated management activity that involves not only particular pollution prevention and control techniques but, also collaboration and coordination between the environmental department and other departments as well as balancing environmental goals with other business goals.

For achieving long term sustainability, manufacturing firms should emphasis on producing environmental friendly products by designing the overall supply chain process in a manner that contribute strategically in reducing GHG. Firms need to identify core processes which can play vital role in supply chain emission reduction by maintaining sustainable development along with the concept of triple bottom line management (das & Jharkharia, 2019; Rashid & Rasheed, 2022). Especially when consumers are well aware of environmental issues and taking keen interest in this matter, companies responsibility also increased with the changing world requirements (Saeed & Kersten, 2019).consumers are now more informed and tends to purchase the goods which are less or no damage to environment. They even pay the premium prices for these products and the number of consumers is increasing who prefer greener products (Sarhan et al., 2018; Baloch & Rashid, 2022; Hashmi, 2022).

Industries have less focus on adoption of environmental policies causing constant rise in CO2 emissions and making it difficult to achieve the united nation's (SDGs), 17 sustainable development goals by 2030 (Gh & Pintado, 2022; Hashmi, 2023). Several studies have been conducted on low carbon supply chain techniques, for instance Das and Jharkharia (2019), showed a positive impact of

carbon governance for the implementation of low carbon supply chain procedures. Other variables were also discussed such as effect of low carbon purchasing and low carbon product and process design on environmental sustainability.

### **1.3 Problem Statement**

Internal green management can minimize the use of resources and energy while increasing reuse, which can lower costs and produce financial gains. Total environmental management can lower environmental hazards while improving profits. By bench marking and learning, including ISO14001 into daily operations aids a manufacturing in resolving environmental issues. This lowers energy usage and adverse environmental effects, enhancing the manufacturer's reputation and competitiveness (Rashid & Rasheed, 2023). Additionally, by incorporating environmental considerations into product design, businesses are able to systematically lessen the environmental effect of their products and processes, which lower costs and improve brand recognition. Additionally, it can assist businesses in upholding their environmental commitments and improving their environmental reputation, which will increase demand for their goods and their bottom line (Rashid et al., 2023).

Manufacturing Industries are the major sources of carbon emission and a serious threat to the planet. Therefore, the need to adopt green supply chain practices is crucial for industries to maintain their presence in the environmental sustainable economy (das & Jharkharia, 2019). Compared to established countries, rising economies like India, China, and Taiwan accounted for 44% of research in the last ten years, and the majority of these studies focused on just one particular organization. The literature evaluation rarely identified which specific environmental management techniques or strategies were more successful at enhancing the company's economic performance (Pinto, 2020; Rasheed & Rashid, 2023).

Several studies have been carried on low carbon supply chain techniques, for instance Das and Jharkharia (2019), showed a positive impact of carbon governance for the promotion of low carbon supply chain techniques other variables were also discussed such as effect of low carbon purchasing and low carbon product and process design on environmental sustainability. However, it was mentioned that the study could not found a positive relation between low carbon supply chain procedures and economic performance (Rasheed et al., 2023). To address this, issue the following research questions were investigated in order to discover the answers.

*RQ1: Which LCSCM procedures are used by manufacturing companies in Karachi?*

*RQ2: How LCSCM practices impact the economic performance of the firms?*

*RQ3: What is the impact of corporate social and environmental reporting on economic performance?*

The purpose of this study was to analyze impact of sustainability procedures such as LCP (low carbon purchasing), LCPP (low carbon product and process design, LCML (low carbon manufacturing and logistics) and corporate social and environmental reporting on economic performance of the manufacturing companies. According to the underlying theory and data from this study impact of sustainability practices and corporate social and environmental reporting on economic performance of the manufacturing firms was examined and the relationship between economic performance of the manufacturing firms, corporate social and environmental reporting and low carbon supply chain practices was studied (Rashid et al., 2022a, b).

Section I explains the context of the study, the issue description, the research questions, the goal of the investigation, and the importance of the study. Supporting theories, empirical reviews, research frame work, and hypothesis are explained in section-II, research methodology, research

approach, a research design, a sampling plan, a data collection tool, a data collection technique, and sampling techniques are explained in Section-III, which is research methodology.

## **2. Literature Review**

### **2.1 Supporting Theories**

Theories help researchers understand the complex concepts through multiple lenses and provide a framework within which to conduct their analysis. Theories are the fundamental part of research and it helps researches in publication in renowned international journals. In this research two theories were applied First stakeholder's theory and second NRBV.

NRBV: The core element of the theory is its focus on internal factors of firms which leads to the sustainable practices in competitive environment. The NRBV asserts that sustainable development, product stewardship, and pollution prevention are the three main strategic competences. Each of these is influenced by various environmental factors, relies on various essential resources, and derives its competitive advantage from various sources. Lower expenses are related to pollution prevention, which aims to stop waste and emissions rather than clean them up "at the end of the pipe." For instance, reducing input requirements, streamlining the procedure, and lowering compliance and liability costs are all ways that removing pollutants from the production process can boost efficiency.

Stake holder's theory states that management of the firm have some obligations towards group of stake holders. Stakeholders are the groups who are vital for the survival of any business. Stake holder's theory has several parts. First is the rational level; It debates on who are to be considered as stake holders and what are those group who can affect and be effected by the organizational decisions. It includes several parties like Political parties, business owners, the financial sector, and activist groups Customers, customer advocacy organizations, unions, staff, professional organizations, rival companies, suppliers, and the government. Second is the process level; It tells that organizations perform multiple task in daily routines and the procedures followed by organizations are the result of their relationship with multiple stake holders. Third is transactional level; the transaction managers done with multiple stakeholders and the way it is to be done. Such as selling goods to customers, dealing with suppliers, payment of dividends to shareholders, obligations towards governmental bodies.

### **2.2 Empirical Reviews**

The idea of incorporating sustainable practices with supply chain operations is known as "sustainable supply chain management" including procurement, product design and manufacturing, and logistics (das & Jharkharia, 2019). However, GSCM is a broader concept and there is no specific definition to explain, different researchers have defined it uniquely (Tseng et al., 2018). The adoption of GSCM practices not only effect positively to the environment but also becomes a source of goodwill for the company, reduce cost and bring value to business (de Oliveira et al., 2018). It also provides competitive edge over other businesses (Saeed & Kersten, 2019). firms are responsible for carbon emission over 90 percent of the total emission (Shaharudin et al., 2019). literature further reports that the adoption of lean practices along with the green practices significantly increase the of environmental and economic performance as well as effectively adoption of lean practices reduce GHG emission from the production process. organizations are on continuous focus to adopt low carbon supply chain practices and main areas are product and process design and manufacturing and logistics, whereas procurement is considered as separate but an integral part of the sustainable supply chain management while internal and external integration and collaboration of stakeholders provides the pillars to the implementation of GSCM procedures (das & Jharkharia, 2019). In this study the focus was on low carbon supply chain practices, corporate social and environmental reporting and its impact on economic performance were observed and hypotheses were developed.

#### **2.2.1 Economic performance**

Manufacturing plant ability play a significant role in reducing costs related to procurement, energy consumption, waste material treatment, and any fines related to environmental accidents. Different opinions are associated with GSCM practices whether it increases business costs. One opinion is that it does not affect short term profitability while on the other hand low carbon purchasing is a cause of increasing business cost. Another view point is that GSCM has positive impacts on business' economic performance both directly and indirectly. Direct can be done by reducing energy and waste related costs and indirectly by increasing loyalty and reputation in the corporate world (Çankaya & Sezen, 2019). As the GSCM concept is gaining popularity the world is understanding its importance and realizing that companies which use Eco-efficient strategies can reduce carbon footprint and using nonrenewable resources will help preserve environmental sustainability. The recycling, reusing and refurbishing practices can help in reducing overall costs (Khan, et al., 2018).

Environmental management has a number of effects on businesses' financial performance. When waste, both harmful and non-hazardous, is eliminated as a component of environmental control, it improves the efficiency and productivity, lowers operating costs, and results in greater usage of natural resources. Yet again, as the company's environmental performance increases, it gains a significant marketing advantage, which boosts sales, expands market share, and creates new business opportunities. Companies that recycle post-consumer waste, minimise the damaging consequences of their activities and goods on the environment, and implement environmental management systems have the potential to grow their markets or oust rivals who do not support good environmental performance (Rao & Holt, 2005).

### ***2.2.2 Corporate social and environmental reporting***

CSER is an act of providing information regarding company's social and environmental practices to stake holders. Though the financial reporting act 1993 and companies act 1993 does not particularly requires CSER. Although companies are not mandating to disclose social and environmental practices but there are motivations behind this stance. Two basic motivations are genuine or ethical act of publishing information and secondly the purpose of creating an impression of concern for stakeholders about CSR. (Dobbs & Staden, 2016). the link between stake holders theory and CSER is to attract and retain stakeholders and to satisfy powerful stake holders by creating a perception of meeting their expectations (Ashfaq & Rui , 2019). To enhance the CSER in context of low carbon practices specifically in developing counties, firm's low carbon realization is crucial to enhance low carbon behavior. It encourages pro-environmental behaviours like technology adoption, original thought, and cooperation with stakeholders.(Zhou et al., 2019).

### ***2.2.3 Low carbon procurement***

Implementation of green practices in procurement function is called sustainable procurement (Thorlakson, 2018). These practices can be used as a powerful tool to control the impact on environment. Procurement provides the ground for greener products, therefore its essential to put more focus on low carbon procurement strategies by controlling the environmental practices of suppliers (Yee Foo et al., 2019). Earlier literature found that stakeholders put pressure on organizations for adoption of sustainability practices and firms need to collaborate with multiple stake holders for better supply chain performance. Sustainable procurement may affect stake holders other than suppliers such as, government, media, customers and NGO's (Thorlakson, 2018). Another important factor in LCP is reusing and recycling, a firms GSCM strategies need to be aligned with potential suppliers for better implementation. Top management support, suppliers training, technology involvement are the critical factors to be considered (das & Jharkharia, 2019). According to the literature analysis, the following elements were added to the LCP: Supplier training, technological improvement, the adoption of the ISO 14000 environmental management system (EMS).

### ***2.2.4 Low carbon product and process design***

(Liu et al., 2021) stated that Low carbon products are the future of the competitive economy, consumer awareness regarding products design and their effect on environment pushes companies to move towards the low carbon products and to make strategies for the process design to make sure the less carbon emission during the whole process while making sure the quality of product. Here government responsibility to introduce and impose strict policies to lower downs the effect of manufacturing process on environment. Imposing tax on carbon can increase the trend of re manufactured products and hence manufacturing companies can invest in low carbon technology to offset the effect of tax on budget. (Zhang et al., 2021). Implementation of technology innovation in manufacturing industries can increase the efficiency of resources utilization (Li et al., 2021).

### ***2.2.5 Low carbon manufacturing and logistics***

The performance of manufacturing industry can be enhanced by the adoption of technological innovation with a focus on sustainability (Li et al., 2021). Organizations are also required to pay attention on the transportation side of the business. It contributes up to 24% of carbon dioxide emissions to the environment and is continuously adding since 1990. Alternative options for the energy consumption such as hydrogen generated by steam methane reforming and electrolysis using renewable are the most cost effective and less harming for environment. (Fernández et al., 2019). As transportation related activities are rising over the period of time the need for transportation infrastructure planning is also essential and can play significant role in reducing GHG because the choice of mode depends on the available infrastructure (Romito & Guivarch, 2019). Governmental policies related to carbon tax and carbon quota on business's distribution activities to help in reduction of transportation routing cost and raw material cost are also needed to be in focus and research proves that Carbon quota subsidy is the most effective in both way reduction in distribution and carbon emission. (Li et al., 2020).

Following elements were included in the analysis of the literature in LCML: Adoption of low carbon technology by manufacturing industries, alternate option for energy consumption in transportation.

### ***2.2.6 Research gap***

Das & Jharkharia (2019), point out in study that they did not discover a substantial and favorable association between low carbon supply chain operations and a firm's EP. A firm's EP may be affected by other contextual factors as environmental communication, corporate social and environmental reporting, and corporate citizenship, according to some convincing theoretical considerations. Future studies could focus on these contextual factors to determine how organizations enhance their EP while implementing LCSCM techniques. Based on this Gap following research model were developed.

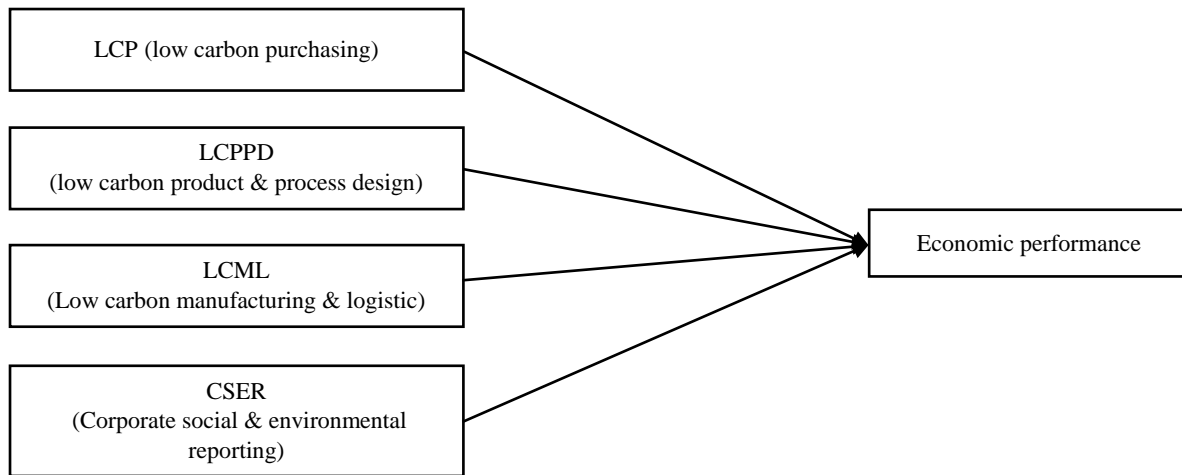


Figure 1: Research farm work (author's creation)

### 2.3 Hypothesis Development

H1: LCP has a positive impact on economic performance.

H2: low carbon products and process design has a positive impact on economic performance.

H3: LCML has a positive impact on economic performance.

H4: CSER has a positive impact on economic performance.

### 3. Methodology

As the research was based on theory testing, explanatory research method was used to test the impact of firm's sustainability practices such as LCP (low carbon purchasing), LCPP (low carbon product and process design, and LCML (low carbon manufacturing and logistics) and corporate social and environmental reporting on company's EP. Deductive approach was used in this research to develop and test hypotheses. The Design chosen for this paper was the "Regression Analysis" because in this paper the relationship and significance of LCP (low carbon purchasing), LCPP (low carbon product and process design, LCML (low carbon manufacturing and logistics) and corporate social and environmental reporting on economic performance of manufacturing firms in Karachi was measured. Data was collected through sampling by conducting survey of manufacturing firms from Karachi. Data was collected through the target population, sample size, and sampling technique (Das et al., 2021; Haque et al., 2021; Khan et al., 2021).

Data was collected from 151 responses, means sample size was 151 for this theses. The sampling technique implement in this paper was "Probability Sampling". In Probability sampling, method employed in this study was the "Simple Random Sampling" (Hashmi et al., 2021a, b; Rashid et al., 2021; Hashmi & Mohd, 2020). The instrument was planned to be flowed as a web-based survey. The survey was concocted on MS word and supported by the supervisor. Later Google a structure was utilized to create and gather a web-based connect circled to the respondents. The questions of survey for the research were taken on from the study by (das & Jharkharia, 2019; Paulraj et al., 2017). For the reliability or validity of the instrument, the data was analyzed statistically and practically so that the tools or instruments of this paper would be reliable or valid.

Following were the procedures of the data collection of this paper: Data on the impact of firm's sustainability practices such as LCP (low carbon purchasing), LCPP (low carbon product and process design, and LCML (low carbon manufacturing and logistics) and corporate social and environmental reporting on economic performance was gathered. Economic performance was the focus of this study. The co-relational category helped to identify the focus of this study. To collect

information, the source of data of this paper was “Survey Data” through a questionnaire. The statistical technique for this paper was “Regression Analysis” and it has analyzed through SPSS software and tests the hypotheses (Rashid, 2016).

#### **4. Data Analysis and Findings**

The analysis outcomes were derived from SPSS. The outcomes from SPSS include reliability testing, descriptive profile (demographic profile) for the respondents using frequency distribution and regression analysis.

##### **4.1 Descriptive Profile**

The objective of this section was to provide insight into the respondents' demographic information, comprise of gender, age, education level, and work history. In order to gain deeper understanding from the descriptive profile's conclusions, the results are presented in a combined table and graph. The number of replies against each demographic factor in the table provides insight into the study's target population. For greater comprehension, a thorough description of the pie charts for the various outcomes was given. The demographic findings showed that male and female respondents have almost equal participation in the study. Among 151 responses, 77 (51%) were men. 74 responses, or the remaining (49%), were women. A breakdown of respondents' ages into four groups (i.e., 20-30 years, 31-40 years, 41-50 years, and 51-60 years). The findings demonstrated that 2.6% of respondents were above 50 years old (i.e., 4 participants). Ages of the respondents ranged from 41 to 50 years for 16 respondents, 31 to 40 years for 41, and 20 to 30 years for 59.6% (90 participants). The findings showed that 61.6% of the participants who answered the questionnaire have a postgraduate degree, followed by 37.1% with a graduate degree and 2 participants (or 1.3%) with an intermediate degree. The findings from the participants' educational backgrounds help to determine that most of the participants were well educated and worked in the supply chain department of the manufacturing company. (i.e., 149 participants with graduation and post-graduation qualifications). Finally, the results showed that the respondents (a total of 88 participants) have experience of 0-5 years, followed by 40 respondents have 6-10 years' experience (26.5% of the respondents), 17 participants with 11-15 years' experience, and 6 with more than 16 years' experience in the manufacturing industry.

##### **4.2 Validation of Model**

The Cronbach's Alpha reliability test was performed on each variable using the Cronbach approach, and by combining 5 items (cumulatively), 0.965 worth of the Cronbach's Alpha was obtained. This value is higher than the benchmark (0.7), indicating that the reliability of the data and consistency of the model are excellent (Hashmi et al., 2020a, b; Rashid et al., 2020).

##### **4.3 Hypothesis Testing**

To accomplish the research goals and test the hypothesis, the researcher performed a regression analysis to analyze the data in great detail, to look into the impacts of LCP, LCPP, LCML, and CSER on economic performance, the findings of the regression analysis were presented. The goal was to put the hypothesis to the test and see if the variables had a relationship and were significant.

##### **4.4 Regression Analysis**

The hypothesis was examined using SPSS software and a linear regression test. The table:02 shows R-value considers the relationship between dependent and independent variables. For further investigation, a value that exceeds 0.4 is used. The value in this research is .897 which is absolutely fit. R-square displays all of the variation that the independent variables can explain for the dependent variables. A score higher than 0.5 denotes that the model is capable of determining the relationship. The value in this research is 0.805 which is good. The adjusted R square, or variance of the sample results from the population in multiple regression, demonstrates the generalization of the results. The



adjusted R-square should must be less than or equal to R-square. The value in this study is.800, which is close to.805, making it good.

The ANOVA result showed the degree to which the independent factors (low carbon purchasing, low carbon product and process design, low carbon manufacturing and logistics, and corporate social and environmental reporting) and dependent variable were significantly correlated (Economic performance). Results show that the association between variables was conspicuous because the sig. value is 0.000, which is less than 0.05. The F value represents a more accurate prediction of the variable by fitting the model after accounting for model flaws. For the F-ratio yield efficient model, a value greater than 1 is used. The value in the ANOVA table is 151.141, which is acceptable.

The above table:03 demonstrates that low carbon product and process design, low carbon manufacturing and logistics, and corporate social and environmental reporting (Independent Variables) have a remarkable impact on economic performance (Dependent Variable). For example, sig values of all Independent Variables were all below 0.05, indicating a notable relationship between our Independent Variable and the Dependent Variable. The beta coefficients have a t-value and significance of the t-value incidental with each, and they can be either positive or negative. The degree to which the outcome variable has changed for each unit of change in the predictor variable is measured by the beta coefficient.

**4.5 Hypothesis Assessment Summary**

It was intended that the research's hypothesis would be assessed utilizing quantitative evaluation and statistical analysis of the participant responses. A table highlighting the research's findings and conclusions was presented with findings from the hypothesis testing. In order to determine the results, the four hypotheses were reported along with the corresponding values from the regression model. These hypotheses listed in below table:05.

Table 05: Hypothesis

S. No	Hypothesis	Sig Value	Conclusion
H1	There is significance connection between low carbon purchasing and Economic performance	0.008	Accepted
H2	There is a positive relationship among low carbon product and process design and Economic performance	0.014	Accepted
H3	There is significance relationship between low carbon manufacturing and logistics and Economic performance	0.035	Accepted
H4	There is significance connection between corporate social and environmental reporting and Economic performance	0.000	Accepted

**5. Discussion**

The LCSCM, a developing concern under GSCM, is the subject of this study. However, because of the effects of GHG emissions, supply chain management now takes emissions-related issues into account. There are not many empirical studies on LCSCM. A LCSCM empirical examination is therefore required. Furthermore, manufacturing companies in Pakistan suffer a number of environmental difficulties, as a result of internal and external forces, yet they place little attention on environmental practices. Organizations may have fewer environmentally responsible behaviors for a number of reasons, including absence of strategic planning, regulatory rules, and environmental awareness. The study questions focused on topics like the significance of LCP, LCPPD, LCML, CSER and their effect on firm’s EP. In this investigation, it was postulated that LCP, LCPPD, LCML, CSER have a positive impact on EP. All of the hypotheses were found to be statistically remarkable. The evaluation of the results of the hypotheses is reported in the next sub-section.

In order to adopt eco-design and logistics management, green purchasing is seen as a strategic need. According to the study's findings, LCP significantly and favorably affected EP. Additionally, the study's results point to an improvement in EP with LCPPD. The NRBV theory states that

companies that employ product management and pollution avoidance techniques cut back on emissions and capital expenses. Developing products with fewer emissions over the course of their useful lives is part of the product stewardship strategy. A company's end-of-pipe standard techniques are also incorporated into the pollution prevention strategy through adopting recycling and reducing pollution, and developing new processes. In light of product stewardship and the ability to prevent pollution, LCPPD are dependent on EP. The implementation of LCPPD, as well as logistics and manufacturing techniques, was also thought to enhance a firm's EP in this study's hypothesis.

The study's conclusions, however, show that low carbon behaviors and EP have important connections. These results run counter to the earlier empirical findings of (das & Jharkharia, 2019), who claimed that there is no meaningful connection between EP and low carbon practices. According to this study, adopting low-carbon operational procedures will boost a firm's EP through enhancing its corporate image. However, adopting environmental policies is not the only factor in developing a positive business image. Building a better business image might be facilitated through environmental disclosures, corporate social and environmental publications, and corporate citizenship.

It's crucial to communicate with consumers about environmental issues in order to build a positive perception of your company. As a result, it is an additional aspect for raising public awareness and thus enhancing a company's market percentage. Furthermore, proactive corporate social and environmental reporting might affect how consumers view a corporation. The short-term financial performance of a corporation will suffer as a result of these environmental management measures because they need a firm's capital expenditure. In light of the conundrum of How much it will cost to be green and how much they can afford it, corporations frequently adopt a pragmatic approach. As a result, the study's discrepant results could be attributable to these contextual circumstances.

The results show empirical proof that LCP, LCPPD, LCML, and CSER are positively correlated with firms' economic success, demonstrating how using LCSCM enables a manufacturing to achieve a competitive edge. The aforementioned findings show how a company's competitiveness and economic performance are considerably increased by greening its inbound function, production, and corporate social and environmental reporting. Integrating suppliers into a sustainable supply chain is a crucial part of greening the inbound function.

Cutting down waste output at the source is greatly aided by requiring suppliers to have their own EMS and greening their business practices. As a result, the organization gains from producing fewer or no air emissions, hazardous waste (including non-hazardous waste), and solid/liquid waste, which results in reduced disposal expenses, abidance with regulations, less pollution, better capability usage, and enhanced economic performance. The reduction of pollution, a type of inefficiency, the re purposing of materials, and recycling programmers are all outcomes of greening manufacturing. This increases competitiveness and economic achievement by reducing the consumption of raw materials, water, and energy. Ecological management is highlighted as a budding component in the improvement of monetary results and competitiveness of the organization from earlier research by (Klassen & McLaughlin, 1996).

According to this study's findings, implementing LCSCM has the same potential to boost the economy. Businesses endeavor to become competitive in their company operations on both a domestic and international level, especially for this region from an industry aspect. According to these study results, if businesses make their supply chains green, they would not only save a significant amount of money on costs, but also increase sales, gain more market share, and take advantage of new market opportunities, all of which would boost profit margins and improve the company's economic situation.

## 5.1 Implications

The implementation of LCSCM methods and corporate social and environmental reporting is discussed in this study in terms of some useful findings. The study's conclusions show that LCPPD enhance EP. If manufacturing companies consider using a product design that has a lower environmental collision, uses a cleaner technology, recycle materials, and necessitates reinforcement, they will benefit from the decline in energy and resource utilization, and emission reduction. Manufacturing companies can benefit financially by consuming less energy and natural resources.

It may also be a trend for OEMs to offer suppliers technical assistance and other forms of support to help them reduce emissions in their operations. Small-scale manufacturers and suppliers may also be required by OEMs and regulatory agencies to embrace ISO 14000 and make contributions to LCPPD, manufacturing, and logistics management. The study's findings imply that LCPPD and LCML were significantly and favorably linked to EP. Findings would encourage manufacturing companies to implement LCSCM techniques and enhance CSER practices.

## 5.2 Limitations and Recommendation

The review has certain limitations. All of the information was initially acquired from the workers of manufacturing companies. Future analysts should take emerging industries like logistics services into account. Second, researchers ought to include other areas of Pakistan in the study's purview. since this study is focused on the manufacturing companies of Karachi. Thirdly, since just 151 employees were included in the sample, future researchers will need to increase the sample size to get accurate results. Aside from this, companies must focus on low carbon purchasing, low carbon product and process design, low carbon manufacturing and logistics, and corporate social and environmental reporting since it helps to obtain competitive edge and increase economic performance. Additionally, management is advised to make continual improvements to internal operational practices and activities because a focus on improvement can raise the effectiveness of sustainability contributions and further improve the organizational performance.

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