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AN STUDY ON THE IMPACT OF GREEN SUPPLY CHAIN MANAGEMENT ON PRODUCTION EFFICIENCY

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ABSTRACT:

This study aims to evaluate how the use of environmentally friendly methods in supply chain management affects performance. Data for this study were collected from a total of 275 respondents (response rate 91.67%) representing product managers in the Bangladesh economy. Purposive sampling was used to select the sample and structural equation modelling (SEM) was used to examine the data. We measure green supply chain management using four independent factors, including green purchasing, green logistics, interaction with customers, and green purchasing. The results show that three decisions of green supply chain management (green procurement, green transportation and green purchasing) have a positive impact on organizational performance. This research will enable organizations to use green business management to improve their business and environment.

Keywords - Green supply chain management; Environmental performance, Organizational performance, manufacturing organizations.

Introduction:

Businesses are rapidly adopting green supply chain management (GSCM) as an environmental management model to reduce negative impacts on business operations. The Global Supply Chain Management (GSCM) approach was developed to integrate supply chain management to promote environmental sustainability. This includes guidelines on the manufacturing process, supplier review and sourcing, environmentally friendly technology development, and distribution, production, and disposal of products for consumers (Endalaye, 2020). To solve organizational performance issues, companies have shown interest in using GSCM supply chain management methods in their processes (Khan, Anwar, and Khattak, 2021). Green supply chain management strategies have been shown to have a positive impact on both performance and cost performance in the industry (Wibowo et al., 2015). 2018). According to the results of other studies, it is difficult for managers to understand the advantages of GSCM technology (Kirchoff et al., 2015). Goyal et al. (2017) also acknowledged that there may be various barriers to their adoption. Green supply chain management is important to protect the environment throughout the company's operations and promote the growth of the company and the environment. Luthra, Garg, and Haleem (2016) believe that the main purpose of green supply chain management is to reduce the generation of waste and pollution, avoid the use of hazardous substances, and reduce the impact of the supply chain on the environment. The competitive business position has been achieved by making the company more efficient, which is a direct result of focusing on green supply chain management. Due to the needs of various stakeholders such as management, customers, competitors, non-governmental organizations (NGOs) and employees of the department company to solve and promote environmental problems, the importance of environmental problems for the company has become important. And people played an important role in production and services in the market (Ashraf et al., 2020). The ability of companies to reduce their environmental impacts is directly related to their ability to establish good relationships with suppliers (Le, 2020). Business organizations can reduce their impact on the environment in a variety of ways. These include planning and managing the green supply chain, modelling the business from raw materials to the end customer, and creating partnerships that bring the supply chain together. Environmental management is an important issue in the context of supply chain management (SCM) (Azevedo et al., 2011). SCM requires the integration and coordination of cooperation and effective collaboration among all businesses that are part of the supply chain (SC) according to the needs of end users. The terms “purchasing,” “production,” “distribution,” “marketing,” and “information” are all part of organizational functions (Green et al., 2012). This entire process must be based on the environment and the concerns of government regulators, customers, and competitors to limit environmental risks, reduce unnecessary public attention resulting from non-compliance with government fines, and improve supply chain performance. . Since there is competition in the supply chain (Bai and Sarkis, 2014) and the focal company is often responsible for the disadvantages of all companies in the supply chain, it is important to know and use GSCM strategies that ensure a competitive environment. Advantage. With this special aspect, the GSCM study has attracted attention in the academic literature (Kirchhoff et al., 2016).Green production, green distribution and green logistics are an important part of the green product management plan for business operations to increase efficiency. According to Green et al. (2012), GSCM processes should include internal environmental management, green information, purchasing information, customer participation, eco-design and investment support. Factors that influence the adoption of green practices come from the natural and manmade environment, both of which influence how much physical and human needs the business needs, One way in which the agent's behaviour can be influenced by the time, effort, and resources of the environment is by providing ownership of these different resources, including, yes, the

management of the salesperson used to perform the tasks, but there are obligations. . Certifications for environmental management standards, supplier audit questions, and waste from products are all resulting processes, organizations, or local facilities (Chandra and Tunmanyan, 2005). While minimizing the negative impact on the environment. In order to participate in the environmentally responsible purchasing process, companies need to evaluate the environmental performance of their suppliers and ask them to use processes that guarantee ecological quality during their production standard production. According to the definition of green purchasing as "an environmental strategy that meets the company's long-term supply, equipment or needs", the purchasing department voluntarily evaluates the level of waste in the company's operations (Zhu and Sarkis, 2007). Forward logistics involves the sale of spare parts, replacement parts and accessories, and capital equipment to repay the investment. This is due to the location analysis required to ensure that warehouses and buildings are safe for storage, transportation, packaging and distribution. The funds take some losses from the sale of inventory and excess equipment, as well as from the sale of scrap, junk and surplus equipment.

FRAMEWORK AND RESEARCH HYPOTHESES

Figure 1 is an illustration of the suggested structure for this piece of study. The model illustrates the influence that environmentally responsible business practices have on the overall performance of an organization.

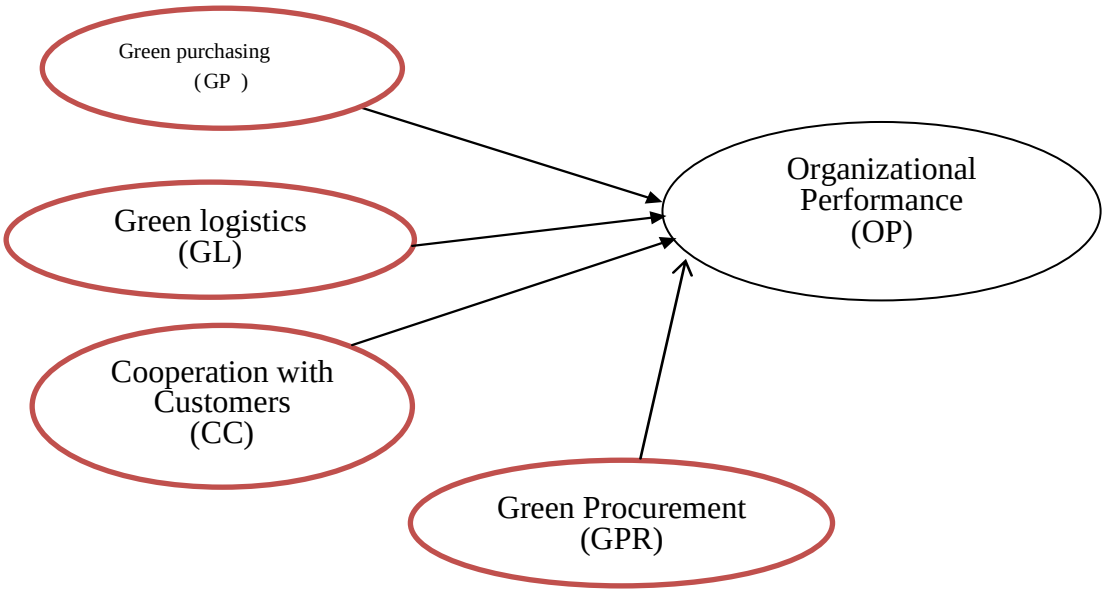

Figure 1. Research framework

The hypotheses of the study are as follows:

H1: Green purchasing significantly affect the organizational performance in the manufacturing sector.
H2: Green logistics significantly affect the organizational performance in the manufacturing sector.
H3: Cooperation with customers has significant association with organizational performance in the Manufacturing sector.
H4: Green procurement significantly affects the organizational performance in the manufacturing sector**.**

RESEARCH METHODOLOGY

The empirical study was conducted using self-administered questionnaires, usually collected through personal interviews with senior managers of manufacturing companies. Interviews are conducted to gather as much information as possible. Purposive random sampling technique was used to select 300 factories in the states of Gujarat and Surat. The result of this process was 275 valid responses to the survey (25 of which were disregarded due to some inconsistencies in the survey). A survey was created for this study. The data of this survey was collected in two parts. The first section collects information about the respondent's profile. Second, it uses a five-point Likert scale to evaluate three aspects of green purchasing, green logistics, green procurement, collaboration with customers, and three indicators of corporate performance. The Likert scale ranges from 1 (disagree) to 5 (agree), starting with 1 (disagree) and ending with 5 (agree) (Udriyah, 2019). The validity and reliability of the survey were evaluated with various tests. The model was validated with the help of structural equation modelling and the data was analysed with the help of Smart PLS version 3.

EMPIRICAL RESULTS

PLS-SEM is a complex statistical technique that requires identifying and estimating the relationships that exist between analysed variables. Research models and theories are evaluated using this tool. In this survey, business orientation and innovativeness are both considered independent factors.

Competitive advantage is thought to play a mediating role between freedom and prosperity. PLSSEM combines not just one but two different levels of analysis, namely the structural model and the reflect metric model. These standards are called standards and standards are measured accordingly.

Results of the Reflective Measurement Model

For the purpose of determining the amount of internal consistency, the factor loadings were analysed. According to Table 1, the vast majority of factor loadings are over the minimum permissible value of 0.7 (Hair, Hult, Ringle & Sarstedt, 2016).

Table 1: Outer loadings of the measurement model

No.	Items of the Constructs	Outer Loadings
GP1	The organization buys items with environmentally friendly labels.	**0.921**
GP2	The organization works along with its suppliers to reduce the amount of waste generated by packaging and packaging materials.	**0.862**
GP3	The firm investigates the environmental policies and procedures of its vendors.	**0.893**
GL1	Selection of the location of the warehouse/distribution centre requires environment friendly	**0.726**
GL2	The business is transitioning its warehouse and distribution facility to run on renewable sources of electricity.	**0.890**
GL3	The company is now using Optimization of the routes used by vehicles.	**0.872**
CC1	The company works closely with clients to develop environmentally friendly products.	**0.883**
CC2	The company collaborates with clients to achieve cleaner manufacturing.	**0.873**
CC3	The company works together with clients to develop environmentally friendly packaging.	**0.645**
GPR1	The successful implementation of procurement plans is directly correlated to green procurement.	**0.858**
GPR2	Sustainable organizational performance can be attributed to environmentally responsible purchasing.	**0.815**
GPR3	The practice of green procurement guarantees an assessment of the amount of waste that enters into company operations.	**0.822**
OP1	The costs have been brought down.	**0.882**
OP2	The overall quality of the products has been improved	**0.914**
OP3	Our company has increased the value that we provide to our clients.	**0.901**

Statistical analysis measures matching and separation is not valid. “Convergent validity” refers to “the extent to which measurements of a particular group converge” (Hair, Hult, Ringle, & Sarstedt, 2016). Cronbach's alpha was used to measure construct reliability. Table 2 shows that all alpha values are reliable and above 0.7 (DeVellis, 2003). Table 3 shows the consistency of the items, that is, Cronbach's alpha is the same as (0.7). AVE was used to measure usability. An AVE greater than 0.50 indicates effective use (Tenenhaus, 2005).

Table 2: Reflective Measurement Model assessment

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)

Green Purchasing	0.874	0.908	0.921	0.796
Green Logistics	0.776	0.795	0.871	0.693
Cooperation with Customers	0.727	0.773	0.847	0.653
Green Procurement	0.778	0.783	0.871	0.692
Organizational Performance	0.881	0.884	0.927	0.808

Fornell and Larcker (1981) say, "The variation that is typically shared between each construct and its measurements ought to be larger than the variance that is often shared between the construct in question and other constructs."

Table 3. Discriminant validity using the Fornell–Larcker criterion

	Green Purchasing	Green Logistics	Cooperation with Customers	Green Procurement	Organizational Performance
Green Purchasing	0.892				
Green Logistics	0.613	0.833			
Cooperation with Customers	0.555	0.684	0.808		
Green Procurement	0.589	0.622	0.719	0.832	
Organizational Performance	0.520	0.678	0.588	0.667	0.899

Off-diagonal regions show correlations, whereas diagonal regions show the square root of the average variance extracted (AVE).

Hypotheses testing

Hair, Hult, Ringle, and Sarstedt (2016) recommend reporting the sign, magnitude, and significance of path coefficients to test the model and test hypotheses. The reason is the path coefficient values and their t. Once the value was reached, 5000 resampling were performed using Smart PLS software to bootstrap the entire sample. This yields path coefficient values (Hair, Hult, Ringle, & Sarstedt, 2016). The data support most of the hypotheses in this study. In particular, green purchasing (β=0.138, t=3.837), green logistics (β=0.408, t=5.483) and green purchasing (β=0.380, t=6.540) have a positive effect on organizational performance (Table 4).). Supports H1, H2 and H4. On the other hand, customer involvement (β=0.015, t=0.198) has no effect on organizational performance. It refutes H3.

Table 4: Hypothesis testing for the effect of independent variables

	Path coefficient (β)	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**

Green Purchasing -> Organizational Performance	0.138	0.036	0.046	3.837	0.038
Green Logistics -> Organizational Performance	0.408	0.406	0.074	5.483	0.000
Cooperation with Customers -> Organizational Performance	0.015	0.022	0.074	0.198	0.843
Green Procurement -> Organizational Performance	0.380	0.378	0.058	6.540	0.000

DISCUSSION

The general purpose of the study is to determine whether the role of environmental responsibility in the supply chain management process can improve the business. Researchers have developed conceptual models and theories considering different aspects of green supply chain management. Carter et al. (2000) investigated the impact of green purchasing decisions on a company's marketing and green performance. They concluded that due to the good performance of green products, pollution costs are not only higher, but also improve environmental performance and reputation in the business community. Large businesses have adopted better environmental business behaviour than small businesses. As people become more environmentally conscious, these types of shots become more important to the company's success. However, Zhu and Geng (2005) conducted a case study in China to examine the relationship between green purchasing and financial sustainability. Despite their expectations, they found that green sourcing had a negative impact on the financial performance of Chinese companies. Additionally, the Chinese government does not have specific environmental regulations, but it would be a good development for Chinese companies to adopt a green culture due to consumer demand and fear of losing business internationally. However, in the long run, environmental behaviour gives companies a competitive advantage, attracts good customers, creates a good image and reputation of the company in local and international markets, and provides actual returns. Environmentally conscious companies have access to a wider international market to sell their products than other companies.

The impact of green purchasing on environmental protection laws, affecting the operations of companies that must comply with these laws, needs to be investigated. Some authors advocate the creation of various technologies that focus mainly on distribution through organizational and operational management (Sheu et al., 2005; Zhu and Sarkis, 2004). According to previous studies, the green approach can be beneficial for companies and organizations because it can utilize limited, specialized and complex resources that help organizations differentiate themselves from the competitive market (Roslender and Hart, 2002). In today's world, where the service sector is rapidly expanding, important research needs to be conducted on the service sector and its impact on the environment. Manufacturing is generally considered to have a greater impact on the environment than the service sector. But most economic services, including transportation, use a lot of natural resources and therefore cause a lot of pollution. This is an issue that needs to be addressed to improve environmental management (Sharma, 2013).

In order to improve the business's ability to promote environmentally friendly practices, many companies around the world have adopted green practices, and management forms a significant part of their business. This trend is especially prevalent in the manufacturing sector (Quyen, 2020). The adoption of environmentally friendly practices is linked to factors such as top management support, information and communication technology, consumer choice, and compliance by authorities to protect the environment. One of the biggest concerns of business is overall quality control, and many different manufacturers have designed and developed their own devices to enhance their business strategies. This makes employees productive and gives them confidence in their ability to meet the needs and interests of their respective companies (Tan et al., 2019).

CONCLUSION AND POLICY IMPLICATIONS

The report explains green practices and how they affect corporate performance. Implementing a responsible environmental policy is a necessary step in promoting and sustaining excellence. Organizations operating in the context of most manufacturing companies work according to government-imposed regulations to protect the environment, ensuring and managing green practices that will influence the success of competition to meet the needs and requirements of major customers.

According to eco-design standards, manufacturers are required to produce products that reduce the raw materials and energy used in production, facilitate the reuse, recycling and recycling of materials and equipment, and prohibit the use of hazardous chemicals. To achieve the best results in this field, researchers recommended continuing the cooperation of different levels of management in order to use environmentally friendly products and find the necessary raw materials for the production of goods. The government should implement stricter laws and regulations, pay attention to environmental protection, increase investment in green supply chain research, and continue to develop safe and environmentally friendly design and packaging.

Most studies use large companies as examples to obtain information. It is clear that we must first ensure that large businesses adopt GSCM so that small businesses can follow it. There is a perception that small businesses follow the standards of big companies. As the concept of GSCM expands and

large businesses adopt GSCM, it is now important to evaluate the impact of adoption on small businesses. Small businesses need to review and participate in environmental protection to support and contribute to a more sustainable process.

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APPENDIX Questionnaire

	Demographic Information
1	Name:
2	Position:
3	Age:
4	Year of the establishment of your organization:
5	Location of the organization:

Rating level

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Green purchasing	Items	1	2	3	4	5
1)	The organization buys items with environmentally friendly labels.					

2)	The organization works along with its suppliers to reduce the amount of waste generated by packaging and packaging materials.					
3)	The firm investigates the environmental policies and procedures of its vendors.					
Green Logistics						
1	Selection of the location of the warehouse/distribution centre requires environment friendly					
2	The business is transitioning its warehouse and distribution facility to run on renewable sources of electricity.					
3	The company is now using Optimization of the routes used by vehicles.					
Cooperation with Customers						
1	The company works closely with clients to develop environmentally friendly products.					
2	The company collaborates with clients to achieve cleaner manufacturing.					
3	The company works together with clients to develop environmentally friendly packaging.					
Green Procurement						
1	The successful implementation of procurement plans is directly correlated to green procurement.					
2	Sustainable organizational performance can be attributed to environmentally responsible purchasing.					
3	The practice of green procurement guarantees an assessment of the amount of waste that enters into company operations.					
Organizational Performance						
1	The costs have been brought down.					
2	The overall quality of the products has been improved.					
3	Our company has increased the value that we provide to our clients.					