OPEN ACCESS

Saudi Journal of Business and Management Studies
Abbreviated Key Title: Saudi J Bus Manag Stud
ISSN 2415-6663 (Print) |ISSN 2415-6671 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article

# Assessing the Impact of Green Supply Chain Management on Environmental Performance of Bangladeshi Manufacturing Firms

Abdullah Mohammad Ahshanul Mamun[1*], Kowshic Chowdhury[2], Masoud Ahmad[3], Syed Mohammad Hasib Ahsan[4]

[1]Department of Business Administration, International Islamic University Chittagong, Bangladesh
[2]Brac Business School, BRAC University, Bangladesh
[3]Department of Business Administration, International Islamic University Chittagong, Bangladesh

**DOI:** 10.36348/sjbms.2021.v06i06.004 | **Received:** 12.05.2021 | **Accepted:** 20.06.2021 | **Published:** 23.06.2021

***Corresponding author:** Abdullah Mohammad Ahshanul Mamun

## Abstract

***Purpose:*** Nowadays, environmental sustainability is a challenge for the enterprises of the whole world. This paper aims to assess the impact of green supply chain management on the environmental performance of Bangladeshi manufacturing firms. ***Design/methodology/approach:*** This study is designed to assess the impact of Internal Environmental Management (IEM), Green Purchasing (GrP), Customer Cooperation with Environmental Consideration (CO), Eco-Design (EcD), Investment Recovery (InR), on Environmental Performance of Bangladeshi manufacturing firms and also the relationship between the dependent and independent variables. Statistical analysis has taken place by SPSS, and the elements are the collected data by survey questionnaires from 48 Bangladeshi manufacturing firms of several industrial sectors. Correlation, regression analysis, reliability test, etc. are taken place in data analysis. ***Findings***: In Bangladeshi manufacturing firms at present green purchasing has a standard impact on environmental performance. But the others have a minimum impact on environmental performance where there harms customer co-operation on environmental performance. ***Research limitations/implications****:* The study is limited with a little amount of participants. In some cases, there has no proper existence of the full supply chain department. Future studies can be enriched with identifying mediating and moderating relationships, and some other variables like the Cost-effectiveness of GrSCM can be included. This paper can keep an important role in green supply chain management of Bangladeshi manufacturers and the research about this. ***Practical implication****:* Collaborative efforts between the Bangladesh government and Bangladeshi manufacturers can establish a gorgeous image in green supply chain management, and the environmental performance can be ensured and enriched. The base of the supply chain also needed to be established fully in Bangladesh. ***Originality/value****:* This is the study where the overall situation of green supply chain management of Bangladeshi manufacturers and its impacts on environmental performance has been assessed, and also a maximum industrial sector has been covered as much as possible.

**Keywords**: Paper type- Research paper.



## INTRODUCTION

Being Green has a positive impact on the environment also for business (Holdway, Walker, and Hilton, 2010). Green supply chain management means designing the entire supply chain system to decrease the pressure of industrial and operational or managerial activities on the environment. This supply chain management is the entire system of a firm that starts from picking customers' demands and ends by fulfilling the demand in a cost and time-effective way. There have several functions in this whole system, like Procurement, Inbound logistics, Warehousing, Production or Manufacturing, Outbound logistics, Distributors or Third parties, Final Customers, etc. This is a collective form of all departments of a firm.

The necessity of supply chain management will be essential for the growing economy like Bangladesh to fill up the demand gap of different industrial and agricultural products and services effectively, efficiently, and environmentally friendly. For ensuring the aim of maximum profit in the present

competitive world market, this supply chain is a key for every member of global or local business.

Our government is thinking a lot about the improvement of supply chain management's present condition of Bangladesh. Minister of state of labor ministry Monnujjan Sufian has requested ILO to conduct a dialogue about "Global Supply Chain Management" to develop SCM's present situation at developing countries like us on 5th November 2019. Supply chain management needs to be adopted at first at the managerial level of a firm then it is needed to be spared downstream and upstream. Our honorable Prime Minister Sheikh Hasina has said at the opening ceremony of international commerce fair, 2020 that the present business world is struggling. We can say that without sustainable supply chain management practicing, no one can prosper perfectly in this present business world.

The environment-related problems are becoming the center of focus of the various general group of people and the organization's stakeholders, which are affecting both national and international co-operation and also creating conflicts in different aspects (Chung-Chiang Chen, 2004). At the same time focus for environmental sustainability has got a global concern in various environmental organizations. China is the country where GrSCM is a great issue for several companies (Zhu. Sarkis, Geng, 2005). Air Quality Index ranks Dhaka's pollution 3rd worst in the world in recent years. For various types of environmental change, the world is thinking a lot about every sector's greenness or sustainability. Business is one of them and supply chain management is fundamental for the effectiveness of business. The adoption of sustainable supply chain management can be expected for resulting in improved environmental representation measured by reduction of air emission, solid waste, cleaner production, effluent waste, and consumption of hazardous or toxic materials (kneeth W. Green, 2012). It is fundamental for the industries to offer environment-friendly products or services in the present business world or marketplace. Because industries are getting pressure from both sides like; customers and the government to manufacture environment-friendly products and are conscious about this matter. (Shaikha Al Zaabi & Noura Al Dhaheri & Ali Diabat, 2013) The world has come under one roof at the Madrid Climate Change Conference-cop 25 on 2-16 December 2019 in Madrid, where an ultimatum has come from the experts about the severe negative condition of the world's climate changes. Our two big cities named Dhaka and Chattagram have been selected as the most polluted cities in Bangladesh.

For the changing mode of world climate, the business world is impacted at a significant level. So that it is high time to think a lot about sustainable or green supply chain management. It is applicable also for Bangladesh. The organizations are implementing environment-friendly systems like recycling and integrating the information system to smooth the supply chain functions. Sustainable supply chain management helps increase environmental performance throughout the system by buyers' and suppliers' long-term and effective relationships. Nowadays, customers and governmental entities are demanding that processes, products, and services needed to be environment-friendly, and the important matter is managers identify and implement environmental sustainably that extend throughout the supply chain (Kneeth W. Green, Pamela J. Zelbst, Jeramy Meacham, Vikram S. Bhadauria, 2012).

## LITERATURE REVIEW

The literature review comprises prior research conducted related to the concept of green supply chain management, the environmental performance of Bangladeshi manufacturing firms. In this part of the study, the effort was given to discover the relationship between green supply chain management practices and environmental performance. Various published articles, books, newspapers related to green supply chain management have been reviewed.

### Environmental performance

Environmental performance is a matter of concentration of managerial bodies for contractual consent, public deliberation, and competitive advantages (Josep, 2006).

Environmental management or performance has started getting more important over the last decade because they face tenderness from different stakeholders like final consumers, industrial customers, suppliers, and financial institutions in supply chain management (Henriques and Sadorsky, 1999). The adoption of GrSCM generally expected to improve environmental performance measured by reduction in air emission, reduction of wastewater, solid waste, consumption of toxic materials, etc. (Kenneth, Pamela, Feramy and Vrom S. 2012). The environmental performance or corporate environmental performance generally focuses on the result of managerial activities with a concentration on the natural environment (C. Trumpp, J. Endriat, C. Zopf, E. Guenther, 2013). Under environmental performance index ranking 2019, Bangladesh stays at number 179, where India and Pakistan are staying at the numbers 177 and 169. Organizations have started recognizing environmental management as fundamental for ensuring competitive advantage (Wagner, 2005). At present this is extensively recognized that organizations have to decrease their environmental impacts caused by their operational or managerial activities or issues and the earlier industrial environmental focus on so-called End of Pipe solution like Solutions for reducing the number of hazardous or harmful emergence and elements from production activities have shifted toward a more prohibitive system in which the focus is on the issues

related with the environmental problems (Johansson, 2002). This is usually realized that GrSCM can improve or promote skill and synergy among business stakeholders and their leading organizations to increase environmental performance, decrease waste, and earn cost-effectiveness (Rao and Holt, 2005).

There have several factors for which supply chain management has gotten importance nowadays, like Globalization, Increasing pressure for reducing lead time, Increasing customer service focus and this can be defined as the integrated system for controlling and planning the flow of materials from suppliers to final users or consumers (Lisa M. Ellram, 1991). A supply chain is a devoted way taught to discover the tools and techniques to increase the firm's operational activities and efficiencies with the help of delivery channels that must be designed internally and externally for supporting and supplying the existed corporate products and services offered to customers (Andrew Cox, 1997a). There needs cross-functional integration for successful supply chain management, and marketing must play an important role (Douglas M. Lambert and Martha C. Cooper, 2000).

**Supply chain management**

Sunil Chopra and Peter Meindl have said their books named " SUPPLY CHAIN MANAGEMENT, Global addition" at page 13 that a Supply Chain is the combination of various activities of all directly or indirectly involved parties in fulfilling customers request and they also noted some parties involved in SCM like Customers, Retailers, Wholesalers or Distributors, Manufacturers, Components or Raw material suppliers. That means in the present world SCM is a system of working effectively from suppliers to the final consumer. Supply Chain Management is the collective form of all entities involvements in fulfillment of customer requirements, including suppliers, logistics, third party involvement, and consumers themselves (Andrew Cox, 1999).

J.R. Tony Arnold, Stepen N. Chapman, Lloyd m. clive have said in their book named " MATERIAL MANAGEMENT" on page 6 that SCM is the collective form of all activities and processes to supply a product or service to the final consumer. A supply chain may involve several parties like Suppliers, Manufacturers, Wholesalers or Distributors, Retailers, Consumers, etc. We notice some exceptional sectors where there have more or fewer parties involved in SCM other Like RMG. A theme of collectivity is coming again and again when we are discussing SCM. There were conflicts among the different parts of organizations, like Marketing, Finance when the organizations followed the traditional system. One fundamental way to resolve the conflicts is by providing a system of combination among these functions that means SCM (J.R. Tony Arlond, Stepen N. Chapman, Lloyd M. Clive, book name Materials Management page no.10).

**Green supply chain management**

**Definition from the sustainability and green literature**

Green supply chain management is now a popular concept in the South East Asian Region (Rao and Holt, 2005). Green supply chain management can be defined as the integration of environmental thinking into supply chain management, which covers designing company's products, sourcing, and volition of required materials, manufacturing processes, delivering the final goods or services to final consumers and also the management of the goods after the useful life of the products, that means the end of life management (Srivastava, 2007). It can also be described as an innovative way in which supply chain and industrial purchasing are integrated with the environment (Ken Green, Barbara Morton, and Steve New, 1996).

The quality revolution has taken place in 1980 and the supply chain revolution in 1990, which means it is sure that the maximum practice called for integrating environmental operation with a running operation (Samir K. Srivastava, 2007). Green supply chain management (GrSCM) has risen as a balancing path or tool for this present global business environment (Narasimhan and Carter, 1998).

At least from a suture of decades, green supply chain management has become a developing topic (Qinghua Zhu, Joseph Sarkis, Kee-hung Lai, 2013). Changing mode of world weather, inanition of environmental resources, environmental contamination, etc. are playing as vital roles for global exertion to greening the supply chain (Hassan Younis, Balan Sundarakani, and PrakashVel, 2015). In 1997 this is stated by Ehrenfeld and Lennox that the successful organizations with the sustainability issues have some common things or matters among them, like: The organizations are structured with a system in which the environmental information generally transferred as the issue of interest of the organizations for the development of themselves.

Sustainability means the considered situation of environmental factors and social aspects in supply chain management (Marcus Brandenburg, Kannan Govindan, Joseph Sarkis, Stefan seuring, 2013). GrSCM develops competency and synergy among business stakeholders to the point of increasing environmental performance, waste minimization, and cost-effectiveness (Rao and Holt, 2005).

Nowadays, the ecological and environmental impacts of products are turning into a matter of thinking. Because issues like global warming, ozone layer depletion, environmental pollution, etc. are the most discussed issues in this present business world (Ehsan Nikabakhsh, Green Supply chain management). Customer and Governmental authorities or entities are demanding that the processes, products, and services

need to be environmentally friendly, and an important factor is that managers are identifying and implementing environmental sustainability practices (Kenneth W. Green, 2012). Kenneth, Pamela, and Vikram in 2012 are proposing that effective implementation of GrSCM practices like Green Purchasing, considered a systematic environmental approach and as a great environmental innovation (Article in Management Research Review.Martch2010). A question is arising about the term cost and economical condition when the term adoption of GrSCM is coming. Alvaeez Gil *et al*. (2001) has indicated a positive relationship between GrSCM and organizational, economic performance. A few studies show that GrSCM can ensure economic performance. GrSCM is an effective system or path to achieve environmental goals of affirming, which is mostly used term in this global world. GrSCM is a combination of certain transactions like Product design, Delivery, Raw material selection, and Waste management with a point of view of environmental consideration (Samir K. Srivastava). " GrSCM is not just about considering the environment in Supply Chain decision-making processes, but also about productivity and making more profit " (Ehsan Nikbakhsh, Green Supply Chain Management theory, and practices, December 2013). Sustainability concept is adding day by day with various fields like economy, technology, agriculture, SCM, etc. (Ehsan Nikbakhsh, Green Supply Chain Management theory, and practices, December 2013). Sunil Chopra and Peter Meindl say in their book named “SUPPLY CHAIN MANAGEMENT" on page 47 that “Issues related to the environment and sustainability have grown in relevance and must be accounted for when designing supply chain strategies". The academic and corporate focus in Sustainable supply chain management is raising considerably in the present years or the present global world (Stefan Seuring, Martin Muller12 JUNE, 2008). Adopting environmentally responsible supply management has taken as a fundamental objective of firms in chapter 1 page 5 book named " Procurement Principles and Management" by Peter Bally, David Farmer, Barry Crocker, David Jessop, David Jones. Operations, Purchasing, and Supply Chain Managers are introducing environmental and social issues (Stefan Seuring, Martin Muller 12 June 2008). Green supply chain management (GrSCM) = Green Procurement + Green Production / Material Management + Green Marketing / Distribution + Reverse Logistics (Aref A. Hervani, Marilyl M. Helms, Joseph Sarkis, 2005). Environmental concentration in procurement and supply chain management deals with an analects of matters, like who find below.

- Pollution of air, water, ground, and noise.
- Using, storing, and arraying hazardous or toxic elements of waste in production.
- Managing wastewater.
- Working environments with unhealthy and unsafe conditions.
- Finished products without safety.
- The harm of plant and animal life by industry.
- The system of recycling access inventories, equipment, and manufactured scrap.
- Recycling of scrap or obsolete end products.
- Planning of production or manufacturing for material upkeep, reuse, and recycling.
- Redemption and restitution of vicious resource or land by industrial activities (George A. Zsidisin, Thomas E. Hendrick, 1998).

Green supply chain management drives, practice and hypothesis selection. In Southeast Asian states GrSCM is getting importance and popularity day by day (Rao and Holt, 2005). For achieving Sustainable development goal companies need to be redesigned with their products and also need to take new tools or techniques for activities and processes, though this new adaption changes the business norms of supply chain management (Nidumolu *et al*., 2009).

Interest for sustainable supply chain management is increasing day by day in academic and corporate level (Stefan Seuring a, Martin Mu¨ller b, 2008). Sustainable development and sustainability have most popularly defined as meeting the needs of the present generation without considering the needs of future generations (Joseph Sarkis, 2001).

Suppliers, central companies, and customers are connected by information, material flow, and cash flow. In line with the final product's value comes the sustainable and social burden loaded during different production (Stefan Seuring, Martin Mu¨ller, 2008).

Sustainable Supply chain management is an integrated form of internal environmental management and green information from the market or external environment. There is a necessity for more pragmatic research to definitively establish the impact of environmental sustainability arrangements on organizations' competitiveness (Kenneth W. Green, 2012).

**Internal environmental management**

Internal environmental management means the environmental management system at the top of any organization's core managerial level. This is a core for green or sustainable supply chain management and, of course, for firms' gorgeous environmental performance. Because decisions and instructions for every product’s standard and production procedures are generally designed and come from firms' higher managerial authority. Various scholars have discussed a very positive relationship between the internal management system as a tool for GrSCM and better environmental management. Like: Business procedures which are must be compacted and harmonized include procurement, production, distribution, logistics and virtual

communication and in which there have strategic obligations that must be classified include customer focus, efficiency, quality and responsiveness (Zelbst eat all, 2010) and recently environmental sustainably for which internal environmental management is fundamental. The collective form of managerial activities to reduce the products and process that create environmental burden helps decrease unimportant wastage and increase the overall supply chain (Seuring and Muller, 2008) in which environmental performance's efficiency is fundamental. Ethics creates moral thinking in consideration of the natural environment (Rudolf, Cristina Gimenez, 2011). Environmental management system or internal environmental management structured by a collective form of internal policies, measurement, and design and implemented activities (Coglianese and Nash, 2001) affects the whole firms and their relationship with the naturalistic environment. (Icole Darnall, Jason Jolley2 and Robert Handfield, 2009). As a result of the adoption or introduction of ISO 14001 thinking for the corporate environmental management system has increased (Melnyk, P. Sroufe, Calantone, 2003). There have needed a unified effort with the reciprocal cooperation of all members of the Supply Chain Management department to develop environment-friendly processes, services, and products (Green Jr, Zelbst, Meacham, and Bhadauria, 2012). For assuring pollution preventive situations by taking early compliance of firms created from a firm's proactive environmental approaches and reflecting evolutionary environmental strategy (Menguc, 2010), internal environmental management is a great fact for perfect environmental performance.

**That means this can say that**

**$H_1$** Internal environmental management fruitfully impacts environmental performance.

**Green purchasing**

Purchasing means getting or earning needed goods or materials for firms by perfect sourcing. There has a speech like 'If one can buy profitably, then he can sell profitably'. That means the efficiency of the supply chain depends on efficient procurement at a large scale. Like this, Green or Sustainable Supply Chain Management depends upon green procurement with a large portion because it is a fundamental part of the whole Supply Chain. Procurement also related to suppliers. If procurement gives restrictions to the suppliers for the green supply and after getting materials with greenness or green production, it will help the firms for successful environmental performance. The authors are saying about this matter.

K. Green, B. Morton, and S. New, 1996 in their research on purchasing and environmental management have created a chart in which they tried to present the role of purchasing for effective environmental management which is fundamental for effective environmental performance.

Like: They have pointed out six factors, first one is Design and Specification in which they recommend the environmental impact management in purchasing and the second one is Qualification and Tendering which means thinking about the supplier's environmental qualification and appraisal system, the third one is Purchasing that means buying the desired goods or raw materials with the intension of greening the overall system, then Receipt and Distribution which included product handling and logistics management with sustainability and then the Use of Disposal which contains recycling, waste management, and reuse and these are fundamental for effective environmental performance, the last one is Accounting which means full cost accounting and whole life accounting about the cost for green issues adoption. That means green purchasing and environmental performance are interrelated with each other. Department of purchasing can keep its fruitful contribution to actual prevention (A. H. Verschoorl and L. Reijnders, 1997). The transmission of environmental pressures generally impacted by the supply chain and connected by the purchasing function, likely to be realized eventually n the firm's research and development (Ken Green Barbara Morton and Steve New, 1998). Purchasing of products which are designed to qualitative or quantitative waste and outflow reduction can help to enrich the environmental performance of itself (A. H. Verschoorl and L. Reijnders, 1997). The green supplier that means this can be said that

**$H_2$** Green purchasing helps to be successful at the environmental performance of organizations.

**Customer co-operation with environmental consideration**

Customer co-operation with environmental consideration is fundamental for successful GrSCM and also for effective environmental performance. Suppose customers give eco-design, cleaner production, and green packaging requirements. In that case, the firms will think for the greenness of whole procedures and products and it will play an important role in the firm's environmental performance. To become a supplier or exporter of foreign or global customers, the Chinese enterprises need to address and overcome the green barriers and strengthen their global competitive adequacy (Deng and Wang, 1998), which means customer co-operation with environmental consideration is fundamental for environmental performance. Based on 333 questionnaires earned from an export-dependent city in China, two customer relationships or co-operation factors have identified and these are trust and relationship and reciprocity and co-operation (Zhu, Feng, Choi, 2017). Customer awareness would advance in a very fast way in this era (Charter and Narasimhan, 2000). Green supply chain management combats for environmental sustainably and internal health by using the ability of self-correction

based on information from the external environment (Vachon, 2007).

GrSCM encloses different ecologically responsible programs designed to incorporeal environmental consideration for planning at every stage of corporation's material management, logistics functions especially at customer's need fulfillment (Ricky, Hongwei, Hing and Willam, 2012) that means the customer co-operation with environmental consideration. Various consumer surveys and public opinion polling suggest that there has extensiveness in environmental consciousness about a product into customers, increasing day by day (Veronica, William, and Paul, 1996). The thrust for satisfying customer's environmental needs has motivated various business firms for the adoption of sustainable or environmentally friendly production and marketing (Suku, Michael, John & Shadwell, 2006) which helps the organizations for perfect environmental performance. Manufacturers face pressures from various stakeholder groups, including end or final customers who prefer to consume or buy eco-friendly product designing like reusable, recoverable or recyclable (Suhaiza, Chin-Chun, and Keah, 2011) that means customer co-operation for eco-design.

**$H_3$** Customer co-operation with environmental consideration is so much important for effective environmental performance, but it can be varied by country to country or economy to the economy.

**Eco-design**

Eco-design means designing the products to recycle, reuse and recover the material or parts, etc. The intention of reduced consumption of hazardous or toxic materials is a component of eco-design.

Eco-design can be described as the thinking of designing products to identify the environmental aspects of product over its lifetime and the integrated form of these aspects for product development that means the green design of products (Zailani, Eltayeb, Hsu, and Tan 2012). Eco-design is generally used to support the upstream and downstream manufacturing systems in GrSCM (Yudi Fernando and Nijo Chein Rou, 2017). Green products have gotten popularity in the apparel and textile industry (Guo-Ciang, Jyh-Hong & Ping-Shun, 2012) which means the eco-design is getting popularity within the whole world. Eco-design is the proactive pathway of environmental management that aims to decrease the product's total environmental pressure (Daniela, Evelyn, Ame´ rico, Aldo, Henrique, 2010). In the broad sense, eco-design reduces the impact of the overall life cycle when this is maintaining performance and value for money and packaging. This eco-design means to design for proper use of the resource by minimization of waste and maximum use.

Eco-design is the system that includes priorities of sustainability of humans, together with a corporation or business interrelation. The aim or objective is to enrich the product development processes or methods for reducing environmental or natural loads (Karlsson and Luttropp, 2006). The increased attention of academic and technological pressures influences the organizations to be green or eco-designed in environmental performance (Qinghua, Joseph, and kee- hung, 2010). The product plan has a higher level of significance of influence on the environment (George A. Zsidisin and Thomas E. Hendrick, 1998). Environmental nobility begins at the time of products and process design (R.D. Klassen and C.P. McLaughlin, 1993). Industrial ecology is becoming a flourishing concept for the induction of ecologically sustainable industrial development of the industrial area of china (Qinghua Zhu, Raymond P. Cote, 2004). Manufacturers are facing pressures from various stakeholder groups including final customers who prefer to consume or by eco-friendly product designing, like Reusable, Recoverable, or Recyclable (Suhaiza, Suhaiza, Chin-Chun and Keah, 2011). The starting point of the eco-design is the early stage of product and process design, integrating environmental thinking to be a balanced situation of environmental performance with the traditional requirement (Bovea and Pérez-Belis, 2012) that means the eco-design is positively related with effective environmental performance.

**$H_4$** Eco-design has a positive relationship with environmental performance.

**Investment recovery**

In this part we have taken some factors like sale of excess inventories or materials, sale of scrap or used material, and sale of excess or used material of firms. By these types of sales, organizations will recover their investment and it plays a helping tool. This is fundamental for any organization that is adopting GrSCM to ensure a balancing mode between environmental quality and economic progress (Cheng, Suhaiza, Sieow, Mohd Rizaimy, 2016) and investment recovery is a tool for economic growth. Investment recovery needs the sale of excess inventory, scrape, and used materials and excess capital equipment (Zhu *et al*, 2008a). Investment recovery related with the finding of the alternative path of using the products or assets which have no longer use in the firm and the objective of investment recovery is to retain the largest financial recovery with the help of disposal or sell of scrap items (George A. Zsidisin, Thomas E. Hendrick, 1998). So that it can be said that

**$H_5$** Investment recovery can be a tool for efficient environmental performance.

# METHODOLOGY

**Questionnaire development**

To find out the practice of sustainable supply chain management among Bangladeshi manufacturers in different industrial sectors, we have developed a questionnaire including sustainable supply chain management practice with a focus on solid waste management, performance improvement, and sustainable supply chain management drivers and barriers.

Using the scale from a previous study (Zhu, Gangs, Fujta, 2010) we have developed questions on GrSCM practices and performance. Sustainable or Green supply chain management practice includes 21 questionnaires, covering internal environmental management, green purchasing, and customer co-operation with environmental concern, eco-design, and investment recovery. Questions were answered by using a five-point scale (1= no consideration, 2= a little consideration, 3=moderate, 4= practicing, 5= actively practicing). A total of 7 questions about environmental performance were answered by using another five-point scale (1= not at all, 2= a little bit, 3= to some degree, 4= relatively significant, 5= significant).

As introduced before, environmental image and thinking + social responsibly are two mold pressures among Bangladeshi manufacturers. Laws are compelling pressures. The willingness with environmental laws and regulations can be taken as normal and expected practices from maximum respondent manufacturers. For every manufacturer financial benefit is an important issue. So that we have included the statements like Sales of scrap, Investment recovery, etc.

**Data collection and sample statistics**

Surveys are used to reach a wide audience and enable the researchers to survey several variables or issues (Cresswel, 2003). Data are collected from various supply chain managers, MDs, Procurement officers, etc. by questioner surveying. Interviews have been taken by the interviewers and have been given by the honorable interviewees. This has taken place by physical visiting or by virtual meetings with the interviewees. Maximum interviews have been taken physically and some by virtual media, like phone calls.

**Table-1: Shows the distribution of respondent in terms of industry**

| INDUSTRY | NUMBER | PERCENTAGE |
|---|---|---|
| Steel | 5 | 10.4% |
| RMG | 9 | 18.8% |
| Shoe | 1 | 2.1% |
| Chain Shop | 4 | 8.3% |
| Agro | 13 | 27.1% |
| Cement | 4 | 8.3% |
| Food and Beverage | 5 | 10.4% |
| Construction | 1 | 2.1% |
| Aluminum | 4 | 8.3% |
| Event Management | 2 | 4.2% |
| Total Industry | 48 | 100% |

Supply Chain Manager, MD, Procurement manager, Merchandiser, Deputy Manager, Manager, Executive- supply chain, Production Officer have taken place in this survey. 35.7% of managers have taken place. The industry size has ranged from under 5000 to up to 25000. More than half fall into 5000.

Table 2 shows the survey items.

**Table-2**

| Variables | Measurement item | Sources |
|---|---|---|
| Internal Environmental Management (IEM) | Commitment of GrSCM from senior-level managers.<br>Support for GrSCM from mid-level managers.<br>Cross-functional co-operation for environmental Improvement.<br>Total quality environmental management.<br>ISO 14001 certification.<br>Environmental management system existence. | Zhu, Gangs,Fujta 2010 |
| Green Purchasing (GrP) | Providing design specification to suppliers that includes the environmental requirement for purchased items.<br>Co-Operation with suppliers for environmental objectives.<br>Environmental auditing for suppliers internal management. | Zhu, Gangs, Fujta 2010 |

| | | |
|---|---|---|
| | Supplier's ISO 14001certification. | |
| | Second-tier suppliers environment-friendly practice evolution. | |
| Customer co-operation with (CO) | Co-Operation with customers for eco-design<br>Environmental consideration Co-Operation with customers for cleaner production<br>Co-Operation with customers for green packaging Eco-Design (EcD)<br>Design of products for reduced consumption of Material or energy.<br>Design of products for reuse, recycle, recovery of Material, component parts.<br>Design of products to avoid or reduce the use of hazardous<br>Products and their manufacturing process. | Zhu, Gangs, Fujt2010 |
| Investment recovery (InR) | Investment recovery (Sale) of excess inventories or materials<br>Sale of scrap or used materials.<br>Sale of excess capital equipment. | |
| Environmental performance (EP) | Reduction of air emission.<br>Reduction of wastewater.<br>Reduction of solid wastes.<br>Decrease of consumption for hazardous/harmful/toxic materials.<br>Decrease of frequency for environmental accidents.<br>Improve an enterprise's environmental situation. | Zhu, Gangs, Fujt2010 |

## RESULTS AND DISCUSSION

**Table-3: Anova test**

| ANOVA | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df. | Mean Square | F | Sig. |
| 1 | Regression | 4.278 | 5 | .856 | 8.831 | .000[b] |
| | Residual | 4.069 | 42 | .097 | | |
| | Total | 8.347 | 47 | | | |
| a. Dependent Variable: EP | | | | | | |
| b. Predictors: (Constant), IN, CO, ED, GRP, INTE | | | | | | |

The Anova table is showing the R squire value is .512 which is impressive. This means 51% of Variance in environmental performance is explained by the predictors. The adjusted R Square value is .454. Because in the maximum Bangladeshi industry still now supply chain means only a strong purchasing department.

**Table-4: Coefficients**

| **Coefficients** | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1: | (Constant) | 1.083 | .647 | | 1.673 | .102 |
| | INTE | .209 | .136 | .240 | 1.533 | .133 |
| | GRP | .377 | .111 | .520 | 3.384 | .002 |
| | CO | -.116 | .130 | -.124 | -.893 | .377 |
| | ED | .125 | .124 | .130 | 1.011 | .318 |
| | INR | .242 | .102 | .264 | 2.384 | .022 |

Dependent Variable: EP

From table 4, the b coefficients tell us how many units of dependent variables change for a single unit change in each predictor. Like so 1 unit increase in Internal Environmental Management (INTE) correspondents to .209 unit increase in Environmental Performance. Here all be coefficients are positive without one in the relationship between the dependent variable (Environmental Performance) and the independent variables (Internal Environmental Management, Green Purchasing, Eco Design, and Investment Recovery) and the negatively related variable is Customer Cooperation with Environmental Consideration. Therefore, there is a significant and positive correlation at the maximum and negative correlation in minimum among all variables and hypotheses, such as H1, H2, H3, H4, and H5 are accepted.

## RESULTS AND DISCUSSION

To evaluate green supply chain management's impact on the environmental performance, we have done Anova test and Coefficient test. In the ANOVA test, environmental performance is explained by the predictors more than half. Because the Bangladeshi manufacturers are focusing on purchasing as supply chain at maximum enterprises and they are not thinking a lot about the others like eco design, customer co-operation, etc.

**$H_1$** Internal environmental management impact positively environmental performance.

1 unit change in internal environmental management can increase .209 of environmental performance. The firm's administrative bodies have no collaborative green thinking in some cases and some other cases, there has inadequacy about the cost efficiency of GrSCM. So that they are facing problems to take a green decision. Though they are trying their best to be green and by this, hypothesis 1 have proved.

**$H_2$** Green purchasing helps to be successful at the environmental performance of organizations.

Still now in Bangladeshi firms, purchasing in covering overall supply chain in maximum cases. Because companies are trying to buy cost-effectively and this GrSCM in Bangladeshi firms at present generally run by this green purchasing. So that this purchasing helps to be successful at the environmental performance.

**$H_3$** Customer co-operation with environmental consideration is important for effective environmental performance, but it can be varied by country to country or economy to the economy.

There has inadequacy at customer co-operation in Bangladeshi firms to be green. The maximum customers are not conscious of environment-friendly products, they are conscious of the low price. The firms are not cost-effective in many cases, and the middle-sized or small enterprises are not customer-oriented. So that this **$H_3$** has been proved.

**$H_4$** Eco-design has a positive relationship with environmental performance. Eco design has a positive relationship with environmental performance in Bangladeshi manufacturers. But for maximum Bangladeshi firms, this positivity is staying not at a strong level, because they are not so much acknowledged about this eco design. This **$H_4$** has also been proved.

**$H_5$** Investment recovery can be a tool for efficient environmental performance. This investment recovery helps for effective environmental performance because it reduces the scrap products and decreases the gathered old office equipment. But the manufacturers are thinking about some other ways for investment recovery which we haven't included.

## DISCUSSION ON FINDINGS

The first thing to notice that we have covered maximum participants from the Agro field of Bangladesh, more than 25%, 27.1%, who have no green thinking at large, and this sector is getting developed day by day. Still, they are now using some inorganic instruments in manufacturing for rapid production because they are not getting the proper organic instrument with a minimum cost and have no adequacy in knowledge environmental consciousness. The maximum agro-related participants have quoted the necessity of proper training, infrastructural enrichment, and government motivation. There has an existence of RMG participants at about 19% which are pressured by the international buyers and in some cases by national buyers. So that they are getting pressure from the international buyers for environmental thinking like Cleaner Production, Proper Waste Management, etc. They are green by force and in some cases by their willingness and motivation. The Steel industry is an enriched industrial sector in Bangladesh, they are trying to be green with the whole system with self-consciousness. Food and Beverage which is not increasingly green by nature like Green Packaging, Green Production, etc. But there have some exceptions in this field. The Chain Shop industry in greening day by day and they are gaining inspiration from the other countries. But they have some problem with the supplier's co-operation for environmental thinking because they are dependent on suppliers at large. Then the others which are not furnished with Supply Chain fully, they have been needed to be enriched with proper SCM. Because still now in the maximum company supply chain means procurement only. So that green thinking is staying so far from the organizations.

There is a strong correlation between Environmental Performance with Internal Environmental Management, Green Purchasing. The participants are thinking that the higher-level authority can take proper plans and programs and recommend government monitoring about greening the economy. Green Purchasing also can help to establish a green environment. Eco Design can be related to environmental performance if it can be taken properly, but we have not experts about green or eco-design at every organization.

Environmental Performance has explained by the Internal Environmental Management, Green Purchasing, and Customer Co-Operation with environmental Consideration, Eco- Design, and investment recovery more than half, 51%. In Bangladesh, the local business firms are not getting sufficient customer requirements for green products and this customer co-operation has been taken as a measurer

or factor for GrSCM in this study. They are not enriched with the knowledge about the eco-design of products with environmentally friendly. Rapid profit earning is a factor for maximum. So they are using chemicals and non-rotten materials in production, Conservation, and packaging. They are thinking for Investment recovery by the sale of scrap or unused materials and some other ways and they are designing their purchasing as a way where there has no existence of any excess equipment. Some of the export-oriented organizations are not enabling for green packaging, because the goods are damaged by the moisture of see air into the ships.

Findings are showing that in Bangladesh Internal Environmental Management, Green Purchasing, Eco-Design, and Investment Recovery keep an important part of ensuring proper Environmental Performance. But, there has an inadequacy in Customer Co-operation in the Environmental Performance of the organizations.

## IMPLICATION AND CONCLUSION

Our expectation of the different Bangladeshi companies, that they will establish an Environmental Management System. In case of theoretical implications, the data can be used to assess the level of existence of Green Supply Chain Management factors we have taken in this study, on the Environmental Performance of the different manufacturers of Bangladesh and the government. Besides this, the legislative bodies whatever government or personal of companies can understand the condition of practicing Green Supply Chain Management all over the Bangladeshi industrial sector and can get an idea about the need to green the total supply chain of firms. By these findings, the basic problems for green supply chain management, like the inexistence of proper idea, Skill and Tendency for earning profit with environmental thinking, etc. can be shown to the related bodies. Also, the condition of adopting proper SCM in Bangladesh can be presented. Because without adopting proper supply chain management the Green Supply Chain can't be adopted. Supply Chain is the base of Green Supply Chain Management and this GrSCM is more complex than Supply Chain. The companies can understand that this Supply Chain is a widespread process for the overall firms. They can include or deduct the factors they think are important or unimportant after scrutinizing this study result and making them perfect for Green Supply Chain Management's national and international platform from the global business aspects with the standard level of Environmental Performance. This study reveals that there has needed a proper assessment of the situation of practicing GrSCM and the actual situation of Environmental Performance for this practice and then some initiatives for ensuring and improving Environmental Performance of the firms as their ability or capacity and duties, like Government Pressure, Proper Monitoring and Initiatives, Self-Consciousness and Taking proper plans and programs to be skilled about this issue, at last, Mass awareness about the environment because customer responsiveness is fundamental for effective Green Supply Chain Management. Manufacturers can focus on re-use, remanufacturing, or recycling by picking external environmental pressures and being influenced by the necessity of cost-effectiveness and maximum use of resources. With a combination of these elements the companies can be successful in effective environmental performance by taking different practical initiatives like Proper Training, Finding an alternative for the green system, Finding the monitory issues, like cost-effectiveness and the related factors with Green Supply Chain management by the experts and Picking the international environmental needs, etc.

The present situation of practicing of green supply chain management is needed to be developed. The industrial wastes are not appropriately managed in some cases, the customers are not influencing the organizations for environment-friendly products, and organizations are not skilled so much about this overall GrSCM. To ensure proper environmental performance by the overall organizations they need a combination of governmental influence and monitoring, organization's self-environmental consciousness and public awareness, etc. which are described, and by this combination, and environmental infrastructure will be established in our industrial sector.

## REFERENCES


- Adler, E.S., & Clark, R. (2010). An invitation to social research: How it's done. 4th Ed. Blmont, NJ: Wiley.
- Belderbos, R., Carree, M., Diederen, B., Lokshin, B., & Veugelers, R. (2004). Heterogeneity in R&D cooperation strategies. International journal of industrial organization, 22(8-9), 1237-1263.
- Bhaskaran, S., Polonsky, M., Cary, J., & Fernandez, S. (2006). Environmentally sustainable food production and marketing: opportunity or hype?. British food journal.
- Bovea, M. D., & Gallardo, A. (2006). The influence of impact assessment methods on materials selection for eco-design. Materials & Design, 27(3), 209-215.
- Bovea, M. D., Pérez-Belis, V. (2012). A taxonomy of ecodesign tools for integrating environmental requirements into the product design process. Journal of Cleaner Production, 20(1), 61-71.
- Carter, J. R., & Narasimhan, R. (2000). Sourcing's role in environmental supply chain management. Supply Chain Management, 3(4), 78-88.
- Chen, C.-C. (2005). Incorporating green purchasing into the frame of ISO 14000. Journal of Cleaner Production, 13(9), 927- 933.

- Chopra, S., & Meindl, P. (2016). Supply Chain Management: Strategy, Planning, and Operation. 6th ed. Pearson: Always learning.
- Cox, A. (1999). Power, value & supply chain management. Supply Chain Management: An International Journal, 4(4), 167-175.
- Cresswell, J. (2003). Research design: Qualitative, quantitative, and mixed methods approach. Thousand Oaks, California: Sage Publications.
- Darnall, N., Jolley, G. J., & Handfield, R. (2007). Environmental Management Systems and Green Supply Chain Management: Complements for Sustainability? Business Strategy and the Environment, 17(1), 30-45.
- Deng, H., Wang, H. (1998). How do Chinese enterprises overcome the green barrier? Business Studies, 12(10), 45–47.
- Ellram, L. M. (1991). Supply Chain Management: The Industrial Organisation Perspective. International Journal of Physical Distribution & Logistics Management, 21(1), 13-22.
- Green, K. W., Zelbst, P. J., Meacham, J & Bhadauria, V. S. (2002). Green supply chain management practices: impact on performance. Supply Chain Management: An International Journal, 17(3), 290-305.
- Green, K., Morton, B., & New, S. (1998), Green purchasing and supply policies: do they improve companies' environmental performance? Supply Chain Management, 3(2), 89-95.
- Hervani, A., A., Helms M., M., Sarkis, J. (2006).Performance measurement for green supply chain management. Benchmarking: An International Journal, 12(4), 330 – 353.
- Holdway, R., Walker, D., & Hilton, M. (2010). Eco-design and successful packaging. Design Management Journal,
- Jasch, C. (2000). Environmental performance evaluation and indicators. Journal of Cleaner Production, 8(1), 79-88.
- Jeswiet, J., & Hauschild, M. (2005). EcoDesign and future environmental impacts. Materials and Design, 26(7), 629-634.
- Johansson, G. (2002). Success factors for integration of ecodesign in product development. Environmental management and health, 13(1), 98-107.
- Klasse, R. D., & McLaughli, C. P. (1993). TQM and Environmental Excellence in Manufacturing. Industrial Management & Rata Systems, 93(6), 14-22.
- Kumar, S., Teichman, S., Timpernagel T., (2012). A green supply chain is a requirement for profitability. International Journal of Production Research, 50(5), 1278-96.
- Lambert, D. M., & Cooper, M. C. (2000). Issues in Supply Chain Management. Industrial Marketing Management, 29(1), 65-83.
- Large, R. O., & Gimenez Thomsen, C. (2011). Drivers of green supply management performance: Evidence from Germany. Journal of Purchasing & Supply Management, 17(3), 176-184.
- Menguc, B., Auh, S., & Ozanne, L. (2010). The interactive effect of internal and external factors on a proactive environmental strategy and its influence on a firm's performance. Journal of Business Ethics, 94, 279-98.
- Min, H., & Galle, W.P. (2001). Green purchasing practices of US firms. International Journal of Operations & Production Management, 21(9), 1122-1238.
- Min, H., Galle, W. P. (2001). Green purchasing practices of US firms. International journal of operation and production management, 21(9), 1222-1238.
- Montabon, F., Sroufe, R. & Narasimhan, R. (2007). An examination of corporate reporting, environmental management practices, and firm performance. Journal of Operations Management, 25(5), 998-1014).
- Muller, M., & Seuring, S. (2008).From a literature review to a conceptual framework for sustainable supply chain management. Journal of Cleaner Production, 16, 1699-1710.
- Pagell, M., Wu, Z., & Murthy, N. N. (2007). The supply chain implications of recycling. Business Horizons, 50(2), 133-143.
- Pigosso, D. C. A., Zanette, E. T., Filho, A. G., Ometto, A. R., Rozenfeld, H. (2010). Ecodesign methods focused on remanufacturing. Journal of Cleaner Production, 18(1), 21-31.
- Rao, P., & Holt, D. (2003). Does the green supply chain lead to competitiveness and economic performance? International Journal of Operations & Production Management, 25(9), 898-916.
- Rao, P., & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? International Journal of Operations & Production Management, 25(9), 898-916.
- Rao, P., Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? International Journal of Operations & Production Management, 25(9), 898–916.
- Sánchez-González, G., Herrera, L. (2014). Effects of customer cooperation on knowledge generation activities and innovation results of firms. BRQ Business Research Quarterly, 17(4), 292-302.
- Sarkis, J. (2001). Manufacturing's role in corporate environmental sustainability Concerns for the new millennium. International Journal of Operations & Production Management, 21(5/6), 666-686.
- Srivastava, S.K. (2007). Green supply chain management: a state-of-the-art literature review. International Journal of Management Reviews, 9(1), 53–80.
- Verschoorl, A. H., Reijnders, L. (1997). How the purchasing department can contribute to the toxics

reduction Journal of Cleaner Production, 5(3), 187-191.

- Waddock A. S., & Graves B. S. (1998). The corporate social performance- financial performance link, 18(4), 303 – 319.
- Wagner, M. (2005). Sustainability and Competitive Advantage: Empirical Evidence on the Influence of Strategic Choices between Environmental Management Approaches. Environmental Quality Management, 14(3), 31-48.
- Wong, V., Turner, W., & Stoneman, P. (1996). Marketing Strategies and Market Prospects for Environmentally -Friend1 y Consumer Products. British Journal of Management, 7(3), 263-281.
- Wu, G. C., Ding, J. H., & Chen, P. S. (2012). The effects of GSCM drivers and institutional pressures on GSCM practices in Taiwan's textile and apparel industry. International Journal of Production Economics, 135(2), 618-636.
- Zelbest, P., J. Green, K. W., Abshire, R. D. & Sower, V. E. (2010), Relationships among market orientation, JIT, TQM, and agility. Industrial Management & Data Systems, 110(5), 637- 658.
- Zhu, Q. Geng, Y. Fujita, T. Hashimoto, S. (2010). Green supply chain management in leading manufacturers. Case studies in Japanese large companies. The management research review, 33(4), 380-392.
- Zhu, Q., Sarkis, J., & Geng, Y. (2005). Green supply chain management in China: pressures, practices and performance. International journal of operations & production management.
- Zhu, Q., Sarkis, J., & Lai, K. H. (2013). Institutional-based antecedents and performance outcomes of internal and external green supply chain management practices. Journal of Purchasing and Supply Management, 19(2), 106-117.
- Zhu, Q., & Cote, R. P. (2004). Integrating green supply chain management into anembryonic eco-industrial development: a case study of the Guitang Group. Journal of Cleaner Production, 12(8 – 10), 1025–1035.
- Zhu, Q., Feng, Y., & Choi, S. B. (2017). The role of customer relational governance in environmental and economic performance improvement through green supply chain management. Journal of Cleaner Production, 155, 46-53.
- Zsidisin, G. A., & Hendrick, T. E. (1998). Purchasing's involvement in environmental issues: a multi- country perspective. Industrial Management & Data Systems.