

EXPLORATORY STUDY OF ENVIRONMENTALLY SUSTAINABLE SUPPLY  
CHAINS IN BANGLADESH FOOD INDUSTRY

**by**

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A thesis submitted to the Department of Procurement and Supply Management in partial  
fulfillment of the requirements for the degree of  
Masters in Procurement and Supply Management

Procurement and Supply Management  
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## **Declaration**

It is hereby declared that,

1. The thesis submitted is my own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. We have acknowledged all main sources of help.

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## Approval

The thesis/project titled “Exploring MNCs Supply Chain Challenges in the Bottom of the Pyramid (BoP) Market” submitted by

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## **Ethics Statement**

- I. The research paper has been prepared considering the guidelines of BIGD.
- II. The researcher sought consents from the respondents before conducting the qualitative and quantitative interview.
- III. The respondents took part in the study voluntarily.
- IV. The researcher respect the confidentiality and anonymity of the research respondents.

The researcher takes responsibility of the quality of the work and declares hereby that the research is independent and impartial.

## **Abstract**

The objective of this study is to understand and explore the development and practice of environmental management, precisely in terms of supply chain management in food industry of Bangladesh. The results of this study indicate that energy-climate issues have significant impact on the manufacturing entity's growth and performance, thus affecting the overall economic performance. Energy-climate issues have become the focus of the debate in global economic development because of the gravity of the issue. The world business has been facing a very critical challenge as logistics and supply chain is the key part in the business management. For this, environmental sustainability of supply chain has attracted increased attention of the researchers in recent years. Although sustainable supply chain management has yet to be a matter of concern in developing country like Bangladesh, there are little information found about the practice of sustainable supply chain management. This paper presents one of the earliest exploratory study on the environmentally sustainable supply chain management in Bangladesh frozen and packaged food industry. The questionnaire for the survey were developed based on the relevant available literatures and feedbacks from corporates. And the participants of the survey consist of 12 local companies and 3 multinational companies. Major findings of the study are summarized as follows. The concept of environmentally sustainable supply chain concept is very new in Bangladesh and it is still at its infancy. Among all the firms taken as sample it has been found that large scale organizations are more likely to adopt and practice environmental sustainability in supply chain compared to the smaller firms. Besides there exist gap in local and multinational companies practice and action plans. Actions of the regulatory body is not that significant to bring change in the industry by putting pressure to implement environmental sustainability. Lack of consumer's awareness and knowledge of environmental sustainability has been one of the major impediments behind the implementation and adoption of sustainable supply chain practices. The researcher found results about reverse supply chain but the percentage found in the results are still not satisfactory as the respondents were only those who have implemented environmentally sustainable supply chain management. And the percentage visible about the organizations growth, market penetration, customer acquisitions are significant but only for those who have implemented green supply chain management. The firms which initiated environmentally sustainable supply chain practices voluntarily are not found to practice sustainability to a significant extent. The researcher also has found that supplier's performance has significant positive impact on designing and developing sustainable supply chain. Multinationals always try to perform

maintaining the global standards and operate equitably all over the world. The global benchmark they set to their firms makes it difficult for the local companies to compete with but the local companies can follow MNC's models to improve their systems. Finally, the researcher concludes the paper by indicating directions for future research on environmentally sustainable supply chain management.

**Keywords:** Sustainability; Supply chain management; Environmental sustainability; Green supply chain management; Bangladesh; Food industry; Frozen and packaged food industry; SCM; GSCM

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# **Chapter-01**

## **1.0 Introduction**

The interconnection between the energy and climate is imperishable. Energy-climate issues have become the focus of the debate in global economic development because of the gravity of the issue. The world business has been facing a very critical challenge as logistics and supply chain is the key part in the business management. As both of these impacts energy and climate issues in business, these ultimately lead to the challenges in logistics and supply chain management.

On a different note, the rising prices of energy and more frequent environmental disasters resulted from the energy crisis and climate change are constraining the development of logistics and supply chain management (SCM) leading to a negative effect on global business. And a very serious point to observe that traditional logistics and SCM instigate the acceleration of energy-climate issues.

To get completely out of the conflicts, the timeliness of the environmentally sustainable supply chains cannot be overlooked since green supply chain management (GSCM) could mitigate the impacts caused by energy crisis and climate change.

Although a lot of studies have been conducted investigating the effectiveness of environmentally sustainable supply chain, there is lack of study investigating the food sector supply chain sustainability. Hence, the researcher wished to carry out a study on the Environmentally Sustainable Supply Chain on Food Industry of Bangladesh.

## **1.1 Background of the Research**

The emergence of the concern of environmentally sustainable supply chain management has got an increasing attention in academic study. Due to the increasingly competitive business environment, sustainable competition, also regarded as sustainable competitive advantages, is a buzzing word in the business world and literature. A considerable amount of research has been undertaken on sustainability and environmental management, such as Corporate Social Responsibility (CSR) in supply chain, sustainable supply chain management, corporate sustainability, environmental management and green supply chain. These studies have stipulated the significance of environmental management in current supply chain management.

Such findings in previous literature have encouraged the researcher to conduct an Exploratory Study of Environmentally Sustainable Supply Chain in Bangladesh Food Industry. The researcher has chosen the food industry of Bangladesh to carry out the research.

## **1.2 Research Aim and Objective**

The aim of the researcher is to investigate the Environmentally Sustainable Supply Chain in Bangladesh Food Industry. In order for fulfilling the aim of the research, the researcher has developed the following research objectives.

- To explore the development of environmental management in supply chains;
- To identify the consequences of energy consumption and the climate issues in the food industry supply chains by focusing on the energy costs, logistics costs and logistics performances;
- To identify the drivers and barriers towards green supply chain management practices;
- To investigate the implementations of green supply chain management in Bangladesh food industry supply chains;
- To assess the differences of environmental management in domestic companies and international companies.

## **1.3 Research Question**

The researcher, throughout the study, sought answers for the following questions.

- How is the literature on the definition and theories of environmental management in supply chain?
- What are the consequences of energy consumption and the climate issues in the food industry supply chain?
- What are the drivers and barriers towards green supply chain management practices?
- What are the results of the implementation of green supply chain management in Bangladesh food industry supply chain?
- What are the differences of environmental management in domestic and international companies?

## **Chapter-02**

### **2.0 Literature Review**

#### **2.1 Supply Chain Sustainability**

The significance and importance of sustainable supply chain is arising as it is suggested that only focusing on economic sustainability is not enough for a long run success. Generally sustainability is explained as achievement of development, which fulfills the need of the current generation without hampering the interests of the future generations while fulfilling their needs. According to Lee, T. and Kashmanian, R. (2013), combination of the three dimensions: economic, environmental and social as a whole is the most important catalyst towards the development of sustainable and stable business and society. Chen, Y. (2013) explained in a study, to enhance the sustainability along with competitiveness effective and efficient supply chain rather efficiently only supply chain is a prerequisite. Markman, G. and Krause, D. (2014) on the other hand explained, effective and efficient supply chain with proper sustainable strategies would do no harm to society and environment though it generates profitability for a long period of time.

In last many decades, Organizations cannot overlook the environmental and social issues in their daily business. Lee, T. and Kashmanian, R. (2013) opined, the increase in the scope of the business activities operationally forced organizations to adopt outsourcing activities, cost-effectiveness management and development of sustainable supply chain strategies. The current practice of the logistics and supply chain operation strategies are driving the attention of both academic and practical likeliness towards inspection of supply chain sustainability.

Rao, P. (2008) stated that, current play of the global competition dictates sustainable supply chain is inevitable in the current business arena. Sustainable supply chain not only covers the interest of the environmental aspects but also has a very positive roles to play in developing the sense of responsibilities among employees, customers, suppliers and communities. Besides it can be a good weapon to achieve competitive advantage over the competitors with bringing new opportunity and innovation scope.

#### **2.2 Environmental Management in Supply Chains**

Environmental management in supply chain basically refer to an organization's capacity to manage environmental issues in the supply chain effectively and efficiently. Eltayeb, T. and Zailani, S. (2014) mentioned that the core focus of the environmental management in supply

chain is to reduce the harm from the unsustainable supply chain through application of strategies, policies and action plans.

Energy resources and climate issues have been taken into consideration with environmental concerns in logistics and supply chain management. Setyadi, A. (2019) in his theory of environmental management in supply chains addressed green supply chain management a solution which delineates the relationship between natural environment and supply chain management through green manufacturing, green purchasing and green logistics development.

In an earlier study by Yakovleva, N. (2007), it is found that environmental management in supply chain has positive correlation with the increase of organizations efficiency, profitability and performance. But such conjoint development of supply chain management is not easy as because of different economic drives and business relationship with the suppliers and customers. So the favorable outcome of environmental management in supply chain needs more attention and few systematic changes in the production process design with collaboration of environmental activities in every stage of the process.

The literature review exhibits a likelihood that the supply chain management is advancing towards the new direction as traditional supply chain management does not fit into the current turbulent business environment. A more sustainable supply chain is required to fulfill the current demand for environmentally sustainable supply chain management.

### **2.3 Demand of Sustainable Supply Chain Management**

Climate change and energy crisis are putting pressure to the development of sustainable economy. Paloviita, A. (2010) explained in broader perspective that the global economic growth is facing the vulnerability of serious environmental problems and energy issues. The issue of sustainable supply chain management has emerged in the agenda of global business development discussions.

Eltayeb, T. and Zailani, S. (2014) stated that eradicating the negative results generated by the conventional supply chain management global businesses started to look for the solution of recent buzz of the energy-climate issues. In a study of Hossain, M. and Jahan, R. (2016) it is found that the only way to get out of the impacts of this issue is to develop strategies along with action plan to achieve environmentally sustainable supply chain management.

## **Chapter-03**

### **3.0 Research Methodology**

The researcher has adopted both quantitative and qualitative methods for carrying out this study. To conduct the research the researcher has developed questionnaire and arranged telephone interview with the research participants. The procedures of the data collection for both qualitative and quantitative data analysis processes are depicted in this chapter.

#### **3.1 Research Design and Planning**

##### **3.1.1 Exploratory Study**

As environmental issues in supply chain management is evolving in direction research study and not many studies have been conducted or found on this particular research area especially in Bangladesh food industry, the study would help and reveal what is happening in Bangladesh food industry in terms of environmental management in supply chain. Exploratory method is useful in this field as the study is mainly focusing on the interpretation of current problems in this industry with a motive to identify what is actually happening.

Moreover, there were little information available as there was no such studies conducted in the past on similar problems. The exploratory study has been conducted to assemble where more information is required in order to develop a practicable theoretical framework. The core advantage of such kind of study is, initially it considers the broader aspect and gradually becomes narrower and gets aligned with core concept as the research starts progressing.

Therefore, exploratory study has been chosen to conduct as there exists little information available relevant to the study of Environmentally Sustainable Supply Chain in Bangladesh Food Industry.

##### **3.1.2 Case Study**

When the research topic is broad and quite difficult to study in association with exploratory study case study approach has also been conducted to understand the research phenomenon. Under exploratory study a survey has been conducted to understand the environmental sustainability but this is not enough to answer all the questions. The study also requires qualitative analysis and interpretations to answer the questions asked 'How' and 'What' in order to gain a proper understanding of the problems with adequate justifications.

Lack of adequate studies on such specific topics in Supply Chain of the food industry in Bangladesh sought to do case studies for better understanding of the phenomenon with greater

insights. Environmental issues has been a global buzz for a long time and considered as real life problems. In such case, it wouldn't be wise to develop feedback with conclusion only basing on the exploratory study alone. Therefore, along with interpretation of the observation from quantitative survey the environmental issues in packaged and frozen food organizations has been given attention to get adequate information on this research topic.

### **3.2 Research Method**

The researcher has adopted both quantitative and qualitative methods for carrying out this study. Quantitative methods has been followed in order for collecting numerical data which actually assisted the researcher in identifying and developing a quantifiable relationship among environmental issues and supply chain sustainability in Bangladesh food industry. On the other hand, case studies has been conducted to understand the phenomenon in broader aspects.

### **3.3 Data Collection and Analysis Method**

Number or words both has been considered while collecting research data. Quantitative data has been collected in form numerical data and standardized later using specific close ended research questionnaire. The qualitative data were in words form and captured through finding the answers of the research questions.

There existed difference in the analysis method as well as in the interpretation as quantitative data provides result or outcome which required a little or thin description. On the other hand, qualitative data driven results required thick description as this will cover the broader aspects of the study. Quantitative research has generated more explorative outcome whereas the qualitative study has been conducted to fetch on results emphasizing more on the descriptive study.

### **3.5 Sampling Technique**

As incorporating the whole industry in the survey was not possible, therefore the researcher has carried out the study on a sample of 10 to 15 organizations from food industry where all of the participants were from packaged and frozen food manufacturing organizations in Bangladesh. While selecting the participants, random sampling technique was adopted because each organizations had equal significance in providing primary data for the survey and simple random method ensured equal chance for all organizations in the population.



## Chapter-04

### 4.0 Results and Discussion

The researcher, through the research aimed at exploring the environmental sustainability of the supply chain of food industry in Bangladesh. The researcher has gathered and analyzed the data collected from secondary sources. In this chapter, the researcher has incorporated the results derived from the secondary sources through different charts and graphs in alignment with the objective of the study.

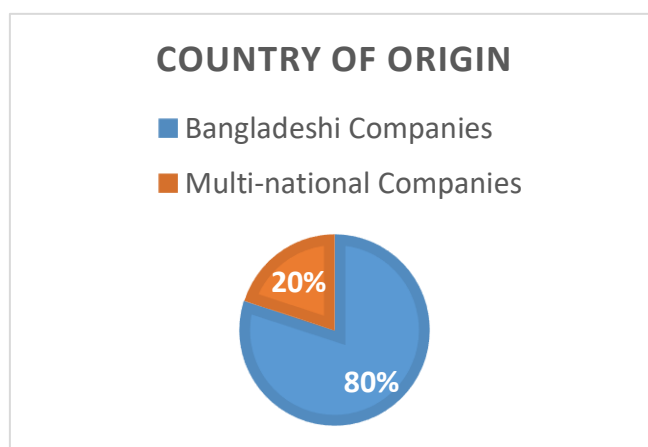
#### 4.1 General Information

The questionnaire is designed maintaining the anonymity of company-specific information and there is no such section. But to conduct the exploratory study, the questionnaire did collect some general information such as company's main product line, origin of the company and about ISO certifications.

The initial part of the questionnaire mainly designed to discover the above mentioned information to understand the basic ground to relate with the supply chain concept. In addition, this part also captured information regarding Environmental Management System (EMS), energy crisis and climate change.

#### 4.2 Company Information

To conduct the study the researcher took 15 sample company of frozen and packaged food industry of Bangladesh selected through random sampling. From every company one respondent from middle management took part in the survey.



*Figure 1: Country of Origin*

Among of the organizations in this research, 80% of the companies are originated from Bangladesh and remaining 20% are multinational companies (MNCs). Majorities of the companies have at least 20 years of industry experience.

The respondents took part from each company have at least 5 years of experience in their respective companies. Along with that many of them have past history of working in supply chain management of diverse industries in Bangladesh.

To understand the concern of the company about environmental sustainability the researcher tried to know about the International Standards Organization (ISO) acknowledgement and certification.



Figure 2: ISO Certifications

It is found that 87% of the company receive ISO 9001 quality management system (QMS) certificate which indicates the ability of the companies to provide consistently quality products and services to the clients. The rest 13% could not reach that level. Again, it can be seen that 53% of the organizations from the sample have ISO 14001 environmental management system (EMS) certificate achieved through consistently following the effective environmental management framework of ISO. The rest 47% did not achieve any such certificate. But interesting response receive form the respondents that 87% of them practicing environmental sustainability management in supply chain as well as different other processes in the business following a framework developed in-house.



Figure 3: EMS Implementation

And 13% of those companies who are yet to implement environmental management system would implement within next 3 years and already they have designed action-plans for effective implementation of the EMS.

As the concerns participated in the study are manufacturing entities, organizations supply chain activities have been spread out to importing raw materials, production, warehousing and transportation. In case of energy consumptions, the respondents shared that electricity, gas and oil appeared to be the crucial energy source for these frozen and packaged food manufacturers in Bangladesh.

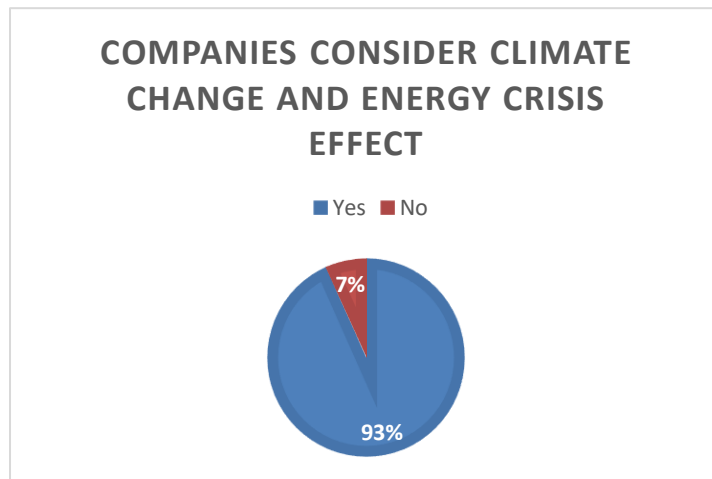


Figure 4: Climate Change and Energy Crisis Effect

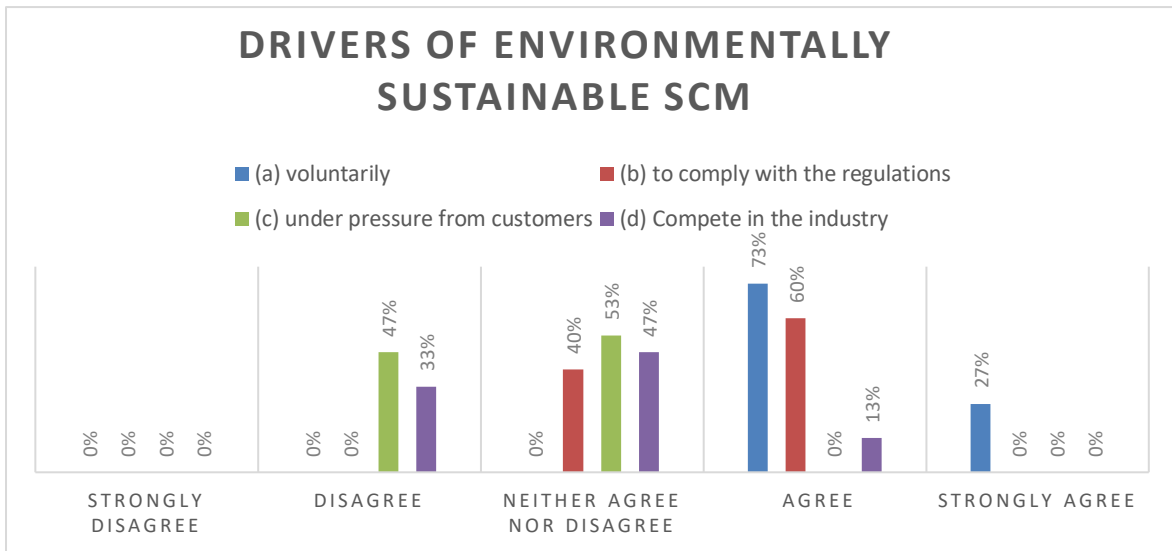
In every phases in the manufacturing process companies sincerely keep climate change and energy crisis in consideration and always try to minimize the consumption through utilizing alternative sources such as solar energy. Besides they do different activities like tree plantation to minimize the effect they harm to

environment. 93% of the companies have dedicated environmental management body to do continuous research and inspection to minimize harm and otherwise to adapt the changes happened because of the climate change to do a sustainable business. Green supply chain management has become buzzword in the corporations and they are committed to implement such to make the supply chain activities more effective and environment friendly. The rest 7% does not give any such indication about their action towards the effect of climate change and energy crisis because of the uniqueness of their business and functions.

### 4.3 Drivers of Environmentally Sustainable SCM

Items 9a – 9d in the questionnaire basically illustrated to understand what leads organizations to adopt environmentally sustainable supply chain management practices.

Here, the researcher tried to explore whether they practiced such voluntarily, to comply with the regulations, under pressure from customers and to compete in the industry. From the findings it is visible that 27% strongly agreed that their organizations practiced environmentally sustainable supply chain voluntarily and they have their own organization policy to practice such within the organizations. The 73% also agreed on that but their internal policy is not so rigid in that case.



*Figure 5: Drivers of Environmentally Sustainable Supply Chain*

Again from the respondents 60% of them told that they practice environmentally sustainable supply chain to comply with the regulation and framework set by government and ISO. The 40% did not give any such opinion. Here, from the response it can be narrated that the regulatory framework is not so effective for the organizations to follow religiously or alternatively regulators partially failed to convince the stakeholders by setting a benchmark. This shows that environmental sustainability norms are still not as rigorous as developed countries. Sustainable practices should be brought to light by compelling strict laws and regulations putting zero harm to the business prospects.

9a and 9d results show very poor percentage on the graph. There is no such significant pressures from customer base as awareness level of the customers are very low. On the other hand, industry competitiveness in this regard is not significant in developing country like Bangladesh. External pressures is unnoticeable here to compel firms to adopt environmentally sustainable practices. Precautionary measures to be taken to enlighten customers about the degradation of environmental sustainability to increase the environmental friendly practices in the manufacturing firms.

It can be summarized that the firms which practice environmentally sustainable supply chain voluntarily do not do so because of the regulatory pressures. It is already evident that there are many firms to adopt the environmental sustainability or at least aware about the facts. External pressure can be put through raising awareness though the actions may take time.

### 4.3 Sustainable Purchasing Practices

Six items in in questionnaire 10a – 10f relate to the sustainable purchasing practices of the packaged and frozen food items manufacturers in Bangladesh. The idea here is to understand

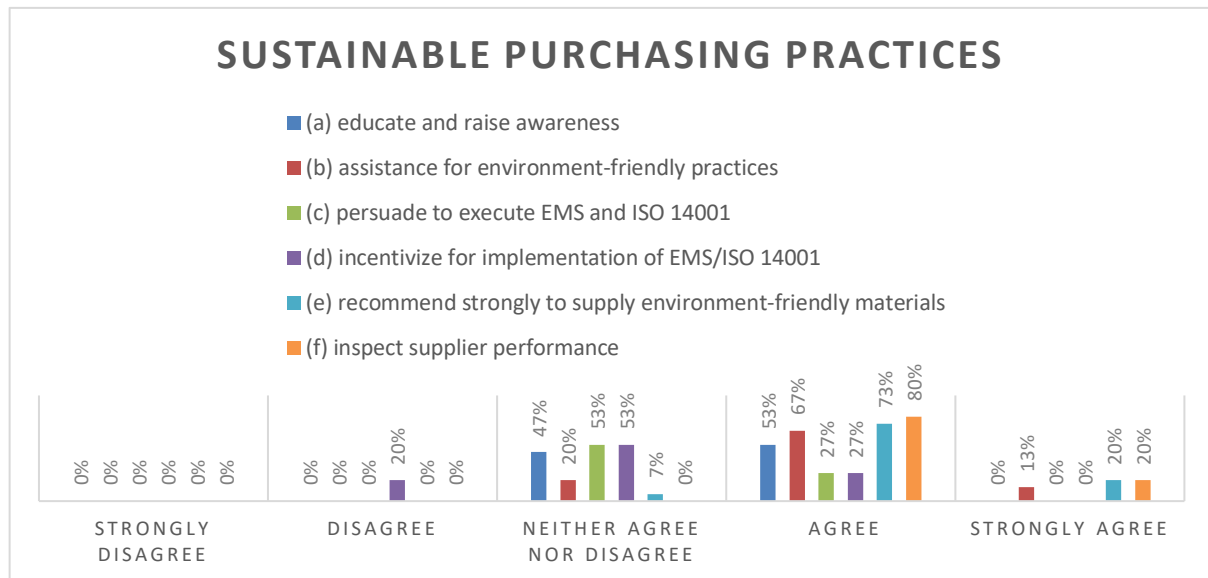


Figure 6: Sustainable Purchasing Practices

how organizations urge their suppliers to provide environmental friendly materials.

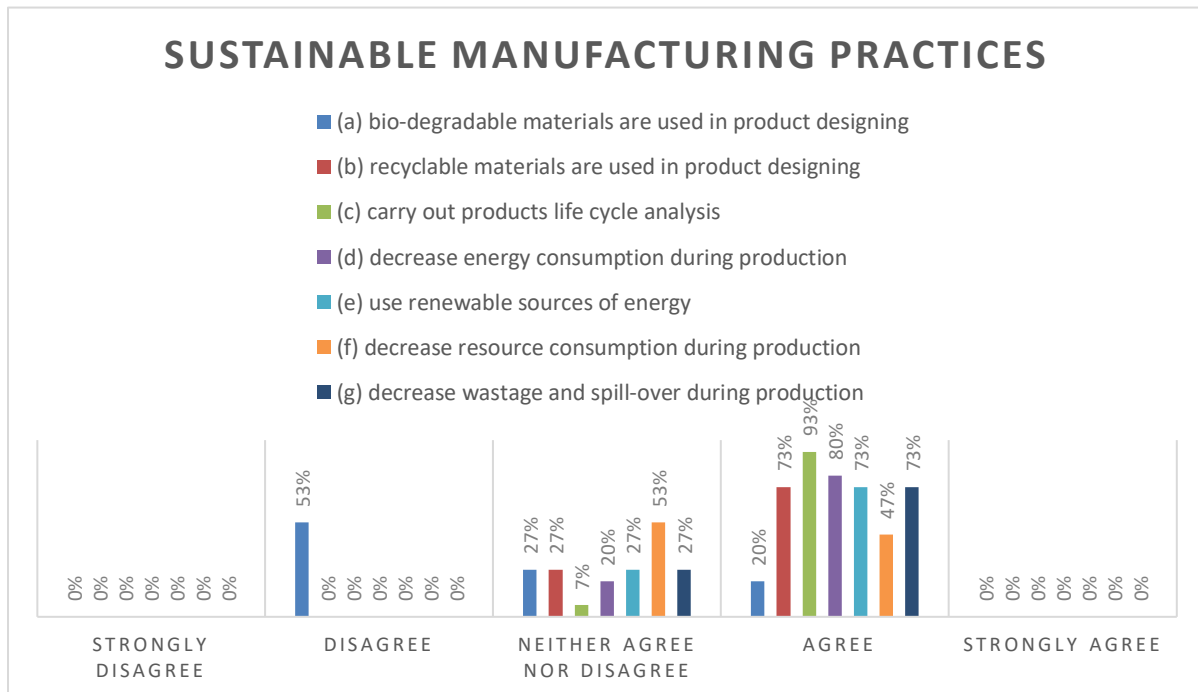
From 10a it is visible that 20% of the respondents strongly agreed to the fact that they train and educate their suppliers about the importance of environmental sustainability and they put pressure on them to practice so. 73% of the respondents agreed to the fact that they take necessary initiatives to raise the awareness among suppliers. They not only just share policy and framework 67% of them provide indirect assistance and benefits for undertaking environment-friendly practices and 13% of them directly provide assistance and support.

In 10c and 10d we can see that they put pressure on the suppliers to execute EMS and interestingly 27% of them incentivizing those suppliers for implementing EMS. 73% of the organizations recommend strongly to provide materials which are environment friendly and bio-degradable. Organizations not only just put pressure and incentivize, they do routine inspection work to measure the performance of the suppliers.

We can also find that many of the organizations are indifferent in such case which means they are not in position to put pressure on their suppliers for EMS executions. The reason behind this is the imprecise regulations and moderate actions from the regulatory bodies. Continuous monitoring and routine follow up from the regulatory body can improve present scenario with environmental sustainability in supply chain as ultimate outcome.

## 4.4 Sustainable Manufacturing Practices

There are seven items in the table ranging from 11a – 11g in the questionnaire based on sustainable manufacturing practices. The findings here relate to the materials used and process



*Figure 7: Sustainable Manufacturing Practices*

designed by the organization in achieving environmentally sustainability in supply chain management.

In 10a it is evident that 53% of the respondents told that they don't use bio-degradable materials in their product designing. 27% of the respondents didn't give any such opinion whereas only 20% responded that they use bio-degradable materials. This is alarming as they mainly use plastic items while packaging though 73% of the respondents told that those are recyclable. But the matter of concern is the awareness of the customers as there is no such opportunity to dump plastic items from where the manufactures can collect those and recycle them for further use.

In 11d 80% of them responded with positive note that they are working behind to reduce the energy consumption in their production process and 73% responded that they use renewable sources of energy during the production such solar power as an alternative of electricity. Because of the technological enhancement organizations become able to reduce resource consumption in their production process as well as to decrease wastage and spill-over during production.

The reason behind such outcomes can be the decrease in economies of scale for 100% implementation of such items. Another reason can possibly be the availability of resources and the cost involved in implementations. But the use of renewable sources of energy, recyclable product designing and reducing resource consumption dictate Bangladeshi firms put emphasis on implementation of sustainable design of the supply chain process.

#### 4.5 Sustainable Logistics Practices

There are five items in table ranging from 12a – 12e in the questionnaire which let the researcher to understand sustainable logistics practices including the areas of packaging, storage, transportation and distribution.

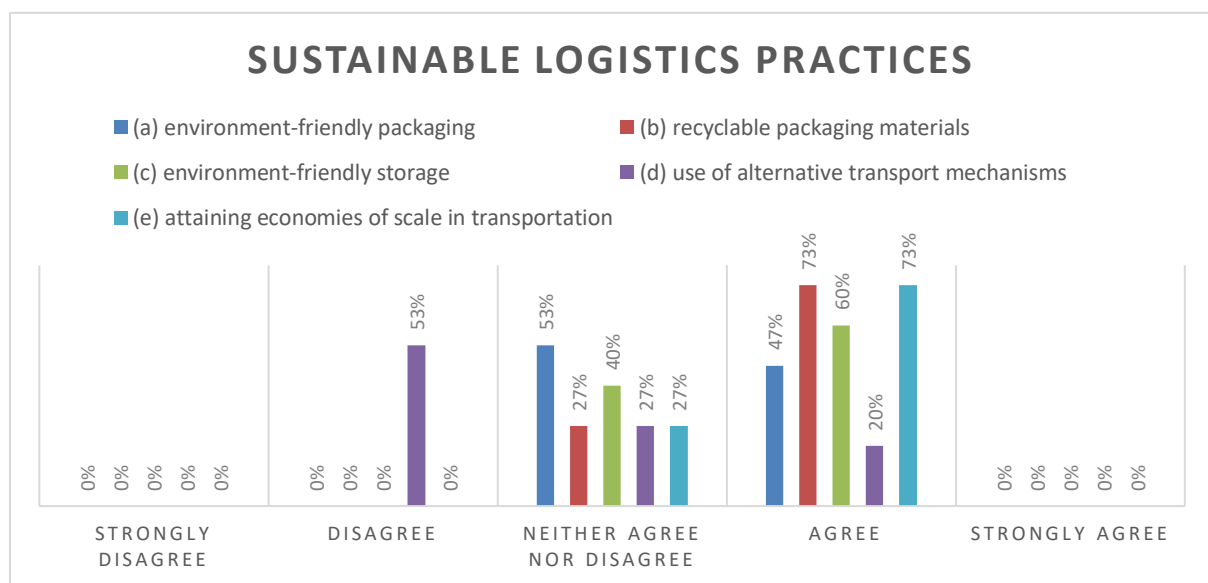


Figure 8: Sustainable Logistics Practices

Here in 12a 47% of the respondents stated that they do environmental friendly packaging but in 11a 53% of them told that they don't use bio-degradable materials in product designing. On the other hand, 73% of the respondents stated that they use recyclable packaging materials in their production process. At one point all these information conflicts because of the rigorous practice of environmental management systems. Organizational practice and information perceived have huge gap and that might happen because of the absenteeism of monitoring and regulation.

In 12d 20% of the respondents stated that they use alternative transport mechanism in their supply chain. But the practice is not that significant in those organizations although the practice might reduce the significant cost of transportation along with putting less harm to climate as burden on industrial transportation would get reduced. In 12e 73% of the respondents agreed

that alternative transportation would help the organization achieving increased economies of scale and marginal profits with reduced energy cost.

#### 4.6 Sustainable Waste Management

In question 13 the researcher asked the respondents whether the organizations provide waste management support or assistance in the disposal or recovery of the wastes. Among all the respondents 46% of them stated that they do provide support in waste management and they have facilities to recycle the disposed waste. But remaining 54% responded negatively.

Those who responded positively have been asked what factors they consider while performing reverse supply chain.



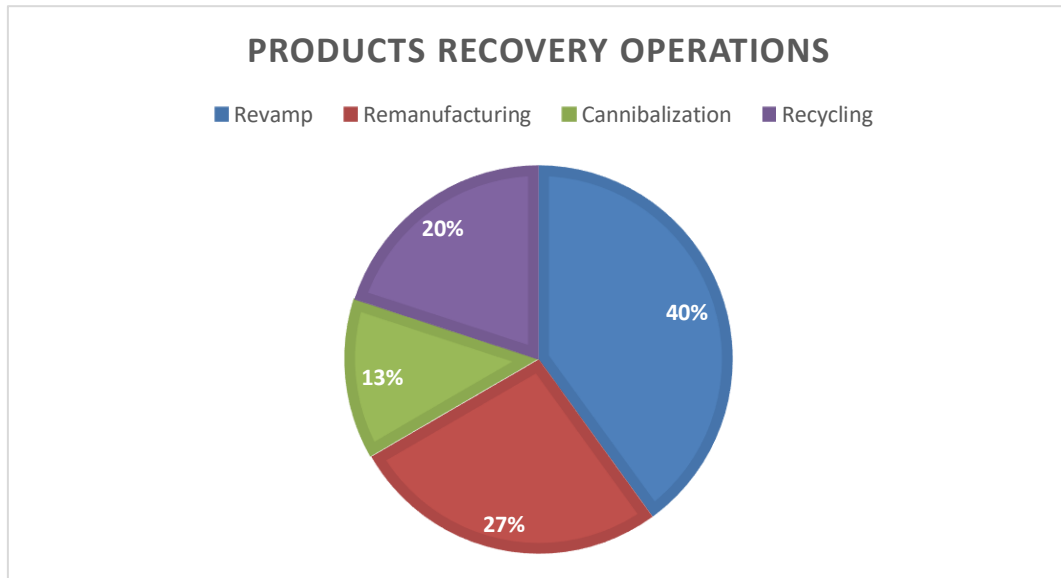
Figure 9: Sustainable Waste Management

In the findings the researcher got 13% of the respondents think customers are environment-conscious whereas 60% disagreed and 27% of them have responded indifferently. 73% of the responded that customer have zero waste management consciousness and they don't cooperate in waste management. Majority percentage of the customers does not use bin especially in the street while disposing waste after consumption.

20% of the respondents stated that they have centralized disposed items collection facility and those 27% responded that they also have disposed items inspection facilities. This indicates their concern and sense of responsibility towards developing environment friendly sustainable supply chain.



In 13e, 13f and 13g and 13h the respondents stated that they have centralized disposed items recovery facilities and sometimes they contact with third party for product recovery. But the percentage is not that significant to mention. There exist many scopes to recycle wastage to develop new products for a sustainable environment. 13% respondents stated that the recovered products can be used to develop new products which can bring extra profit with minimum cost



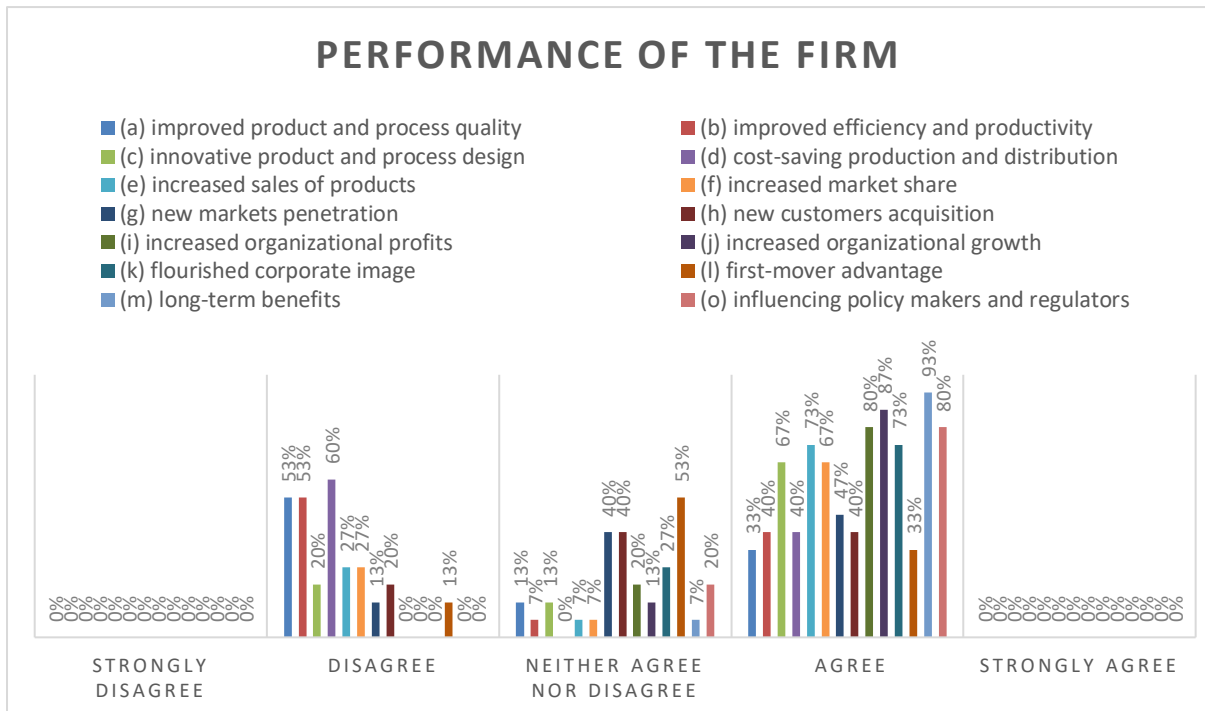
*Figure 10: Products Recovery Operations*

with additional but lesser consumption of energy. The researcher also found that many organizations are moving towards bio-degradable packaging so that those packets get easily disposed in the soil and the environment putting zero environmental negative affect.

Interesting findings came out when the researcher wanted to learn how organizations conduct product recovery operation. 40% of the respondents stated that they revamp the products to give new form to the products life. 27% stated they remanufacture the same products maintaining the quality. 13% responded they cannibalize and do not produce same products and the rest 20% recycle the products by bringing those to the previous form. But not every products can be recovered because of the nature of the packaging and the quality of the products. Firms are investing in research and development to find sustainable solutions of the existing problems and make the supply chain management environment friendly.

#### **4.7 Performance of the Firms**

There are 14 items, 16a – 16o in the questionnaire on performance of the firm. The researcher tried understand and evaluate overall organizational actions to achieve environmentally sustainable supply chain management.



**Figure 11: Performance of the Firm**

In 16a 33% of the respondents stated that they experienced a lot of scopes where they can produce quality products with improved process quality. And 40% experienced improved efficiency and productivity. 67% stated sustainability in supply chain products the opportunity to develop innovative products and process along with cost-saving production and distribution opportunity. 73% believes implementing EMS in supply chain increased sales of products because EMS practice provides a good impression of the company to the customers. Besides 67% responded that the environmental practices add new value to company which ultimately leads to create a position of the to the customers mind. 47% thinks EMS practice in supply chain has positive impact in penetrating new markets. It decreased the barrier to new entrance and made it easier for firms to capture position in the new market places. Besides 40% responded that sustainability initiative creates sense of responsibility to the buying behavior of the customers which pulls new customers on board and increase sales of the firm. 80% of the respondents stated that increased customers acquisition has increased profitability of the firm and use of alternative transportation decreased the cost of the firm through achievement of economies of scale in supply chain process.

87% of the respondents stated that EMS practice works as a catalyst increasing organization's values and establishing position in the market thus, ensuring overall organizational growth and profitability.

In 16k 73% of the respondents stated that to achieve and build a solid corporate image in the industry especially in food industry environmental friendly practice has no alternative. Besides it gives the organization the first mover advantage which creates a strong and positive corporate image of the firm in the market.

Environmental sustainability practices not only gives the corporate an image in the industry but also ensure the long run sustainability of the overall business. 93% responded with positive note that to sustain in the industry and to perform long term there is no alternative of reducing energy consumptions, utilizing the alternative resources available and practice environmental sustainability following the national and global framework.

80% of the respondents stated that they have been able to create benchmark which push the regulatory bodies to take rigorous actions towards developing policies and regulation which will ensure the overall sustainability in the industry.

After getting the pictures of firm's performance majority of the organization practices environmentally sustainable supply chain practices voluntarily but not getting under pressure from government, global regulators, customers and any other external bodies. The businesses have grown the mentality of practicing the best not only for the business but also for the environment. From the results it can easily be perceived that the firms also want to move forwards no hampering the environment. The consciousness has developed and majority of them wants strong regulator action to ensure sustainability in every aspects. It is evident that sustainability makes the firms position better in the industry, increases profitability and more customers acquisitions along with positive corporate image.

## **4.8 Green Initiatives**

In the study there were several large and medium size organizations. The small and medium size organizations have taken one or two initiatives towards going green. On the other hand, large scale organizations have more tendency to take green initiative. However, large size organizations have taken different measurable initiatives such as corporate social responsibility towards environment, performance measurement of the environmental sustainability, working on sustainability.

### **4.8.1 Corporate Social Responsibility towards Environment**

Every organization has some responsibility towards the community and the stakeholders of the organizations. They have spare fund to support the initiative. Small scale organizations

performance in this regard is not evident but large size firms have taken many actions. Usually large organizations donate the firms to the NGO to do something better for community. In recent days, corporates have started to utilize the funds by taking measureable environmental actions. They work with third party and sometimes donate the funds to environmental sustainability action takers to plant trees for the healthy environment, to clean the waste of the society for better environment. Sometimes they take CSR actions for research and development of green initiatives. For example, corporates these days are planning to go paperless to prevent deforestation and eradicate adverse environmental effect due to climate change.

#### **4.8.2 Performance Measurement of the Environmental Sustainability**

Large corporates invest funds to measure the environmental sustainability. They focus on the five global indicators such biological diversity, human resource, food production, average global surface temperature, resource depletion. Organizations follow industry specific or organization specific measurement tools to identify imbalance and to take protective measures to achieve sustainability and balance across social, environmental and economic principles.

#### **4.8.3 Working on Sustainability**

To foster achievement of UN sustainable development goals (SDGs) organizations have started working on developing sustainable cities and communities and recognizing the sustainability work. Organizations developed policies which recognize environmental sustainability work carried out by suppliers, customers and other stakeholders and that policy encourage minimizing or restrict the work carried by the organizations that harms the society and environment.

Bangladeshi companies prime focus to practice environmental management in areas like waste management and energy use deductions. In supply chain organizations try to control on packaging, noise, smoke, harmful gas from refrigerator and transportation. 40% of the companies responded that they do continuous cost analysis in their production process to understand daily electricity and energy waste and what protective measures to be taken to minimize such costs.

### **4.9 Comparing Green Supply Chain Management Initiatives**

In survey stage three companies attended who have already undertaken green supply chain management (GSCM) initiatives. Among the five companies two of them are Bangladeshi food suppliers targeting only the local markets in Bangladesh. Other three companies are multinationals food suppliers targeting Bangladesh and other international markets. Although

all of them are operating in Bangladesh but there exist huge differences in implementation and performance in those local and multinational companies in terms of their industry background, performance and policy implications. So, their primary concern for implementation of environmental sustainability and reducing the energy cost and prevention of drastic climate also differs.

As organization structures of those organizations differ each of those companies allocated management into different department of their organizational hierarchy in Bangladesh such environmental management engineer, operations manager and so on. One difference has been observed in the study that Bangladeshi organizations environmental management system doesn't have solely dedicated team to work for environmental sustainability of supply chain rather it works for overall organizational environmental sustainability. Whereas, multinational companies have separate team to work solely for environmental sustainability of supply chain. This may happen because multinational companies have global benchmark and team to support with. The business size and operational limitations could be the limitations for local companies not being able to perform up to the benchmark.

Their exist differences in the prime focus factors of the local and multinational companies. Local companies tend to focus more on internal issues, such as waste management and reducing energy cost. But local companies lack focus on the environmental performance of the upstream and downstream of the supply chain management.

But the multinational companies not only focus on the internal issues but also they take measurable initiatives towards all of the suppliers, customers and other stakeholders involving in processing raw materials, packaging and alternative transportation to reduce the carbon omission within the supply chain. They simultaneously measures their internal performance as well as the performance of the suppliers. It dictates that multinational companies be able to implement environmental sustainability in more integrated and collaborative way than those local companies.

In terms of sustainable policy implications and target aspects of the firms there exist a gap in the performance of local and multinational companies. Multinational company's sustainable policy for environmental management covers all the areas of economic, social and environmental issues and they assess continuously the economic costs and environmental impacts of the products developed. Besides there is no such specific policy or external parties to review and monitor the policy implications and performance of the local companies actions

and initiatives. Whereas, multinational companies do review their implications and performance by external parties to get neutral results and to identify the improvement areas.

In terms of the motives for implementation of green supply chain management (GSCM), both locals and multinational companies have achieved some goals or performed at least to achieve environmental sustainability. But the researcher has found that the local companies doesn't even know whether their products have competitive advantage or their actions have measurable impact on environment. On the contrary, multinational companies do know what percentage they have achieved undertaking green supply chain management initiative and what things to do next.

Compared to multinational companies only one Bangladeshi companies have environmental standard certification ISO 14001 whereas all the multinational companies have such certificate.

#### **4.10 Discussion**

Rao, P. (2008) stated that, current play of the global competition dictates sustainable supply chain is inevitable in the current business arena. Sustainable supply chain not only covers the interest of the environmental aspects but also has a very positive roles to play in developing the sense of responsibilities among employees, customers, suppliers and communities. In this study it is also evident that multinational companies adopt and practice environmental sustainability of supply chain management. Whereas local companies are still far behind than the benchmark set by multinational companies. Here local companies can consider multinational companies as model and play a good role to practice and develop sense responsibilities among employees, customers, suppliers and communities. Besides it can be a good weapon to achieve competitive advantage over the competitors with bringing new opportunity and innovation scope.

Environmental management in supply chain basically refer to an organization's capacity to manage environmental issues in the supply chain effectively and efficiently. It is completely relatable with the study the researcher conducted. We have found in the study that practicing environmental sustainability increase overall organizations efficiency and work as a catalyst to achieve economies of scale. Besides adoption of environmental sustainability in supply chain increase industry acceptance and organization value. Eltayeb, T. and Zailani, S. (2014) mentioned that the core focus of the environmental management in supply chain is to reduce the harm form the unsustainable supply chain through application of strategies, policies and action plans.

Energy resources and climate issues have been taken into consideration with environmental concerns in logistics and supply chain management. Setyadi, A. (2019) in his theory of environmental management in supply chains addressed green supply chain management a solution which delineates the relationship between natural environment and supply chain management through green manufacturing, green purchasing and green logistics development. In this study it is found that in every phases in the manufacturing process companies sincerely keep climate change and energy crisis in consideration and always try to minimize the consumption through utilizing alternative sources such as solar energy.

In an earlier study by Yakovleva, N. (2007), it is found that environmental management in supply chain has positive correlation with the increase of organizations efficiency, profitability and performance. But such conjoint development of supply chain management is not easy as because of different economic drivers and business relationship with the suppliers and customers. So the favorable outcome of environmental management in supply chain needs more attention and few systematic changes in the production process design with collaboration of environmental activities in every stage of the process. The research outcome of study partially different from the study of Yakovleva, N. (2007). Both the local and multinational companies agreed with the fact that conjoint development of supply chain management is possible if the regulatory body takes active participation in the process. Besides economic drivers will always be there in every phases of the business and relationship with the supplier will never be the same. But the business must continue and environmental sustainability practice in supply chain management cannot be stopped.

Paloviita, A. (2010) explained in broader perspective that the global economic growth is facing the vulnerability of serious environmental problems and energy issues. The issue of sustainable supply chain management has emerged in the agenda of global business development discussions. In the study majority respondents agreed to the fact that major reason behind practicing environmentally sustainable supply chain management is the climate change and adverse effect of the business on environment. Climate change and energy crisis are putting pressure to the development of sustainable economy.

#### **4.11 Major Findings and Implications**

The major findings and the consequent managerial implications of the study summarized and described as follows.

The concept of environmentally sustainable supply chain concept is very new in Bangladesh and it is still at its infancy. Though the result shows significant urge in the organization regarding supply chain sustainability but there exist conceptual gaps in understanding environmentally sustainable supply chain management of the organizations. Besides due to the limitations of the sample size transparent picture and practice of the overall food industry could not get measured.

Among all the firms taken as sample it has been found that large scale organizations are more likely to adopt and practice environmental sustainability in supply chain compared to the smaller firms. Besides there exist gap in local and multinational companies practice and action plans. Actions of the regulatory body is not that significant to bring change in the industry by putting pressure to implement environmental sustainability.

Bangladesh being one of the prominent importer of goods and merchandise would definitely do well especially in the international market if the sustainable supply practices of the organizations come to the light and the regulatory bodies take measurable action against the firms not implementing environmental management systems.

From the study it is found that organizations do not think that the consumers are aware of the fact of environmental sustainability. So, the organizations get hardly any pressure from the customers or different other external forces except regulatory bodies about implementation of environmental sustainability. The researcher found results about reverse supply chain but the percentage found in the results are still not satisfactory as the respondents were only those who have implemented environmentally sustainable supply chain management. And the percentage visible about the organizations growth, market penetration, customer acquisitions are significant but only for those who have implemented GSCM.

The firms which initiated environmentally sustainable supply chain practices voluntarily are not found to practice sustainability to a significant extent. However, from the other company's respond it is evident that if firms practice sustainable supply chain voluntarily it would have put positive impact on the overall firm's economic performance and industry competitiveness. Results also shows that firms adopt environmentally sustainable supply chain or green supply chain management for regulatory compliance but the percentage is minimum than those adopted voluntarily. Since the objective is to go green firms should adopt and practice environmentally sustainable supply chain practices.



The researcher also has found that supplier's performance has significant positive impact on designing and developing sustainable supply chain. Besides industry competitiveness has less effect or relationship with the economic performance of the firm because sustainable supply chain is not a luxury but a necessary but voluntary adoption of sustainable supply chain practice has significant positive impact on the growth and economic performance of the firm.

Besides the certification of ISO 14001 has no positive relationship with the firms engagement in environmentally sustainable supply chain management as majority of the firms usually in Bangladesh adopt that certificate to attract foreign buyers or sometimes to fulfill the requirements of the buyers.

On the other hand, it is evident in the study that multinational companies have reputation of adoption and practicing environmentally sustainable supply chain management than those local companies. Multinationals always try to perform maintaining the global standards and operate equitably all over the world. The global benchmark they set to their firms makes it difficult for the local companies to compete with but the local companies can easily follow their strategy to improve their systems.

Interestingly one important fact comes to light in the study. One of the global food manufacturer has established a separate place besides the factory area of the company for better monitoring and collaboration with the suppliers. This company is outperforming in the case of practicing and developing sustainable supply chain management. They train their suppliers, assist them in products and process designing. This company compels its suppliers to obtain ISO 14001 certification. This company always share the production schedule with the suppliers so that the suppliers can plan accordingly and perform consistently maintaining the environmental issues and sustainability of the supply chain management. And automatically this attitude of the company towards its suppliers encourage the suppliers to generate up to the mark output.

There is huge scope for local firms to follow and adopt environmentally sustainable supply chain practices considering multinational companies as model. Local firms can easily improve their firm performance and create a good position in the market. Even many local firms work as suppliers of multinational companies. Besides due to globalization it has become easier for local firms to communicate and learn from global market places.

Collection and recovery of disposed items is quite evident in Bangladeshi food industry. This sector needs proper monitoring ensure the quality of the recovered items. Though not every

items produced cannot be recovered but at least the firms should keep practicing and utilize 100% of the scope available. Solely this process may put huge impact on the environmental sustainability of supply chain management. Therefore, increasing the activities regarding product recovery of disposed items and reusing those to reproduce to sell in the secondary market would possibly generate extra margin for the business as well as create a mass impact on supply chain management activities of the firm.

## **Chapter-05**

### **5.0 Conclusion**

In this paper, the researcher presented the results of the survey conducted on environmentally sustainable supply chain and its effectiveness in food industry Bangladesh. The survey items in the study are basically Bangladesh-specific and developed basing on relevant previous studies and corporate feedback. In this chapter of the study, the researcher draws conclusion of the research objectives along with limitation of the study and future research directions.

### **5.1 Objectives of the Study**

- To explore the development of environmental management in supply chains;
- To identify the consequences of energy consumption and the climate issues in the food industry supply chains by focusing on the energy costs, logistics costs and logistics performances;
- To identify the drivers and barriers towards green supply chain management practices;
- To investigate the implementations of green supply chain management in Bangladesh food industry supply chains;
- To assess the differences of environmental management in domestic companies and international companies.

#### **5.1.1 Objective 01**

To explore the development of environmental management in supply chains.

The findings of the study revealed that the environmentally sustainable supply chain management practices in Bangladesh frozen and packaged food industry is underdeveloped. Green supply chain management practices within the industry is not so remarkable.

Sustainable supply chain management practices should come as a joint effort of environmental management but in reality there exists huge lack in awareness and actions. Corporates are paying attention but the practices are not so significant to build environmentally sustainable supply chain in Bangladesh. But it is also found that many managers are concerned regarding energy-climate issues and organizations are taking measurable actions but this is not enough to achieve overall sustainability unless joint effort comes from the entire industry.

This research also found that there aligns huge gap between theory and practice in environmentally sustainable supply chain management. Besides, in comparison with developed countries Bangladesh is far behind to reach the benchmark. Except voluntary participation and actions by the corporates and regulatory body's strong intervention the achievement of environmentally sustainable supply chain management can never be possible.

### **5.1.2 Objective 02**

To identify the consequences of energy consumption and the climate issues in the food industry supply chains by focusing on the energy costs, logistics costs and logistics performances.

In this study, it is found that majority of the organizations does not consider energy and climate issues seriously as there is no such direct impact of climate issues on the frozen and packaged food industry. But organizations are more concerned about energy issues and they are putting more focus on finding alternative sources of energy. Besides there is a global pressure from the buyers regarding energy consumptions and crisis. Many small and large organizations are currently planning to adopt green supply chain management to come out of the pressure and develop sustainable supply chain practice.

### **5.1.3 Objective 03**

To identify the drivers and barriers towards green supply chain management practices.

The corporate social responsibility (CSR), organizations internal management policies, willingness of the top management are the internal drivers which can easily lead the path forward to achieve environmentally sustainable supply chain management practices. Besides external forces such as customers, regulatory body and government can also put pressure on the corporates to practice green supply chain management.

Major barriers that hinders the implementation of green supply management practices are lack of regulations and legislations, awareness of the stakeholders, lack of commitment of the top management, cost of implementation and lack of knowledge in acceptance of new technology. If all the barriers are taken into consideration and take actions to eradicate those with possible sustainable solutions green supply chain management can be achieved with significant positive impact.

### **5.1.4 Objective 04**

To investigate the implementations of green supply chain management in Bangladesh food industry supply chains.

In this study, the insights received from the survey is that the organizations considers cost issues as a major impediment in implementation of green supply chain management rather not focusing on the economic costs if not implemented. Besides many small and medium organizations policy do not dictate them to implement and practice green supply chain management. They are not at all concerned about the energy-climate issues impact on the business. Their plan is to survive in the current economy surroundings. On the other hand, large organizations struggle with the problems raised due to implementation of green supply chain management as the business structure of those organizations are complex and not so easy to restructure in a cost effective way. Most of the organizations are currently focusing on the profit maximization rather focusing on the long run sustainability of the business. Strong government intervention and sustainable actions from regulatory body can improve the scenario and can compel organizations to practice green supply chain management.

#### **5.1.5 Objective 5**

To assess the differences of environmental management in domestic companies and international companies

In terms of the motives for implementation of green supply chain management (GSCM), both locals and multinational companies have achieved some goals or performed at least to achieve environmental sustainability. But the researcher has found that the local companies doesn't even know whether there products have competitive advantage or their actions have measurable impact on environment. On the contrary, multinational companies do know what percentage they have achieved undertaking green supply chain management initiative and what things to do next.

Multinational companies have access to their other global concerns and can consider those as model in any decision making. Besides technology adoption rate is very high in case of multinational companies whereas local companies are struggling and far behind the benchmark set by multinational companies.

## **5.2 Limitation of the Study**

This research study has several limitations which ultimately affected the interpretations. Firstly, the study has time and fund constraints which ultimately limits the sample size, therefore this study does not represent the true population or industry picture. Secondly, the core focus of the study is on effectiveness of environmentally sustainable supply chain practices in frozen and packaged food industry in Bangladesh and did not take other types of food industries in

consideration. Lastly, understanding the study concept by the managers or the participants was opaque which also limited the result obtained and the interpretation of the results.

### **5.3 Future Research Directions**

More future research is needed especially in the area of government legislations and its effect on the environmental performance of the organizations. Besides further research can be conducted on the same research work with extended sample size and considering the overall food industry of Bangladesh to measure the effectiveness of environmentally sustainable supply chain practices. The environmentally sustainable supply chain practices in Bangladesh is still in its infancy and this study is relatively exploratory. There exist scopes for the future researchers to conduct longitudinal studies to assess the implementation of sustainable practices and adoption green supply chain management by the organizations.

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## Appendix

### Questionnaire for a Survey of Environmentally Sustainable Supply Chain Management

#### Practices in Food Industry of Bangladesh

1. Name of the company: \_Division: \_\_\_\_\_
2. Main product lines: \_\_\_\_
3. Ours can be best described as Bangladeshi / multi-national company (Please tick your response)
4. Our company is ISO 9001 certified: Yes / No (Please tick your response)
5. Our company is ISO 14001 certified: Yes / No (Please tick your response)
6. We have implemented Environment Management System (EMS): Yes / No (Please tick your response)
7. We have plans to implement Environment Management System (EMS) in next 3 years (Please tick your response)
  - a) Yes
  - b) No
8. We consider the climate change and energy crisis effect on the business. (Please tick your response)
  - a) Yes
  - b) No
9. We have adopted environmentally sustainable SCM practices (Please encircle your response)  
(1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree)

(a) voluntarily	1	2	3	4	5
(b) to comply with the regulations	1	2	3	4	5
(c) under pressure from customers	1	2	3	4	5
(d) Compete in the industry	1	2	3	4	5

10. We do the following for our suppliers (Please encircle your response)  
(1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree)

(a) educate and raise awareness	1	2	3	4	5
(b) assistance for environment-friendly practices	1	2	3	4	5
(c) persuade to execute EMS and ISO 14001	1	2	3	4	5
(d) incentivize for implementation of EMS/ISO 14001	1	2	3	4	5



(e) recommend strongly to supply environment-friendly materials	1	2	3	4	5
(f) inspect supplier performance	1	2	3	4	5

11. To design our products and processes, we do the following (Please encircle your response)

(1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree)

(a) bio-degradable materials are used in product designing	1	2	3	4	5
(b) recyclable materials are used in product designing	1	2	3	4	5
(c) carry out products life cycle analysis	1	2	3	4	5
(d) decrease energy consumption during production	1	2	3	4	5
(e) use renewable sources of energy	1	2	3	4	5
(f) decrease resource consumption during production	1	2	3	4	5
(g) decrease wastage and spill-over during production	1	2	3	4	5

12. While packaging, storage, transportation and distribution of raw materials and finished goods, we prioritize on the following (Please encircle your response)

(1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree)

(a) environment-friendly packaging	1	2	3	4	5
(b) recyclable packaging materials	1	2	3	4	5
(c) environment-friendly storage	1	2	3	4	5
(d) use of alternative transport mechanisms	1	2	3	4	5
(e) attaining economies of scale in transportation	1	2	3	4	5

13. We provide waste management support or assistance in the disposal/recovery of our products and packaging discarded/returned after use: Yes / No (Please tick your response) If “Yes” go to Q. 14, If “No” go to Q. 16

14. While performing the reverse supply chains, disposal/recovery of our products and packaging, we observe or have the followings (Please encircle your response)

(1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree)

(a) customers are environment-conscious	1	2	3	4	5
(b) our customers cooperate in waste management	1	2	3	4	5
(c) we have a centralized disposed items collection facility	1	2	3	4	5

(d) we have a centralized disposed items inspection facility	1	2	3	4	5
(e) we assist in environmentally friendly disposal of waste	1	2	3	4	5
(f) we have a centralized disposed items recovery facility	1	2	3	4	5
(g) Our production is integrated with the recovery facility	1	2	3	4	5
(h) we have third-parties for our product recovery	1	2	3	4	5
(i) recovered products can be used in new product development	1	2	3	4	5

15. We do following while conducting our product recovery operations: revamp / remanufacturing / cannibalization / recycling (Please tick your response(s))

16. By adopting environmental SSCM practices, we have achieved the following (Please encircle your response)

(1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree)

(a) improved product and process quality	1	2	3	4	5
(b) improved efficiency and productivity	1	2	3	4	5
(c) innovative product and process design	1	2	3	4	5
(d) cost-saving production and distribution	1	2	3	4	5
(e) increased sales of products	1	2	3	4	5
(f) increased market share	1	2	3	4	5
(g) new markets penetration	1	2	3	4	5
(h) new customers acquisition	1	2	3	4	5
(i) increased organizational profits	1	2	3	4	5
(j) increased organizational growth	1	2	3	4	5
(k) flourished corporate image	1	2	3	4	5
(l) first-mover advantage	1	2	3	4	5
(m) long-term benefits	1	2	3	4	5
(o) influencing policy makers and regulators	1	2	3	4	5