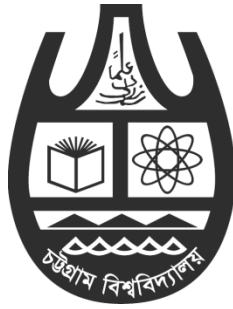


**Term Paper on GREEN SUPPLY CHAIN
MANAGEMENT OF RMG INDUSTRY OF
BANGLADESH**

**Term Paper on GREEN SUPPLY
CHAIN MANAGEMENT OF RMG
INDUSTRY OF BANGLADESH**



Submitted to:

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4th Year BBA Examination 2014

Session: 2010 – 2011

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Date: August 14, 2016

Letter of Transmittal

August 14, 2016.

Mohammed Shahedul Quader

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Subject: Term Paper on “Green Supply Chain Management of RMG Industry of Bangladesh”.

Dear Sir,

With due respect, this is to inform you that I have completed my term paper. The term paper titled “Green Supply Chain Management of RMG Industry of Bangladesh” has been prepared as per the requirement of my undergraduate program at Department of Marketing in University of Chittagong.

In scripting this paper, I have tried my best to apply the concepts learnt in my academic courses along with the vigorous brain storming, discussion, and summarization while working for this project. I have reflected what I have understood in this paper as per my coursework; reproducing the complete narrations, illustrations, relationships, findings & recommendations, and the reasons behind all these discussions.

I hope this paper will entice your kind appreciation.

Sincerely,

Mohammed Sanjidul Anwar

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4th Year BBA Examination 2014

Session: 2010 – 2011

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Acknowledgement

In the Name of Allah, the Most Gracious and the Most Merciful.

I got the chance to pursue my bachelor degree at the Department of Marketing in University of Chittagong in 2010. When I started my BBA Program as a full time student in 2011 at University of Chittagong, I realized that it's a big responsibility in the way of my academic journey and as a part of this journey I was assigned to complete this term paper to bridge my academic knowledge and research perspective. My study, however, was not accomplished on my own. I wish to express my sincere gratitude and appreciation to all the people who had helped me throughout my journey to achieve this goal.

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Executive Summary

Garment industry has been occupying as the largest source of exports and foreign currency as well as the second largest contributor to GDP in Bangladesh for more than a decade. Millions of poor women and men are employed in this industry. The export-oriented RMG sector has some distinctive features, which differentiate it from other businesses. Whatever the wage level or lead time, without proper supply chain management no business is viable especially when RMG sector is counted as a suitable one. As supply chain networks keep on expanding in RMG industry around the country, it has created significant effects on the environment. As a measure, Green Supply Chain Management (GSCM) has become an important standpoint in RMG firms in recent times.

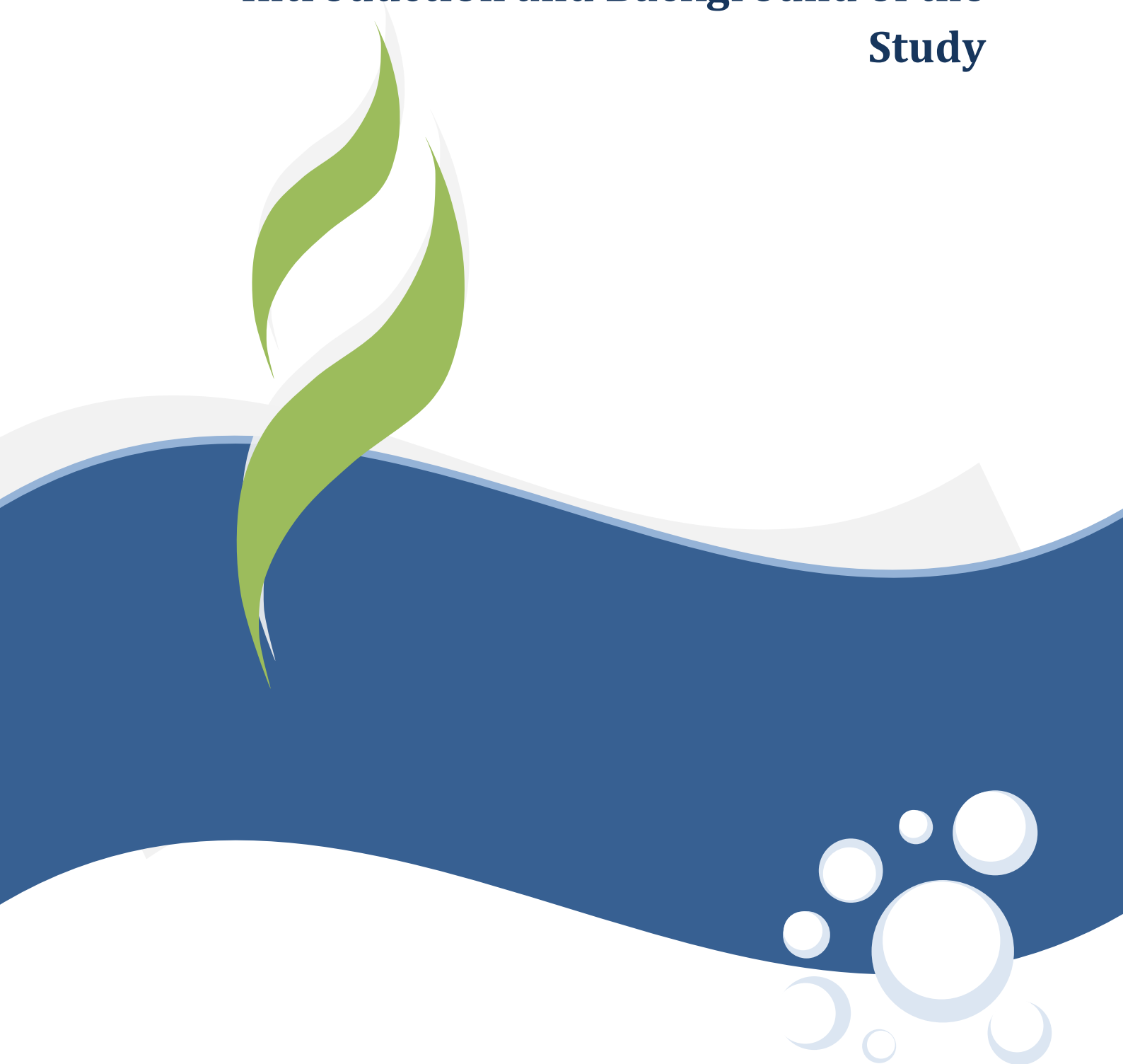
Several GSCM drivers and factors simultaneously work behind greening the RMG sector with pressures for sustainability from every end whether it is internal or external to the organization. Consequentially, different scholars and industrialists suggested GSCM practices, and taxonomies to those practices detailing the RMG product, transportation and distribution, warehousing, reverse logistics, design, and operation. Three main components are essential to any kind of sustainability: economic, social and environmental; also to RMG industry.

RMG's supply chain sustainability reveals the demanding part of society who pursues greenness around the whole industry processing, and execution process. Starting from investors, to the buyers/users and other stakeholders demand the GSCM. And, with successful implementation, the benefits pay off through environmental performance and competitive advantage. But the implementation process includes many hurdles to overcome through some core GSCM contents based on assets, flows, performance, cooperation, and evaluation. Transparency, harmony, dynamism, integration, codes of conduct, and the like are the prerequisites. Reduce, reuse, recycle, and rethink – the 4R approach works also as a vital sanction along with other typical measures. Surely, RMG industry of Bangladesh is competing on global scale for GSCM and prospering to a state of brighter future along with top earning sector of the country.

Keywords: Bangladesh RMG Industry, Supply Chain Management (SCM), Green Supply Chain Management (GSCM), Sustainability.

Chapter 01

Introduction and Background of the Study



CHAPTER 01

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Introduction

RMG is the leading sector in Bangladesh in terms of foreign currency earnings. Bangladesh is the second largest garments exporter next to china. It contributes 80% of total export earnings. Low labor cost, efficient worker, different organizational support and government support are the main strengths of this sector.

On the contrary, Supply Chain Management is such kind of Management dealing with customer contentment concerning Manufacturing and Service which are the key values for the Bangladesh Garment Industry obviously. It Constance all of the customer requirement and essential it's all about customer (buyer in term of garment industry) satisfaction. Supply Chain Management (SCM) is such kind of Management for a network of intra and interconnected businesses (Supplier to Manufacturer to Buyer) engaged in the provision of goods and service packs (Lead Time or up to Shipment) needed by the bottom end customers in a supply chain. Supply chain management extents all attempts and procurements of raw materials like trims and accessories, work-in-process inventory, and completed goods from source of origin to source of consumption inside the garment commerce. So according to the nearby scenario Supply Chain Management is in actuality offering a New Paradigm for Bangladesh Garment Industry undoubtedly. Supply chain management systems help in reducing inventories, operational costs, compress order cycle time, enhance asset productivity as well as increase the companies' responsiveness to the market. Besides from these benefits, the apparel industry is able to achieve quick response through efficient supply chain management practices. Quick response is a concept pertaining to the collaboration and sharing or information among manufacturers, suppliers and distributors, allowing them to respond more rapidly to the needs of the customers.

Since entering into the 21st Century, Bangladeshi RMG and apparel industry begun to face increasingly serious problems with offering high-quality, low-cost products within a short lead time; and to meet health, social, and environmental compliances in the face of increasingly stiff completion. Under this domestic and foreign competitive

environment, the future survival and development of Bangladeshi RMG industry faces large challenge. Simple management mode of made of “import to export” or the production and management mode of “vertical integration” have made the Bangladeshi RMG industry lack in activity, innovational ability and insufficient international competition. Under this background, the idea of “horizontal integration” begins to rise, and as the representative of this idea, the supply chain management (SCM) increasingly prevails. Because of enormous economic importance in the economy of Bangladesh, RMG industry growth is to be sustained by improving SCM.

Moreover, with the intensification of greening different aspects of an organization, RMG industry is now facing a huge pressure to green its activities especially for adopting the Green Supply Chain Management (GSCM) approach. Since SCM is essentially merged with every activity of the RMG firms, now-a-days they are trying to reduce the environmental impacts by covering many facets of GSCM.

1.2 Background of the Study

Recent development on world economic climate creates uncertainty on business environment. Thus, this creates a necessity for organization to look into reconstruct, restructuring and enhance their strategy to sustain the business and profitability while remain competitive in marketplace. Additionally, organizations are facing rising global community inquiries through media and non-governmental organizations (NGOs) pertaining sustainability aspect of their developments (Sarkis, 2001). According to Porter and Kramer (2006), companies are increasingly expected to extend their sustainability efforts beyond their own operations to include those of their suppliers, and to meet their customers' sustainability expectations. Though, in the past, supply chain management only focuses on the efficient and responsive system of production and delivery from raw material stage to final consumer but currently environmental issues in supply chain are significantly growing partly due to wider debate on how industry meets the challenges of sustainability. This study will focus on antecedents of green and sustainable development within an organization and the relationship between the antecedents of Green and Sustainable Supply Chain Management Practices and how this practices effects the sustainable supply chain performance of the organization.

1.3 Scope of the Study

If Supply Chain Management (SCM) and Green Supply Chain Management (GSCM) are ended appropriately, Bangladesh Garment Industry will diminish their catalogs to cut operational costs, lessen order cycle time, enhance plus efficiency as well as augment the companies' receptiveness to the market by considering the negative impacts over the environment and finding a proper solution to that. Improved and superior SCM and GSCM performance also leads to quick response which is a concept pertaining to the collaboration and sharing of information among manufacturers, suppliers and distributors, permitting them to act in an environmental friendly response more swiftly to the requirements of the clients. The organizations like Universities, Training Institutes, and Commercial Offices etc. are offering Supply Chain Management from an environmental perspective as important courses for the modern management by which the employees can be well educated concerning green supply chain management and after that they can implement the learning directly in the Bangladesh garment industry. It can make certain our future economic augmentation more enthusiastically and sustainably.

1.4 Justification of the Study

Empirical research provides that Supply Chain Management (SCM) contribute to organizational performances. It is a well-developed body of knowledge and practice that has positive impacts the effectiveness on the organization's financial and market performances. Adding Green to the SCM i.e. GSCM is now an emerging concept especially in RMG industry of Bangladesh. In spite of being one of the major industries in Bangladesh, RMG industry yet face problems in gaining environmental excellence. This study therefore seeks to investigate the impact of GSCM practices on RMG industry of Bangladesh.

The question however is, to what extents do green supply chain management practices affect or influence the performance of garments businesses in Bangladesh? Is there a recognized and standardized framework for assuring GSCM success through the application of the principles of green supply chain management? This study therefore sought to find some answers to these questions particularly from a Bangladesh perspective and to establish whether green supply chain management practice affect environmental performance in different firms of the country.

1.5 Motivation and Research Approach

Society and politics are becoming more and more aware of the climate change and its consequences. Consequently, measures for the improvement of ecological sustainability are required in every field of life. The logistics sector assumes increasing responsibility: globalized business processes necessitate more transportation processes over longer distances, thus, resulting in high energy demand and growing emissions. In particular, the emission of greenhouse gases (GHG) need to be closely observed as the climate warming is accelerated by excessive human-caused. While GHG emissions have decreased by 2 % in the 192 countries of the UNFCCC contract (United Nations Framework Convention on Climate Change) from 1990 to 2005, the emissions of the transportation sector have increased within the same period by 43% to 3.47 bn. t. (Kuczmierczyk, 2010). The transportation sector induces 14% of worldwide GHG emissions (Stern, 2008). Within OECD countries this share amounts to 30% (International Transport Forum, 2008).

Counteractive measures can be divided into technological and organizational approaches. Technologically, energy and emissions may be saved by innovations such as hybrid engines or SkySails (the equipment of cargo ships with sails, cf. <http://www.skysails.info>). Organizationally, ecological objectives need to be included in logistics planning, e.g. when deciding upon transport dispositions or network locations. In order to influence logistics networks in an early stage and, therefore, to make use of the maximum potential for improvements, these activities have to start at the long-term level of Supply Chain Management (SCM). Here, classic approaches consider logistics costs and performance as primary objectives, whereas modern approaches integrate ecological objectives and, thus, are considered as Green Supply Chain Management (GSCM) approaches.

1.6 Research Questions

This paper discusses over the different reviews of Green Supply Chain Management (GSCM), its impact on environmental performance, problems and future measures in implementation over the RMG Industry of Bangladesh. So, according to the summarization of the paper, this may provide an answer to the following two questions:

1. How can companies in the garment industry of Bangladesh work with their supply chain to realize environmental improvements?
2. On the basis of the experiences of various ongoing practices, how can a result-oriented outcome be reached which really creates an impact?

1.7 Objective of the Study

The study on Bangladesh garment industry is the main source for economic development of Bangladesh demands examination and evaluation of multidimensional aspect of garment sector and its impact on the environmental condition of Bangladesh. In such a context, the main objective of the study is to examine, evaluate and analyze Green Supply Chain Management in garment industry and identify the techniques and practices used by them in Bangladesh. The objectives of the study are:

- To get an overview over the RMG Industry of Bangladesh.
- To highlight about the Supply Chain Management (SCM) and Green Supply Chain Management (GSCM) of RMG Industry of Bangladesh.
- To find out the role of GSCM in RMG Industry of Bangladesh.
- To ascertain the problems and project the future approaches toward sustainable RMG growth from supply chain point of view.

1.8 Methodology of the Study

This paper followed the systematic literature and analyzed articles approach. Considering the increasing number of books, journals, conferences and work-shops, the systematic literature review has become an indispensable method. In systematic literature review pertinent work and recent findings are analyzed with regard to a particular research question. The ultimate goal of this study is to find out the major implications of green supply chain management in RMG industry of Bangladesh. Various sources are supporting this issue by different ways. So we have exerted our effort to gather important aspect of GSCM and articulate those aspects for making conceptual understanding. Following steps are followed for research perspective.

1. Definition of Review scope
2. Conceptualization of topic
3. Literature search process
 - a) Identification of Journals
 - b) Identification of Database
 - c) Keyword Search
 - d) Backward/Forward Search
 - e) Literature Evaluation: Title, Abstract, Full Text Evaluation
4. Literature analysis and synthesis
5. Research Agenda
6. Thorough Discussion
7. Projection of the Future Activities

In this research qualitative method has been used. The literatures are collected in a systematic manner. Prominent online sources and university journals are used in this regard. Some key words also used here for searching relevant journal papers like “Green Supply Chain Management in RMG Industry”, “Sustainable Supply Chain”, “Sustainability”, “Supply Chain Management in RMG”, “Corporate Social Responsibility (CSR)” and Sustainability”, and the like. After that the collected resources were analyzed and synthesized.

1.9 Limitation of the Study

GSCM means Green Supply Chain Management or process comes into eminence when these companies have to allocate their products either to the retailers or directly to the patrons in the Bangladesh garment industry by fulfilling all essential elements related to the social, economic, and environmental concerns. The studies on GSCM are few in numbers, especially when considered in the perspective of garment industry of Bangladesh. For this reason, we have some hardheaded limitations to merge the green supply chain management concept usually in Bangladesh garment industry over this whole paper. These limitations are manifolds.

The first and foremost limitation of the study is the time constraint. The prospective time needed for the study has a huge difference with the time actually taken for the study. Another major limitation of the study is that it is almost based on the secondary research approach due to the time constraint. Moreover, this study has drawn on theory that had been developed in the European and American context. There might be some differences in the Bangladeshi context especially in Garment Industry of Bangladesh. Little exploration about green supply chain management was available that had been conducted in Bangladesh RMG Industry.

For future research, to extend beyond the present situation, the framework may need changing or adapting to be suitable for the targeted industry. The study of green supply chain management will lead researchers and managers who want to improve towards better sustainable ways of advancing supply chain management. Future research will need to develop an understanding of the impact of strategic environmental supply chain management skills in different market situations. The present study has moved toward considering these constructs simultaneously, but there is room for further development in that direction.

1.10 Managing Research Problems

Despite many limitations of the study, the project needed to be completed in a simplified good manner considering all the constraints. Administrating and conducting the study by having an overall idea on the green supply chain management concept of RMG industry was a difficult task. As the industry is still new to this concept and practices are very much low, uncertainties surround the application of this concept. So, the problems were basically solved through intensive study over different dimensions of the topic and by taking instructions from the supervisor. For conceptualizing the study, fundamentals of supply chain management, green and environmental marketing, and overview of RMG industry of Bangladesh were analyzed. The endeavors concluded:

1. Knowing the overall supply chain process
2. Observing the simple supply chain mechanism available in Bangladesh garment industry
3. Acquiring the elements and the areas of supply chain procedures
4. Building a bridge between greenness and supply chain practices
5. Finding the practical and conceptual clues about the green supply chain procedures in Bangladeshi garments
6. Monitoring the future prospect and projecting measures as per our subjective knowledge

Chapter 02

An Overview of RMG Industry of Bangladesh



CHAPTER 02

AN OVERVIEW OF RMG INDUSTRY OF BANGLADESH

2.1 Introduction

The export of ready-made garments (RMG) from Bangladesh has been increasing so rapidly for the last two decades that it has come to occupy the lion's share of its total exports. Bangladesh started exporting RMG at an annual value of about US\$32 million in 1983-84 but experienced a continuous massive growth which resulted in an almost US\$28,094.17 million of export value of RMG in 2015-16 (Export Promotion Bureau, Bangladesh, 2016). Once heavily dependent on exporting jute products, the economy of Bangladesh is now experiencing more than three fourths of its export contributions from the RMG sector alone. In Bangladesh, the export value of RMG out of total exports was almost 78% in 2011 and 82% in 2016 (Export Promotion Bureau, Bangladesh, 2016). This newly born industry has become immensely significant in the economy of Bangladesh due to its high contributions to the total export value, Gross Domestic Product (GDP) and job creation, especially for women, as well as helping the backward-forward supply chain industries to grow.

Among developing economies such as Cambodia, Sri-Lanka, China, etc., Bangladesh has achieved a strong position as one of the global suppliers of RMG, mainly due to having one of the cheapest labor costs among the apparel manufacturing countries. The globalization of industries created pressure for location-based manufacturing economies which were also supported by the US and European Union (EU) import policies. The 'multi-fiber arrangement' (MFA), a quota system imposed by the US federal government forced US importers to source from less developed countries with the aim of fostering their manufacturing ability and supporting the growth of the apparel industry in countries from South Asia, China and other developing nations. After the MFA system became defunct in 2005, Bangladesh started to counter more rivalry, both anticipated and unanticipated, from many producers and suppliers because it turned into an open market for all. Now, the RMG industry of Bangladesh is struggling with many global competitors in terms of cost, quality, customer service, lead time, and environment.

2.2 History and Evolution of RMG Industry of Bangladesh

Bangladesh Raw Material Garments Industry was evaluated through a lot of successive stages. It faced many obstacles while it's lifetime till date. The transformation can be delineated as under:

2.2.1 Initiation: Role of Korean Finns (1980s):

Within a single decade garments industry in Bangladesh has emerged as the single dominant industry iii export arena: the industry set its profile with four billion dollars in gross value terms and employment scopes of more than million skilled and semi-skilled women workers. This compelling successful economic development path was initiated in Bangladesh during 1978. At that time there were only 9 export-oriented garment manufacturing units, which generated export earnings of hardly one million dollar. Some of these units were very small and produced garments for both domestic and export markets. One of such units was Reaz garments established in 1960 as a small tailoring outfit, named after Reaz store in Dhaka. After serving only domestic markets for 15 years in 1973 it changed its name to M/s Reaz Garments Ltd and initiated new dimension in Bangladesh export industry by shipment of 10,000 pieces of Bangladesh made garments (men's shirts) worth to 13 million Francs to a Paris-based firm in 1978. But the actual milestone was led by the Desh Garments Ltd established in 1977. It was set-up in joint venture with Daewoo of South Korea and at that time emerged as the single largest and most modern garment—manufacturing unit in the sub—continent, A contract signing of collaborative arrangement for technical and marketing between Desh-Daewoo during 4 July of 1978 enabled Desh garments to send 130 workers and management trainees to be trained at Daewoo's state-of-the-art technologies at Pusan plant in South Korea in 1979. The 130 Desh-selected trainees returned home after a six-month training period to form the nucleus of the RMG sector's technology and its core human resource base. Consequently, Desh's modern factory constructed with Daewoo's specification and technical assistance with capability of 6 lines, 600 workers, and 5 million pieces per year capacity worth \$1.3 million investment goes into operation. Another South Korean firm, Youngones Corporation formed the first equity joint-venture garment factory with a Bangladeshi firm, Trexim Ltd in 1980. Bangladesh partners contributed 51 percent of the equity of the new firm, named Youngones Bangladesh. It exported its first consignment of padded and non-padded jackets to Sweden in December. 1980.

2.2.2 Promotions by the Government (1990s):

Usually governments in less developed countries are weak and always lack proper timing and coordination with regard to creating supportive policy regime for conducive growth of emerging industry. From that perspective the role of successive governments to promote the RIIG industry in Bangladesh is quite remarkable. It is worthy to note that the first export consignment of shirts from Bangladesh made by the state-trading agency, the Trading Corporation of Bangladesh, in the mid- 1970s was destined to sonic East European countries under counter trade arrangements.

Bangladesh inherited its industrial policy framework from Pakistan which focused on bureaucratic control of a largely private industrial sector with emphasis on import substitution and near exclusion of foreign investment. Immediately after independence the government regime due to its socialist orientation chose to maintain tight control over the economy and started to nationalize all large-scale industries, in particular, jute and cotton textiles, sugar, and most banks. At that time limits were imposed on private investment and on foreign direct investment. After the coup d'état of 1975 a number of socialist policies of the previous regime was reversed to more pro—market and laissez—faire leaning even though the new regime intervened frequently in the economic development process. As a consequence, investment approval and loan disbursement procedures were simplified to liberalize the investment climate of the country. Tile investment ceiling was raised to Tk. 100 million and then finally withdrawn in September 1978.

Even though rigidity of government responsiveness in terms of adaptability of the ideas from private entrepreneurs is very common cases in LDC countries, in case of RMG in Bangladesh the scenario was quite extraordinary: the innovative ideas and strategies from the entrepreneurs were well accommodated by the policy makers of the government. Two most important financial features that play key role to expansion of rapid growth of manufactures are back-to-back L/C and bonded warehouse facilities. Both these policy components were formulated based on the prescription of the leading entrepreneurs. The innovation of the back-to-back L/C system eliminated the need for cash for working capital and the need for foreign exchange in the RMG industry. This allowed the entrepreneurs to set—up factories with low capital investment and thus allowed rapid

growth of the industry. As consequence, these policies ensured net foreign exchange earnings for the country. As in 1993, revised import policy specified that the back-to-back L/C cannot exceed 70 percent of mother L/C. It implies that the foreign exchange spent on purchasing intermediate materials for manufacturing RMGs for export cannot exceed seventy percent of the value of export earnings. It, thus, ensures 30 percent net foreign exchange earnings of total export volume.

Following the trends, Bangladesh government continuously supports the industry in terms of rationalization of tariffs and taxes on imports of capital machinery, raw materials, dyes and chemicals, and reduction of interest on long- and short-term loans. As a forward looking attitude, at present the Bangladesh government offers lucrative incentives for encouraging the use of local fabrics in the export-oriented garment industries. To encourage textile export, companies can import capital machinery duty-free. Cotton also may be imported duty-free. Moreover, the government recently has implemented several policy reforms to create a more open and competitive climate for foreign investment in the backward linkages of the industry.

2.2.3 Threat of MFA Phase out and Counteractions against It (2000-04):

It may be noted that textiles and clothing are susceptible to trade restrictions caused by trade friction. From historical trend it was found that after World War U Japan was strongly encouraged to exercise voluntary restraint on cotton textile exports to the US in 1957 because rapid expansion of Japanese textile exports frustrated the textile industry in the US (Yamazawa 1988) Since then controlled trade has been the norm rather than temporary regulation of the trade in textiles and clothing. The import restrictions by the US, Canada, and the European countries were first incorporated as a short-term arrangement regarding international trade in textiles in 1961, which was followed by a similar long-term arrangement regarding international trade in cotton textiles between 1962 and 1974. In the sequel, a restricted trade regime was perpetuated through the Multi-Fiber Arrangement (MFA) on international trade in textiles, which came into effect in 1974.

When the World Trade Organization (WTO) was launched in 1995, it was assumed that the MFA system of controlled trade would be phased out by January 1, 2005. At the beginning of 2005 exports from China and India jumped in the first half of

the year in open markets. Since China was the largest exporter of garments to the US and since the growth rate in the value of exports from China was extremely high, the US government seriously considered invoking safeguards to put brakes on garment imports from China. The EU also faced a surge in garment imports from China.

Academics and researchers have generally attributed the remarkable growth of RMG exports from Bangladesh to the Multi-Fiber Arrangement (MFA): bilateral quota system imposed by developed apparel countries, and low wages in Bangladesh (Siddiqi, 2004; Razzaque, 2005; and World Bank, 2005). The initiation of the industry was started by the Korean and Hong Kong ventures in order to penetrate the developed countries market via channeling their production through Bangladesh's granted quota access. In 2002 Bangladesh depends on quota restrained markets for about 94 percent of its RMG exports, among the highest ratios in the world. Such high concentrations of market access through quota readily pose concern for her potential vulnerability to the possible large scale shock due to abolition of quotas among policy planners, researchers, and academicians. The main concern was related to the competitiveness of Bangladesh garment industry and its growth in the quota free world which might, in turn, deteriorate country's balance of payments, output and employment vis-à-vis overall macroeconomic balances.

Several studies have conducted to assess the potential impact of MFA phase out on Bangladesh economy. Most of these studies used general equilibrium model for their simulation exercise to estimate the possible impact of phase out on Bangladesh economy. Elbeheri (2004), Lips et al. (2003), Mlachila and Yang (2004), Nordas (2004), and Spinanger (2004) had been the five main quantitative studies that had used database provided by Global Trade Analysis Project (GTAP) based at the Purdue University, the USA. Most of these studies depicted a gloomy future for the garments industry of Bangladesh in open era.

The empirical data shows that the RMG has grown consistently after the phase out period. It has been noted that from 1990 the R.MG exports on average grew at an annual rate of about 19 percent up to 2005. Data from Export Promotion Bureau (EPB) show that during the first six months of the quota-free regime the RMG sector registered export growth of about 19 percent. The growth rate recorded for FY05-06 was higher than

average to 23.5 percent. In value terms between July 2004 and June 2007 RMG exports earn \$4 billion extra which is 75 percent higher of the RMG export volume of FYO3-04. From the empirical evidence it is evident that Bangladesh comes as winner in the post-MFA world.

2.2.4 Aftermath and Reconciliations with Workers (2005-Till Date):

Mechanization and automation have not diminished the role of human element in industrial establishments. Nor have the economic reforms belittled the significance of labor. Human resource is an important factor to increase productivity and quality and to reduce costs: all of the factors of production are equally important to survive in the competitive world. In fact, the role of workforce has become highly critical in garment industry. Labor force is an important input in industrial production and this is equally in garment industry of Bangladesh.

Despite having a significant achievement in national economy, labor unrest in this sector is not diminishing at all. In order to survive in the quota-free competitive international market, addressing labor unrest has been a crying need. Labor unrest has been a common phenomenon in the RMG industry of Bangladesh. Workers are being embroiled in clashes frequently: they call strikes often to press their demand home. It causes enormous loss to the owners, cripples the economy and tarnishes the image of the country abroad. It also makes foreign buyers reluctant to render future orders. In addition the industry is losing competitive edge for this.

But the basic needs of the labor force must be mitigated. The socioeconomic condition of labor force of RMG industry of Bangladesh, in no way, can be said well. As most of them are uneducated and unskilled, they get very poor salary in contrast to ever-increasing expense of livelihood. Very often they do not get their salary, bonus and overtime bills in time. In many factories they are forced to work long hours in unhygienic condition. Maltreatment by the mid-level officers is their common fate. As there is no provision for trade unionism, they do not have any access to the policy-making process. In such a situation, they come to the street to raise their voice and involve themselves in vandalism and rampage.

Though causes of labor unrest are many and cross-cutting, it is evident that the foremost is the long-standing grievance of the workers. In this regard workers concern for job security and ensure payments are crucial and need to be look at. At present it is established that the wage they get is low Very often they do not get their salary overtime bills and bonus in time. Their recruitment system is outright hiring and firing as they do not get any appointment letter and identity card of the factory, they can be dismissed by owners for any reason at any time. They do not know anything about their job contract. Being maltreated by owners and mid-level officers, working long hours in congested environment without sufficient rest, lack of nutritious foods, medicine, right to legitimate protest against ruthless exploitations, etc. are their daily destiny. Factory building collapse, fire accident, stampede render many dead and injured. Nevertheless, if any worker protests against owners or management, he/she is threatened by various types of harassment such as dismissal, arrest or even physical assault by the hired hooligans of owners. Under prevailing uprising Bangladesh government has taken initiatives to address the grievance issues through fixing minimum wage for the industry.

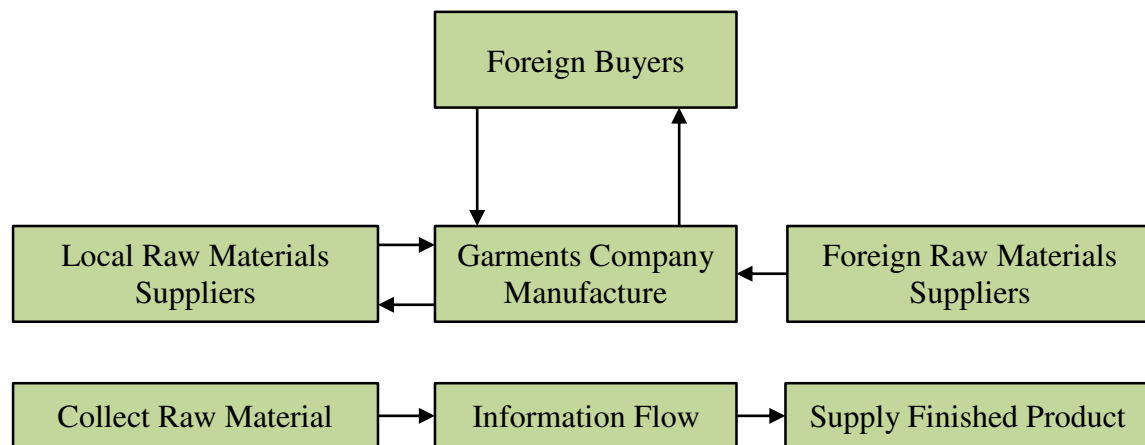
The second phase of labor unrest in the RMG sector in 2010 began with the implementation of the new wage. Though reluctantly the workers accepted the new wage structure, many factories are found not implementing the new scale under various pretexts. Despite repeated severe warning from government: factories were found to have been flouting it. It may also be noted that implementation of the new wage structure is difficult under present political and administrative institutions as several stakeholders play key roles RMG entrepreneurs in Bangladesh argue that low wages in the RMG sector reflect the low productivity of workers in the sector. Khatun and Moazzem (2007) suggest a number of factors need to be considered while fixing the minimum wage of industrial workers. These are: i) workers' minimum requirement for decent living; ii) enterprise's capacity to adjust with the additional cost originating from the rise in wage; iii) consideration of the wage structure of similar types of industrial sectors; and iv) adjustment of the wage with country's economic development. Further, Centre for Policy Dialogue (CPD) (2003) suggests for continuing dialogue between workers and management, particularly in view of changing employment composition and new types of demands.

However, as the evident from industrial revolution showed when, in course of time, government realized the importance of workforce and adopted welfare policies such as increasing wages, limiting working hours, providing trainings, establishing daycare centers and schools for the children of the workers etc. it made a significant to resolve the conflict. Labor unrest is a social phenomenon of enormous complexity; hence it is very difficult to give any complete explanation of this phenomenon. It is a matter of controversy whether the predominant factors underlying labor unrest are economic or non-economic. Whatever might be the cause of labor unrest in the RMG sector, impact is, beyond doubt, catastrophic. All the four parties- the workers, the owners, government, and foreign buyers are affected. The whole economy of Bangladesh will be adversely affected if such unrest continues. It has been concluded that so long as income remained the all-important means for satisfying human wants and needs, wage would continue to be major consideration in labor unrest. Labor force has been the most important factor in RMG industry. Government is to play a vital role in addressing the problem. By formulating policy regarding management of labor force of RMG industry, by involving the workers in the decision making process, by regular monitoring the factories and conditions of the workers, by evaluating the implemented policies and reviewing opinions of the stakeholders, government can help a lot to solve the problem and continue the success story.

2.3 Theoretical Analysis of RMG Industry of Bangladesh

2.3.1 RMG Business Structure

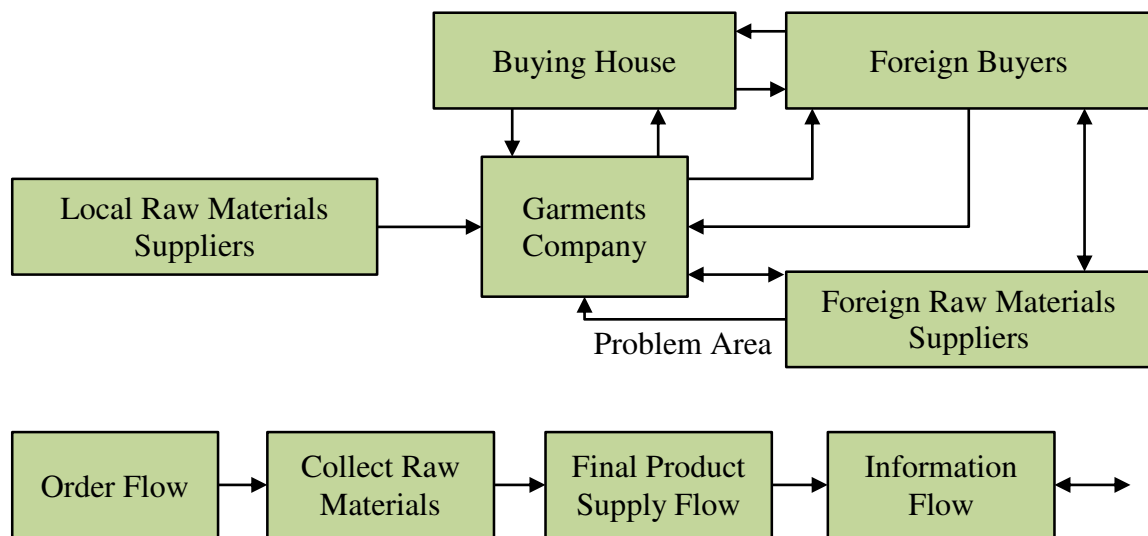
Readymade garment is a labor intensive industry and relatively simple technology compared to other high-tech industries. The RMG manufacturing units are like tailor's shop; getting order from the foreign buyers and then import raw materials specially fabrics from the foreign suppliers or sometimes buy from the local market as per order, then manufacture garments and supply those to the buyers (Munir, Q. and Salim, R. 2000).



Source: Nuruzzaman, 2007

Figure 2.1: Business Structure and Raw Material Suppliers

In the RMG sector, the Manufacturer - Raw materials Supplier relationship is different. In this Industry the main raw materials are fabrics (Cloths) and few accessories are like button, collar etc. About 80% of the suppliers of accessories are local and accessories suppliers are not responsible to Increase 1 time. Bangladesh garment manufacturer need more time is getting higher due to import of fabrics mainly from China, Indonesia and India, The total average time to import fabrics from abroad is 50-65 days and this is the main reason for long lead time (BGMEA research cell). In the process of import of fabrics from the foreign suppliers lies the main reason for long lead time. The process is visualized below.



Source: Nuruzzaman, 2007

Figure 2.2: Business Structure and Raw Materials Collection Process

2.4 Present Situation of RMG Industry in Bangladesh

Quota system was a great blessing for establishing our garments industry. We were strongly benefited by using that. As a result we can see a matured garments industry today. But while quota system was approaching to an end in 2004, there's so many got upset about the RMG sector of Bangladesh. Though in the latter it can't be affected here as the experts were seemed. We conquered the post quota challenges and made that a successful story.

In RMG sector of Bangladesh, there are more than 5000 garment factories (private statistics) at the current time, employing more than 12 lack labors, where 85% of the labor force is women. But, according to BGMEA the number of garment factories in Bangladesh around 4000. Now, RMG industry is the country's largest export earner with the value of over \$24.49bn of exports in the last financial year. It's a great news for us that, Bangladesh is clearly ahead from other South Asian suppliers in terms of capacity of the ready-made garments industry.

Though, there are various types of garments are manufactured in Bangladesh, but all the ready-made garments are classified into two broad categories, where one is woven products and another one is knitted products. Woven products include Shirts, Pants and Trousers. On the other hand, knitted product includes T-Shirts, Polo Shirts, Undergarments, Socks, Stockings and Sweaters. Woven garments still dominate the export earnings of the country. From BGMEA website it's seen that, Day by day knitted items production is increasing in considerable rate and now about 40% export earnings has achieved from knitted products.

2.5 Sources of Competitiveness in the RMG Industry

It is evident from the foregoing reviews that overall growth of the apparel sector in Bangladesh has been supported by a regulated international trade regime and a proactive domestic policy framework. But the intrinsic competitive components of RMG sector can be attributed to cheap labor supply. However, this raises concern for the sector as the potential for Bangladesh to assert its cheap labor-based competitive advantage is circumscribed by the modest share of labor in the cost structure of RMG products and the marginal presence of backward linkages in processing activities. The present section identifies in depth the crucial factors in the RMG sector that maintain the global competitive edge of the industry.

2.5.1 Low Wage Rate:

As the industry is highly labor-intensive in nature, the historical evolution of world apparel business reveals that comparatively lower wage rate countries were always the major apparel supplier in the world. As human labor is embodied in the manufacturing process, it makes wage rate as an important determinant of production cost. As quotas were imposed on sonic apparel exporting countries, a large number of intermediate buyers shifted sourcing of RMG products to Bangladesh which was reinforced by the market access power of the country through the US and Canadian markets quotas imposed on imports of apparel garments. Considerably the then prevailing low wages ensured competitive prices for the ventures entrepreneurs to shift their production transition process Although labor productivity was an issue, low wages helped Bangladesh focus on high volume mass production of RMG items, competing directly with countries such as China, India, and Vietnam.

Though Low wages go a long way in explaining the attractiveness of Bangladesh-made garments to foreign buyers but increasing liberalization of the global textiles market creates new challenges if the industry in the country continuously relies on a low skill/low wage strategy. Because it is widely held that cheap and readily employable labor underpins the competitive advantage of the country's export sector.

Female workers in Bangladesh were traditionally linked to global markets through export of tea and raw jute. Women entering the industrial labor force in Bangladesh

generally find themselves in low skill/low wage jobs. In RMG production, female workers are predominantly concentrated in low-skill/low-wage operations and, thus, are low paid. Most women are either production workers or helpers (female workers constitute 40-60 percent of the total workforce in the latter category).

Given the low opportunity cost of female labor in Bangladesh, is female labor attractive because women are paid less than men for similar jobs—even when productivity differentials are accounted for? This particular concern is heightened by the fact that entrepreneurs prefer to employ young, single, literate women in export-oriented units. Accordingly non-wage factors (such as social docility and amenability to repetitive process functions) prompt entrepreneurs to opt for a distinctive set of female labor. Thus, non-wage factors clearly influence employment patterns as well. Available information also suggests that conventional measures of gender bias (such as wage gaps, access to employment and lack of job security) are relatively less conspicuous in the organized segment of the manufacturing sector (Bhattacharya, 1999). These trends are present in units located in both export processing zones and the domestic tariff area. These are characteristics of the labor force of foreign-owned units in particular—which tend to have the most advanced technology and the highest productivity levels in the country (Bhattacharya, 1999). Majumder and Begum (2006) show that occupational segregation and gender discrimination in wage rate was wide.

Table 2.1: Apparel Labor Costs in 2008

Source: Jassin-o-Rourke Group, LLC.

Country	For US Market USD/hr
Bangladesh	0.22
Cambodia	0.33
Vietnam	0.38
India	0.51
China	0.55-1.08
Turkey	2.44

In general the level of wages in the RMG sector is low for both males and females. The daily wage rate of RMG workers compares unfavorably with that of similar categories of workers in both the public and private sectors. Bangladesh's apparel sector enjoys comparative advantage mainly because the sector is labor intensive and low productivity is somewhat offset by low wages (Bhattacharya and Rahman, 1999).

2.5.2 Government Policies:

Government role in terms of letting conducive policy environment for flourishing the industry in less developed country has very little success story. In this prospect Bangladesh government policy setting has been point on especially in case of RMG sector. Most extraordinarily Bangladesh government formulate policy in such way it let more or less the sector alone, not regulating it while almost everything else in the manufacturing sector was heavily regulated. Besides, the government helps the industry indirectly by providing other policy support such as the duty drawback scheme, cash incentives, back-to-back letters of credit, duty-free raw material imports, and the provision of special bonded warehouses to access inputs at international prices. Some other notable initiatives taken by the government are the adoption of conducive investment and industrial policies, encouragement of foreign direct investment, establishment of export processing zones and organizing trade fairs inside and outside the country. More specifically, there is exemption of corporate taxation on export profits, although this has been weakened since 1992 by the imposition of advance income tax. Besides, the industry has enjoyed a concessional duty rate of 7.5 percent on capital equipment imports for several years.

In 1980, the Bangladesh Bank, the central bank of the country, granted the back-to-back letters of credit and bonded warehouse facilities to RMG producers/exporters, decreasing their working capital requirements and allowing duty-free access to inputs for the sector. In what follows is a succinct analysis of these facilities:

- i) **Back-to-Back Letter of Credit:** Under the back-to-back letters of credit scheme extended by commercial banks, the exporters of RMG are able to import inputs (i.e., fabrics and accessories) against the export orders placed in their favor by the RMG importers. The mechanism is like when an order is received by the exporter in a master (Export) L/C form she then approach her/his bank (the local bank) to open an import L/C for fabrics and trimmings needed. The banks accept this system as their risk is rather limited if the documents are good and can earn a good profit on the entire transactions. The amount of financing is sometimes close to 75 percent of the value of output. Given this provision, Bangladeshi exporters do not need to invest their own resources to finance working capital and thus the facility enables them to overcome the constraints of obtaining world-priced raw materials.

- ii) **Bonded Ware House Facilities:** Under the bonded warehouse facilities, the imported inputs can be cleared through the customs against export orders without paying any import duty. This ensures that the export-oriented RMG units can access imported inputs at zero-tariff. Around 75 percent of the value of the product can be stored on factory premises. This allows the industry to circumvent the difficulties involved with paying the duty and later putting claims on those taxes.

2.5.3 Internal Dynamism of the Industry:

The level of exports achieved and the speed at which the industry was able to penetrate global markets and sustain the expansion makes the history and political economy of the apparel exports from Bangladesh a compelling economic development case study. The garment industry's success is unusual and remarkable partly because the initial conditions in Bangladesh were so unfavorable. The success of garments industry was, therefore, unexpected and proves that the unfavorable odds, individually or combined, need not to be fatal to industrialization and export growth. In this respect the genesis of internal dynamism within the industry is very compelling. Some of the enabling factors are discussed below.

- i) **Role of BGMEA:** During 1982 Bangladesh Garment Manufacturers and Exporters Association (BGMEA) was formed to promote and protect the interests of the manufacturers and exporters of RMG. A model of an industry association that is given monopoly over quota and other issues is to be found in the Philippines and in some other countries. In Bangladesh the model has worked well. During most of its history the organization has functioned moderately efficiently to serve the collective needs of the factory owners. It is certainly one of the most important trade organizations in the country. It is also strategically positioned in the business of getting new orders and has an important voice in the quota negotiations and in the administration of the quotas. Finally, from the viewpoint of private sector development, the special status which the industry earned by its impressive early contribution to exports enabled the emergence of BGMEA as a strong industry association that could command the direct attention of the political establishment to ensure the availability of the above incentives. The annual convention called BATEXPO has been reasonably successful in getting the politicians to renew their commitments to the core business of exports and in presenting the new products to foreign buyers.

ii) **Technology Adoption and Adaption:** In developing world the garments industry runs on three basic operations: cutting, stitching, and pressing/finishing. The typical production is a combined process of various specialized and/or general machines operated by manual/mechanical/electronic devices by skilled and unskilled labor of diversified organizational production activities (Bhavani and Tendulkar, 2001). Traditionally, high technology and R&D activities have been less prioritized in the garment manufacturing industry. However, in many instances, the production involves manual operations of machines and materials of automated assembly. Since the materials need proper feed through the machines, automation is limited (Bailey, 1993). Therefore, the technology adoption in the industry has primarily been mass-production focused, and technology development and usages have been limited. In recent years, however, the change in the market trends and fast fashion styles reduced demands for mass production models. At apparel executives believe that industry competitiveness depends upon the ability to quickly respond to demand with a variety of practices and better engineering practices (Bailey, 1993). Desired levels of production and quality can be achieved by adoption of newer technologies and techniques.

Usually, the size of a firm has been a conventional factor that determines the innovation and performance level of the firm: firm size positively influences the degree of innovation and technology adoption of a firm. Normally large firms have an advantage over small ones as their financial strengths allow them to be more capable adopters. Although small firms have certain advantages over larger firms in terms of flexibility, informality, adoptability, and operational speed (Fiegenbaun and Karnani, 1991), so the size positively affects the technology adoption of the firm. It has been found that skilled labor has been one of the most important strategies that contribute to the growth of small and medium-sized firms, and it is likely to be a facilitator of technology adoption (Baldwin et al., 1994). Therefore, firms that have a skilled labor forces to support advanced technology are more likely to be proactive in adopting technologies because of the availability of technical skills. The ultimate goal of advanced technologies seems to be producing better products and services at lower prices, which results in gaining a competitive edge. Firms can gain competitive advantage and grow as a result of technology adoption and implementation.

2.6 Contribution of RMG Industry to the National Economy

The role RMG sector in Bangladesh economy is remarkable. It's seen that from the last decade, RMG sector contributes to the national economy in considerable rate. About 76% of total export earnings come from RMG sector. According to statistics, it's known that in FY 2003-04 RMG sector of Bangladesh earned US\$ 5,686.06 million, in FY 2004-05 the value was US\$ 6,417.67.67 million, in FY 2005-06 the value was US\$ 7900.80 million, in FY 2006-07 the value was US\$ 9,211.23 million, in FY 2007-08 the value was US\$ 10,699.80 million, in FY 2008-09 the value was US\$ 12.35 billion and finally in FY 2015-16 the value stands at \$28.09 billion.

Although suffering from image crisis after the GSP withdrawal from USA, Bangladesh registered remarkable export growth in the just concluding fiscal year. RMG export grew 10.21% to 28.09 billion USD and total export including RMG rose to 34.24 billion USD which is 9.72% higher than the previous financial year.

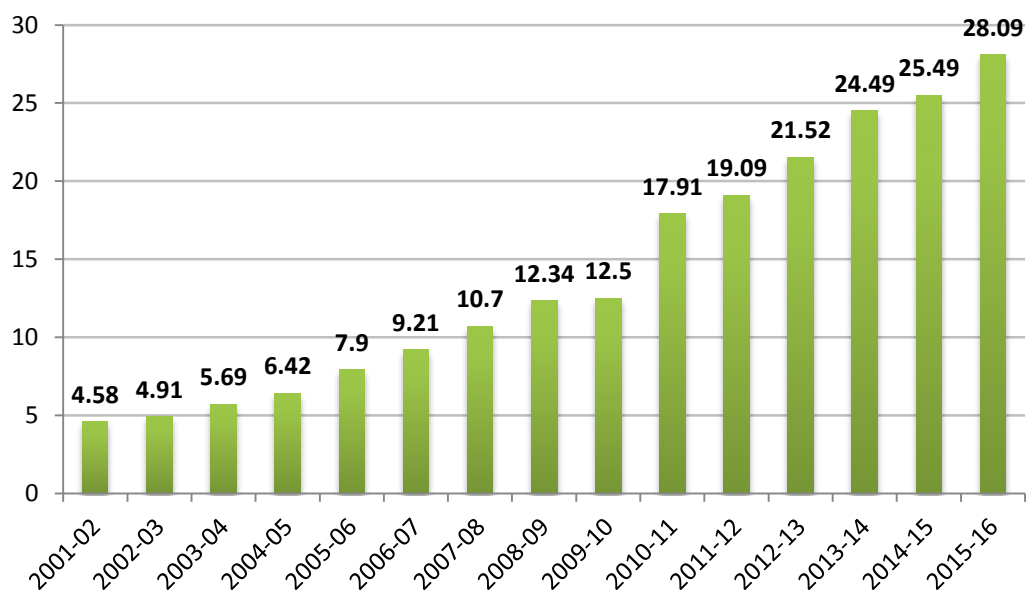


Figure 2.3: Bangladesh RMG Export (In Billion US\$)

Export Promotion Bureau, EPB of Bangladesh has set an ambitious export target for the financial year 2016-17 that is 37 billion USD, 8.18% higher than previous year's export 34.24 billion USD. Though the country could not achieved the last year target, this time also the country want to chase a big target. But the year has been started with a great uplift at its first month.

Table 2.2: Comparative Statement on Export of RMG and Total Export of Bangladesh

Source: Export Promotion Bureau Compiled by BGMEA

Year	Export of RMG (In Million US\$)	Total Export of Bangladesh (In Million US\$)	% of RMG's to Total Export
1983-84	31.57	811.00	3.89
1984-85	116.2	934.43	12.44
1985-86	131.48	819.21	16.05
1986-87	298.67	1076.61	27.74
1987-88	433.92	1231.2	35.24
1988-89	471.09	1291.56	36.47
1989-90	624.16	1923.70	32.45
1990-91	866.82	1717.55	50.47
1991-92	1182.57	1993.90	59.31
1992-93	1445.02	2382.89	60.64
1993-94	1555.79	2533.90	61.40
1994-95	2228.35	3472.56	64.17
1995-96	2547.13	3882.42	65.61
1996-97	3001.25	4418.28	67.93
1997-98	3781.94	5161.20	73.28
1998-99	4019.98	5312.86	75.67
1999-00	4349.41	5752.20	75.61
2000-01	4859.83	6467.30	75.14
2001-02	4583.75	5986.09	76.57
2002-03	4912.09	6548.44	75.01
2003-04	5686.09	7602.99	74.79
2004-05	6417.67	8654.52	74.15
2005-06	7900.80	10526.16	75.06
2006-07	9211.23	12177.86	75.64
2007-08	10699.80	14110.80	75.83
2008-09	12347.77	15565.19	79.33
2009-10	12496.72	16204.65	77.12
2010-11	17914.46	22924.38	78.15
2011-12	19089.69	24287.66	78.60
2012-13	21515.73	27027.36	79.61
2013-14	24491.88	30186.62	81.13
2014-15	25491.40	31208.94	81.68
2015-16	28094.17	34241.82	82.05

Besides, RMG sector is the largest employer of women in Bangladesh. The garment sector has provided employment opportunities to women from the rural areas that previously did not have any opportunity to be part of the formal workforce. This has given women the chance to be financially independent and have a voice in the family because now they contribute financially. The industry provided jobs for a lot of people, 80% of whom are women.

However, the women workers are facing many problems. Most women come from low income families. Low wage of women workers and their compliancy have enabled the industry to compete with the world market. Women are paid far less than men mainly due to their lack education. Women are reluctant to unionize because factory owners threaten to fire them. Even though trade unionization is banned inside the Export Processing Zones (EPZ), the working environment is better than that of the majority of garment factories that operate outside the EPZs. But, pressure from buyers to abide by labor codes has enabled factories to maintain satisfactory working conditions. In recent times, garment workers have protested against their low wages. This has forced the government to increase minimum wages of workers along with the compliance of physical working environment.

Since the late 1970s, the RMG industry started developing in Bangladesh primarily as an export-oriented industry although; the domestic market for RMG has been increasing fast due to increase in personal disposable income and change in life style. The sector rapidly attained high importance in terms of employment, foreign exchange earnings and its contribution to GDP.

2.7 Opportunity of RMG Industry of Bangladesh

RMG sector of Bangladesh has some key factors which inspired for steady growth of this sector. Though it's a matter of great surprising for many of us that how RMG sector of Bangladesh continues to show its robust performance in the world. The main key factors which have great influence on RMG sector of Bangladesh are the following:

1. Vast labor force,
2. Skilled human resources,
3. Technological upgrades,
4. Government supports for textile and clothing,
5. Special economic/export processing zones,
6. Creation of textile and clothing villages,
7. Incentive for use of local inputs,
8. Duty reduction for the import of inputs/machines,
9. Income tax reduction,
10. And international supports like GSP, GSP+, duty free access etc.

By using the above factors, Bangladesh is taking place in the world's readymade garments market very strongly. But there're some other key factors. If these can be applied in our readymade garments sector, then it will achieve the first priority in the worlds' famous buyers note book. These key factors are:

- i) **Cost Effective Strategy:** Cost Effective Strategy includes the following two key points:
 - a) **Cost Reduction Strategy:** Cost reduction strategy should begin with assigning the highest priority for establishing backward linkages. The establishment of backward linkages will reduce our dependence on foreign sources which will reduce the total and average production cost of garments. This Strategy will make our products more competitive in the world's ready-made garments market.
 - b) **Labor Productivity Improvement:** Bangladeshi workers are not efficient as of Hong Kong, South Korea and Sri Lankan workers. Wages are low in Bangladesh, but it does not necessarily mean that relatively low wages workers automatically lead to higher productivity. So, to keep place in the world's largest competitive market, labor productivity must be improved.

- ii) New Product Development strategy:** It's a matter of great sorrow for us that, we are regularly produced the same products. Our product categories are very less in quantities. Our product items that are exported into foreign market are Shirts-60%, Jackets-11%, Knit items-10%, Trousers-7% and Others-11.50%. To survive in the world's most competitive RMG market, we have to develop new product items with a lot of variations.
- iii) Product Diversification Strategy:** Product Diversification Strategy is an important factor to keep place in the world's ready-made garments market. Different types of products should be produced by applying fashion. Thailand, China, India, Pakistan, Hong Kong, Singapore, Malaysia, Indonesia and others are the main competitors of Bangladesh. They are already ahead of Bangladesh in product diversification strategy areas.
- iv) Market Diversification Strategy:** Bangladesh has exported their products in the world's limited market. Mostly are in USA, Canada and Europe. About 46% of its total garment exports go to USA, 14% to the Canada and rest of those into the European market. The competitors of Bangladesh are regularly expands their markets and keep changing their products by using fashion. The following key factors must be undertaken during market diversification strategy:
- a) Market research on product design
 - b) Market research on product development,
 - c) Market promotion through trade fairs, exhibition, etc.
 - d) Human resources development by providing training.

2.8 Challenges for RMG Industry in Bangladesh

Though RMG sector of Bangladesh has achieved the second spot for the highest number of garments exporter, but it has a lot of problems. The major problems faced by RMG sector currently is the lack of safety in working place and working conditions for the millions of garments workers. It's become a great challenge for the upcoming financial year of Bangladesh. Another important one is political stability.

Two major incidents in RMG sector of Bangladesh are the Tazreen fire and the Rana Plaza collapse, which have brought the issue of workplace safety to the fore and led all stakeholders to act accordingly. But it's good news for RMG sector that, following the unfortunate incidents, various platforms such as the Bangladesh Accord on Fire and Building Safety, the Alliance for Bangladesh Worker Safety and National Plan of Action have been formed to improve building and fire safety of Bangladesh's garment industry. Also BGMEA and BKMEA are working together here to solve such kinds of problems. They have also taken necessary actions and invested huge amount of money.

It's a huge responsibility for the government of Bangladesh to ensure working place safety in all the garments manufacturing factories. If we can't do it, foreign buyers will refuse to place order here, which will be a massive blow for RMG sector of Bangladesh. We hope, the government of Bangladesh, BGMEA and BKMEA, with the support of global brands and international development partners, will be able to ensure the safety of the RMG industry and maintain the momentum of socio-economic development in the country.

Political stability creates a negative impact on RMG sector of Bangladesh. If it continues, it will be a massive blow to destroy our most valuable sector. So, political leaders should come out immediately to solve such kinds of problems.

According to McKinsey's report, while Bangladesh presents some distinct advantages for sourcing, our study identified five challenges for apparel companies seeking to do more business there.

- i) **Infrastructure:** Transportation bottlenecks create inefficient lead times for garments and delay deliveries to customers. This issue will become even more important in the future, since buyers want to source more fashionable products with shorter lead times.

Energy supply is a concern, too—90 percent of the more than 100 local suppliers we interviewed rate it as poor or very poor. The government has prioritized improvement in this area and started to upgrade power systems over the last two years, however.

- ii) **Compliance:** Nongovernmental and other organizations monitor Bangladesh for labor and social-compliance issues. While most European and US chief purchasing officers said in the survey that standards have somewhat or strongly improved over the past five years, they noted that suppliers vary greatly in their degree of compliance. Environmental compliance is just beginning to get attention.

- iii) **Suppliers' Performance and the Skilled Workforce:** Our study found that the suppliers' productivity must improve not only to mitigate the impact of rising wages but also to close gaps with other sourcing countries and to satisfy new customer requirements for more sophisticated products. Two other concerns are a lack of investment in new machinery and technologies and the insufficient size of the skilled workforce, particularly in middle management.

- iv) **Raw Materials:** Bangladesh lacks a noteworthy supply of natural or artificial fibers, and its dependence on imports creates sourcing risks and lengthens lead times. Compounding the problem is the volatility of raw-material prices over the past few years. The development of a local sector would improve lead times.

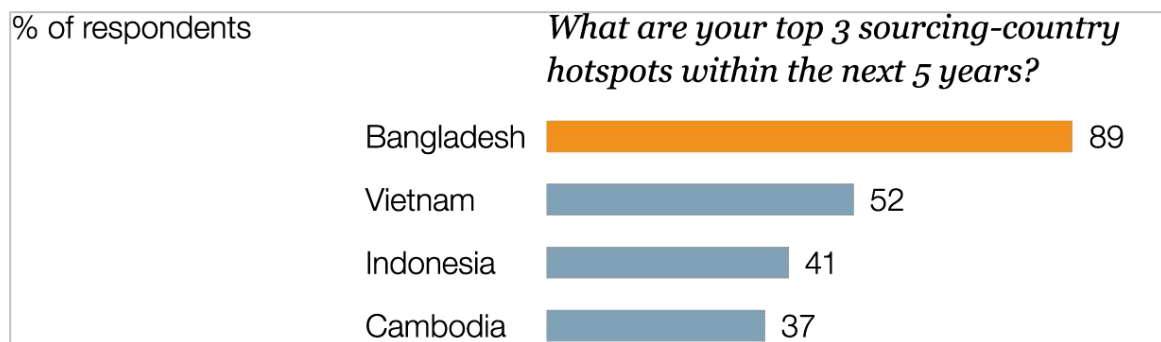
- v) **Economic and Political Stability:** About half of the chief purchasing officers interviewed stated that they would reduce levels of sourcing in Bangladesh if its political stability decreased. The survey found that political unrest, strikes, and the ease of doing business are top of mind for respondents.

2.9 Future of RMG Industry of Bangladesh

Lower costs are an advantage for the country's ready-made-garment industry, but challenges remain. In 2010, China dominated European and US markets for ready-made garments, accounting for about 40 percent of the import volume in each region. A recent McKinsey survey, however, found that 86 percent of the chief purchasing officers in leading apparel companies in Europe and the United States planned to decrease levels of sourcing in China over the next five years because of declining profit margins and capacity constraints.

Although Western buyers are evaluating a considerable number of sourcing options in the Far East and Southeast Asia, many chief purchasing officers said in the survey that they view Bangladesh as the next hot spot (exhibit). Indeed, our study of the country's ready-made-garment industry identified solid apparel-sourcing opportunities there—but also some hurdles.

Many chief purchasing officers view Bangladesh as the next hot spot for sourcing in the ready-made-garment market.



Source: Sept–Nov 2011 McKinsey survey of 28 European and US chief purchasing officers from leading apparel companies that together account for \$46 billion in total apparel-sourcing value and 66% of all apparel exports from Bangladesh to Europe and the United States

McKinsey survey also reported that, with about \$15 billion in exports in 2010, ready-made garments are the country's most important industrial sector; they represent 13 percent and more than 75 percent of GDP and total exports, respectively. McKinsey forecasts export-value growth of 7 to 9 percent annually within the next ten years, so the market will double by 2015 and nearly triple by 2020.

Chapter 03

Literature Review on Supply Chain Management (SCM) and Green Supply Chain Management (GSCM)



CHAPTER 03

LITERATURE REVIEW ON SUPPLY CHAIN MANAGEMENT (SCM) AND GREEN SUPPLY CHAIN MANAGEMENT (GSCM)

3.1 Supply Chain Management and Green Supply Chain Management

3.1.1 Supply Chain Management (SCM):

A supply chain is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw materials and components into a finished product that is delivered to the end customer.

The supply chain process for manufacturing and service industries started with suppliers, manufacturers, distributors, retailers, customers and suppliers, service providers, customers and end with consumers respectively. The customers are the most vital focal point of the supply chain, since the primary purpose of the existence of any supply chain is to directly or indirectly satisfy customer needs.

In every manufacturing organization, for their working purpose they follow the basic supply chain. The following diagram is the basic supply chain for manufacturing organizations.

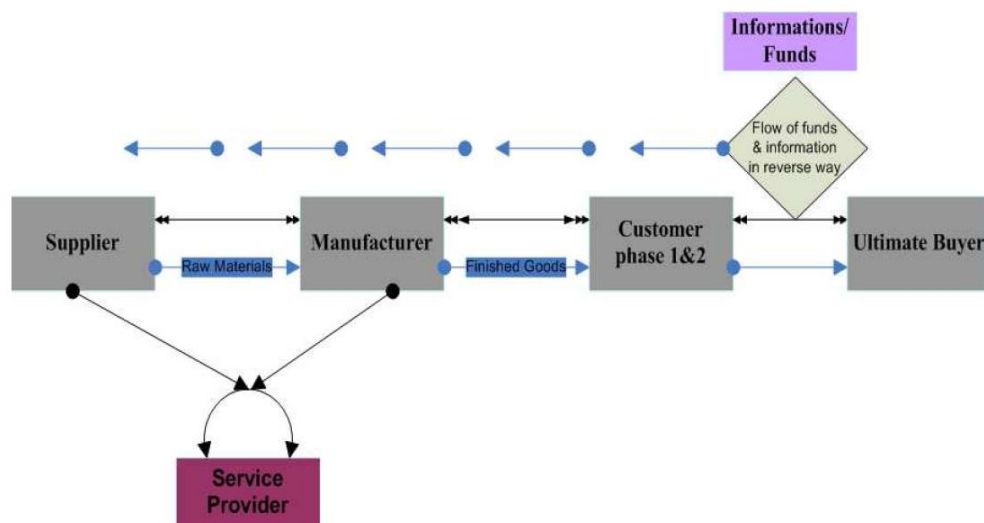


Figure 3.1: Basic Supply Chain ([S. Chopra, P. Meindl, and D.V. Kalra])

The basic supply chain of readymade garment industry in Bangladesh involves supplier, manufacturer, ultimate buyer and service provider.

- i) **Supplier:** Fabrics, Accessories, Packaging producers are defined as supplier in garments industry. All the fabric items can be sourced from around the world but most of the time accessories and packaging items procure locally.

- ii) **Company:** Garments manufacturer or factories are defined as company. If we think about in Bangladesh perspective all the garments factories are working as a company.
 - a) **Customer Phase 1:** Merchandise organization or buying house. In fact, all the merchandise organization and buying house working as a middleman between buyer and garments factories and for this service, they earn commission.
 - b) **Customer Phase 2:** Retail Branding Owner (RBO)-H&M, M&S, Tesco etc. All the garments brands are in this phase. They are the main buyer and acted as a customer and they merchandise all the garments and distribute it through DC to available for consumers.

- iii) **Ultimate Buyer:** Consumer (who buys the product for ultimate use) is the most vital point for value chain in garments industry. All the works have been done for meeting the consumer needs. In this supply chain, there is another part that provides the service and worked as helping hand for the manufacturing organization.

- iv) **Service Provider:** Bank, washing centers, printing centers are the service provider. The entire service providers also act as a vital part in the value chain. Because all the banks are related with L/C, export-import process, washing plants use for washing the garments, all the printing centers works for printing design or logo label in the garments.

3.1.2 Supply Chain Integration:

In the early 1990's, supply chain management evolved dramatically with the increasing importance of the relationship with other suppliers (Harland, 1996). Slack (1991) and Christopher (1992) explain that the reason for this was the emergence of a globalised marketplace. Wood (1997) argues that firms need to become more integrative amongst other firms to reduce the vulnerability of the supply chain. There are various case studies where firms are becoming more integrative to their supply chain partners. Lamming (1993) and Womack, Jones and Roos (1990) mention the Japanese automotive industry and the Italian craft-based industry as basic examples. Lean and Just-In-Time (JIT) Management have added factors that helped enhanced the operational processes of the supply chain (Wood, 1997; Power, 2005). The requirement for organisations to become actively responsive to the needs of customers has increasingly been important (Christopher, 2000). Power (2005) observes that speed (delivering customer demand quickly), agility (responsiveness to customer demand) and leanness (doing more with less) are the contributing factors that would make firms more competitive.

3.1.3 Green Supply Chain Management (GSCM):

Green Supply Chain Management (GSCM) can be defined as the management of the raw materials, parts /components and processes from suppliers to manufacturer to customers and product take back with improvement to environmental impacts through life cycle stages. (Hu and Hsu 2010), (Sarkis et al. 2005) also defines GSCM by adding the green component to supply chain management and hence it involves addressing the influence and relationships of supply chain management to the natural environment. It considers the environmental effects of all processes of supply chain from the extraction of raw materials to the final disposal of goods. With this integration, the GSCM practices strive to achieve what any individual organization on its own could not possibly achieve: minimized waste, minimized environmental impact while assuring maximized consumer satisfaction, and healthy profits.

The key practices worth noting from the previous research work are the concepts of green design, green operations, reverse logistics, waste management and green manufacturing (Guide and Srivastava 1998), Srivastava 2007). The environmental laws and CSR practices and ISO 14000 certifications have improved the environmental practices in many Indian companies. But the question lies if the same has been extended

to the supply chain .It is important to integrate the organizational environmental management practices into the entire supply chain to achieve a sustainable supply chain and maintain competitive advantage (Zhu et al. 2008), Linton et al. 2007). Most of the research works on GSCM practices are fragments of a part of the Porter's value chain model. Emmet and Sood (2010) have classified GSCM practices as Green procurement and supply, Green production, Green packaging, Green marketing, Green Logistics and Supply loop. In this descriptive work a framework of the GSCM practices across five major functions are conceptualized and studied.

- i) In-bound logistics (Manish 2011), (Ninlawan et al., 2010), (Sanjeevkumar 2012)
- ii) Design and Production (Ninlaw 2010), (Toke 2010), (Sanjeevkumar 2012), (Sarbjit Singh 2010), (Halme et al 2002)
- iii) Out-bound logistics (Toke 2010)
- iv) Reverse logistics (Toke 2010), (Sreevatsa 2007), (Tonanont 2008)
- v) Management support practices (Ninlawan et al. 2010), (Hu and Hsu 2010)

Changing environment and the deterioration of the natural resources has triggered organizations to identify, understand and manage the issues of environmental sustainability. This has led to new paradigms in supply chain management strategies, and this has shifted the attention towards the impact to the natural environment and the environmental performance of organizations. This shift in the supply chain management has evoked due to the growing social, political and legislative pressures. According to Ford Chairman, William Clay Ford Jr., "Sustainability is not a soft issue, or a passing fad. When people are empowered with knowledge and choices, they will do what's best for themselves, their families, and their communities. And in fiercely competitive global market where information is shared instantly, consumers will virtually have all the knowledge and choices in the world. Companies that don't do the right thing will find that they are not sustainable."

With growing environmental hazards this paper focuses mainly on the environmental sustainability of organizations. Worldwide industrialization has led to the destruction of the environment, industrial wastes severely damage and pollute the environment and cause ozone depletion, greenhouse effect and Antarctic icebergs melt. These issues have triggered the manufacturers on their substantial developments and production responsibilities towards a sustainable environment for all. Since corporations

are vital organs of society, corporate interests pose serve societal concerns. Consumers are becoming more attuned to and involved in the growing green interests. With customer loyalty shifting towards environmentally friendly products, businesses are increasingly trying to make their supply chains greener by introducing sustainability strategies throughout their organizations and supplier networks.

Environmental issues under legislations and directives from customers have become an important concern for manufacturers in India. To combat these pressures and that from the society, customers and the stake holders and manufacturers have started to adopt a more systematic and integrated strategy of Environmental management in supply chain system. This is termed as Green Supply Chain Management (GSCM). GSCM is a management activity that crosses organizational boundaries and requires active integration and involvement from the supply chain partners.

3.2 Supply Chain Management and Green Supply Chain Management in RMG Industry

Lam and Postle (2006) have reviewed the concept of supply chain management in textile and apparel supply chain management in Bangladesh. They discussed the strengths and problems faced by the Bangladesh textile apparel supply chains. They argued that Bangladesh apparel industry is generally not aware of the concept of supply chain management and industrial benchmark for both manufacturing and retailing industries in Bangladesh (M.S. Islam. 2012).

Nuruzzaman and Rafiq (2005) took an attempt to develop more effective supply chain for Bangladeshi RMG to enjoy competitive advantage in the global apparel business through analyzing the current supply chain and investigating the relationship among the players in the supply chain (Nuruzzaman, A. Haque and R. Azad. 2010).

Islam (2013) analyzed that apparel supply chain matters such as new orders, raw materials supply, production processes and logistics related to finished goods delivery by using efficient supply chain process and also mentioned that Bangladesh garment industry improvement is desired in reducing the supply time required to produce and fulfill the orders placed by foreign companies. His findings is using modern fast and effective machinery can reduce time taken to deliver the order (M.S. Islam. 2012).

Saiful and Noorul (2013) analyzed the approach is to compile the supply chain management on the Bangladesh garment industry seriously. In the RMG sector the supply chain management is more complex owing to characteristics of global supply chain (SC). In the global supply chain, crossing borders nearby supply with a multiplicity of general obstructions to intercontinental business: tariffs, nontariff obstructions, switch over rates and differences in product necessities, consumer savors and business observes. Borders also present some impediments in transportation services, which are very common for RMG sector in Bangladesh. Manufacturers, suppliers, and buyers all stages of supply chain in the RMG sector are decentralized. Different stages of supply chain have conflicting goals and objectives (S. I. Tanvir and N. Muqaddim 2013).

Asgari and Hoque (2013) examined the opportunity that lies in an integrated supply chain to provide a competitive advantage to the Bangladesh RMG sector. A system dynamics approach has been used to identify the dominant variables of supply chain performance such as enablers, performance or results, and inhibitors in the RMG sector. Since the end consumers of the apparel fashion market are becoming increasingly time-sensitive, a decrease in lead time, besides quality and cost criteria, is needed to win more orders from buyers (B. Asgari and M. A. Hoque 2013).

In recent years many reputable organizations are purchasing products, and sourcing, distributing and selling simultaneously from different corners of the world. This globalization of operations has become inevitable because cheap labor is available in some countries while raw material is readily available in others. Moreover, the time, cost and quality sensitiveness are also significantly varied among customers in different regions of the world. Through an efficient implementation of integrated supply chain management, the RMG industry in Bangladesh could stay competitive by maintaining the required efficiency and responsiveness. This was the traditional view of all companies that they existed as single and complete units and operated their businesses separately.

However, the business environment has changed in the 21st century such that working alone is less competitive while collaborative working among upward and downward supply chain partners is more profitable. Through managing the supply chain, the ultimate objective of companies is offering maximum value to customers for the delivered products or services by achieving either responsiveness or efficiency. To add dynamic capability to the RMG sector and enhance supply chain performance, manufacturers should plan and work collaboratively with the upward suppliers of fabric and accessories as well as the downward buyers and partners of the supply chain.

Scott and Westbrook (1991) and New and Payne (1995) describe the supply chain as “the chain linking each element of the manufacturing and supply processes from raw materials to the end user, encompassing several organizational boundaries”. According to this broad definition, supply chain management (SCM) “encompasses the entire value chain and addresses materials and supply management from the extraction of raw

materials to its end of useful life”. Farley explains (1997) that SCM “focuses on how firms utilize their suppliers’ processes, technology, and capability to enhance competitive advantage”.

Houlihan (1987, 1988) defined SCM as the technique of combining various key departments such as production, finance, marketing and human resource of a company so that this unified chain links tier-one suppliers and distributors to enhance performance by reaching the final customers on time. There is already some scholarly work that shows focal companies can utilize vendors’ manufacturing expertise and other R&D assets to design new products at lower costs through collaboration among trading partners.

Some of the key characteristics of the fashion industry are that the life cycle of any new styles of apparels is continuously decreasing, end demand for any garments is highly fluctuating and changing over time, various kinds of designs and styles are evolving everyday worldwide, and the total chain from yarn and cotton supplies to final garments through a lot of suppliers from many countries is very dynamic and difficult to manage (Sen, 2008). So, apparel manufacturing companies of any country should manage the supply chain in a way that meets the total needs of the end consumers (Gunasekaran et al., 2008). This has caused the fashion industry to become increasingly complex and dynamic, and this sector has attracted many new market entrants and thus has triggered intense competitions (Gunasekaran et al., 2008).

The business of the fashion industry is so volatile and competitive that the driver for successful entrepreneurship is capitalizing on opportunities and scopes by integrated efforts among supply chain partners (Sen, 2008); apparel manufacturers and traders are engaging themselves to utilize integrated supply chain management as a source for improving their business performance (Gunasekaran et al., 2008). Lam and Postle (2006) found in their study that supply chain management consciousness was still comparatively low among the apparel manufacturers and traders in Hong Kong. Lee and Kincade (2003) mentioned some of the key dimensions they found in the US apparel supply chain including “partnership, information technology, operational flexibility, performance measurement, commitment of top management and demand characterization”.

The current RMG manufacturers of Bangladesh are importing most of the required woven fabrics from China, India, Pakistan and Indonesia. As a result, the total lead time is becoming longer, putting a negative edge on competitiveness. It is possible to reduce the total lead time through supply chain integration among upstream and downstream partners to make RMG manufacturers more competitive (Nuruzzaman and Haque, 2009). Supply chain integration makes it possible to manufacture fabrics before taking orders from buyers but requires more collaboration among buyers, fabric suppliers and garment manufacturers in Bangladesh.

Nuruzzaman et al. (2010) realized that a long lead time was one of the greatest problems of the RMG sector in Bangladesh and that its top five causes constituted the issues of integrated supply chain management (SCM). They emphasize that SCM is basically a complex process for countries, and a new in the apparel sector especially in the least developed countries like Bangladesh. Nuruzzaman *et al.*, (2010) concluded that a country like Bangladesh may create a remarkable position in the world's total apparel export by managing the partners of supply chain to reduce the lead time.

However, there are only a few in-depth studies about GSCM for the RMG sector in Bangladesh and no study offers indications on how factories can increase productivity, reduce costs, and respond to changing customer needs using effective and efficient integration among supply chain partners considering the environmental impacts. The primary purpose of the study is to identify the interdependence and dynamic behavior that exists among green supply chain performance variables.

3.3 The Chronology of Green Supply Chain Management (GSCM)

Green supply chain management (GSCM) is an emerging field that strands out of the traditional supply chain perspective. The “quality revolution in the late 1980’s and the supply chain revolution in the early 1990’s” have sparked businesses to become environmentally conscious (Srivastava, 2007, p. 53). GSCM has gained popularity with both academics and practitioners to aim in reducing waste and preserving the quality of product-life and the natural resources. Eco-efficiency and remanufacturing processes are now important assets to achieve best practice (Ashley, 1993; Srivastava, 2007). Global market demands and governmental pressures are pushing businesses to become more sustainable (Guide and Srivastava, 1998; Gungor and Gupta, 1999). Walton, Handfield and Melynyk (1998, p. 2) even claim that “increasing government regulation and stronger public mandates for environmental accountability have brought these issues into the executive suites, and onto strategic planning agendas.”

The key themes that came out in the literature over the last twenty years are the concepts of: green design, green operations, reverse logistics, waste management and green manufacturing (Guide and Srivastava, 1998; Srivastava, 2007). The very first green supply chain came into context in 1989. Kelle and Silver’s (1989) article was the first of this literature that developed an optimal forecasting system for organizations to use to forecast products that can be potentially be reused. This forecasting system, however, was highly contentious because returning individual containers is not usually known with certainty, so therefore, their findings may somewhat be incoherent.

The first green design literature came into context in 1991. Navin-Chandra’s (1991) article was the first of the literature to consider the need for a green design to reduce the impact of product waste. Works of Ashley (1993); Allenby and Richards (1994) and Zhang, Kuo, Lu and Huang (1997) came into context and expanded the framework of green design. Life-cycle analysis was an example of a framework that came out of green design. Works of Arena, Mastellone and Perugini (2003), Beamon (1999) and De Ron Penev (1995) all discussed life-cycle analysis as a framework.

Green Operations in terms of reverse logistics was an important concept that came out of the GSCM literature. Apart from Kelle and Silver’s (1989) article, works of Pohlen

and Farris (1992); Stock (1998) and Tibben and Limbke (2002) all provided case studies on reverse logistics. The use of plastics and bottle recycling are mentioned in some of these articles. Carter and Ellram, (1998); Srivastava and Srivastava, (2005); Shih, (2001); Nagorney and Toyasaki, (2005) and Min, Ko and Ko, (2006) are all academic perspectives of reverse logistics.

Waste management is another topic that came out of the GSCM literature. This came into prominence with the work of Roy and Whelan (1992). This article created a standardized model for reducing electronic waste without harming the environment. After this article, different waste management issues came into context particularly around recycling and remanufacturing. Works like Owen (1930), Hannah and Newman (1995); Sarkis and Cordeiro (2001) and Nagorney and Toyasaki (2005) are all examples of trends of waste management becoming an issue.

Green Manufacturing, on the other hand, was not conceptualized until 1993 in the work of Crainic, Gendreau and Dejax (1993). Ideas of green manufacturing were then developed further by Van Der Laan and Salomon (1997); Guide and Srivastava (1998) and White, Masanet, Rosen and Beckman (2003). There are other comprehensive reviews around GSCM, particularly in the late 1990's where issues such as green production and planning and manufacturing (Bras and McIntosh, 1999; Sarkis and Cordeiro, 2001; Van der Laan, Salomon and Dekker, 1996) and product recovery (Gungor and Gupta, 1999; Van Der Laan et al., 1996) are discussed. Barros, Dekker, and Scholten (1998) discuss recycling in the supply chain and Darnall, Jolley, Jason and Harnfield (2008) critique GSCM by saying that Environmental Management Systems (EMS) are making less progress in reducing environmental harms. Some studies, however, are of limited focus. Van Der Laan et al. (1996) only discussed product remanufacturing and disposal, and Zhang et al. (1997) only discussed environmental technologies and design. Journals that are useful to GSCM are *Organizations and the Natural Environment*, *Business Strategy and Environment* and *Journal of Operations Management*. Some key authors of the field are Srivastava (2006; 2007), Gupta (1999) and Guide (1998; 2003). Some of the famous books of GSCM are from Allenby and Richard's (1994) '*The Greening of Industrial Ecosystem*' and Preuss's (2005) '*The Green Multiplier: A Study of Environmental Protection and the Supply Chain*' and Sarkis's (2006) '*Greening the Supply Chain*'.

3.4 Drivers and Factors of Green Supply Chain Design

Various research in the area of GSCM show that there are numerous drivers that influence the implementation of GSCM practices. Increasing scarcity of resources, building awareness among consumers, stringent laws that are more environmentally conscious and the demand from the export markets are posing real challenge to companies today (Vachon and Klassen 2006); (Srivastava 2007). Globalization has made it even more significant to the industries as the majority of the world's manufacturing will be carried out in Asia, making these industries an integrated part of the Global supply chain (US-AEP 1999). But this tremendous growth opportunity to the country also brings equal environmental challenges (Rao 2002). Previous studies identified numerous drivers that have a potential to motivate organizations to adopt environmental practices. These drivers generally emanate from pressures of external and internal stakeholders such as government, investors, customers, suppliers, community groups and competitors (Donaldson and Preston, 1995), (Cetinkaya et al. 2011), (Cervera and Flores 2012), (Carter and Jennings 2002).

Increasing pressures from a variety of directions have caused the Indian supply chain managers to consider and initiate implementation of green supply chain management (GSCM) practices to improve both their economic and environmental performance. Some of earlier works investigating the GSCM pressures/drivers are an empirical analysis of 89 automotive enterprises within China show that the Chinese automobile supply chain enterprises have experienced high and increasing regulatory, market pressure, ecological pressures from governmental and competitive sources. (Zhu and Sarkis 2004). Another research work conducted a moderated hierarchical regression analysis of data provided by 341 Chinese manufacturers and examined the relationships between GSCM practice, environmental and economic performance, incorporating three moderating factors market, regulatory, and competitive institutional pressures. (Zhu and Sarkis 2007).

New government policies have prohibited products made from environmentally destructive materials and polluting processes. Companies that utilize environmentally destructive and/or polluting processes are not allowed to sell their goods and may be subject to financial penalties and criminal prosecution. Manufacturers have realized the

importance of GSCM practices due to this regulatory pressure. Baird and Rowen (2010) and Zhu et al., (2008) have argued in their research work that changes in government policies have made the industry responsible for post disposal of products too, forcing the implementation of sustainable operations across the supply chain.

A global survey conducted by Boston Consulting Group in 2009 of more than 9,000 consumers, have inferred that 73 percent of consumers consider it important that companies have good environmental records and that a majority of those respondents are willing to pay a premium of 5 percent or more for green products. Consumer demand for environmentally friendly products has changed the attitude of the market. Companies are seeking to capture this market opportunity by minimizing their environmental impacts and/or selling environmentally friendly products. Christmann and Taylor (2001), Baird and Rowen (2010), Zhu et al., (2008) research has also shown that customer pressure is a primary driver for enterprises to improve their environmental image and practices. The practices of green purchasing and customer cooperation have developed the market for product take-back and product reintroduction (Van Hoek 1999).

The literature indicates that there are nine basic drivers for green supply chain initiatives; regulations, customer pressures, expected business benefits, social responsibility, supplier pressures, competition, market demand, community pressures, and employee pressures. most of the available studies, on drivers for green supply chain initiatives, support the significant effect of the top four drivers as potential key drivers to green supply chain initiatives (Ninlawan et al (2010), Gyaneshwar (2010), Zhu and Sarkis (2004), Ma Jun (2010), some other studies found no significant effect of these drivers on green supply chain initiatives. Bowen et al. (2001), Zhu, Sarkis and Lai (2007). This study has considered the customer, export market, regulation and government policies, industrial group activities, competitors and stakeholders as the relevant drivers in Indian context and has investigated the impact on green supply chain initiatives.

Sustainable development has the potential to affect future government policy, current production operations, and identify new business models, with new initiatives being proposed or adopted by both the public and private sectors (Linton, Klassen, and Jayaraman, 2007). Such binding legislations resulting from the urge for sustainability together with the pressures imposed by the customers have been the main drivers in the

adoption of environmental approaches in SCM for companies world-wide (Zhu and Sarkis, 2004; Sheu, Chou, and Hu, 2005; Srivastava, 2007; Buyukozkan Feyzioglu and Erkut, 2008). Based on an extensive literature review, Walker, Di Sisto, and McBain (2008) have identified the drivers and barriers to supply chain environmental management (SCEM) practices (from both the private and public sector perspectives):

Table 3.1: Drivers of SSCM
(Walker, Di Sisto, and McBain, 2008)

Internal	External
<u>Organizational Factors:</u> Skillful policy entrepreneurs Desire to reduce costs Investor Pressure Manage economic risk Improve quality Extension of founder's and/or owner's value Employee Involvement Manager's improving position in company	<u>Regulatory:</u> Legislative and regulatory compliance Pro-active action pre-regulation ISO 14000 certification
	<u>Customers:</u> Pressures by customers to green supply chain Customer demand Collaborate with customers E-logistics and environment Marketing Pressures
	<u>Competition:</u> Gaining competitive advantage Improve firm performance
	<u>Society:</u> Stakeholder encouragement Potential publicity Public Pressure Reduce risk of consumer criticism Non-economic stakeholders Pressure by environmental advocacy groups
	<u>Suppliers:</u> Collaborate with suppliers Supply integration

In the context of GSCM implementation at a chip manufacturer, Trowbridge (2001) differentiated between internal and external drivers. Internal drivers refer to the collaboration between manufacturer and supplier to minimize the impact on the environment. This can be achieved by using more ecological resources and equipment. External drivers are influences and restrictions given by customers, investors and nongovernmental organizations. Bowen, Cousine, Lamming, and Faruk (2001b) provided an “initial analysis of the role of supply management capabilities in green supply” and

found, within their study, internal drivers for greening the supply chain. Wee and Quazi (2005) “aimed to develop and validate a set of critical factors of environmental management that could be used by managers in assessing and improving their own practices.” In the end they established seven critical factors: top management commitment to environmental management, total involvement of employees, training, green product/process design, supplier management, measurement and information management. Walker et al. (2008) identified, in line with a literature review, factors which drive or hinder companies from adopting ecological measures. This research also includes a classification by internal (e.g. organizational factors) and external factors (e.g. regulations, customers, competitors) as well as internal and external barriers for implementing GSCM: “Internal barriers include cost and lack of legitimacy, whereas external barriers include regulations, poor supplier commitment and industry specific barriers.” According to Lee (2008), the major drivers are buyer influence, government involvement and GSC readiness. A research about the different levels of greening the supply chain in the UK manufacturing sector has been accomplished by Holt and Ghobadian (2009). The authors have analyzed the relationship between drivers of environmental behavior and the management methods which followed. Hu and Hsu (2010) gathered 20 critical factors for implementing a green supply chain management in the Taiwanese electrical and electronic industry to comply with European directives. The critical factors were divided into the following four dimensions: supplier management, product recycling, organization involvement, and life cycle management.

In summary, the analysis of drivers and factors of GSCD is already at an advanced stage as a lot of research projects contributed to this subject in various contexts. Nevertheless, when deciding upon structural or process-wise alternatives, the impact of these drivers on the supply chain configuration has to be evaluated. This topic is addressed by various methods as discussed in the next section.

3.5 Green Supply Chain Practices

Liberalization of international trade has designated the key role of developing markets as sources of low cost production processes, due to low wages, cheap land and tax incentives provided by the governments to companies that aim in investing to their markets. This has resulted in the relocation of major industrial plants from the developed to the developing countries, increasing therefore, the transportation distances between demand and supply points. In other words extensive and complex supply chain networks have been developed, that require advanced logistics. Additionally, the continuously increasing globalized cargo volumes have generated the necessity for intense production, transportation, and packaging/unpackaging activities. This in turn has had a significant effect on the society, economy as also the environment, through economic growth opportunities, environmental pollution, noise, accidents, etc.

Under this context the concept of sustainable supply chain networks has emerged in order to ensure that supply chain network activities will not comprise the future needs of the society, economy and the environment. To be more specific, sustainable supply chain networks should (i) reassure the society's safety, health, and reduce its disturbance (ii) lead to economic growth, jobs and prosperity and (iii) respect the environment. Moreover, the continual combustion of fossil fuels, from production and transportation activities has resulted in the production of greenhouse gasses in the atmosphere. This in turn increases the planets average global temperature resulting, through catastrophic climate change events, in a significant economic and social upheaval (Mardsen and Rye, 2009).

In this framework the environmental effects of global supply chain networks have gained important attention. As a result the concept of green supply chain management has emerged for addressing the environmental effects of supply chain activities. Green supply chains or ecological supply chains involve the integration of environmental thinking into supply chain management. They also incorporate reverse logistics activities, which close the loop, and therefore the definition of closed loop green supply chains could provide a holistic approach. Typically, improved environmental performance is followed by a reduction in total logistics costs resulting in a win-win scenario for businesses and the environment. Companies can find cost savings by reducing the environmental impact of

their business processes. By reevaluating the company's supply chain, from purchasing, planning, and managing the use of materials to shipping and distributing final products, savings are often identified as a benefit of implementing green policies. On the other hand though, the implementation of numerous green supply chain practices could increase substantially the systems total supply chain costs, resulting in cost/environmental tradeoffs (i.e the utilization of more advanced and expensive Euro trucks).

Moreover, and as the public becomes more aware of environmental issues and global warming, companies must be able to answer questions regarding how green their logistics activities are, how they recycle and what is the carbon footprint of their logistics operations. On this basis numerous corporations are often under considerable pressure from their customers and shareholders (Hall, 2000). Henriques and Sadorsky, (1996;1999) have identified four important environmental stakeholder groups namely: (i) regulatory stakeholders that have the ability to set environmental regulations or pressure governments to set environmental standards (ii) organizational stakeholders, that are directly related to a company and have the ability to set financial pressures (iii) community groups, environmental organizations and other potential lobbies that can mobilize public opinion in favor of/or against a firms environmental strategy and (iv) the media that have the ability to influence the society perception on a firms environmental image. Due to the intense pressures set by these groups, a green image has turned into a top priority business practice adopted by global corporations such as Walmart, McDonalds, and Xerox (Grove et al., 1996).

Under this context the purpose of this paper is to develop a decision support framework that will assist managers in evaluating green supply chain alternatives. To be more specific this work will initially classify green supply chain practices into four categories related to: (i) product, (ii) transportation, (iii) warehousing and (iv) reverse logistics and analyze green business supply chain initiatives that correspond to each one of these categories. The rest of the paper is organized as follows. In chapter 2 the taxonomy of the green supply chain practices will be presented while in chapter 3 the conclusions will be analyzed.

Taxonomy of Green Supply Chain Practices

In the following phase this work will provide significant managerial insight related to (i) Green Product (ii) Green Transportation and Distribution (iii) Green Warehousing and (iv) Reverse Logistics issues.

3.5.1 Green Product:

Green product related issues involve: (i) green product design (iii) green purchasing and (iv) green manufacturing

- i) **Green product design:** Green product design focuses on production processes that adopt environmentally friendly specifications (Luh, et al., 2007). It involves (i) products made from, recycled or remanufactured materials (O'Brien, 1999, Waage, 2007) (ii) products that can be reused and remanufactured (iii) products with environmentally friendly packaging, (iv) products made from organic components and (iii) the identification of the optimum assembly sequence when designing the product in order to be able to follow the regulated recovery rates in an economic manner at the reverse logistics channel (Chu et al., 2009). On this basis, numerous global companies have redesigned their production lines, by adding green attributes to their products.

- ii) **Green purchasing:** This practice involves the selection of supply chain partners (raw material, components and subassemblies suppliers) based on environmental standards and eco labels. It aims in raising consumer awareness in green products, increase their demand and thus motivate the industry to adopt greener production and distribution processes. Numerous researchers have observed that collaboration regarding environmental issues between the suppliers and the company (or the customer) in a supply chain has a significant effect in the adoption of environmentally friendly practices by all intermediate counterparties (Taylor et al., 2004).

- iii) **Green manufacturing:** Green manufacturing incorporates the utilization of environmentally efficient manufacturing hardware and software technologies that minimize energy consumption, and waste. For example, a paperboard manufacturing company that prepares products for customers in North America has purchased a new corrugating machine that reduces the amount of paper needed to corrugate boxes while maintaining their strength (Cote et al., 2008). Moreover Sony uses Product Data Management software (PDM) with green design as an option, eliminating incorrect

product variations induced by improper combination of components and/or modules. This in turn minimizes the number of malfunctioned products and thus generated waste (Luh et al., 2007).

3.5.2 Green Transportation and Distribution:

Green transportation and distribution practices involve:

- i) **Green network design:** Green network design examines the effects of location decisions related to distribution centers (Li et al., 2008, Ramudhin et al., 2009) and production facilities (Iakovou et al., 2010) on the systems transportation emissions performance. To be more specific, by operating one distribution center next to each demand point, the supply chain planner minimizes the distances travelled with the environmentally inefficient delivery truck. This in turn minimizes the amount of various emissions generated in the system. By adopting the practice of nearshoring, the practice that involves the allocation of a portion of production processes close to the serving markets, minimizes the amount of transportation emissions generated compared to the practice of off shoring that involves production in distant locations and thus lengthier distances travelled (Iakovou et al., 2010).

- ii) **Increase of vehicle utilization rates and reduction of empty returns:** Increase in vehicle utilization rates could be achieved through (i) the application of nominated day delivery systems by suppliers (ii) the cooperation between transport users (iii) the application of efficient packaging techniques, and (iv) the transportation of reverse logistics flows. To be more specific through nominated day delivery systems customers are informed that a vehicle will be visiting an area on a nominated day and in order to receive a delivery that day they must submit their order a certain period in advance. By concentrating deliveries in particular areas on particular days, suppliers can achieve higher vehicle utilization rates. Additionally different retail stores located at a specific area could also cooperate by collecting their demanded cargo in a common area, i.e. a warehouse, and then deliver them with high truck loads to the retail shops.

Finally the continuously increasing proportion of products travelling back for reuse, recycling and remanufacturing, along with the growth in the recovery of waste

packaging and life expired products may provide an opportunity of increasing return loadings (MacKinnon, 2006, Anderson et al., 1999).

- iii) **Vehicle routing and scheduling:** A large proportion of freight distribution is carried out by road vehicles. The problem of organizing and routing a fleet in a way that reduces transportation costs and improves the level of service provided, is called the vehicle routing and scheduling problem (Golden and Assad, 1998, Golden, Reghavan and Wasil, 2008). There is a variety of software packages for providing routes and schedules, while managing substantial cost savings (from 5 to 20%) of the global transportation costs (Toth and Vigo, 2001;1997) these cost savings are mainly due to the reduction of unnecessary distances traveled which may lead in the reduction of fuel consumption and thus greenhouse gasses. Additionally difficult journeys (through for example a congested city center) are scheduled for a time of day where the environmental impact will be minimized. The reduction of commercial vehicle emissions is a key concern for numerous companies, which try to find ways for reducing their carbon footprint and therefore improve their green credentials.
- iv) **Fuel-efficient driving (eco-driving):** Driver training programs have shown to improve fuel efficiency by 8-10%. Until today 7000 drivers have received training under the UK governments Safe and Fuel efficient driving (SAFED) program. Fuel efficiency may be also affected by other factors. To be more specific, by leaving the engine idling unnecessarily, failing to check tire pressures and not reporting on engine problems or oil leaks, drivers waste a lot of fuel (Mc Kinnon et al., 2010).

3.5.3 Green Warehousing:

Green warehousing incorporates practices that aim to minimize the environmental impact of warehousing operations. To be more specific, it incorporates the following practices:

- i) **Energy Savings:** Fuel, oil or gas is the primary source for heating a warehouse while electricity for cooling. The extend of which energy is consumed is primarily determined by (i) the temperature required to maintain the stored products in a satisfactory condition. This may require efforts for maintaining maximum or minimum temperature levels as well as to control the humidity, (ii) the background temperature of the internal space of the warehouse for the employees to perform their

work in comfort and in relation to the extent of the physical requirements and the location of the task undertaken. Significant savings in energy can be achieved through (i) the use of close fitting door locks, close fitting barriers or fast-acting doors in areas where fork lifts entry and exit frequently (ii) the segregation of intake and or dispatch areas from other areas of activity and (iii) the use of zoned or time controlled thermostats (Carbon Trust 2002a;2006a).

- ii) **Energy Efficiency of handling equipment:** In order to achieve rapid and intensive movement of goods all warehouses use a range of various mechanical equipment such as (i) fork lifts, for unloading the container or transportation mode and (ii) reach trucks for storing cargo in the distribution center, at different heights. This increases substantially energy requirements in petrol or LPG gas for fork lifts) as also in electricity (for recharging the batteries of the reach trucks). The environmental impact of the mechanical handling equipment utilized in the warehouse could be minimized through (i) the utilization of internal combustion power units using bio-diesel or hybrid fuel combinations along with hydrogen fuel cell technologies for the forklifts and (ii) the use of 3-phase AC high-frequency, fast-charging systems and opportunity-charge batteries.

3.5.4 Reverse Logistics:

In the following paragraphs, this work will identify the ecological ramifications of product recovery and waste management as also direct reuse of products.

- i) **Product recovery:** Product recovery management involves the management of all used and discarded products, components and materials in order to recover as much of the products ecological and economical value, and therefore reduce the quantities of generated waste. It incorporates five product recovery options namely (i) repair, (ii) refurbishing, (iii) remanufacturing, (iv) cannibalization and (v) recycling.
- a) **Repair:** The purpose of repair is to return used products in to a working condition by fixing and/or replacing broken parts. Repair usually requires only limited product disassembly and reassembly, while repair operations can be performed at the customer's location or at manufacturer-control repair centers. World class product manufacturers such as IBM, Phillips have invested heavily in order to engage in effective product repair operations (Volkskrant, 1992).

- b) **Refurbishing:** The purpose of refurbishing is to bring used products up to quality standards lower than those of new products. The products are disassembled into modules which are inspected fixed or replaced. Approved modules are reassembled into refurbished products. Military and commercial aircrafts are examples of products refurbished (Mc Kinnon et al., 2010).
- c) **Remanufacturing:** The purpose of remanufacturing is to bring used products up to quality standards as high as new. The modules of the new products are extensively inspected and all depleted parts are repaired with new ones. BMW has been remanufacturing high components such as engines, started motors etc. for many years. These components are tested based on strict quality standards in order to become a BMW exchange part which is then resold with the same quality and warranty 30-50% cheaper while minimizing significantly the amount of waste produced (Thierry et al., 1995).
- d) **Cannibalization:** The purpose of cannibalization is to recover a limited set of reusable parts from used products or components. To be more specific cannibalization involves selective disassembly of used products and inspection of potential reusable parts. The remaining parts and modules are not used. Auora, a U.S. chip manufacturing company is mainly engaged in cannibalizing internal circuits. The company selects the parts they require from the computer and tests, straitens, redips, polishes and sells the chips.
- e) **Recycling:** Finally, in recycling the identity and functionality the products and components are lost. The purpose of recycling is to reuse materials from used products and components. These materials can be reused for the production of new products (if these materials are of high quality) or else in the production of other parts. In recycling the used products and components are segregated into parts. These parts are then separated into different material categories which are then reused in the production of new parts.

- ii) **Waste management:** Waste management involves pretreatment of waste. To be more specific and based on the producer Pre-Treatment Requirement of the Landfill directive implemented in October 2007, Pre-treatment is undertaken when the waste has passed by a three point test in which all three points have been satisfied. To be more specific:
- It must be a physical, thermal or chemical, or biological process, including sorting.
 - It must alter the characteristics of waste
 - It must reduce its volume, or its hazardous nature, or facilitate its handling or enhance its recovery.

The EC directive on Packaging and Packaging Waste (94/62/EC) aims to reduce the environmental impact by obliging businesses to recover a specific proportion of their packaging waste. This is achieved through electronic Packaging Recovery Notes (PRNs) and Packaging Export Recovery Notes (PERNs) in order to indicate how much packaging has been recovered and recycled. Moreover the EC directives on Waste Electrical or Electronic Equipment (WEEE) (2002/96/EC) and on the Restriction of the Use of Certain Hazardous substances (RoHS) in Electrical and Electronic Equipment (2002/95/EC) aim to reduce the environmental impact of packaging from electrical or electronic equipment (EEE) and increase its recovery recycling and re-use. This will in turn reduce significantly the total amount of waste disposed, and producers will be responsible of taking back products and recycling.

Under the EC 2005 Hazardous Waste Directive (91/689/EEC), producers of hazardous waste must be registered to the environmental agency before they can remove material from their premises. The mixing of hazardous and nonhazardous waste is strictly prohibited and therefore waste separation and segregation needs to be carefully considered in the reverse logistics process. Additionally, the waste carrier should hold a license along with a specific training is required for carrying hazardous goods. Finally the consignee will be required to keep detailed records of the quantities and origins of waste and provide quarterly reports to its Environmental Agency. This practice enables tracking of hazardous waste movements until it reaches the authorized disposal or recovery facilities.

iii) **Re-use:** Reuse is a strategy that eliminates waste, reduces waste disposal costs, and conserves energy and materials. It involves taking useful products, such as furniture, books and appliances, discarded by those who no longer want or need them and redistributing them to those who do. In contrast to recycling, which recovers materials for processing, reuse recovers the original product. Reuse, therefore, primarily involves collection and redistribution of goods. Product returns are an increasing concern to industry.

The following graph represents the proposed framework for green supply chain network design.

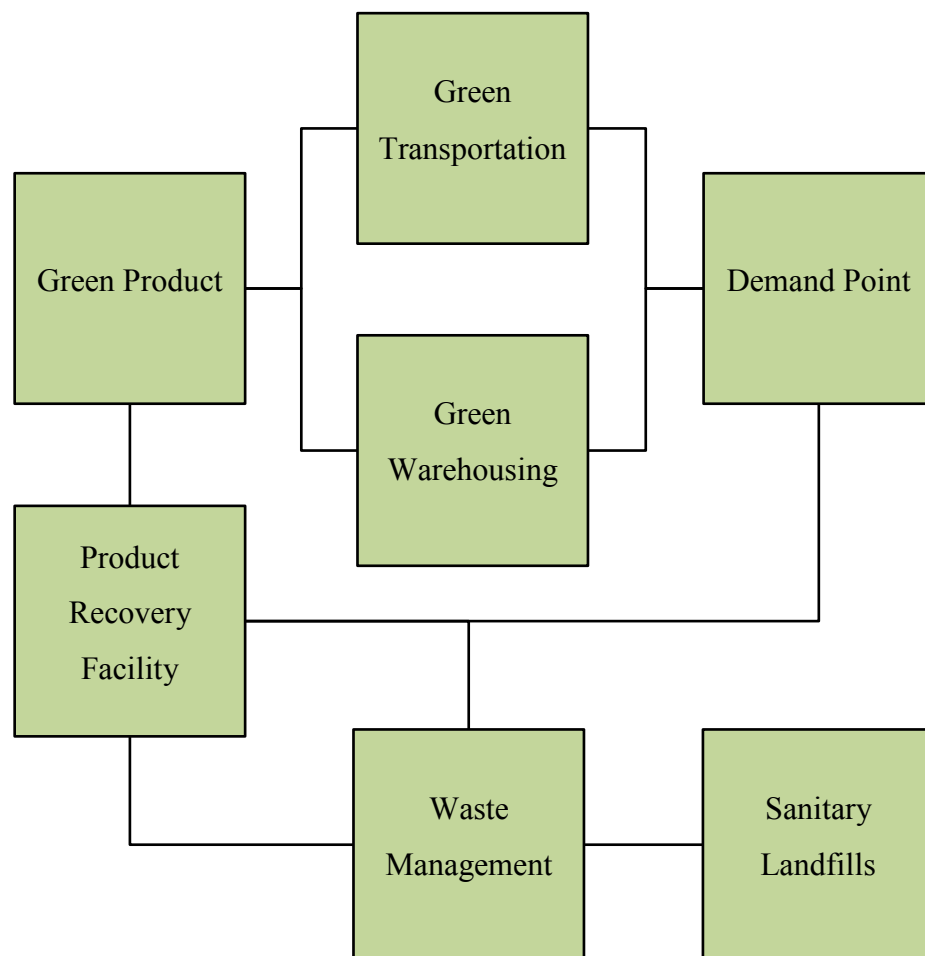


Figure 3.2: Supply Chain Network Design Framework

3.5.5 Green Design:

Green design is an important sub-topic to Green supply chain management. It is about designing a product or a service that encourages environmental awareness. Fiksel (1996) argues that organizations have definite potential to become eco-friendly towards product re-manufacturing. Heavy industries that have complex supply chains should take into consideration the benefits of reverse logistics (RL). Beamon (1999) acknowledged the development of ISO14000. This was introduced as a result of the Rio Summit on the Environment in 1992. There are growing pressure groups that calls for firms to encourage 'greening' in the supply chain.

There are several literatures that relate to Green Design. Barros et al. (1998) proposed a two-level location model on product recovery with the support of the Dutch government. Johnson (1998) examined the role of purchasing in reverse logistics system and design. In this study, twelve American manufacturing plants participated and it appears that all of them were in favor of reverse logistics without government legislation having been imposed. Taleb and Gupta (1997) created applied algorithms to design a product recovery system. This study shows that 'core algorithms' and 'allocation algorithms' are the scheduling systems that would help reduce waste.

Life-cycle Analysis: Life-cycle analysis is an important sub-concept to Green Design. Life-cycle analysis was introduced to measure environmental and resource related products to the production process (Srivastava, 2007). This measurement involves in stages from extraction of raw materials, production, distribution, and remanufacturing, recycling and final disposal. Gungor and Gupta (1999, p. 818) comments that life cycle analysis "examines and quantifies the energy and materials used and wasted and assesses the impact of the product on the environment." Government regulations are also an added factor for organizations to work towards life-cycle analysis. Works of Arena et al. (2003), Beamon (1999) and De Ron Penev (1995) all discussed life-cycle analysis as a framework.

3.5.6 Green Operation:

Reverse Logistics (RL) is the opposite of traditional or forward logistics (Beamon, 1999). Dowlatshahi (2000) and Carter and Ellram (1998) define reverse logistics as a process where a manufacturer accepts previously shipped products from the point for consumption for possible recycling and re-manufacturing. Beamon (1999) illustrates the fundamentals of reverse logistics. This explains the works around RL involving managing the flow of materials towards remanufacturing and recycling, which in this sense reduces the costs of making new products (Dowlatshahi, 2000). Thierry, Wassenhove, Van Nunen and Salomon (1995) reports that reverse logistics have been widely used in automobile industries such as BMW and General Motors. Other companies such as Hewlett Packard, Storage Tek and TRW are also using reverse logistics as a supply chain process. Doing this would eventually help firms become more competitive in their own industry (Srivastava, 2007).

Collection is the first stage in the recovery process. Products are selected, collected and transported to facilities for remanufacturing (Srivastava, 2007). Used products came from different sources and should be brought to product recovery facility to begin the converging process (Thierry et al., 1995). Sorting and Recycling are also an important mechanism when sorting reusable products. Cairncross (1992) and Srivastava (2007) suggest that collection schemes should be classified according to materials whether separated by the consumer (separation at source) or centralized (mixed waste). The goal is to sort products that can be reused to reduce costs of making new products.

3.6 Sustainable Supply Chain Management

3.6.1 Sustainability:

Climate change, depletion of resources, increased pollution, energy consumption, violation of social rights, poor working environment, demand for transparency regarding social and environmental performance have brought the agenda of sustainability in every walk of our life and within the broader facets of society (Carter and Easton, 2011). Sustainability can be referred as “creating long-term shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments” (Jones, 2005). In other words it is termed as “make the world a better place for future generations” and to “provide the processes and products which will give the people of the world shelter, clothing, food and drink, and which keep them in good health” (IChemE, 2005). The most popular and widely accepted concept of sustainability is the meeting the needs of the present in a way that do not deter the ability of meeting the needs of future generations. (World Commission on Environment and Development, 1987, p. 8): In the recent years the domain of sustainability has magnified beyond the organizational boundary with incorporating the whole rubric of the supply chain (Gold et al., 2010) because focal firms are not only responsible for own operations but also responsible for the environmental and social issues of their supply chain members (Oec, 2005).

3.6.2 Sustainable Supply Chain Management (SSCM) – Conceptualization:

There are numerous definitions of the terms ‘Sustainable’ and ‘Supply chain’. More simplified and practical oriented definition is added by New Zealand Business council for Sustainable Development, “Management of raw materials and services from suppliers to manufacturer/service provider to customer and back with improvement of the social and environmental impacts explicitly considered.” The supply chain considers the interactions between a business and its customers and suppliers. Harland (1996) defines supply chain management as “the management of a network of interconnected business involved in the ultimate provision of product and service packages required by end customers”.

The concept of supply chain management can be extended by adding sustainability. Sustainable supply chain management integrating environment thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers, and end-of-life management of the product after its useful life. Besides the environmental issues, there are two other vital part of SSCM are exists, for instances economic aspect and social aspect which are directly involved with the sustaining of organization in the competitive market.

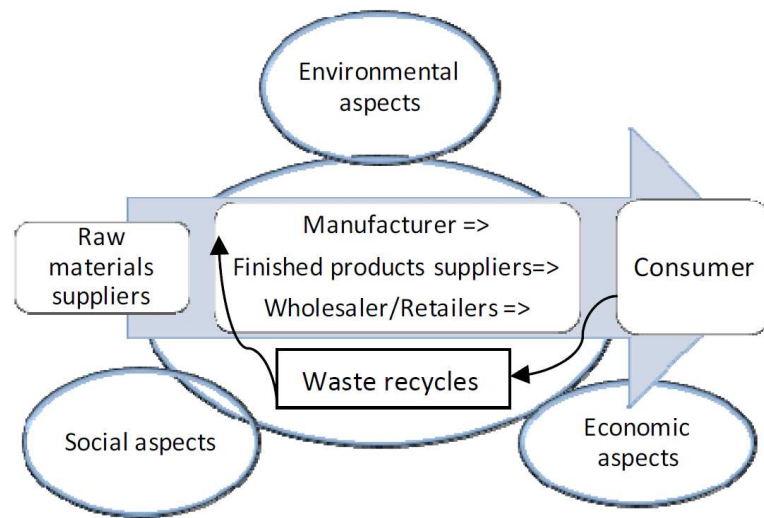


Figure 3.3: Sustainable Supply Chain Management System

3.6.3 Dimensions of Supply Chain Sustainability:

As the time passes the concern for sustainability is growing. There are a number of factors that are responsible for a high level debate about sustainability; for example, supply and demand characteristics of energy consumption, concern for climate change, and demand for transparency regarding the environmental and the social performance of organizations (Carter and Easton, 2011). Scholars focused on different dimensions for achieving and improving sustainability but the most widely used dimensions can be found in the triple bottom line concept of John Elkington. The United Nations (UN) world summit 2005 also describes the three pillar of sustainability: environmental sustainability, social sustainability, and economic sustainability.

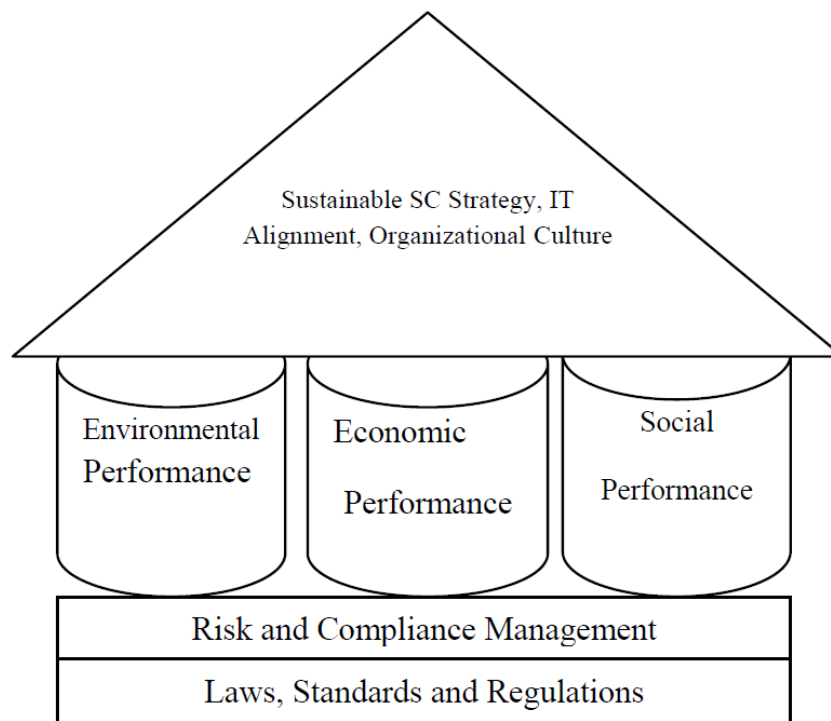


Figure 3.4: House of SSCM with Three Pillars of Sustainable Development

These pillars or the “triple bottom line” served as a common ground for numerous sustainability standards in business, such as, Global Reporting Initiative (GRI), the Dow Jones Sustainability Index (Jones, 2005), and International Standard Organizations (ISO) 14001 (Delai and Takahashi, 2011).

Environmental sustainability refers the maintenance of natural capital (Goodland, 1995). Scholars argue that the depreciation of natural capital cannot go on endlessly

(Lovins et al., 1999). In organizational perspective, environmental sustainability focuses on the production and consumption of resources by corporations in a responsible fashion. That's why responsible companies keep track to the carbon foot print of their activities and open the records to the public.

Social dimension of sustainability stresses on how to bring human wellbeing, how to meet their needs and how to generate development opportunities for all (Comission on sustainable development, 2002). From organizational perspective social sustainability focuses on impact of organizational activity on the stakeholders specifically, employees, customers, suppliers, shareholders and government (Delai and Takahashi, 2011). It can also be related with corporate social responsibility (CSR) practice of the businesses. CSR is the obligation of the firm to its stakeholders. The fulfilment of these obligations is intended to minimize any harm and maximize the long run beneficial impact of the firm on society (Bloom and Gundlach, 2000).

Economic sustainability evaluates short term and long term economic value generated by the organizational activities and the corresponding relationship with shareholders (Delai and Takahashi, 2011). It is concerned with long term economic health or organization and accounts for share value, sales growth, profitability, such as, debt-equity, and other important indicators. The studies of sustainability and sustainable development mostly mention about the ways of achieving the economic, social, and environmental bottom lines but the dynamic interrelationships among the factors are not explored much. Very few writers for example, (Carter and Rogers, 2008) in their conceptual study mention that firms that have social and environmental sustainability have better economic performance but still other relationships are unexplored. Therefore, it is important to identify and explore the relationships among sustainability factors.

A deeper and detailed idea about RMG supply chain sustainability factors can be obtained from the discussion in the light of the following table:

Table 3.2: Factors and Variables of RMG Supply Chain Sustainability

Constructs	Sub-constructs	Variables
Social compliance	Wages and benefits	Minimum standard wages
		On time salary and overtime payment
		Transportation
		Weekly holiday
		Leave benefits
		Break and food
		Medical facility
		Group Insurance
		Baby care facility
	Hazard and safety	Fire safety tools and other PPE
		Factory safety standard
		Temperature control
		Proper Light and ventilation
	Health and sanitation	Dust control
		Cleaning
		Adequate toilets
		Pure drinking water
	Human rights and Others	Child labor
		Standard Working hour and no force labor
		No Harassments
Factor	Variables	
Environmental compliance	Controlling water pollution (ETP)	
	Controlling air pollution	
	No soil pollution or careful disposal of waste	
	Recycling wastes or selling to recyclers	
	Controlling the use of hazardous material	
	Complying environmental legislation	
Operational compliance	Delivery lead time	
	Quality	
	Reliability regarding quality, design and other specification	
	Efficient and Updated Machinery and technology	
	Factory getup	
Economic Sustainability	Sales and business volume	
	Cost	
	Profit	
	Sales growth	
SC Governance	Monitoring the social Performance of suppliers	
	Monitoring the environmental Performance of suppliers	
	Social and Environmental certification and audit	

- i) **Social Sustainability:** Social dimension of sustainability stresses on how to bring human wellbeing, how to meet their needs and how to generate development opportunities for all (Commission on sustainable development, 2002). Social sustainability mainly focuses on the corporate social responsibility (CSR) practice of the businesses. The fulfilment of the social issues is intended to minimize any harm and maximize the long run beneficial impact of the firm on society (Bloom and Gundlach, 2000). From organizational perspective social sustainability focuses on impact of organizational activity on the stakeholders specifically, employees, customers, suppliers, shareholders and government (Delai and Takahashi, 2011). In the contemporary world social sustainability has got intensive focus because of the high profile corporate failures (Aaronson, 2002), and failure to observe social issues by the chain members (Chowdhury et al., 2012a; Kolk and Pinkse, 2006). Among the lot, the poor working environment in apparel manufacturing companies of underdeveloped countries (Emmelhainz and Adams, 1999; Islam and Deegan, 2008) is worth mentioning. Such type of violation of social and environmental issues is not unlikely in the corporations of many developing countries such as Bangladesh, Pakistan (Naeem and Welford, 2009). Therefore, social sustainability issues in the supply chain need to be emphasized while outsourcing from low cost countries. Social sustainability in the supply chain can be ensured by a number of factors such as fair wages, health and safety factors, child labor, force labor and some other indicators (Carter, 2004; de Brito et al., 2008; GRI, 2011; IChemE, 2005; Jones, 2005).

RMG manufacturers and the suppliers need to comply with social and environmental aspects. According to the participants of field study the RMG manufacturers and suppliers try to comply with the buyers requirements otherwise, they will not get order and cannot sustain in the market. Digging deeper into the component of social compliance issues it is revealed that buyers demand for a number of social factors such as wages and benefit of workers, hazard and safety issues, health and sanitation factors and human rights issues. There are a number of issues needed to comply under the factors: wages and benefit, hazard and safety and others. For example, regarding wages and benefit, the RMG supply chain members need to ensure minimum wage standard, overtime payment, leave benefit, weekly holiday, medical benefit, childcare facility and so on. Regarding social compliance, it can be summarized that except some self-motivated social issues such as transport facility and break and food, and

insurance other social issues are ensured by majority of the participants as these are imposed by the buyers. It is identified that regarding child labor, forced labor all respondents are very serious because buyers are very strict on those issues.

Based on the above analysis it seems that - Supply chain members that comply with the social aspects have better social sustainability.

- ii) **Environmental Sustainability:** Environmental sustainability focuses on the maintenance of natural capital (Goodland, 1995). Scholars argue that the depreciation of natural capital cannot go on endlessly (Lovins et al., 1999). In organizational perspective, environmental sustainability concentrates on the production and consumption of resources by corporations in a responsible fashion (Seuring and Muller, 2008). Responsible companies now keep track to the carbon foot print of their activities and open the records to the public. The consumers' concern and environmental regulation regarding the impact of production and consumption is getting tougher as a result companies are shifting their production bases to the areas where the regulations are relaxed specifically the developing and under developed countries. Environmental factors shall not be overlooked while outsourcing from low cost countries (de Brito et al., 2008). The cause of concern is that some production processes have high environmental impact for example, because the processes of dyeing, drying and finishing, the apparel industry make intensive use of chemical products and natural resources (Caniato et al., 2012; de Brito et al., 2008). Moreover, the production of fibers, such as cotton, wool and synthetics, has a significant environmental impact (Caniato et al., 2012). In such a situation the environmental factors along with economic factors need to be considered throughout the supply chain for long term sustainability. Studies (de Brito et al., 2008; GRI, 2011; Hervani et al., 2005; Pagell and WU, 2009) and others refer a number of practices to ensure environmental sustainability in the supply chain such as pollution control, waste recycling, compliance of environmental issues, supplier's environmental performance evaluation and monitoring and others.

With the passage of time RMG buyers are imposing pressure on RMG manufacturers and suppliers to comply with environmental issues as well. To them, buyers now want to see to what extent the RMG manufacturers and their suppliers are complying with environmental issues. The environment department of the government is also strict about the effluent disposal and emission of pollutant. It has been explored that the RMG supply chain members need to treat the pollutants by effluent treatment plant (ETP), and have to obey the environmental legislations set by the ministry of environment. All of the RMG supply chain members expressed high concern on use of environmental and health hazardous ingredients. Meanwhile, the issue of environmental certification, and compliance of environmental legislation are supported by majority of the respondents.

From the above analysis it appears that - Supply chain members that comply with the environmental aspects have better environmental sustainability.

iii) Operational Sustainability: Operational compliance was emerged as a new component of sustainability in RMG supply chain of Bangladesh. RMG products are sensitive to design, color and use of accessories. The manufacturers need to submit samples for buyers' approval before producing in a bulk quantity. If the size, color, design and other specifications are approved by the buyers, operation is started. Sometimes, buyers reject some batches of production because of non-conformity of final bulk production with the approved sample. It's a huge economic loss and reputation loss for the garment manufacturers. Moreover, buyers set a fixed lead time and within this time the manufacturers need to accomplish procurement, production and delivery of finished products. If there is any deviation buyers are dissatisfied and even reject the shipment. In RMG supply chain, meeting lead-time, quality standard and buyers' specification are very important. Failure to comply with these requirements creates buyers' dissatisfaction and cancellation of order.

From the above analysis it seems that - Supply chain members that comply with the operational aspects have better operational sustainability.

iv) Economic Sustainability: Economic sustainability evaluates short term and long term economic value generated by the organizational activities and the corresponding relationship with shareholders (Delai and Takahashi, 2011). It focuses on that segment of the natural resources base which provides physical inputs, both renewable and exhaustible, into the production process (Goodland, 1995). For example, financial capital, such as, debt-equity, tangible capital and intangible capital need to be managed sustainably to produce maximum outputs. In other words, economic sustainability is concerned with long term economic health or organization and accounts for share value, sales growth, profitability, such as, debt-equity, and other important indicators while maintaining social and environmental responsibilities (Delai and Takahashi, 2011). It is not enough to maintain profit and growth for the company itself rather the economic health of all supply chain members shall be considered because competition is no longer confined between firm to firm rather extended to supply chain versus supply chain (Mentzer et al., 2001). Failure to keep cost of production lower than the competitor makes the companies and their supply chain less profitable and incompetent in the highly competitive market. To keep the production cost lower some companies shift their production location in cheaper labor areas. For example, European clothing and textile factories could not sustain their production in Europe as a result shifted to low cost underdeveloped Asian and South American region or got engaged in outsource which created thousands of people unemployed (de Brito et al., 2008). Similarly, the companies that are operating in the low cost areas now need to consider the management capabilities and technological up gradation to remain economically sustainable in the long run. A number of factors can be maintained to ensure economic sustainability of the organizations and their supply chains. However, Sales, cost, Value addition, Net income before tax and Return on average capital employed are most widely cited factors for economic sustainability (Delai and Takahashi, 2011; GRI, 2011).

For sustainability, economic efficiency is important. If an organization cannot show economic efficiency it cannot compete in market and eventually get out from business. The market is competitive now and cost is very important factor to all. Some of them opined that they are facing competition both from domestic and international market. In such a situation, if the garments manufacturers cannot quote a competitive

price they cannot compete. To some respondents cost of production is increasing because cost of power, labor costs, and material cost are increasing day by day.

From the above analysis it seems that - Supply chain members that have better performance on economic aspects have better economic sustainability.

- v) **Sustainability Governance:** The emerging issues such as business ethics through entire value chains, human rights, bribery and corruption, and climate change, violation of social and environmental issues in the supply chain has generated the debate of sustainability governance in the organizations and their supply chains (Elkington, 2006; Chowdhury et al., 2012). Along with the RMG manufacturers, the suppliers also need to maintain social compliance issues. The buyers govern the whole chain and in some cases, for better control, they specify/nominate the suppliers from which the manufacturers need to procure material. The nominated suppliers are certified and evaluated by the buyers. Buyers monitor their plants time to time to inspect compliance issues. Sometimes buyers do not specify/nominate any supplier when place orders to RMG manufacturers. In that case the reputed and large garment manufacturers try to ensure compliance issues in their suppliers' and sub-contractors' plant otherwise, any information regarding violation of social and environmental issues in the suppliers' plant may create buyers' dissatisfaction and cancellation of order.

Based on the above analysis it seems that - Supply chain members that have sustainability governance have better social and environmental sustainability.

3.6.4 Potential Benefits of Sustainable Supply Chain Management (SSCM):

Social responsibility, good environmental and economic performances are not just about the activities that the business firms should carry out within the factory walls. As sustainability demand rose from ultimate consumer, so it is act as a source of different potential benefits and competitive advantages.

There are some potential benefits will rise easily from sustainability of supply chain management field:

- Increased productivity through greater efficiency and higher quality,
- Opportunity for innovation and competitive advantage,
- Risk minimization,
- Protection and enhancement of a company's brand reputation,
- Advantages of considering international agendas and joining sustainability indexes

From the marketing perspective of sustainability, there are boundless opportunities to include social responsibility and be financially successful. The Canadian Business for Social Responsibility includes bottom-line benefits having:

- Reduced operating costs
- Enhanced brand and image reputation
- Increased sales and customer loyalty
- Increased ability to attract and retain employees
- Publicity and increased public image from good works

Chapter 04

Rationales, Benefits, and Competitive Advantages of GSCM in RMG Industry of Bangladesh



CHAPTER 04

RATIONALES, BENEFITS, AND COMPETITIVE ADVANTAGES OF GSCM IN RMG INDUSTRY OF BANGLADESH

4.1 SWOT Analysis of RMG Industry of Bangladesh

4.1.1 Strengths (S):

- Low labor cost.
- Energy at comparatively lower price.
- Easily accessible infrastructure like sea road, railroad, river and air communication.
- Wide ranges port facilities.
- Accessibility of fundamental infrastructure, which is about 3 decade old, mainly established by the Korean, Taiwanese and Hong Kong Chinese industrialists.
- FDI is legally permitted.
- Moderately open Economy, particularly in the Export Promotion Zones.
- GSP under EBA (Everything but Arms) for Least Developed Country applicable (Duty free to EU).
- Investment assured under Foreign Private Investment (Promotion and Protection) Act, 1980 which secures all foreign investments in Bangladesh.
- Bangladesh is a member of Multilateral Investment Guarantee Agency (MIGA) under which protection and safety measures are available.
- Excellent Tele-communications network.
- Convenience of duty free custom bonded w/house.

4.1.2 Weaknesses (W):

- Long lead-time.
- Lack of marketing tactics.
- The country is deficient in creativity.
- Absence of easily on-hand middle management.
- A small number of manufacturing methods.
- Lack of training organizations for industrial workers, supervisors and managers.
- Sluggish backward or forward blending procedure.

- Incompetent ports, entry/exit complicated and loading/unloading takes much time.
- Speed money culture.
- Time-consuming custom clearance.
- Unreliable dependability regarding Delivery/QA/Product knowledge.
- Subject to natural calamities.

4.1.3 Opportunities (O):

- EU is willing to establish industry in a big way as an option to china particularly for knits, including sweaters.
- Bangladesh is included in the Least Developed Countries with which US is committed to enhance export trade.
- If skilled technicians are available to instruct, prearranged garment is an option because labor and energy cost are inexpensive.
- Foundation garments for Ladies for the FDI promise is significant because both, the technicians and highly developed machinery are essential for better competence and output
- Japan to be observed, as conventionally they purchase handloom textiles, home furniture and garments. This section can be encouraged and expanded with continued progress in quality.
- Chittagong port is going to be much faster; it will also reduce lead-time as well as total cost will be decreased.

4.1.4 Threats (T):

- China is a most likely the biggest threat for Bangladesh as this country has relatively high labor productivity and applies more capital-intensive modern technology and it has less lead-time because of its relative advantages in getting locally available raw materials like fabrics, various RMG accessories.
- China has also relatively better infrastructural facilities like energy supply, transportation and communication system.
- Some African and Caribbean countries have enjoyed zero-tariff facility under AOA act (Agreement on Agriculture) that helps them to be more competitive relative to Bangladesh.

4.2 Why Change to Green Supply Chain Management (GSCM)?

There are different motivators for companies to switch to 'green' in their supply chain. Although some of the motivators are quite unclear, Wu and Dunn (1995) suggests that some organizations are simply doing this because it is the right thing to do for the environment. Perhaps some are more radical to environmental change, but others may not (Wu and Dunn, 1995). Studies, however, have shown that profitability and cost reduction are some of the main motivators for businesses to become 'green' in the supply chain (Srivastava and Srivastava, 2006; Srivastava, 2007; Darnall et al., 2008). Johnson (1998) argues that reverse logistics were motivated primarily by economic factors and not concerns about protecting the eco-system. Tibben-Lembke (2002) and Van Hock and Erasmus (2000) suggest that reverse logistics can only bring about profitability, reduction of waste and, advertising. Zhu and Sarkis (2004) took this idea further and argued that most of the 186 participants in their study all agreed that GSCM practices are only about 'win-win relationships on environmental and economic performance'.

Companies, however, need to acknowledge that there are hidden values to reverse logistics (Mollenkopf and Closs, 2005). Jayaraman and Luo (2007) claims that customers, on average, return about 6% of the products they buy. These products can be from plastic bottles to boxes. Organizations are able to cost-save if they can capture this 6% return from the consumers. Doing this, however, still remains in question. Srivastava and Srivastava (2006) suggested a model to manage product returns. The study utilized average-life cycle of product data; past sales forecast demands to support their analysis. Semi-structured interviews to 84 stakeholders were used to triangulate the findings of the model. The findings shows that reverse logistics can cost-save only if done correctly. Saying this means that organizations must have a core vision to encourage Environmental Management before going any further to green logistics.

4.2.1 The Needs for Integrated Sustainable Supply Chain Management (SSCM):

The SC includes the flow and transformation of goods and information from raw material stage, through to the end user (Seuring and Müller, 2008). The optimization of operations has extended to the entire supply chain rather than a specific facility or organization during the last two decades (Linton, Klassen, and Jayaraman, 2007). Sustainability in SCM must also include product design, manufacturing by-products, by-products produced during product use, product life extension, product end-of-life, and recovery processes at end-of-life, in addition to the core SC activities (Linton, Klassen, and Jayaraman, 2007).

The above mentioned integration calls for an extended set of needs for the design of SSCM, among which sustainable management systems are considered the most significant with respect to economic, environmental and social customer requirements (Buyukozkan Feyzioglu and Erkut, 2008). These needs are provided below:

Table 4.1: SSCM Design Needs

(Buyukozkan, Feyzioglu, and Erkut, 2008)

Employee Training	Fuel Monitoring-Control Devices
Certification Programs for the Employees	Local or Overseas Suppliers
Balanced Working Hours	Fair Payments to the Suppliers
Security in Material Handling and Stocking	Long-term Supplier Options
Optimization in Warehouse Design and Work-Flows	Collaboration with the Suppliers
Reusable Packaging Options	Optimization of the Supply Chain and Logistic Network
Optimization in the Product Collection Process	Accuracy Rate in the Forecasting Methods
Consolidation	Sustainable Management Systems
Minimization of the Obsolete and Damaged Inventory	Utilization of Decision Support Systems
Traceability of the products	Efficiency in Product Returns
Optimization of the Transportation Roads and Routes	Efficient Distribution Strategies
Regular Vehicle Maintenance	External Resource Use in Reverse Logistics Operations
Fuel Saving Transportation Means	Establishment of a Central Return Unit

4.2.2 The Needs of Green Supply Chain in the Growth of RMG Industry:

In today's highly competitive global marketplace customers are placing greater value on excellence and delivery time with the concern for environmental protection. Manufacturers similarly have begun to situate more value on quality and delivery time and companies need to try to swell a competitive perimeter and improve profitability through cutting cost, increasing quality, improving delivery, and ensuring sustainable RMG development by the assistance of green supply chain management. In the system, it can be materials, fund, information or it can even be supply of business (volume of business). One small material missing or delayed just puts the whole order at stake and environmental deterioration. Schedule failure for one single order delivery jeopardizes the whole production plan. Unplanned and earlier importation of materials increases the inventory level. Supply of materials, when delayed in-house, creates a line gap. Both the situations have a negative impact on finance. On the other hand, if the finished goods are not shipped on time due to not getting the approval, the factory has to pay the bills of back-to-back (BTB) L/Cs (letters of credit) against its bank loan at a high interest. So the factory always tries to avoid delayed shipment, even by covering that delay with overtime work, which leads to double production cost. When this overtime work does not help, then they take the recourse to un-authorized sub-contracts. Excessive overtime work and un-authorized subcontracts both amount to violation of compliance, another inevitable feature of the sector.

In RMG business, manufacturers, suppliers, and buyers all stages of supply chain in the RMG sector are decentralized. Different stages of supply chain have conflicting goals and objectives regarding environment. Carefully using the available information and integration of supply chain can reduce the cost of conflicting goals and objectives to ensure environmental sustainability. Delivering the finished products on time from suppliers to customer would be possible through the proper application of supply chain management. Sustainable supply chain management systems help in reducing inventories, operational costs, compress order cycle time, enhance asset productivity as well as increase the companies' responsiveness to the market. Besides from these benefits, the apparel industry is able to achieve quick response through efficient supply chain management practices. Quick response is a concept pertaining to the collaboration and sharing of information among manufacturers, suppliers and distributors, allowing them to

respond more rapidly to the needs of the customers. If GSCM or procedures is ended appropriately, it can assist the Bangladeshi garment industry to diminish their catalogs which will direct to cutting of operational costs, lessen order cycle time, enhance plus efficiency as well as augment the companies' receptiveness to the market through sustainable environmental concern. Improved or superior GSCM also leads to quick response to the environmental issues which is a concept pertaining to the collaboration and sharing of information among manufacturers, suppliers and distributors, permitting them to act in response more swiftly to the requirements of the clientele who have concerns for the environment.

4.2.3 Investor Demand for Sustainability Data is Increasing:

This should be a serious consideration for public companies and their suppliers. The concern for sustainability of public companies is not driven by altruism, but rather by a need to increase the degree of transparency and visibility of potential risks and liabilities that could harm long-term returns. While manufacturers can expect more rather than less in the way of environmental reporting requirements, substantial rules are already in force, including several statements of position (SOP) from the Accounting Standards Executive Committee of the American Institute of Certified Public Accountants (CPA)s. Because public companies must be audited by CPA firms, the following pieces of AIC positions ought to be of concern to manufacturers:

- Guidance on "Accounting for Contingencies" requires that liabilities be recognized in the financial statements if a loss is probable and the amount is estimable. This of course would include losses that would result from changing regulations that would require refit of existing manufacturing processes or product designs, refit of product in the field or reclamation of product at end of life. At the very least, even if the loss is not estimable, the likely loss must be accounted for in footnotes to financial reporting.
- These position statements also require that environmental contamination costs be expensed as incurred unless these costs extend the life or increase capacity of the property or mitigate or prevent future environmental contamination that could occur otherwise—or if these costs are realized while preparing the asset for sale.

Private companies that comprise the supply chain need to prepare accordingly.

4.2.4 Regulation is Advancing:

Reduction of Hazardous Substances (RoHS) generally restricts the use of hazardous substances in electrical and electronic equipment, while associated regulation, Waste Electrical and Electronic Equipment (WEEE) regulates the disposal of these products. RoHS and WEEE focus on “certain heavy metals,” specifically lead, mercury, cadmium and hexavalent chromium. In Europe, these regulations also cover the flame retardants polybrominated biphenyl (PBB) and polybrominated diphenyl ethers (PBDE), while states like California do not, as of yet deal with these substances in their RoHS regulations. California does, however, already have separate regulations that make it illegal to manufacture, process, or distribute products containing more than one-tenth of 1 percent of these substances by mass, which once again has green supply chain implications.

This means firms will need to roll up in each of your assemblies the materials that are in each product with great detail. Manufacturers will need excellent functionality for tracking of the raw materials going into component parts sourced through a supply chain and for decision support in the area of product design.

4.2.5 Customers' Demand for Greenness:

This is actually a more daunting task than is reporting for regulatory compliance because a manufacturer can expect individual requirements from each of its customers with a green supply chain program. Each of these customers cares about certain things that they track for their supply chain and their green emphasis. This might not be the same things that another manufacturer tracks and requires documentation on. So, because most manufacturers have more than one customer, there is the need for a great deal of flexibility in an environmental footprint solution. Each customer with a green supply chain program is likely to have unique requirements for tracking different hazardous materials and environmental impacts depending on what it is that they are purchasing from you and what industry they are in. The six heavy metals included in RoHS, like lead and cadmium, may be typical and broadly of interest. But beyond that there will be other needs based on what customers want.

So manufacturers need flexibility to track environmental impact by product, and also need the ability to customize the queries and reports so they can display what that customer cares about. Each customer can then, in turn, justify their product to the concerned authority or to their customers as being in compliance with regulation or as being greener than a competitor's products.

4.3 Benefits of Greening the Supply Chain Management

In today's competitive business markets where globalization and customer satisfaction stand at the forefront, the sustainable and thus efficient management of supply chains initiated by these drivers has soon taken a voluntary path due to some indispensable returns, such as increased profitability (Porter and van der Linde, 1995a,b; van Hoek, 1999; Sarkis, 2003; Vachon and Klassen, 2007; Darnall, Jolley, and Handfield, 2008; Seuring, Sarkis, Müller, and Rao, 2008). Thus, the short-term investments in sustainability are compensated in the long run (Vachon and Klassen, 2006). In fact, Vachon and Mao (2008) have shown statistically at the country level that a trade-off between "economic development and wealth creation" and sustainability does not exist. The benefits of SSCM for companies are given in the following table:

Table 4.2: Benefits of SSCM for Companies

(Porter and van der Linde, 1995a,b; van Hoek, 1999; Sarkis, 2002; Zhu and Sarkis, 2004; Rao and Holt, 2005; Wilkerson, 2005; Büyüközkan and Vardaloğlu, 2008; Routroy, 2009)

Decreasing system costs	Decreasing problems in decision-making
Decreasing resource (i.e., materials, work force, and energy) usage	Increasing adoptability through innovative processes and continuous improvement
Increasing profitability	Gaining competitive advantage
Increasing efficiency	Acquiring a good public image
Improving customer satisfaction level	Decreasing wastes
Decreasing risks and gaining agility with accelerating innovation	Enabling recycling
Joining global markets more easily	Increasing ecological effectiveness
Empowering the control mechanism	Increasing job satisfaction and social life quality

Moreover, there are tons of issues to discuss regarding the benefits of implementing a green supply chain management strategy. The most immediate benefit that should be considered when evaluating the implementation of green practices involves reducing waste. A common example within supply chain literature involves garment manufacture. Consider the fact that there are multiple steps that are required towards retailing the cloths manufactured by garments. Well with a closed supply chain loop, the wasted by products can be re-manufactured into other products. Or the semi-damaged products can be retailed as other purposes. The steps in a closed loop supply chain add value by increasing possible revenue streams, but it does also add costs.

There are a number of benefits to go 'Green' with one's business and its supply chain. The following is an overview of the benefits one may accomplish by integrating 'green' practices into his/her business.

- i) **Sustainability:** (environmental protection and wise resource use): The greater value of going green relates to maintaining the health of the environment. Going 'green' means not only assisting our environment to recover from industrial damages, but also helping to reduce misuse of natural resources. Utilizing sustainable methods can prevent the waste of natural resources, helping reduce the risk of depletion on the long run.
- ii) **Improve efficiency by lowering potential costs:** Going 'green' can improve the overall efficiency of a business by being cost-effective. Reducing unnecessary waste (using recycled, recyclable materials and biodegradable packaging) can trim operating expense for the business dramatically.
- iii) **Increase sales and profits:** With 'green' initiatives increasing in popularity, economic studies have shown that companies utilizing 'green' technology and selling 'green' products are seeing an increase in profits. Companies such as Wal-Mart has incorporated 'green' changes such as composting and recycling, changing transportation routes to save gas, reducing packaging, and stocking their shelves with greener products. As a result, the company has seen customers respond positively to the changes, with green product sales alone jumping somewhere around 20 percent as of 2010 (Lorette, 2013; <http://smallbusiness.chron.com>). Further, Coca-Cola's efforts to cut down on packaging saved it \$100 million. After Marks and Spencer adopted environmental and ethical business guidelines, the company earned an extra £50 million in revenue. Environmental Defense Fund and Frost and Sullivan conducted a survey of energy efficient business leaders. Of 500 respondents, 42 percent said their sales have increased over the past one to two years, and an equal number said that their sales have remained the same (www.earthshare.org).

- iv) Improved workplace:** (cleaner and healthier work environment): Providing 'green' options within a company can offer overall workplace improvements. For example, choosing clean (non-toxic) supplies, appliances, and equipment that improves productivity, prevents injury and can also have a major impact on the health and well-being of citizens (Lorette, 2013; <http://smallbusiness.chron.com>).
- v) Attract new customers and talent:** (employee satisfaction, morale or retention): Marketing that demonstrates a company's commitment to sustainability attracts not only new customers but also ensures company loyalty who will recommend one's business to others. Environmentally conscious business practices help attract and retain the best employees by increasing their satisfaction and pride in the workplace. According to a MonsterTRAK poll on 'green' employment survey, 92 percent of young professionals would be more inclined to work for an environmentally-friendly company. About 80 percent of those surveyed said they are interested in a job that has a positive impact on the environment (Odell, 2000; www.greenbiz.com). These new surveys imply that 'green' and responsible companies are attracting and retaining talented people.
- vi) Opportunities for a new supply chain:** Seeking out other companies who practice sustainability may open doors to new business concepts, products and suppliers that can add value to one's current business model (Manget et al 2009; www.bcgperspectives.com).
- vii) Improve public image:** Community involvement is an important cornerstone for many companies, and green practices enhance public image, community relations and good will. Businesses that engage their community in sustainable initiatives and campaigns reap benefits for the long-term (www.earthshare.org).
- viii) Comply with governmental regulations:** Many businesses have found that green practices help them automatically to meet government environmental regulations, making audits less stressful.

ix) **Tax credits and incentives:** Going ‘green’ has also many practical advantages such as getting tax credits and incentives from governments. In the United States, for example, companies such as FedEx and General Electric have incorporated ‘green’ technology in order to reduce carbon emissions and comply with state standards (Lorette, 2013; <http://smallbusiness.chron.com>).

Going ‘green’ is an incremental and continuous process, and it is difficult to quantify how far along the ‘green’ path a business should travel. However, a focused effort can have a meaningful impact. So, it is important for companies to understand why it is so necessary to ‘Go Green’, before providing a workable roadmap for them to follow in order to greenify. Green supply chains will continue to grow in importance. The best possible outcome is one where all supply chains can reduce waste, improve profits, and become more eco-friendly. There is ample evidence that green supply chain practices can create the aforementioned outcomes.

4.4 Impact of GSCM on Environmental Performance and Competitive

Advantage of RMG Industry of Bangladesh

The environmental issues in supply chain management are among the topics in the field of Production and Operations Management (Mathiyazhagan *et al.* 2013). Green supply chain management (GSCM) is a strategy for sustainable development in today's competitive markets, which aims to simultaneously achieve financial benefits and reduce environmental risks (Hajikhani *et al.* 2012). The advances in industrial production in terms of manufacturing techniques on one hand and increasing governmental regulations to protect the environment on the other, forced industrial organizations to further consider the concept of green supply chain management. According to several studies in the field, environmental issues in the supply chain are crucial, and widespread research has been conducted (Lampikoski 2012; Min, Kim 2012; Seman *et al.* 2012a), but the results are not conclusive in all contexts and industrial environments (Eltayeb *et al.* 2011).

Accordingly, recent years show an increase in the development of sustainable supply chains throughout various industries (Seuring 2013) and organizations that seek to revive the industrial activity, achieve market growth or competitive advantage while focusing on environmental issues, such as depleting resources, environmental protection and reduction of pollution. Hence, there is an urgent need to develop innovative ways in economic activities (OECD 2012).

4.4.1 Environmental Performance:

Environmental performance is defined as the measure of reduction of substances and emissions that reduces environmental impacts caused by business organizations. Zhu et al.(2004), Wu et al.,(2010), Ninlawan et al.,(2010), Sanjeev Kumar et al.,(2012), Bhateja et al., (2011), Sarkis (2003), Chein and Shih(2007).It also helps to improve efficiency and synergy among business partners and helps to enhance environmental presence, minimize waste and achieve cost saving (Rao and Holt, 2005) and good will. (Cervera and Flores 2012). Environmental performance is measured in many research works. Researchers have proved that GSCM practices enhance environmental performance in organizations. (Chan et al., cited en Lou, 2011; Hu and Hsu, 2010; Efron, 2009). Cervera and Flores (2012), Ninlawan et al (2009), Zhu et al.,(2007). VarioCorderio and Sarkis(1997), Walley and Whitehead (1994), Zhu et al., (2007), Zhu et

al., (2010), Montabon et al. (2007), Wagner et al., (2001) and Zhu et al., (2008) have found significant and positive relationships between GSCM practices and environmental performance.

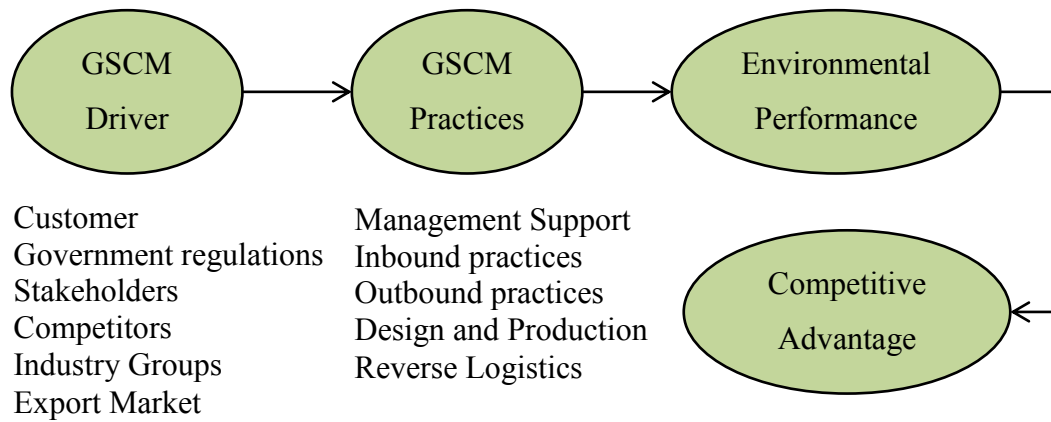


Figure 4.1: The Casual Relationship between GSCM Drivers, GSCM Practices, Environmental Performance, and Competitive Advantage.

4.4.2 Environmental Performance and Competitive Advantage:

Eltayeb *et al.* (2011) states that green supply chain management (GSCM), mostly due to its direct environmental, economic and operational results, is now one of the central issues discussed in the field of production and operations management. In a survey conducted by Porter and Van der Lind (1996), it was determined that in response to the company's competitive business environment and legal pressures, they must increase productivity and efficient use of resources, aimed at the improvement of the environmental performance of organizations (Hajikhani *et al.* 2012). Chiou *et al.* (2011) tried to provide an environmental performance index taking into account the environmental performance of suppliers. Regarding the relationship between environmental performance and competitive advantage, prior studies revealed an independent relationship and most of them consider the competitive advantage as a side consequence of GSCM. It can be stated that the direct relationship between environmental performance and competitive advantage has been understudied compared to other dimensions, which, in this case, can motivate organizations to implement GSCM as their strategy to gain competitive advantage.

Chapter 05

Implementation of GSCM in RMG Industry of Bangladesh



CHAPTER 05

IMPLEMENTATION OF GSCM IN RMG INDUSTRY OF BANGLADESH

5.1 Problems Faced by RMG Industry of Bangladesh

The garment industry of Bangladesh has been the key export division and a main source of foreign exchange for the last 25 years. RMG products are traditional products to earn foreign exchange through export in Bangladesh, and for a long term, Bangladesh has been the one of the biggest export trade country of RMG and Apparel in the world market. But since entering into the 21st Century, Bangladeshi RMG and Apparel industry begun to face increasingly serious problems with offering high-quality, low-cost products within a short lead time; and to meet health, social, and environmental compliances in the face of increasingly stiff completion. Under this domestic and foreign competitive environment, the future survival and development of Bangladeshi RMG industry face large challenge.

Garment factories in Bangladesh provide employment to 40 percent of industrial workers. But without the proper laws the worker are demanding their various wants and as a result conflict is began with the industry. Following are the some specific problems facing by the RMG sector of Bangladesh.

- i) **Dependence for Raw Materials:** Bangladesh is highly dependent on different countries for the raw materials. It imports raw materials for garments like cotton, thread color etc. This dependence on raw materials hampers the development of garments industry. Moreover, foreign suppliers often supply low quality materials, which result in low quality products.
- ii) **Unskilled Workers:** Unskilled workers lack to achieve higher productivity and specified quality. Most of the illiterate women workers employed in garments are unskilled and so their products often become lower in quality.

- iii) **Improper Working Environment:** Bangladeshi garment factories are encountered with the most unhygienic, risky and morally deteriorated working environment. Taking the advantages of workers' poverty and ignorance the owners forced them to work in unsafe and unhealthy work place overcrowded with workers beyond capacity of the factory floor and improper ventilation. Most of the garment factories in our country lack the basic amenities where our garment workers sweat their brows from morning to evening to earn our countries the major portion of our foreign exchange. Anybody visiting the factory the first impression he or she will have that these workers are in a roost. Improper ventilation, stuffy situation, filthy rooms are the characteristics of the majority of our factories. The owners profit are the first priority and this attitude has gone to such an extent that they do not care about their lives.
- iv) **Lack of Managerial Knowledge:** Beyond the poor technical and logistic support, there are some other problems which are associated with this sector. Those are: lack of marketing tactics, absence of easily on-hand middle management, a small number of manufacturing methods, lack of training organizations for industrial workers, supervisors and managers, autocratic approach of nearly all the investors, fewer process units for textiles and garments, sluggish backward or forward blending procedure, incompetent ports, entry/exit complicated and loading/unloading takes much time, time-consuming custom clearance etc.
- v) **Gender Discrimination in Division of Labor:** In the garment industry in Bangladesh, tasks are allocated largely on the basis of gender. This determines many of the working conditions of women workers. All the workers in the sewing section are women, while almost all those in the cutting, ironing and finishing sections are men. Women workers are absorbed in a variety of occupations from cutting, sewing, inserting buttons, making button holes, checking, cleaning the threads, ironing, folding, packing and training to supervising. Women work mainly as helpers, machinists and less frequently, as line supervisors and quality controllers. There are no female cutting masters. Men dominate the administrative and management level jobs. Women are discriminated against in terms of access to higher-paid white collar and management positions.

When asked why they prefer to employ women for sewing, the owner and managers gave several reasons. Most felt that sewing is traditionally done by women and that women are more patient and more controllable than men.

- vi) **Low Level of Wages:** The government of Bangladesh sets minimum wages for various categories of workers. According of Minimum Wage Ordinance 1994, apprentices' helpers are to receive Tk. 500 and Tk. 930 per month respectively. Apprentices are helpers who have been working in the garment industry for less than three months. After three months, Apprentices are appointed as helpers. Often female helpers are discriminated against in terms of wages levels, and these wages are also often fixed far below the minimum wage rate. A survey conducted in 1998 showed that 73% of female helpers, as opposed to 15% of their male counterparts, did not receive even the minimum wage.
- vii) **Insufficiency of Loan:** Being the major industry in Bangladesh, RMG industry needs a lot of capital for the investment purpose through loan and other facilities. Insufficiency of loan in time, uncertainly of electricity, delay in getting materials, lack of communication, problem in taxes etc. often obstruct the industry. In the whole world market, 115 to 120 items of dress are in demand whereas Bangladesh supplies only ten to twelve items of garments. India, South Korea, Hong Kong, Singapore, Thailand, Taiwan etc. have made remarkable progress in garments industries. Bangladesh is going to challenge the garments of those countries in the world market.
- viii) **Cheapest Unit Labor Cost:** Bangladesh has the cheapest unit labor cost in South Asia. It costs only 11 cents to produce a shirt in Bangladesh, whereas it costs 79 cents in Sri Lanka and 26 cents in India. Clearly, Bangladesh's comparative advantage lies in having the cheapest unit labor cost. But for this cheapest labor cost, the labor gets paid very less which is sometimes so insufficient to manage a minimum level of standard of living for them.
- ix) **Long Working Hours:** Though the wages are low, the working hours are very long. The RMG factories claim to operate one eight-hour shift six days a week. The 1965 factory Act allows women to work delivery deadlines; however, women are virtually

compelled to work after 8 o'clock. Sometimes they work until 3 o'clock in the morning and report back to start work again five hours later at 8 o'clock. They are asked to work whole months at a time the Factory Act, which stipulates that no employee should work more than ten days consecutively without a break.

- x) **Poor Accommodation Facilities:** As most of the garment workers come from the poor family and comes from the remote areas and they have to attend to the duties on time, these workers have to hire a room near the factory where four to five huddle in a room and spend life in sub-human condition. For four to five workers there is one common latrine and a kitchen for which they have to pay from Tk. 2,500 to Tk. 4,000. They share this amount among themselves to minimize the accommodation expense.

One cannot believe their eyes in what horrible condition they have to pass out their time after almost whole day of hard work in the factory. After laborious job they come into their roost, cook their food and have their dinner or lunch in unhygienic floor or bed and sleep where they take their food. They share the single bed or sleep on the floor.

The owners of these factories must not treat the workers as animals. The owners of these factories who drive the most luxurious car and live in most luxurious house do ever think that these are the workers who have made their living so juicy. Will these selfish owners ever think of these workers of their better living for the sake of humanity by providing better accommodation for these workers in addition to providing with the job?

- xi) **Poor Communication Facilities:** Besides the poor accommodation facilities, there are acute poor communication facilities for the garments' workers who live far away from the factory. It is a well-known fact that the labors have to maintain a family which may live far away from the factory. Sometimes, the factories arrange hired vehicle for the workers but these vehicles are unfit and have no permanence to reach their desired destination. In such cases, the workers have to manage their own communication expense which is a high burden for them resulting in search of extra money by their family members.

xii) Safety Problems: Noncompliance with the particular safety law is common in Bangladesh garments factories. Because of the carelessness of the factory management and for their arrogance factory doors used to be kept locked for security reason defying act Safety need for the worker is mandatory to maintain in all the organization. But without the facility of this necessary product a lot of accident is occur incurred every year in most of the company. Some important cause of the accident are given below:

- Routes are blocked by storage materials
- Machine layout is often staggered
- Lack of signage for escape route
- No provision for emergency lighting
- Doors, opening along escape routes, are not fire resistant
- Doors are not self-closing and often do not open along the direction of escape
- Adequate doors as well as adequate staircases are not provided to aid quick exit
- Fire exit or emergency staircase lacks proper maintenance
- Lack of proper exit route to reach the place of safety
- Parked vehicles, goods and rubbish on the outside of the building obstruct exits to the open air
- Fire in a Bangladesh factory is likely to spread quickly because the principle of compartmentalization is practiced

xiii) Price Competitiveness is Very High in the Global Market: China and some other competitors of Bangladesh have implemented sharp price-cutting policies in exporting garment products over the last few years, but Bangladesh has failed to respond effectively to such policies. China was able to drop the export price of 29 garment categories by 46 per cent on average in the United States within a year, from \$6.23 per square meter in December 2001 to \$3.37 per square meter in December 2002. Bangladesh needs to respond to such price-cutting policies of its rivals in order to remain competitive in the quota-free global market.

- xiv) **Less Efficient Lead Time:** Lead time refers to the time required for supplying the ordered garment products after the export order has been received. In the 1980s, the usual lead time in the garment industry was 120-150 days for the main garment supplier countries of the world; it has been reduced to 30-40 days in the current decade.

However, in this regard the Bangladesh RMG industry has improved little; for example, the average lead time is 90-120 days for woven garment firms and 60-80 days for knit garment firms. In China, the average lead time is 40-60 days and 50-60 days for woven and knit products respectively; in India, it is 50-70 days and 60-70 days for the same products respectively.

- xv) **Environmental Pollution:** There are 12 million people right now in Dhaka which is going to be 22 million by 2025. There are 7000+ industrial units in and around the Dhaka city. The RMG sector is the second major contributor of river pollution after tanneries. RMG sector are discharging 2 million m³ effluents every day. Underground water level in Dhaka city is going down quickly. Wastage of water- as usage is 15 – 18% higher than is required (Green the Supply Chain of the Textile Industry in Bangladesh, Report on the World Bank initiatives shown in CP workshop, 08–09 May 2012, BTT Desk). Almost, the scenario is same in the port city, Chittagong, also.

5.2 Core Contents of Implementing Green Supply Chain Management in RMG Industry of Bangladesh

There are five contents of implementing green supply chain in RMG sector of Bangladesh, by which RMG sector of Bangladesh can solve the problems mentioned in previous section, are establishing the strategic assets, developing a flow system, designing an organization of performance based, establishing the strategic cooperation, and establishing a performance evaluation and management system.

5.2.1 Establishing the Strategic Assets View of Green RMG Supply Chain:

US Michigan State University was, in 1996, first put forward the concept of green supply chain (Handfield, 1996, P. 1295 – 1297). After that commencement, domestic and foreign academe begun to study various aspects of the green supply chain management (Beaman, 1999, P.332-342, Joseph, 2003, P.397-409, Jiu-Biing, 2005, P.287-313, Aref A, 2005, P.330-353, Samir K, 2007, P.53-80, Wu, 2003, P.86-88, Wu, 2004, P.1-3, Liu, 2006, P.27-30, Wang, 2003, P.11-16, 47). Some foreign famous multinational companies such as Ford Motor Company, Hewlett-Packard Company, Valuable Clean Group and General Electric Company regarded the supply chain management as the strategic assets and corporate cultures acquiring corporate competitive advantage to filter into various parts, various department and various employees.

To rewrite the competitive law in the industry and impel competitors to have to develop themselves, the supply chain has been utilized as the strategic weapon. It is the challenge for Bangladeshi RMG enterprises and if Bangladeshi RMG enterprises want to change “Made by Bangladesh” to “Created in Bangladesh” and walk on the road of sustainable development, the enterprises should not only implement green production but also the green supply chain “from cradle to recurrence”, that is to say, the green supply chain should be regarded as the strategic asset of enterprises and the strategic supply chain management should be implemented.

First, the green supply chain strategy composed by five basic collocation factors including the followings should be established:

- Green Operation Strategy
- Green Outsourcing Strategy
- Green Channel Strategy
- Green Client Service Strategy and
- Green Asset Network

Second, the green supply strategic culture should be established, and the green supply chain management should be integrated into enterprise culture.

Finally, the green supply chain strategy which can be organically integrated with green product strategy and green market strategy should be developed.

Therefore, the green supply chain strategy which can accord with the competitive strategy, client demand strategy, strength status of textile and apparel enterprise and fit in with the environment should be developed.

5.2.2 Developing a Flow System of Green RMG Supply Chain:

Bangladeshi RMG enterprise should describe a blueprint about green supply chain to integrate the rules of the flow relationships among various operation units in the supply chain to ensure the harmony among various flows with the base establishments of the supply chain and achieve the aim of the green RMG supply chain after confirm the strategic status of green supply chain. But this blueprint should not only acquire the corporate competitive advantage and economic efficiently through implementing green supply chain management, as viewed from the management objective, also reduce the negative influences of management to the least extent and maximize the social efficiencies such as the utilization rates of resource and energy. As viewed from management objects, the blueprint should include five aspects (Jiuh-Biing, 2005, P.287-313, Aref A, 2005, P.330-353).

- The **first** one is the material suppliers which are middling enterprises such as fiber manufacturer, resin manufacturer, dye manufacturer, and accessories manufacturer.

- The **second** one is the manufacturers which produce the middle products or final products such as yarn manufacturer, textile manufacturer, printing and dyeing manufacturer, apparel manufacturer and composite material manufacturer.
- The **third** one includes operators, distributors and shopkeepers.
- The **fourth** one includes consumption units or consumers.
- And the **final** one includes reclaim disposal manufacturers which compose an integrated positive supply chain and reverse supply chain with other suppliers, manufacturers, operators, distributors and consumers.

In the green RMG supply chain management, the management objects become into the strategic partners among enterprises through many basic flows such as green plan, green stock, green manufacturing, green distribution, green logistics, green consumption and green reclaim. To ensure the order of various flows and maximize the performance of the whole green supply chain, many technical support, information support and mechanism support such as decision-making support system, information management system, green evaluation system and support guarantee system should be established, as the same time.

5.2.3 Designing an Organization of Performance Based on Green RMG Supply Chain:

Corresponding organization structure is needed for operation flow. The organization design of Bangladeshi RMG and apparel enterprises also need to add a green smartness integration supply chain organization (seen in the following figure), as viewed from the strategic status and flow system of the green supply chain management.

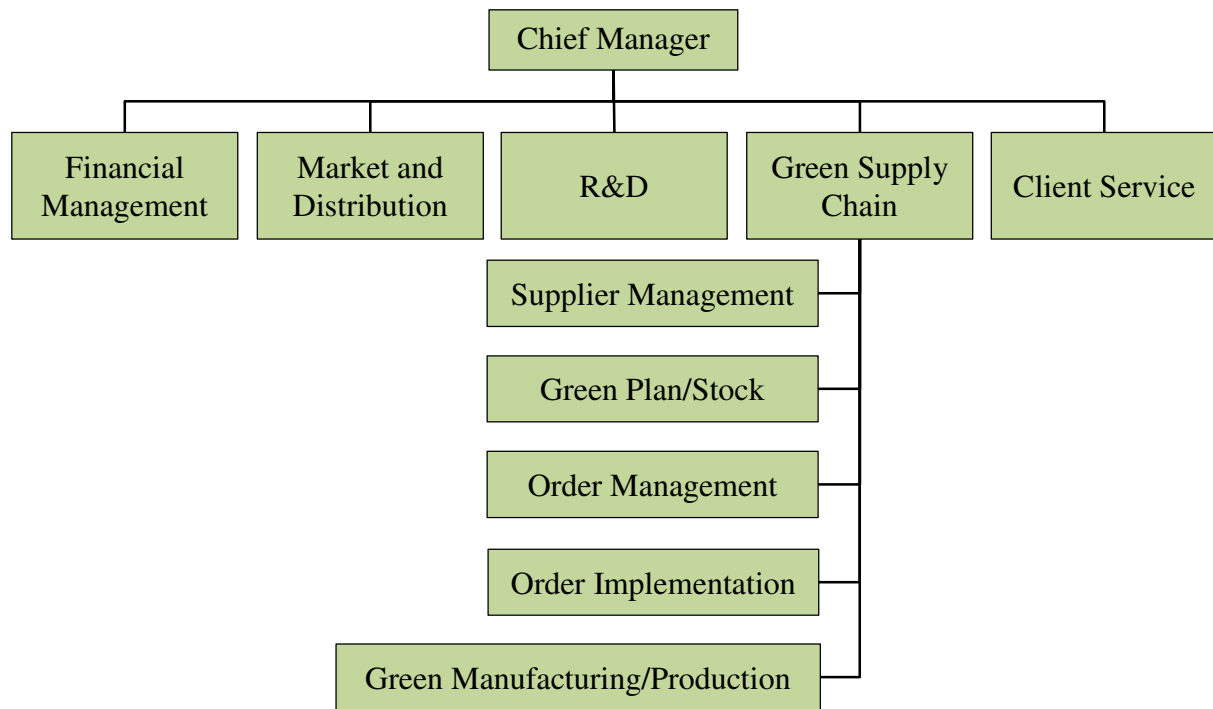


Figure 5.1: Organization of Green Smartness Integration Supply Chain

The organization should possess following characters (Shoshanah, 2006).

- **First**, it can support the whole competitive strategy of the enterprise.
- **Second**, it has the skills and the core ability to implement all supply chain flow among the interior of the enterprise with its strategic partners.
- **Third**, it has established the effective green performance evaluation system.
- **Fourth**, it should follow a series of feasible design principle including the principle that form obeys the function (the supply chain organization must really reflect the green supply chain flow) and the equal principle of flow and responsibility and ability (each flow should arrange corresponding function department or responsible personnel takes on corresponding function and possesses corresponding ability).

At the same time, the organization should possess following characteristics (Xu, 2004, P.80-82).

- The **first** one is the whole cooperation, and in the process of cooperation and interaction, the decision-making, execution, cooperation, feedback, follow and emergency disposal should be developed.
- The **second** one is the smart reaction, and aiming at complex and changeable market and competitive development, the organization should quickly make reasonable reactions and harmonize enterprise to implement new resource distribution and strategic and tactic adjustment.
- The **third** one is the three-dimensional communication, and in different enterprises, various levels operation and decision-making layers, the organization can implement three-dimensional information transfer and communication.
- The **fourth** one is the process drive, and the organization should drive the team through harmonizing the environment and process.

5.2.4 Establishing the Strategic Cooperation Mode of Green RMG Supply Chain:

The supply chain of RMG is longer than other supply chains in other industries, and for the whole supply chain, the latter includes many suppliers. But in fact, more enterprises are gradually reducing the strategic range, and they more and more focus on few core abilities. So the effective cooperation among enterprises in the green RMG supply chain becomes into the base to acquire the best performance of the green RMG supply chain management, and it is the most important strategic activity for enterprises, that is to say, to establish the cooperation relationship is same important with technological innovation, and the enterprise which possess the ability of effective cooperation can acquire effective competitive advantage. However, few executive officers of green RMG supply chain can give a clear and specific definition of cooperation, because the cooperation comes down to many aspects which include not only many cooperation types, but extensive mutual activities, and information sharing among operation units and the R&D of long-term production and marketing items.

At present, according to the cooperation extent and profundity, the cooperation partnership can be divided into four sorts such as trade type, cooperative type, harmony type and cooperation type.

- a) The cooperation partners of **trade type** devote their minds to enhance the simplicity of trade execution and few of them are absorbed in reducing the cost of supply chain management and enhancing the income of supply chain. This sort of cooperation relationship needs few advanced information system, and it is the most basic cooperation relationship at present.
- b) The cooperation of **cooperative type** possesses higher level of information sharing, and it generally implements information communication through special electric data exchange network and internet.
- c) The cooperation of **harmony type** possesses more complex basic establishment and flow of information sharing than the cooperation of cooperative type, and both cooperation relationships are closer and they more depend on their ability each other. This sort of cooperation relationship needs the negotiation and compromise with higher level, and they all expect to benefit from long-term cooperation, and this cooperation is fitter for the key supply chain partners with strategic meaning.
- d) The cooperation of **cooperation type** can mutually invest in R&D project and the development project of intellectual property rights, and the sharing degree covers from entity assets to knowledge assets even to the human resource. This sort of cooperation generally is called as “strategic alliance” which can not only share information but also develop information.

Though the strategic cooperation modes of the green RMG supply chain are different, but the RMG enterprise should establish “key” and “strategic” clients and suppliers accruing the rule that “20% of clients will bring 80% of profits for the enterprise”. The concrete method is to establish a selectable evaluation standard to evaluate and select the cooperation relationships and cooperation partners according to many special demands such as green strategy, culture, organization and technology.

At the same time, RMG enterprises also should follow following instructive principles to ensure the success of cooperation relationship.

- **First**, simplify the interior cooperation before cooperation.
- **Second**, customize the cooperation mode according to the importance degrees of cooperation partners.
- **Third**, ensure to sharing knowledge and information and assume mutual risks and benefits among cooperation partners.
- **Fourth**, trust each other.
- **Fifth**, confirm every cooperation partner's anticipation.
- **Sixth**, utilize the technology to support the cooperation relationship.

5.2.5 Establishing a Performance Evaluation and Management System of Green RMG Supply Chain:

For the RMG enterprise which first introduces the green supply chain management, the establishment of the green RMG supply chain performance evaluation and management system is the effective tool, and the effective supply chain performance evaluation system can tell enterprise whether various parts in the positive supply chain and reverse supply chain are really exerting function, and help enterprise to diagnose problems and continually correct problems.

First, we should add green indexes into the general supply chain evaluation index system to establish effective green RMG supply chain evaluation index system which can exactly reflect the green health status of the RMG enterprise supply chain.

Second, we should utilize the green RMG supply chain evaluation index to support the strategic aim for RMG enterprises and implement effective green RMG supply chain performance management. Effective supply chain performance evaluation system must include following three sustainable activities (Anne-Marie, 2006):

- a) Making quantitative aims to accord with plan and budget.
- b) Establishing individual objective and department objective to accord with the total objective of RMG enterprise.
- c) Establishing clear follow evaluation process and the mechanism and program of management performance.

At present, there are many articles to study the supply chain performance evaluation index system, and the structure research of the performance measurement system mainly includes two tendencies, and the first one is to establish a new system based on the advice model, and the second one is to adopt the performance measurement system with multiple advices. The performance evaluation and management system of the RMG supply chain should possess following characters (Anne-Marie, 2006, p.1427-1432).

- **First**, the system has been implemented in other industries, and it is not only the concept theory.
- **Second**, the system is designed based on the environment of the supply chain.
- **Third**, the management system should be composed by the performance measurement which can be easily operated.

The supply chain operation reference model (SCOR) is the first supply chain reference model based on performance measurement, and it has been in the growth stage of lifecycle and become into the standard in the industry. It is the most popular supply chain reference model which is adopted and accepted in the world. Therefore, in the performance evaluation system of SCOR, we can add green indexes about RMG enterprises to establish the green RMG supply chain performance evaluation and management system.

5.3 Challenges of Implementing Green Supply Chain Management in RMG Industry of Bangladesh

In recent survey by Wipro and outsourcing center 65% of the respondents indicated that prioritization was an important barrier in implementation of green supply chain management. 62% of the respondents cited cost and budget constraints as challenge to green supply chain management. Initial investment may look as a challenge but sustainability reports of many companies have proved that the financial gains are also significant and NPV is significantly positive (Navneet, 2011). Other challenges include lack of appropriate technology and business processes, trade-off between green requirements and investment, and integration of general supply chain efforts and green supply chain efforts (Muchiri, 2010). Major barriers related to Sustainable Supply Chain Management according to Walker, Di Sisto, and McBain, 2008 are as follows:

Table 5.1: Barriers of SSCM

(Walker, Di Sisto, and McBain, 2008)

Internal	External
<u>Costs:</u> Cost concern hinders Lack of understanding on how to incorporate green into buying Focus on cost reductions at expense of green practices Lack of training and management commitment Lack of buyer awareness Accounting methods limit green reporting Pressure for lower prices	<u>Regulation:</u> Inhibits innovation
	<u>Poor supplier commitment:</u> Unwilling to exchange information
<u>Lack of legitimacy:</u> PR exercise as greenwash	<u>Industry specific barriers:</u>

Undoubtedly going green is a great move for a consumer facing company. But there are problems that need to be addressed further down a value-chain you go. And these problems can be a plethora of items including a level of uncertainty regarding: market position, stakeholders concerns, and change. Let's briefly examine firms as far downstream the value chain as we can go.

Firstly, manufacturers and suppliers will fear that by operating along green supply chain practices they could become too expensive compared to their competition (Lo, 2014). Consider a market where there are 5 firms producing aluminum, if firms choose to

implement a closed-loop supply chain to reduce waste and create re-manufactured products, they might out price themselves compared to its competition.

Secondly, downstream firms aren't the only firms that feel uncertainty towards implementing a green supply chain management strategy. Upstream firms such as retailers might fear they can over price their products and consumers will no longer be interested in purchasing. Although there is definitely a better chance of implementing green supply chain practices with consumer facing firms due to an increasing importance in eco-friendly practices. Yet out-pricing themselves isn't the only uncertain aspect consumer-facing firms can face. Supply chain managers also need to consider uncertainty towards change as well as uncertainty towards stakeholder positions.

Thirdly, the likelihood of implementing green supply chains can be diminished when employees running the supply chain are adverse to change. For example, perhaps they've been using paper purchasing processes and they're only comfortable faxing invoices between departments. Although the firm can easily save money by installing an e-procurement software to reduce paper waste and increase purchase tracking; the firm cannot easily continue with e-procurement software because employees can be intimidated by change.

Fourthly, there are also issues of stakeholder positions. In some cases, stakeholders are only interested in improving profits and that would mean vying away from more expensive green supply chain practices. However this could work in the favor of a supply chain manager if a stakeholder is adamant about eco-friendly practices. The challenges of green supply chains are such that they will be increased if a flexible adoption is not taken. The best possible outcome will incur where all supply chains can reduce waste, improve profits, and become more eco-friendly. There is evidence that green supply chain practices can create the best outcomes. However without properly evaluating all possible outcomes, implementing green practices can lead to disaster.

5.4 Approaches to Reduce the Environmental Impacts at Different Stages of The Supply Chain of RMG Industry

The growing importance of GSCM is driven mainly by the escalating deterioration of environment. The waste and emissions caused by the supply chain have become one of the main sources of serious environmental problems including global warming and acid rain. One of the key aspects to green supply chains is to improve both economic and environmental performance simultaneously throughout the chains by establishing long-term buyer–supplier relationships. Efforts have been made by the authors to study the supply chain of the systems with the focus on its optimization and implementation.

Supply chain management has traditionally been viewed as a process where in raw materials are converted into final products, and then delivered to the end-consumer (Beamon, B. 1999). This process involves extraction and exploitation of the natural resources (Srivastava, 2007). It is important to note however that we live in a decade where environmental sustainability has been an important issue to business practice. The waste and emissions caused by the supply chain have become one of the main sources of serious environmental problems including global warming and acid rain. Green supply chain policies are desirable since reactive regulatory, to proactive strategic and competitive advantages.

Green supply chain management (GSCM) is gaining increasing interest among different industries, researchers and practioners of operations and supply chain management. Ready Made Garments (RMG) Industry has become a wide sector where GSCM is now a contemporary issue. Firms use different approaches to GSCM to reduce the environmental impact, gain competitive advantage, and to achieve overall sustainability. The growing importance of GSCM is driven mainly by the escalating deterioration of environment, e.g. diminishing raw material resources, overflowing waste sites and increasing level of pollution. However, it is not just about being environment friendly; it is about good business sense and higher profit. The supply chain “system” includes Purchasing and In-bound Logistics (materials management), Production, Outbound Logistics (physical distribution and Marketing), and Reverse Logistics (L. K. Toke, R. C. Gupta, Milind Dandekar, 2010).

Different measures to reduce the environmental impacts at different stages of the supply chain of RMG industry of Bangladesh can be dug into detail further as the following.

5.4.1 Contribution of Important Factors to Reduce Environmental Impact at Different Stages of the Supply Chain:

Greening supply chains aims to balance marketing performance with environmental issues. To meet with challenges such as energy conservation and pollution abatement, enterprises have tried to green their supply chains, that is, to create networks of suppliers to purchase environmentally superior products or to build common approaches to waste reduction and operational efficiencies. Greening the supply chain is increasingly a concern for many business enterprises and a challenge for logistics management in the 21st century. Of particular concern is how to arouse organizational environmental awareness and put environmental activities into practice in the logistics activities of their supply chains.

- i) **GSCM Practices:** GSCM is designed to incorporate environmental considerations into decision making at each stage of an RMG's materials management and logistics functions through post-consumer disposal (Handfield R, Sroufe R, Walton S, Simpson DF, Power DJ. 2005). Definitions vary. In some cases, GSCM has been defined as a simple green purchasing relationship between a buyer and vendor. In other cases more extensive concepts of 'closed-loop' supply chains are employed which consider GSCM to be an unending logistics cycle of materials and products use, reuse and management from both an inter-and intra-organizational perspective (Qinghua Zhua, Joseph Sarkisb, James J. Cordeiroc, Kee-Hung Laid, 2008). RMG sector is so sensitive in Bangladesh and this GSCM practices should be implemented with cautious care to reduce the bad outcome.
- ii) **External GSCM Relationship Factors (ER):** ER factors in GSCM can include both upstream and downstream factors external to the RMG's operational boundaries.
 - 1. Upstream factors include such inbound logistics (materials management) activities as green purchasing and vendor management (Min H, Galle WP. 2001; Zsidisin GA, Hendrick TE. 1998). For example, items include providing suppliers with

design specifications incorporating environmental requirements for purchased items, cooperation with suppliers for environmental objectives; environmental audits for supplier's internal management and suppliers' ISO 14001 certification. Investigating the determinants of ER factors in the US, Min and Galle found that organizational size (number of employees), regulatory pressures, source reduction policies and high environmental costs played a significant role in the adoption of green purchasing practices.

2. Downstream factors include green outbound logistics (physical distribution) with activities such as distribution and marketing components of a product or RMG's supply chain. Researchers have found supply chain customer–supplier relationships and collaboration around environmental issues to be significant in environmental practice adoption and performance in the Southeast Asia (Rao P. 2002). For example, leading firms from developed countries evaluate not only their direct suppliers but also the suppliers of these suppliers.

iii) Eco-design (ECO): Early eco-design work focused primarily on technical improvements to products and processes to mitigate environmental costs. Recognition that more substantial improvements are possible only when design factors outside of the direct control of producers, including relationships with suppliers, consumers, recyclers and governmental authorities, are included for eco-design to become an integral GSCM practice (González-Benito J, González-Benito O. 2005; Partidario PJ, Vergragt PJ. 2002). The success of eco-design requires internal cross functional cooperation among intra-organizational units within a company as well as cooperation with outside partners throughout the supply chain of RMG industry. Studies in the US support this position especially for product-design based integration of suppliers into the green supply chain to meet the specific supply chain environmental design requirements.

iv) Investment Recovery (IR): IR refers to an RMG's strategic use of reverse logistics recycling, redeployment, reselling and similar techniques to derive greater value from materials and products. IR seeks to turn surplus assets into revenue by selling idle assets, reducing storage space and deploying idle assets to other corporate locations to avoid purchasing additional equipment or materials (Atkinson W. 2002). Out-of-service equipment, excess inventory or raw materials, waste and process by-products

and demolished facilities are included in these non-working assets. IR can be legitimately viewed as both an economically and environmentally beneficial practice. IR practices are central to a number of reverse logistics practices such as reclamation, remanufacturing, recycling and reuse.

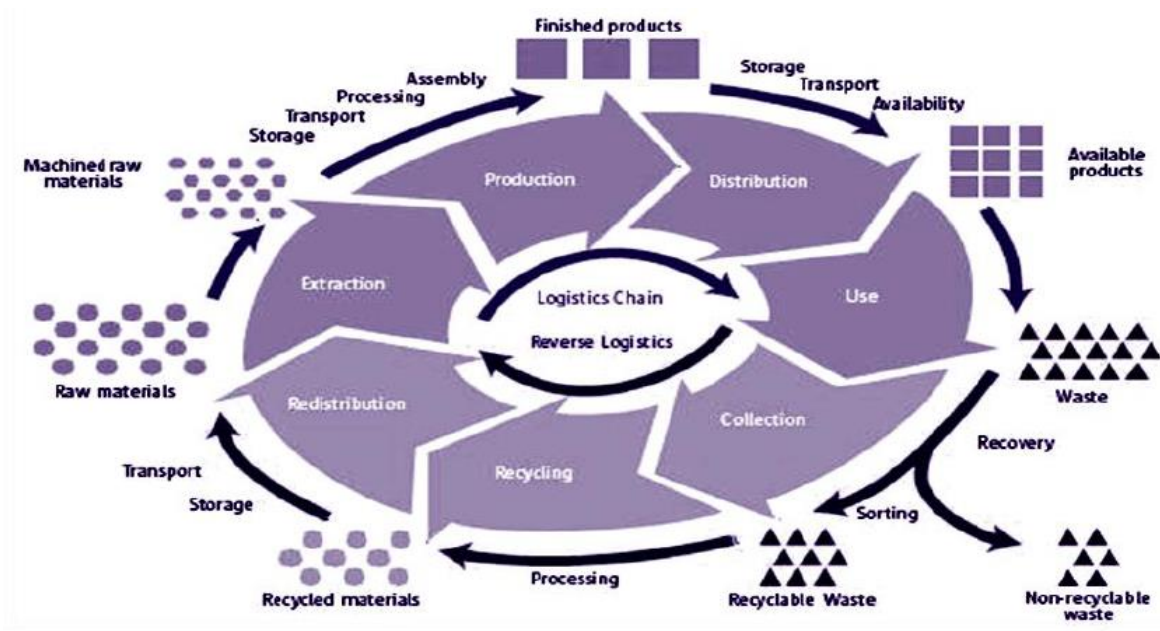


Figure 5.2: Reverse Logistic Process

- v) **Organizational Learning:** Successful competitive strategies and outcomes (including those in the environmental area) depend on the development, effective deployment and maintenance of these resources and capabilities over time. Organizational learning systems facilitate the intelligent and complementary deployment of a firm's existing resources and capabilities to affect a desired end. Russo and Fouts suggest that organizational capabilities are closely tied to environmental performance, and that organizations possessing greater capabilities can more easily adopt proactive environmental management practices (1997). Other research supports the role of organizational learning systems in particular promoting higher levels of environmental capabilities by drawing on expertise developed earlier in basic levels of environmental management by developing or acquiring the necessary socially complex or process-based resource (Qinghua Zhua, Joseph Sarkish, James J. Cordeiroc, Kee-Hung Laid 2008). Thus, the issue of organizational learning systems, and their potential on GSCM practice adoption, is quite salient at this time and will continue to be so for the foreseeable future.

vi) **Management Support and Commitment:** In general, management support is a critical element of adoption and implementation of innovations in a garment organization, especially environmental systems. Organizational innovations may remain stuck at the initial idea stage absent dedicated champions. Top management of garment support can affect new system initiatives success by promoting employee empowerment, by facilitating employee involvement by promoting a cultural shift and increased commitment by the RMG's employees, by instituting rewards and incentives systems to affect employee behavior, by providing training and increasing communication across units and encouraging teams and teamwork in the organization (Pun KF, Chin KS, Gill R. 2001). Top management support has been associated with the success of information technology diffusion within organizations, business process reengineering, virtual enterprise formation, environmental purchasing, ISO 14000 implementation, enterprise resource planning (ERP) and EMS.

Cross-functional efforts like GSCM are likely to benefit too. Like most other major environmental efforts, GSCM is a broad-based pervasive organizational Endeavour with cross-functional programs. As such, it has the potential to benefit from top management support. It is not just top-level managers from whom support is needed; support from mid-level managers is also important to successful implementation of environmental practices in RMG. Support from middle-management levels is important because environmental management is related to almost all departments in an organization, and cross-departmental cooperation is important to successful practices. Strong communication between RMG business managers and environmental professionals with management support is also necessary for effective management of both business and environmental issues (Qinghua Zhua, Joseph Sarkisb, James J. Cordeiroc, Kee-Hung Laid, 2008).

5.4.2 Through Supply Chain Collaboration to More Sustainable Practices:

The environmental impact of the garment industry can be reduced considerably by implementing good processing practices and ensuring that effluent emissions at least comply with local legislation. In most developing countries, compliance with local legislation cannot be taken for granted. Although legislation often exists, its enforcement is weak and corruption occurs. At the same time, in some cases, where the court step in to see to legislative enforcement, the requirements put in place are so strict that the industry is not able to comply, which in turn negatively affect the sector and shift the activities to other regions where legislation is less strict or is not enforced.

For the long term sustainability of the textiles and garment sector, as well as for the sustainable economic development in key textiles clusters, it is important that the negative sustainability impacts, such as inadequate working conditions, inefficient resource use, and water pollution, are minimized, through efforts of all stakeholders involved; and particularly by the government and the industry.

- i) **Creating Supply Chain Transparency and Traceability:** Brands and retailers can be important drivers for sustainability improvements, particularly in countries where the government is weak. An approach of value chain collaboration between buyer and supplier, which recognizes a joint responsibility to reduce the environmental footprint of garments, is likely to be most effective. In order for brands and retailers to take this “drivers’ seat” it is important to know where the processes with the biggest environmental impact in the value chain take place. This knowledge of the value chain cannot be taken for granted in the garment sector.

The RMG value chain from fiber to finished product is complex and fragmented. Most garment retailers and brands place orders – directly or via agents – with garment manufacturers and exporters. Some garment exporters are vertically integrated industries, with fabric manufacturing and textile wet processing activities in-house. In some cases – particularly for special/high quality products and performance wear – the garment manufacturer has to procure the fabric from designated suppliers. Most common however, is that the garment manufacturer sources his inputs directly from various sub-suppliers. Dyeing and finishing of fabric – particularly of knitted fabrics – is often ‘job work’, where fabric is sent to dye houses for processing. This complex

structure of the garment supply chain results in a lack of transparency, due to which many brands and retailers are unaware of where the processing of their fabrics takes place. Nor are they aware of the exact nature of the processes and the conditions under which processing takes place. Where products are sourced through agents or importers, the lack of transparency is often even bigger, since the supplier network in these cases is often considered confidential (out of a concern of customers surpassing the agent or the importer).

In the past, this lack of transparency was used by the apparel industry as an argument for not being able to address sustainability issues higher up the value chain. Since the past year, consensus is growing that ‘not knowing’ does not relieve brands and retailers from their part of the responsibility for sustainability issues in the supply chain.

In order to take steps towards more sustainable supply chains, garments be working on supply chain transparency and traceability and this is the key to a more collaborated supply chain.

- ii) **Creating a Realistic and Harmonized Supply Chain Requirements:** For the past many years, the garment sector has widely set requirements to address social circumstances in the supply chain. This has led to increasing awareness and knowledge in the supply chain of (legal) social minimum standards that should be adhered to. While frontrunners in the apparel supply chain have also focused on setting environmental minimum standards, particularly with regards to effluent treatment, this is still a lot less widely spread. Particularly in view of an insufficiently strong functioning government, a demand for sustainable production by brands and retailers is key. It is particularly valuable if the industry can harmonize its requirements through pre-competitive collaboration. The Sustainable Apparel Coalition and the Joint Roadmap towards zero discharge are collaborative efforts to come to more transparency as well as improved sustainability levels.

What is also important is that a certain level of knowledge and capacity is necessary for a factory to be able to identify and implement effective measures to achieve sustainability targets. A collaborative approach between buyer and supplier,

supporting the supplier to develop capacity, is more likely to result into positive results than a focus on ‘compliance only’. The success of the User Groups shows that collaboration between different factories within producing regions is also instrumental to achieving sustainability improvements. In summary, an attitude on both a buyer and supplier level, that shows that sustainability is a topic that allows for pre-competitive collaboration, which is demonstrated through an active exchange of information, solutions, good practices and experiences, is important to achieve measurable improvements.

iii) Buying Practices and Price Pressure: Conventional buying practices are another bottleneck hampering sustainable improvements in supply chains. Often CSR and buying are separate responsibilities and have different and sometimes conflicting goals. The CSR or compliance manager sets the minimum requirements when it comes to social and environmental performance; having to demonstrate gradual improvements in performance of their suppliers. The buyers generally have targets stimulating them to optimize their margins and buy at the most competitive price. In many cases part of the remuneration of a buyer is based on the performance to achieve such targets.

Consumers have however become used to buying increasing volumes of ever cheaper garments. A change in this trend can only be successfully achieved through broad sector wide change. Good examples of such collaborative efforts which enhance sustainability are given by the Dutch supermarkets, for example when it comes to eggs or meat. It needs to be noted however, that in the apparel sector, such agreements will be more difficult to achieve. One reason is the character of the largest players in the Netherlands, who have presence in multiple markets, with each their own dynamics. Other challenges include the lack of transparency and changing supply chains. It is not always clear if a higher price for the product is indeed used by the factory management for fair compensation of its suppliers, workers, ensuring that the effluent treatment etc. also hampers a constructive dialogue between supplier and buyer. So, the industry should shift towards prices that reflect the true cost of production. Educate the consumer on how more sustainable consumption practices.

iv) Supply Chain Dynamics: The technical nature of environmental requirements as well as the fact that the key environmental impact takes place at the second tier (sub-suppliers) makes it difficult for buyers or CSR managers to observe and discuss areas for improvement with suppliers. Many Dutch brands and retailers are often not among the biggest customers for their suppliers, which frequently gives the feeling that it is difficult to influence their suppliers. The change from a ‘buyers’ market to a ‘suppliers’ market in some sourcing regions enhances such challenges. The trend towards supply chain consolidation, focusing on less suppliers with whom long term strategic partnerships are being developed, will be beneficial to achieve sustainability improvements.

Collaboration among brands and retailers, resulting in collective requests for similar sustainability improvements, will increase the impact of CSR policies in the value chain. Although brands and retailers are important drivers for change, it is also clear that brands and retailers alone will not be able to solve all sustainability issues. Local governments need to develop and more effectively enforce existing legislation. In Bangladesh for example, most garment exporters with wet-processing activities in house have waste effluent treatment plants (ETP). It is also frequently mentioned that those ETPs are not operated 24/7, that they are switched on only during factory visits of buyers or auditors. Increasing enforcement by the government (with high enough fines) is essential to change this behavior.

It is important to train and raise awareness among staff of brands and retailers on environmental issues, enabling them to start the discussion with their suppliers. Local service providers need to be developed and awareness should be raised among suppliers on the possibilities to reduce production costs through improved efficiency. Capacity of local service providers and knowledge institutes needs to be built. Through joint initiatives by brands/retailers and their suppliers a joint responsibility can be demonstrated. Closer collaboration and more open cost calculations can contribute to working towards fairer pricing mechanisms.

Chapter 06

The Future of GSCM in RMG Industry of Bangladesh



CHAPTER 06

THE FUTURE OF GSCM IN RMG INDUSTRY OF BANGLADESH

6.1 RMG Industry – The Road to Progress towards Sustainability

The long term view of the sustainable growth of RMG industry of Bangladesh is still blurry. In addition to fire and building safety matters, other issues such as proper working conditions, much needed infrastructure and a long-term view both from brands and factories are hampering the industry's development. From a country perspective, the current infrastructure would not be able to support the garment industry's growth. Infrastructure such as paved roads, highways, ports and a steady flow of electricity is limited. Additionally, lack of skilled workers is a concern for the industry and country. For example, before the Rana Plaza event there were only 11 building inspectors, now there are more than a 100 with targets to reach 500 in the next year. While the numbers are impressive, some question whether or not the inspectors have the necessary skills and educational background to conduct proper inspections. The question of a living wage is still an issue. How much more than the minimum wage should a factory pay? How does this relate to how much the middle management is earning? And finally, how does this relate to how much other people in the country such as teachers are earning? Moreover, social unrest is frequent in the country – with massive strikes, heightened particularly during election periods, causing the country to be at a standstill leading to work stoppages and disruptions in the supply chain. These issues are national matters that cannot be dealt by one industry alone.

Social issues are still prevalent in the industry. Proper worker representation is still limited with effective unions in factories being almost non-existent. Furthermore, factories are faced with other issues such as the quality of the labor force. Absenteeism and employee turnover is high amongst workers – particularly during the periods after national holidays such as Eid.

Factories still get mixed messages from their clients. Audits are not standardized and are, sometimes, contradictory depending on the company doing the audit. A certain anecdotal story from a factory manager saying how they had to move the daycare center several times because of the audits shows how much time and effort factories have to exert just to comply with varying standards. Additionally, certain companies are still bargaining on price – making it difficult for factories to make the necessary investments and implement the initiatives to become a better garment factory.

Bangladesh is only one chapter of the entire supply chain story. The issues found in Bangladesh are not entirely unique to the country. Retailers are exploring other countries from where they can source, such as Ethiopia and Myanmar where the environment and conditions are not much better than that of Bangladesh or possibly even worse. Additionally, retailers are currently sourcing in countries such as Vietnam and Cambodia where similar problems in working conditions and social issues can be found. As such, while attention is being put in Bangladesh due to the urgency of the situation as highlighted by the Rana Plaza tragedy, it must not be forgotten that there are other countries where similar contexts and conditions can also be found and must also be attended to.

6.1.1 Moving towards Industry Standards:

The Accord, the Alliance, and the National Tripartite Plan of Action all have the same goal: to ensure the fire and building safety of factories in Bangladesh. Nevertheless, despite having the same goal, collaboration between the three initiatives has been far from smooth sailing. Discussions with factories have brought about the need for an agreement on factory standards. While certain companies may ask for requirements beyond the minimum, standardized requirements would already increase efficiency in these factories. Should they be able to set their differences aside, the three initiatives have the possibility to create an industry standard for the fire and building safety regulations in Bangladesh and, if successful, could pave way for the standardization of other types audits – not only in the country, but also in other garment sourcing countries.

6.1.2 Government Action is Needed:

The role of the government in the sustainable development of the garment industry is not to be overlooked. As mentioned previously, basic infrastructure in the country is still limited. In order to support the growth of the industry, the government would need to make the needed investments in better roads, a dependable electricity network, and a deep sea port, which the country does not currently have. Additionally, the issue of living wage would be more efficiently addressed at a national level. Increasing wages is a delicate subject as it can create social imbalances and lead to strikes in the country (as it turns out, it is very easy to get a group of people protesting on the streets). As was seen when the government increased the minimum wage last year causing both the factory workers and middle management went on strike. The factory workers believed that the increase was not enough, while the middle management believed that they too deserved an increase in their salaries. Additionally, garment factory workers earn more than school teachers. Consequently, the issue of a living wage needs to be tackled in collaboration with the different players, government included. Finally, the issue of the lack of skilled laborers and even that of chronic social unrest can best be addressed through an effective public system of education. Much of Bangladesh's past economic growth can mainly be attributed to the private sector. It is now the government's turn to ensure that this growth is sustainable.

6.1.3 Retailers Need to Start from within their Operations:

Retailers still have their role to play. The most important of which is to realize that if they do want to clean up their supply chain it has to start from within their company. After discussions on the ground, it became clear that the companies' buying practices have changed little since the collapse in that it hasn't really moved beyond the price of the product. There is still a disconnection between the audits and improvements made to increase the social standards and what the buyers are really looking for. Improving the buying practices in such a way that a relationship with open communication lines between the retailers and factories exists would be a step towards a more sustainable supply chain. This also includes the relationships between the retailer, the intermediaries, and the factories. Enhancing the company and supplier relationship is currently the most effective way to combat unauthorized subcontracting. Additionally, retailers need to have a better understanding of the risks that come with sourcing from countries such as Bangladesh and need to better plan for them. Having direct employees on the ground is a step forward as it allows for better knowledge of the local context. Retailers would also need to integrate the potential effects of the social risks into their financial planning – for example, the retailers were caught by surprise and financially unprepared when the minimum wage of Bangladesh was increased last year as such some of the factories were forced to swallow the extra costs for fear of losing the orders from the retailers. Responsible supply chain management takes a lot of resources from the companies thus we don't expect this for all the countries they are sourcing in and expect only this amount of effort to be located in countries where the company's exposure and the risks are high. As mentioned, Bangladesh is not the only country where human rights issues are prominent, similar problems are also found in other countries such as Cambodia and Pakistan. With their global reach, companies are able to use their positive influence in these countries as well.

6.1.4 The Road to Progress:

The road to a sustainable supply chain is still long and its path not very clear. The problems encountered in Bangladesh are not limited to the country and expand to other sourcing countries such as Cambodia and Vietnam. There are a lot of improvements to be made from the different players in the industry. Companies have the capability to ensure that sustainable supply chain management best practices are found not only in Bangladesh, but also in other sourcing countries. Companies cannot do this alone and would need the participation from governments and society. Investors too have their role to play. One is by applauding and putting forward the companies that have made significant progress towards this goal. Companies need to know that they can be open and transparent about the challenges and their initiatives in cleaning up the supply chain of social issues. Following this, investors can and should also engage with the retailers, accompanying them towards the goal of improving the sustainability of their global supply chain. With this in mind, we believe that a collaborative engagement with other investors would be more effective in incurring change within the companies and would yield more favorable results. As such, we have launched a collaborative engagement with other institutional investors with the hopes to use our combined investor leverage to discuss with relevant companies on how to best improve their supply chain practices.

This analysis has allowed us to have a deeper insight into the challenges that retail companies face on the ground and would thus, hopefully, lead to more fruitful discussions in our engagement with them, particularly relating to the following axes identified in our previous study on the supply chain:

- Increased transparency: more communication on the structure of their supply chains, their initiatives and its progress
- Social risk mapping: better understanding of the risks linked to the supply chain, where they are and how big the negative impacts could be
- Enhanced relationship with the suppliers: development of longer-term relationships that starts with the company's buying practices
- Multi-stakeholder initiatives: a systemic approach to addressing issues that the industry as a whole faces (e.g. lack of worker representation, providing a fair living wage, etc.)

6.2 A More Integrated Approach to Green Supply Chain Management

Green Supply Chain Management (GSCM) is an emerging discipline in RMG where researcher has commenced only few years back. Though the literature survey reveals that a lot of areas in GSCM have been researched, there is ample scope for future research and application to address the unanswered questions and utilization of those areas. The RMG's Green Supply Chain Management (GSCM) can improve through collaborating different functions and GSCM, performance measurement of GSCM, embedding environmental strategy in the manufacturing strategy, selection of green suppliers as part of green purchasing, ensuring socially responsible behavior in the supply chain, reducing the environmental impacts of supply chain, by shaping the supply chain through a more integrated approach, linking RMG's organizational theories with GSCM to explain how the concept can find greater acceptance by management and other stakeholders. Also, there is lot of scope to work on reverse logistics of RMG.

6.2.1 Ensuring Socially Responsible Behavior in the Supply Chain:

While the expansion of global trade has created affordable products, produced new business opportunities, and helped some regions develop, it has also brought about its share of issues. From the early 2000s, reports of labor abuse in the factories where their goods were manufactured have affected the reputation, sales and profitability of large global brands and resulted in an increase in consumer awareness over Labor standards. Today, not only consumers, but investors and stakeholders at large, expect organizations to respect labor standards and behave in a socially responsible manner. Also, in case of RMG Industry, such reports are true. These objections can be overcome by a more socially responsible behavior.

- i) **Implementing Codes of Conduct throughout the Supply Chain:** Guaranteeing acceptable conditions in a RMG supply chain can be a complex challenge. Developing countries are at different stages of RMG life cycle and in some regions good practices are only beginning to emerge. As part of their efforts to demonstrate ethical practices, many large companies are integrating codes of conduct and guidelines into their factory cultures and management systems. Through these, RMGs are making demands on their suppliers (facilities, farms, subcontracted services such

as cleaning, canteen, security etc.) and verifying, through social audits, that they are complying with the required standard.

In Bangladesh, such codes of conduct on supply chain can be applied over the different stages of raw material collection, manufacturing, distribution, and product disposal. Today, hundreds of RMG codes of conduct exist, the majority of which are based on the International Labor Organization (ILO) conventions. These codes of conduct and standards are usually the result of intense negotiation between interested stakeholders and strongly reflect the organizations that developed them. Suppliers however often express concern at the multiplicity of audits and duplication of effort, which may contribute to hindering the improvement of conditions in the workplace. In order to minimize this, the trend has been for commercial organizations with shared goals to come together, agree on common codes of conduct and share information. An increasing number of initiatives now seek to drive forward consistency of standards and processes.

- ii) **More Support for Supply Chain is yet to go:** Green Supply Chain Management (GSCM) in RMG industry of Bangladesh is almost of a great concern after some dangerous accidents in several factories. So while, more support for supply chain is essential to ensure safety, and protection for the people and planet. It is expected that the coming years will still see large numbers of RMG audits on environmental issues but that new schemes will also come into place to further support suppliers to improve labor conditions. Overall, suppliers in many parts of the world need more support to attain the standards that are required from them. Distributors and firms will be looking at new schemes and models and will work together with their suppliers to address the root causes of their challenges in order to engage into longer term business relations and implement sustainable supply chains.

6.2.2 Reducing Risk and Environmental Impacts through the Supply Chain:

More and more RMG organizations are looking at their supply chain to demonstrate environmental and social commitments in order to monitor and report on their performance. This is because governments, consumers and non-governmental organizations are expecting RMG companies to take more responsibility for where their products come from. Green procurement (GP) can help meet these expectations, it can help reduce the risk of brand/ reputation damage from potentially non-conforming suppliers and can also become a competitive advantage.

- i) **The Various Paths to Green Procurement in RMG Industry:** The approaches to Green Procurement (GP) have taken various shapes: with organizations developing their own internal standards and performance tools to assess supply chains: as well as public bodies such as the Bangladesh and foreign government are providing guidance and policy on their own public procurement.

Green procurement essentially refers to any environmental tool or criteria that an organization uses to interact with and assess its supply chain. Organizations have tended to take one of two approaches to the idea of GP, or a combined approach.

One common method is a product based approach where an organization concentrates on one or more of its products or services and assesses their environmental credentials and thus the credentials of suppliers for those product or services (I.e. the raw material supply). This path is used when an organization wants to better understand a specific product or product range for marketing or strategic purposes. It can also help to thoroughly evaluate a particular supplier's processes.

A second common method involves evaluating the management practices and legal conformance of a supplier to see whether an organization is at risk from its suppliers (risk posed to the brand or its environmental claims/credentials). An RMG organization may wish to know that a supplier has the correct procedures or policies in place to perform to that organizations standard or to the legal minimum requirements in another (more stringent) market. This method helps profile suppliers and is useful when exploring large numbers and complex supply chains.

When selecting one of these methods it is important to know what the specific RMG organization is aiming to achieve and what green procurement means to the organization. It needs to know what criteria are the most important to it and its foreign buyers.

- ii) **Tools to Support the RMG GP Strategy:** There is no one approach right to Green Procurement of RMG, but there are different tools available to help assess most important suppliers, which it can adopt to improve performance or to measure risks. These tools include: carbon foot-printing, life cycle assessments of a product/ service from cradle to grave, following a product down the supply chain, systems certification and suppliers' tracings to meet external standards (ISO), and the like. Without a proper understanding of the key areas and criteria for RMG business to focus on and without a careful selection of the appropriate tools, organization may not obtain the Green Procurement results it wanted.
- iii) **Get the Best Support Available:** There are multiple experts who can help define a local/foreign RMG procurement strategy and develop training and awareness programs for buyers and suppliers. Sustainability experts can assist RMG firms at every step throughout their supply chains by assessing the most significant impacts through analysis of product life cycles and/or supply chain impacts.

6.3 Integrated 4R Approach

Going green is all about a change that many companies will be required to make sooner or later. Changing traditional business habits to more low-impact alternatives, and investing in smart technology that makes this transition smoother and more attractive, is one way many business are going green. Going green can be as simple as making sure lights are turned off in unused offices-thus preventing the waste of electricity-or as elaborate as utilizing alternative forms of energy (i.e., solar or wind energy). Further, investing in better communications technology to facilitate conference calls, teleconferencing or virtual presentations helps a company reduce the impact of traveling to meeting. With a few simple changes, one can greatly reduce one's business's carbon footprint.

RMG industry of Bangladesh is also on their way to reduce the environmental impacts for the greater good. Initiatives can be taken on so forth. The future of Green Supply Chain Management (GSCM) in RMG Industry will complemented through many of these. Environmentalists have suggested a 'Four R' solution i.e. 'Reduce', 'Reuse', Repair, and Recover Resources – 'Recycle' and 'Rethink' to the waste problem. The following are some easy steps that businesses can take to go green (Miler, 1997).

6.3.1 Reduce:

There may be several ways to reduce waste and prevent pollution. The most important one is to generate less waste and pollution by reducing consumption. Reducing electricity consumption can help one's business save money and the environment. Individuals can make good contribution to reducing the volume of our waste stream. Turning off lights in vacant offices, for example, can save energy, save on utility costs and increase the company's bottom line- people, profit and planet. By simply switching off computers, printers and equipment at the end of the business day or when not in use, one could instantly make a positive impact on his/her company's carbon footprint. According to GreenIT- a consultancy focused on sustainable solutions for IT systems, the U.S. computers used nearly 64 billion kilowatt hours of energy in 2005, costing over \$6 billion (www.cisco.com). Going green can improve the overall efficiency of a business by reducing unnecessary waste. The U.S. Department of Energy estimates that consumers can save up to 15 percent on heating and cooling bills just by adjusting their thermostats

(www.worldwatch.org). Investing in energy-efficient electronics, appliances, and light bulbs will also conserve energy. Making use of biodegradable packaging along with recycled and recyclable materials reduces waste dramatically (Lorette, 2013; smallbusiness.chron.com). Document handling (paperless office): In document handling, businesses can take a wide range of 'green' initiative. One of the most common examples is the act of "going paperless" or sending electronic correspondence in lieu of paper when possible. Instead of taking notes on paper, transition to doing as much paperwork as possible digitally is a smart choice. Storing important documents digitally reduces waste and makes it easier to stay organized. Adopting online statements, accepting bills electronically, sending invoices and payments using a Bill Pay service are good examples of green banking (Thombre, 2011). Printing less not only cuts down on paper usage but also can lower the budget spent on printing materials. Printing on both sides of paper obviously helps to save paper (www.notepage.net). Telecommuting: Telecommunication, videoconferencing and other technological solutions can reduce the amount of employee travel. Mobility solutions enable telemarketing/ working, providing secure and reliable connections to corporate resources, thereby saving carbon-based fuel expenditures associated with travel. (www.worldwatch.org).

6.3.2 Reuse:

Reuse (Repair and Resource Recovery): Reuse is another form of waste reduction. A relatively recent idea in waste management has been to treat the waste material as a resource to be exploited, instead of being disposed of. For example, the refillable containers which are discarded after use can be reused. There are a number of different methods by which resources may be extracted or recovered from waste. The practice of treating wastes as a resource is becoming more and more common, especially in metropolitan areas where space for new landfills is becoming scarcer. There is also a growing acknowledgement that simply disposing of waste materials is unsustainable in the long term, as there is a finite supply of most raw materials (en.wikipedia.org).

6.3.3 Recycle:

Recycling is the re—processing of discarded materials into new useful products. In most developed countries, recycling refers to the widespread collection and refuse of single-use beverage containers (e.g. aluminum beverage cans, plastic bottles, glass bottles and jars), and other consumer items such as food and aerosol cans, paperboard cartons, cardboard, newspapers and magazines. These items are usually collected and sorted into common groups, so that the raw materials can be easily recycled into new products. Some recycling processes reuse materials for the same purpose e.g. old aluminum cans and glass bottles are usually melted and recast into new cans and bottles. Other recycling processes turn old materials into entirely new products. Nearly half of the all household and commercial wastes in Japan are recycled. Recycling programs also exist in cities and towns across the United States, helping to save energy and protect the environment. In 2009, San Francisco became the first U.S. city to require all homes and businesses to use recycling and composting collection programs. As a result, more than 75 percent of all material collected is being recycled, diverting 1.6 million tons from the landfills annually. Recycling is a better alternative to either dumping or burning; it saves money, energy, raw materials, land space, cut out waste volume drastically, lower pollution and reduce pressure on waste disposal system. It encourages individual awareness and responsibility for the garbage produced (www.worldwatch.org).

6.3.4 Rethink:

The implied meaning of ‘Rethink’ is that the present system may have fundamental flaws, and that a thoroughly effective system of waste management may need an entirely new way of looking at waste. For example, cutting fabric patterns with slightly more waste material left is a common practice. This type of habit is by no means limited to the clothing industry. Resources can be saved by changing our thinking process. Create a healthy office environment: Rather than buying new things to decorate one's office or workspace, natural option such as green plants can be considered. Green plants can make a nice addition to one's office decor, and can also help to clean the air in the office space. Patronize: All companies buy supplies and use the services of other companies, so it is a wise decision to patronizing companies those also follow green principles. For example, when shopping for supplies or equipment, it is a smart choice to look for brands and companies that are dedicated to having a low carbon footprint and environmentally-friendly products (Miller, 1997).

Chapter 07

Recommendations and Conclusions



CHAPTER 07

RECOMMENDATIONS AND CONCLUSIONS

7.1 Recommendations

7.1.1 A View on SCM Recommendations:

A chain is as strong as all of its rings are. Similarly, a chain is as weak as one of its rings is, i.e. one single ring is more than enough to make the whole chain dysfunctional. The RMG sector in our country has so far been witnessing very clear price competitiveness. The minimum wage in our country is still the lowest among our competitors. But our lead time is under pressure. Cheap labor does not help, if the workers are not efficient. Reducing the dependence for materials on other countries and elimination of middle men are vital to make the chain strong. Without proper management of the supply chain, only wage competitiveness cannot ensure sustainable business by having the concern for environment. So, for the sake of the sector, we have no alternative but to make the SCM effective.

In RMG supply chain, meeting lead-time, quality standard and buyers' specification are very important. Failure to comply with these requirements creates buyers' dissatisfaction and cancellation of order. RMG products are sensitive to design, color and use of accessories. The manufacturers need to submit samples for buyers' approval before producing in a bulk quantity. If the size, color, design and other specifications are approved by the buyers, operation is started for bulk production. Sometimes, buyers reject some batches of products because of non-conformity of sample with bulk. It's a huge economic loss and loss of reputation of the company. Moreover, buyers set a fixed lead time and within this time the manufacturers need to procure, produce and deliver the finished products. If there is any deviation buyers are dissatisfied and may even reject the shipment. Therefore, the following are the recommendations that the decision makers and planners of RMG may consider as fruitful:

- i) The SCM process in RMG sector is scattered in perspective of Bangladesh which is lagging behind in the global competition. To be more efficient in the Global apparel industry Bangladesh have to maintain standard SCM procedures.
- ii) Subsequent, Bangladesh requirements to get better the factory working environment and various social matters related to the RMG industry. International buyers are very

scrupulous about compliance with codes of conduct (Wal-Mart is clearly ahead to SCM generation for an example).

- iii)** Thirdly, issues associated to product and market diversification as well as advancement products desires to be addressed with extraordinary heed which is ensuring by SCM in a scattered manner.
- iv)** Direct marketing and elimination of middle men can help establish an effective supply chain system. It is very difficult to make a combined and coordinated system among the interest groups involved at present. Miscommunication and misinformation at any point hamper the whole process.
- v)** The impact of political instability and workers' unrest destabilizing the SCM are another concern. Adaptation with changing technologies, undisrupted utility supplies, minimizing corruption, and elimination of bureaucratic tangles in customs, port management and other concerned government agencies can play a vital role in overcoming the challenges. Without combined efforts and firm commitment from all concerned, a performance-based supply chain system is not possible.
- vi)** The textile industry is lacking the correct supply chain management know-how as the country has an acute shortage of people who understand the complex nature of supply chain management.
- vii)** The RMG manufacturers need to start working together with all the supply chain partners, as the landscape of low cost sourcing countries is about to change. Buyers in the future would be more interested in total cost of ownership (TCO) rather than just the unit price.
- viii)** To cut the lead time the sector needs to improve the SCM system. A buyer wants everything ready and instantly. Instead of the traditional system, now online costing and orders are now common. In the traditional system it required 120 days in case of solid fabrics and 150 days for yarn dyed. Now a factory is having 60-75 days and 90-120 days respectively. In the case of composite knit garment, a factory keeps the fabrics ready in the grey condition. After having the style details they go for dyeing and thus they can manage to keep the lead time limited to 30-45 days for repeat orders. For any fresh order a buyer does not allow even 60-75 days, though earlier it took 90-120 days.
- ix)** Business firms should align their supply chain strategies with all the business processes and their competitive strategies, to augment the supply chain efficiency.

- x) Furthermore, the government of Bangladesh requires strengthening its prop up. The enlargement and modifying of the port's supply chain management and other physical infrastructure, the smooth supply of utilities, a corruption-free business surroundings and political stability are some precedence concerns for the government to regard as in its efforts to attract international buyers and backers.

7.1.2 A View on GSCM Recommendations:

Our whole study specifically focused on assessing the overall practices of green supply chain management in the RMG industry of Bangladesh. Now, with the discussion of SCM recommendations in the previous section, this section attempts to suggest some policy guidelines for the garment factory owners. The measures are discussed below:

- i) The owners of garment factories should give more attention to the greening aspects in managing their supply chain of garment products. This should be done in all the areas of green procurement, green manufacturing, green marketing, green warehousing, green distribution, green packaging, and the like. Since the EU and the US constitute the majority of buyers for the Bangladeshi garment products and as they are gradually looking for green products, the Bangladeshi RMG owners should not ignore this compliance. Doing otherwise will simply bring disaster for the future of Bangladeshi RMG sector.
- ii) Performance on the dimensions as such green manufacturing, green procurement, green warehousing, green packaging, green transportation, and green distribution should be improved.
- iii) The RMG owners should recruit educated and skilled workers. Though recruiting educated and skilled workers would cost the management initially, it would pay-off well in the long run as skilled workers are quicker at learning and using new technologies.
- iv) The RMG owners should introduce modern human resource practices along with good working environment, better health safety of their workers, minimum wage package compatible to international labor-wages standard and basic recreations and amusement for the workers. These initiatives by the management of RMG factories would make the workers happier and more dedicated to their work. Such sorts of packages would certainly lead to more satisfaction of the workers creating a positive effect on the overall green performance index of the RMG sector in the country.

7.2 Conclusions

There's no escaping from the environment. If we don't treat this well, it will pay back with harsh impacts in future. Buyers, worldwide, are recognizing the appeal for eco-friendly product. Today's business firms are gradually making efforts to recover pollution causing outputs, develop substitutes for non-renewable inputs, and redesign products to reduce material content and energy consumption. They are continually looking forward to developing core competencies in their products and processes that emphasize long-term sustainability throughout the entire supply chain. The stakeholders of garment industry around the world have been striving to innovate new environment-friendly fabrics, chemicals, machineries, equipment as well as improved processes. Thus, to stay in competition, the Bangladeshi garment manufacturers should re-think about the way they are doing business and adapt themselves to the new global trend of greening the businesses.

The RMG Industry is an important and fundamental business sector in Bangladesh. For this ground, companies operating within this industry must then be able to be relevant business strategies that would assist sustain the growth of the clothing or apparel sector through Green Supply Chain Management (GSCM). By means of identifying the current supply chain management practices of some Bangladesh Garment Industries, business areas for upgrading can be acknowledged.

Manufacturers are under increasing pressure to measure, manage and report on their environmental footprint, and this footprint by necessity extends beyond their four walls and into their supply chains. Whether manufacturers need to green their supply chain in order to document their own marketing claims of environmental sustainability, to satisfy customer mandates or to comply with government regulation, the vast amounts of data involved mean that enterprise software is the best way to meet the challenge. For practical reasons, and in order to arrive at data that is accurate and inspires the confidence of downstream trading partners, a centralized ERP solution is a better technology tool for these purposes than a collection of point solutions or, for that matter, manual record keeping.

It has important meaning to implement green RMG supply chain management for the sustainable development of Bangladeshi RMG enterprises and the whole industry by removing the challenges faces in RMG sector, and it offers an ideal management mode for the harmony development of economic benefits and social benefits in Bangladeshi RMG enterprises. But at the same time, to really implement green supply chain management (GSCM), there are works to do, we should not only establish the strategic assets view of green RMG supply chain, but establish organization, cooperation mode and performance management system in the process of implementation. With green supply chain management (GSCM) a collection of many opportunities, it is difficult to decide which potential opportunities to consider and in what ordered. One way is to evaluate the ROI in each case of each activity. However, ROI in case of all activities may not appear positive but net results of all the activities put together are definitely significant both in terms of ROI and intangible benefits.

Though through such a study, it has been revealed that the Bangladeshi RMGs are reluctant to take measures for implementing green supply chain management, due to the complexity of transforming their traditional business into green ones and the size of financial investment required to rationalize the process, they can truly be benefited by the 4R approach – reduce, reuse, recycle, rethink; which will result in cost savings of materials, manpower, and other factors of production. Thus, by implementing cost leadership strategy and practicing green supply chain management, the country's RMG industry will become more competitive on global scale and continue to serve the nation as the top export earner in future.

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