

**Impact of Sustainable Supply Chain on Bangladesh  
Readymade Garments Industry: A case on three factories in  
Narayanganj and Gazipur.**

*By*

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## **Declaration**

It is hereby declared that

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

**Student's Full Name & Signature:**

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## Approval

The thesis titled “Impact of Sustainable Supply Chain on Bangladesh Readymade Garments Industry: A case on three factories in Narayanganj and Gazipur” submitted by Samsuddin Munna (Student ID 21382026) of fall semester, 2022 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Masters in Procurement & Supply Management on 08<sup>th</sup> June 2023.

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## **Ethics Statement**

This thesis on “Impact of Sustainable Supply Chain on Bangladesh Readymade Garments Industry: A case on three factories in Narayanganj and Gazipur” is a new topic for finding out the changes made through initiating sustainability in the supply chain of garments sector of Bangladesh to achieve sustainable development. During writing the thesis, the data was collected from various secondary sources mentioning proper citations and references. This thesis intends to focus on the practices of sustainability that the garments industry does in their supply chain which benefits them economically along with environmental and social impacts. As the economy of Bangladesh is growing rapidly and the garments industry is contributing the lion share of the development through earning foreign revenue, generating large number of employment and especially empowering women, this thesis contributes a bit in the development journey of the country through encouraging the sustainability supply chain.

**Abstract:**

This paper focused on the impact of the sustainable supply chain of readymade garment factories of Bangladesh on sustainable production. This qualitative study was conducted on the analysis of the secondary data available on the newspaper, articles and previous researches on this field. Three garment factories were chosen on the base of their reputation of maintaining sustainability in their supply chain to bring changes in environment, economy and socially. It was seen that these three factories incorporated sustainability in their supply chain basically focusing on attaining the environmental output. It was found also that initiating sustainability in the supply chain contributed to clean environment, sound working ambience and thus made the organizations profitable.

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## List of Acronyms

|       |                                     |
|-------|-------------------------------------|
| RMG   | Readymade Garments                  |
| SSC   | Sustainable Supply Chain            |
| SSCM  | Sustainable Supply Chain Management |
| USGBC | US Green Building Council           |
| ESG   | Environment, Social and Governance  |
| OCS   | Organic Content Standards           |
| TC    | Transactional Certificate           |
| ETP   | Effluent Treatment Plant            |
| PaCT  | Partnership for Cleaner Textile     |
| DBL   | Dulal Brothers' Ltd.                |
| EMS   | Environmental Management System     |
| pH    | Potential of Hydrogen               |
| PFL   | Plummy Fashions Ltd                 |

## **Chapter 1**

### **1.1 Introduction:**

Readymade Garments (RMG) ensured economic development in many developing countries with creating employment, income and securing foreign reserve, thus creating path to sustainable economic growth (Kaizer, 2020). Historically, this sector supported the economy of developing country, specially, in East and South Asian countries; as example, the clothing industry contributed one-tenth of GDP and one-third of export of Japan in 1930, and same advantages was rewarded to some other Asian countries, like, South Korea, Taiwan, Hong Kong etc., (Anderson, K., 1990). With the rising of the readymade garments industry in the late quarter of the 20<sup>th</sup> century, this sector has been contributing substantially in the economic development of Bangladesh (Islam, M. S., Rakib, M. A., & Adnan, A. T. M., 2016). Bangladesh ranked 2<sup>nd</sup> after China in RMG export, becoming a massive source of foreign earnings (Yunus, M., & Yamagata, T. 2012). It is surveyed that Bangladesh would remain as the leading apparel exporter for the next five years (McKinsey Apparel CPO Survey, 2017). A large number of youth and the resulting cheap labour costs set Bangladesh in an advantageous position primarily in the global apparel arena (Yunus, M., & Yamagata, T. 2012). Though this competitive advantage is diminishing due to the emergence of some other East Asian countries, like, Vietnam, Cambodia, Philippines etc., with same advantages of cheap labour (Uddin, M. H., Razzak, M. R., & Rahman, A. A., 2023). Bangladesh RMG sector has been facing immense pressure both in globally and in nationally to remain in strong position. The lower position of Bangladesh position in the global environmental performance index due to Excessive environmental degradation in RMG industry (Sun, et. al., 2020) since RMG industries are marked negatively due to its high resource depletion and environment destruction; as example, producing 1 kg of fabric requires 300 liter of fresh water (Reza, A. K., Islam, M. S., & Shimu, A. A. 2017). Rana Plaza accident in 2013, killed 1100 workers worked in garment sectors, forced Bangladesh to stride in sustainable governance to improve the wellbeing of the workers (Rahman, M., & Moazzem, K. G. (2017). Besides, globally the demand for environmentally friendly product has been rising since it is less harmful to the environment with less carbon emission and to lower the production cost through extending the resource efficiency (Reza, A. K., Islam, M. S., & Shimu, A. A. 2017). Both of these factors put immense pressure on the RMG related sectors to initiate an alternative advantage to remain in



the topmost position. The readymade garment industry of Bangladesh considers introducing Sustainable Supply Chain (SSC) as the new ways to get comparative advantages (Uddin, M. H., Razzak, M. R., & Rahman, A. A., 2023).

Through introducing Sustainable Supply Chain Management (SSCM), Bangladesh has the potential to earn the maximum revenue from the global multi trillion dollar apparel industry. The strides to SSC has already started as RMG sector of Bangladesh has gone through establishing nineties number of green garment factories which is highest around the world as per US Green Building Council (USGBC) (Sarkar, A., Qian, L., & Peau, A. K. 2020). However, there are few academic researches available on the impact of the Sustainable Supply Chain of the readymade garments on the sustainable manufacturing. The current study intends to focus on the impact of SSCM of RMG industry on three areas, such as, Environment, Social and Governance (ESG) to ensure sustainable manufacturing.

## **Chapter 2**

### **2.1 Objective of the research:**

Though SSCM is the buzzword in the industrial arena, it is found that the impact of SSCM of readymade garments on sustainable manufacturing is not properly studied in the research arena as few such researches were available not even in Bangladesh but also in international arena. Some organizations published their own report on sustainability which has lack of adequate data. This ongoing research is likely to contribute to enrich this field through reflecting the impact of sustainability of garments sector in the sustainable manufacturing. The specific objective of the research is to find out the impact of sustainable supply chain of the readymade garments sector in the following areas:

- ❖ The impact of SSC on the overall profit of the organizations.
- ❖ The impact of SSC on the wellbeing of the employers
- ❖ The impact of SSC on the environment.

## **Chapter 3**

### **3.1 Literature review:**

#### **3.1.1 Sustainability and Sustainable Supply Chain Management:**

Sustainability becomes more pertinent in every sphere of life and society due to climate change, resources scarcity, pollution intensity, lack of social rights and poor working environment (Chowdhury, M., et. al., 2013). Report of the World Commission on Environment and Development: Our Common Future (1987) mentioned Sustainable manufacturing is feasible if it prioritizes “the needs of the present without compromising the ability of future generations to meet their own needs”, overcoming the limitations of technology and social organization through improvement and management is a solution for it. Later, the ESG principle comprising of environment, social and governance was set up to form a sustainable manufacturing framework to continue the development without harming the environment (Li, T. T., Wang, K., Sueyoshi, T., & Wang, D. D., 2021).

Sustainable supply chain brings significant impact on manufacturing firms (Uddin, M., et. at., 2022). Sustainable Supply chain is the way of considering sustainability in the process of supply chain that affects the environment, society, economy which comprise the components of supply chain through selecting the source of raw materials, providing sound conditions for workers and reducing the carbon footprint (Queiroz, M. M., Ivanov, D., Dolgui, A., & Fosso Wamba, S., 2022). There are four facets of Sustainable Supply Chain Management : identifying organization’s distinctive initiatives aligned with the overall sustainability strategy, risk management covering the contingency plan for both upstream and the downstream supply chain, organizational culture, like, high ethical standard and expectations, deeply influences the stakeholders, strategy engaging the stakeholders in that process (Carter, C. R., & Liane Easton, P., 2011).

Sustainable Supply Chain Management (GSCM) involves addressing the influence and relationships of supply chain management to the natural environment, incorporating sustainability in purchasing, manufacturing, materials management, distribution, reverse logistics in the business (Hervani, A. A., M. M. Helms, and J. Sarkis. 2005).

### **3.1.2 Sustainability in global apparel industry:**

Apparel industry creates lots of employment globally, but it is also well known as one of the highly polluted industries. Without considering the social impact, like, poor salary and unhygienic working condition, the textile industry after the oil industry is the 2<sup>nd</sup> largest polluting industry in the world, as example, producing a T-shirt and a pair of jeans used 5000 gallons of water (Gupta, R., Kushwaha, A., Dave, D., & Mahanta, N. R. 2022). Many environmental NGOs keep paramount pressure on the global renowned brands to reduce the use of hazardous chemicals in their supply chain (Paulraj, A., Chen, I. J., & Blome, C., 2017). Incorporating sustainability into the supply chain is becoming a key priority for many textile and apparel companies. Typical approaches include sustainable product strategy, sustainable investment, sustainable performance evaluation, corporate social responsibility, and environmental management system adoption, which contribute to the development of sustainable supply chain management in the textile and apparel industry (Shen, B., et. al., 2017). Many renowned brands like Nike, Puma, Adidas and H&M have agreed to reduce the use of hazardous chemicals in their production globally (Shen, B., et. al., 2017). H&M, one of the largest clothing brands, set their seven environmental mottos, like, “provide fashion for conscious customers”, “choose and reward responsible partners”, “be ethical”, “be climate smart”, “reduce, reuse, recycle”, “use natural resources responsibly”, “strengthen communities” to save water, soil and air (Książak, P., 2017). H&M chose the suppliers using cotton made of organic sources and recycled materials. They also selected the factories using water treatment plants by setting the environmental standards. The suppliers are constantly audited by third party audit following the standards of the Textile Exchange Standards or Organic Content Standards (OCS) and transactional certificate (TC) (Shah, R., 2011).

Fast fashion, producing cheaper product with latest design, is responsible for environmental pollution. Some of the companies, like, Patagonia, work against that fashion theme with product of high durability, though, producing a durable cloth needs more water and energy, considering its prolonged life gives some sort of sustainability in the clothing industry (Shen, B., et. al., 2017).

Esquel, a Hong Kong based apparel company, world's biggest shirt producer, introduced sustainability in all of the sphere of its supply chain from cotton farming to sell product through making more skilled worker, increasing productivity, introducing automation, investing in cotton farming, encouraging innovation etc., (Gupta, V., Arora, M., & Minhas, J., 2020). Investing in sustainability enable Esquel to generate USD 1.3 of sale annually, attracting the fashion giant Marks & Spencer, Ralph Lauren, Tommy Hilfiger and NIKE to buy their product (Peleg-Gillai, B., 2007).

Esquel not only considered the environmental impact of company's production but also the social impact through setting four different pillars, like, people, planet, product and community in its core value. Having a group of ninety thousand people in the company they do not focus on the labour cost only, rather, they emphasized on their productivity through providing technical education to the workers which result in increasing the salary of the workers (Gupta, V., Arora, M., & Minhas, J., 2020). Esquel used natural cotton and yarn, those who were involved in cultivating those products this company initiated a microfinance program to support them financially (Peleg-Gillai, B., 2007).

Esquel established a university with four faculties, business and management, design, humanity and social sciences, science and engineering for its workers. Replacing the hazardous works by robots and drones, Esquel sets up a dedicated group to research in technology and innovation. They also found out the innovative solution of their worker's problem, as example, considering the parking scarcity inside one of the factories, the authority made an apps of ride sharing among the workers which reduced the number of using personal vehicle significantly (Gupta, V., Arora, M., & Minhas, J., 2020).

Esquel set its priority to reduce water and energy consumption that could manage to decrease the overall water consumption by 64% and energy consumption by 45% per piece of cloth, establishing a water treatment plant capable of processing more than 5000 tons of water daily. They also used cotton and yarn produced in their farm instead of chemicals in bleaching process which reduced the energy and water use significantly in producing T-shirt (Patnaik, S., & Tshifularo, C. A., 2021).

### 3.1.3 Sustainability in readymade garments industry of Bangladesh:

Ready Made Garments (RMG) sector has been playing a significant role in Bangladesh's development by holding 81.81% of total export, worth USD 42.613 billion<sup>1</sup>, in 2018, generating employment of 4.4 million workers of which 80% are women (Rahman, M., et. al. 2019). Last three decades this industry is contributing the country's economy in generating employment and earning foreign revenues. Though this industry is well known for its extreme pollution, power consumption and waste (Uddin, M. et. al., 2022). It is established that textile industry is one of the most polluted industries around the world which is responsible for 5% of all landfill waste and 20% of all fresh contaminated water (Murshed, M., et. al., 2019).

Readymade garment sector in Bangladesh is facing a great deal of challenges due to labor unrest, violation of human rights, poor wages, poor safety measures and hazardous working environment; environmental pollution, political instability, interruption in utility supply especially power shortage, inefficiency in customs and port management, increased lead time, exchange rate fluctuation, warehousing problem, disruption in supply on time of fabrics and other accessories, increased competition, inefficiency in operation, etc. (Chowdhury, M. M. H., Quaddus, M. A., & Jusy, U. N. 2018).

Being a prime user of water, RMG sector pollutes the water most which creates environmental problem. High amount of water footprint in this sector accounting for 1.8 billion m<sup>3</sup> annually cause the depletion of ground water level, as example, producing two pairs of jeans require 120 liters of water(Awal, M., et. al., 2021). The RMG zone, Dhaka, Gazipur, Savar, Narayanganj has been facing severe problem due to dropping ground water level (Hossain, L., & Khan, M. S. 2020). It is predicted that RMG industry would dispose 20,300 crore liters of untreated water into the water bodies from 2021 (Awal, M., et. al., 2021). It is estimated that only 1,376 textile mills out of 6500 mills has installed Effluent Treatment Plant (ETP), considering the effective numbers of EFT the number will be much lower (Hossain, L., Sarker, S. K., & Khan, M. S., 2018). Green technology is not only preserving the environment but also financially benefited for the factory as it minimizes the energy uses by 40% and water consumption by 30% (Awal, M., et. al., 2021).

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<sup>1</sup> [https://epb-bangladesh-export.com/portfolio\\_page/apparel-2/](https://epb-bangladesh-export.com/portfolio_page/apparel-2/)

'Partnership for Cleaner Textile (PaCT)' a joint venture of brands and factories working for responsible consumption and production, a project of International Finance Corporation, working with 400 factories in Bangladesh to decrease overall energy cost and greenhouse gas emissions for a decade, saved half a million tons of greenhouse gas and 29 billion liters of water. PaCt program also secure investment in the garments industry through advocating with stakeholders and the Bangladesh Bank, establishing a 200 million dollar green transformation fund by Bangladesh Bank in water and energy technology.

#### **3.1.4 Conclusion**

Though SSC is frequently used in industrial sector very often, its implication in apparel sector witnesses a clear progress in recent time. Being a RMG hub, Bangladesh puts the emphasis on SSCM to improve the efficiency in this sector along with preserving the environment. However, in academic area few researches are conducted so far digging out the impact of SSCM on the development of this sector. This ongoing study is a stride to enrich the volume of researches of this sector.

## **Chapter 4**

### **4.1 Methodology:**

The study focuses on the impacts of sustainable supply chain in the sustainable manufacturing in readymade garments industry of Bangladesh. The aim of the study is to examine the impact of Sustainable supply chain and how it contributes in attaining sustainable manufacturing. This chapter reflects on the approaches taken to accomplish this study.

**Research methods:** The research was evolved on secondary data of some selected readymade garments, qualitative method was used to carry out primary research. Secondary data was incorporated from the literatures, articles, journal, articles, websites etc., to accomplish this study.

**Target Group:** Three factories were selected from two districts (administrative tier), namely Narayanganj and Gazipur. These areas were chosen because of having more than half of the total garments in Bangladesh.<sup>2</sup> The factories was chosen on the basis of their reputation nationally and globally for their attaining sustainability in their operation and maintenance.

#### **Method of analysis:**

The secondary data was categorized to find out similarities or differences based on the output. 'Between-subject comparison' was used to find out the differences on same topic of the sustainable supply chain.

#### **Limitations:**

The main limitation of the study was it did not represent the overall picture of the readymade garments industry of Bangladesh because of limited sources. There are more than 4,500 readymade garments in the country, among these factories only three was selected. Selecting of factories were chosen randomly because of time constraints. Difficulty was faced to getting data of those factories. Highly dependent on the websites of the factories was the prime constraint that affected the purpose of the study.

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<sup>2</sup> <https://rmgbd.net/2021/12/no-of-export-oriented-rmg-units-3485-workers-27-lakh/#:~:text=Of%20the%203%2C409%20factories%2C%201%2C351,Narayanganj%2C%20and%20386%20in%20Chattogram.>



## **Chapter 5**

### **5.1 Result and analysis:**

To find out the impact of sustainable supply chain, three garments factory were selected on the basis of their global reputation of maintaining sustainability in their supply chain; they are: Dulal Brothers' Ltd. (DBL) Group, Pacific Jeans LTD, Plummy Fashions Ltd. In this chapter the supply chain of these factories is studied from the angle of sustainability through the secondary data available on the articles, website, and newspaper etc. Simultaneously the impact of this SSC on the environment, the overall profit of the organizations and the wellbeing of the employers are analyzed in this chapter.

### **5.2 Dulal Brothers' Ltd. (DBL):**

Dulal Brothers' Ltd. (DBL), a Gazipur based knit garments manufacturing factory in Bangladesh, started its journey in 1991, extended its operation in multifaceted sector including cotton spinning, fabric knitting, dyeing, finishing and garments cutting, sewing, washing, packaging, and exporting activities (Haque, et. al., 2018). At present, there are 19 different textile and garment factories in different areas of the country with 30,000 employees (The Daily Star, 2017).

#### **Economic Sustainability:**

Bangladesh based DBL group, one of biggest suppliers to globally reputed clothing brands, like, H&M, Marks and Spencer and BESTSELLER, having 43000 workers in its factory, came with a huge investment, accounted \$2.4 million, to address sustainability in its supply chain in 2013 and 2014 respectively, reaping its benefits within 06 months (The Daily Star, 2017). This factory managed to save one million dollar yearly in dyes and chemicals from 2014 as a result of initiating green supply chain in all of its operation (Haque, et. al., 2018). In 2022, DBL exported worth USD 480 million and the annual turnover was more than USD 1 billion. <sup>3</sup>

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<sup>3</sup> <https://www.thedailystar.net/supplements/bangladesh-business-awards-2021/news/rise-apparel-mogul-3116421>

The company saves about \$4.67 million from its lower consumption of water, dyes and energy and lower carbon emission (Haque, et. al., 2018). DBL exported garment items worth \$400 million in 2016 and was fixing target to hit the \$1 billion-mark by 2020 (The Daily Star, 2017). For its sustainability, this group has managed to secure foreign investment also. In 2022, UK's Development Finance Institution and Impact Investor invested USD 52 million in this factory (Business post, 2023). DBL expanded its operation beyond the boundary of the country, investing USD 100 million to set up a garments factory in Ethiopia in 2016 (Haque, H. et. al., 2018).

### **Environmental sustainability:**

DBL group formulated Standard environmental policy along with environmental health and safety policy to reduce carbon emission and water consumption, to generate less waste through using less energy (Haque, H. et. al., 2018).. An Environmental Management System (EMS) team is formed to look after the operation of Effluent Treatment Plants, waste management system etc. (DBL, 2021).

DBL group worked to improve its water steam line through proper insulation to reduce energy and water consumption in its dyeing sections. As a result, producing one kg of dyeing fabrics required 50% less water, equivalent to 60 liters of water, and, less dyes and less chemicals (DBL, 2021). It is estimated that producing a kg of cloth requires 170 litres of water in the garments industry; DBL save 1.3 billion litres of water through incorporating sustainable machineries, like, boilers, dyeing and rinsing machine etc., between 2012 to 2016 (Sarker, S. & Afrin, S., 2021). This company used Stenter machine with Eco booster in its fabric finishing, saving 1,741,815 KWh of energy through consuming low amount of water. In addition, addressing rain water harvesting, the company used 1.86 crore litres of rainwater and saved 2.12 lakh of salt for production of 3.10 lakh kgs of fabrics between May 2016 and September 2017 (The Daily Star, 2017). In addition, introducing water saving technology, like, e-flow technology, used pressurized air in dyeing to save water in the production. There were two ETPs running with the capacity of 11,500 cubic meters for treating the wastewater in fabric dyeing (DBL, 2021).

The company managed to reduce 26.2% of GHG emission in a year in its production (Sarker, S. & Afrin, S., 2021). To save electricity DBL garments used servo motors, use electricity when the needle works, instead of traditional clutch motors which use energy even in standby mode (DBL, 2021).

Using Exhaust gas boilers, a heat recovery system used heat produced from the generator, helped the company to save 330 million normal cubic meter of natural gas in a year (DBL, 2021). Through setting up solar panel, 1% of total energy generated from renewable sources and fixed the target to generate 10MW electricity through solar panel by 2025 (Sarker, S. & Afrin, S., 2021).

A number of 9,179 plants were planted in 2021 for a green environment inside the premises of the factory (DBL, 2021).

DBL group chose the suppliers capable of generating organic cotton to reduce the negative impact in the environment, ensuring 39% of total yarn production from organic cotton (DBL, 2021).

### **Social sustainability:**

DBL group opened a fair price shop, named as Bandhan, help the employees to buy product at lower price comparing with the market, selling more than 400 essential commodities with 5-10% subsidy which supported the customers to overcome their economic challenges (Salvetti, N., & Nijhof, A., 2018). Especially they were selling the sanitary napkins to the women employees with 71% lower price than the usual price, assisting the women to buy with minimum price to ensure the menstrual health (DBL, 2021).

DBL allowed 112 days of paid maternity leave for its female employee, keeping an extra break for 60 minutes for breastfeeding (DBL, 2021). A children education support program was initiated to support the children of the employees, 56 students were under the benefits of the program in 2021 (Salvetti, N., & Nijhof, A. 2018). DBL garments are dedicated to ensure 1:1 ration of male to female in the future, ensuring currently 65 % of male employees in against 35% of female. To ensure the participation of people with disabilities, DBL has a vision to include 1% of total working force from that group; at present a number of 211 persons with disabilities are working in

different units, and we aim to create a more inclusive environment by providing employment to more in the upcoming years (DBL, 2021).

DBL formed a Code of Conduct mentioning some specific standards on labour practices, human rights, social and environmental obligation which must be obeyed by the suppliers to make any business with the DBL, a DBL compliance team is constantly monitoring whether any deviation is occurred in the process (DBL, 2021).

### **5.3 Pacific Jeans Ltd:**

Pacific Jeans Limite is a Chattogram based manufacturing company maintaining international standard, established in 1984, transformed in an excellence center of high quality jeans design and manufacturing.<sup>4</sup> Pacific Jeans was the pioneer of setting up denim laundry in Bangladesh. They started manufacturing jeans for an Italian brand in 1986, gradually becoming one of the leading premium jeans producers. There are 28000 employees working in the factories run by them, producing over 40 million jeans annually for the global customers of more than 30 countries (Samsul, A. et. al., 2022).

#### **Economic impact:**

Pacific jeans gradually invested to achieve environmental sustainability and to improve the lives of its employees. Pacific jeans started their exporting worth USD 12,000 in 1984 to Italy, now becoming one of the fastest-growing garment exporters in Bangladesh; this company exports worth of \$450 million in the year of 2020-21 which was \$325 million in 2017-18, inching to achieve its export target of \$500m in 2023 (Fashionating world, 2022). It has experienced exponential growth in expanding their business in six other units, namely, Pacific Jeans, Jeans 2000, Universal Jeans, PACIFIC Fashion, Pacific Accessories, and Pacific Casual, home of 35,000 people (Barua, D., 2022). Pacific jeans set their target to export worth USD 100 billion in 2030 (The Business standard, 2023).

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<sup>4</sup> <https://www.pacificjeans.com/>

As six reputed clothing brands, namely, Nike, Puma, H&M, Marks & Spencer, Zara and Adidas, were the signatory of Zero Discharge Hazardous Chemicals (ZDHC) of not using the carcinogenic dye in their product, and this is strictly followed by their suppliers (Textile focus, 2020). Being a registered in ZDHC, Pacific jeans went through 3<sup>rd</sup> party auditing to prove their compliance which increased their scope to sell their product to aforesaid clothing brands (Pacific jeans, 2023). Pacific jeans has set up a solar power plant of generating 3.5 mw electricity, 10% of its electricity requirement, saved electricity of tk 10 lac a month (The business standard, 2022).

### **Environment Sustainability:**

A study conducted on the measuring the standard of Effluent Treat Plant of few factories of Bangladesh RMG sector on some parameters, namely, 'chemical oxygen demand', 'biochemical oxygen demand', 'dissolved oxygen', 'Potential of Hydrogen (pH)', 'total dissolved solid', 'total suspended solid', and 'Arsenic'; the overall performance of Pacific jeans was satisfactory (Uddin, M. H., Islam, M. S., & Ayas, A. M, 2018). The waste water being treated in ETP carried the pH value 7.73 which was better than the standard value, pH8.00, set by the Department of Environment (DoE) of Bangladesh whereas total dissolved solid 712 Mg/l in against the standard of less than 2100, total suspended solid was equivalent to DoE's standard 150 Mg/l whereas; dissolved Oxygen, chemical oxygen demand, arsenic level of Pacific jeans were also followed the nationally set standard (ibid: 31).

Pacific jeans have planned to reduce their carbon emission by 65% within 2030, setting up solar plants to generate 30 MW electricity daily, which is now 8.5 MW, within that period (The Business standard, 2023). The factory took the initiatives, like, installing 70 KW/H Solar Power plant for lighting in the production floor, installing 100% LED light, installing servo motors in the sewing machine, installing inverter in the dryer and air compressor, installing modern boiler running with exhaust of gas operated generators, installing condense steam recovery system, using low curing temperature resin for wrinkle, using cold enzymes to save steam etc., to save energy consumption and to introduce green energy (Samsul, A. et. al., 2022).

Pacific fashion brought the changes, like, rain water harvesting, installing RO with UV lamp for clean drinking water for workers, installing water flow meter in the outlet and inlet of production process & others areas, spraying Enzyme in machine to reduce water consumption (Pacific jeans, 2023).

#### **Social sustainability:**

The factory prioritized the wellbeing of the employees by taking the decisions, like, provident fund, festival bonus, paid maternity leave, group insurance, production incentive bonus, attendance bonus, yearly earn leave encashment, transport allowance, food allowance, subsidized transportation, subsidized tiffin etc., for its employee. In addition, the company improved the medical facilities of the employees by taking day care facility, free eye care facility, yearly routine medical checkup, blood donation program etc., (Pacific jeans, 2023). To improve the wellbeing of the employees the Pacific jeans authority took the initiative of prohibiting the forceful overtime through mentioning that overtime must be voluntary and no worker are allowed to do overtime more than 60 hours in a week where women workers cannot be engaged at work after 8 P.M (Sultana., M. 2019). Considering the retirement life of the workers the pacific jeans limited deducts the 8.33% of each month salary of the workers and adds another same amount of money from the company's fund which together deposits to the bank account of a separate trustee board (Pacific jeans, 2023). Pacific jeans addressed mandatory maternity leave for 20 weeks twice the lifetime of the female workers (Sultana., M. 2019).

#### **5.4 Plummy Fashions Ltd:**

Plummy Fashions Ltd (PFL), located in Narayanganj, just 20 kilometers away from Dhaka. This organization has been in the operation since 2007 with the home of 2000 workers capable of

produce 40000 pieces per day; though bit new, they got the tag of being one of the greenest factories in the world as they are certified as LEED platinum from US Green Building Council.<sup>5</sup>

### **Economic Sustainability:**

From the very onset their journey, Plummy Fashions addressed sustainability in the core of their supply chain; as a consequences world's renowned brand, namely, Tommy Hilfiger, Juicy Couture, Calvin Klein, ZARA, Next, Dkny, Sergio Tacchini, Okaidi, Fila etc., are their customer so far.<sup>6</sup> Managing sustainable supply chain this company successfully managed to reduce energy use by 40%, water use by 41% and carbon footprint by 35% (Textile focus, 2016).

The factory chose the machineries having servo motors to minimize the power usages to reduce the energy consumption by 50% in main factories (Textile focus, 2016). Besides, LED lights replaced the incandescent to reduce the power uses to 80% in office area, having a sensor system in those lights maintained no power consumption in no business hours. 13% of total power came from the solar panel with capacity of 65KW which contributed to generate 110 MWH electricity each year.<sup>7</sup>

The factory applied all the possible measures, like, fixing water flow of 1.5 litre/minute, setting up urinals having auto sensor, to deduce the water usages by 60% to follow the standards set up by US Energy Policy Act which also satisfied the buyers (Textile focus, 2020).

### **Environmental sustainability:**

PFL used ingredients having 'high solar reflection index' in making roof which reduce the temperature in the factory (Textile focus, 2016). In addition, they set up 'light color reflecting paving block' in pavements or any other hard landscape to decrease the thermal impact on the workers and the surrounding areas (The business standard, 2023). Half of the factories' areas remained free space with green gardens, water bodies and fountains. Plantation of a great amount of local trees not only enhanced the greenery of the site but also created a zone for the

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<sup>5</sup> <https://www.development2030.com/plummy-fashions>

<sup>6</sup> <http://plummyfashions.com/our-customers/>

<sup>7</sup> <http://plummyfashions.com/>

workers and the visitors to sit and to spend their leisure time, selecting the drought resistant plants needed less water in irrigation.<sup>8</sup>

A carbon di oxide sensor was positioned in the factory to understand the emission, depending the level of emission fans were switched on to provide fresh air (Textile focus, 2023). The factory emphasized on using daylight through setting up windows and free space. In addition, sufficient number of prismatic dome skylights were placed to maximize the day lighting. PFL has a source of surface water where rain water is stored, thus, saving the water. Besides, the factory set up a mechanism to store every single drop of water in the harvesting tank which is used in bathroom and in irrigation (Awal, M., Hossan, M., Aliullah, M., & Saidy, S. 2021).

### **Social sustainability:**

Plummy fashions encouraged their workers to use bicycle or walk on foot instead of using car, bus or any other vehicles to save the environment. After cycling or walking, employees need to take a shower or get fresh, for this the company arranged a standard washing facilities for them (Hossain, L., Sajib, M., & Hafiz, E. 2017).

Compliance the rules of United States Green Building Council this company built a lifestyle centre with green architectural design for ensuring safest working environment for its employees where carbon emission is in minimum level (Textile focus, 2016). This centre ensured a small hospital of 6 beds with two full time doctors and nurses, a child care centre with the presence of trained care giver, an indoor amusement corner with TV, food zone where prices are subsidized, a wide prayer room, a training room with modern equipment etc., to create a congenial working environment (Awal, M., Hossan, M., Aliullah, M., & Saidy, S. 2021).

PFL established an incorporated fire protection system, setting up 250 plus fire detector around the garments which was managed by an individual control room to identify the location and to start evacuation if fire would have occurred.<sup>9</sup> There were fire pump connected to a separate water tank and adequate fire hydrants in the factory, water sprinklers were set up in the

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<sup>8</sup> <http://plummyfashions.com/environment/>

<sup>9</sup> <http://plummyfashions.com/compliance/>



warehouse to protect from the fire accident.<sup>10</sup> The factory built only two storied building for safe and prompt evacuation in any accident with having five emergency exit in an individual floor. The factory opened a fire fighting unit with trained staffs, mandatory fire drilling was conducting in a regular break (Textile Focus, 2016).

### **5.5 Comparison of the sustainability of the organizations:**

Amongst these three factories, DBL invested hugely on the sustainability which brought economic benefit for the organization, attracting foreign investment and expanding the organization outside Bangladesh. This company secured profit through less consuming of resources, like, gas, electricity, water, dye etc., and introduced green energy, like, solar power plant, which on the one side abate the expenditure and on the other side protect the environment through minimizing carbon emission. DBL installed energy efficient machineries and worked on improving the efficiency of the machineries through proper management which reflected in its production. DBL focused on harvesting rain water as well as introducing ETPs and other water saving technology. This organization reduced carbon emission significantly through using green technology and planting trees. In terms of social sustainability, the company emphasized on the wellbeing of its employee by installing fair price shop, addressing maternity leave for the women. Besides, special students benefit program were addressed for the family members of the workers. For greater inclusiveness a quota was there for the workers with disabilities.

Next selected organization, the Pacific Jeans limited, the oldest amongst the three companies. This company gradually invested to bring sustainability in its operation, targeting huge turn over with next few years. Through maintaining sustainable supply chain Pacific jeans become the supplier of some of the world's biggest clothing brands. Collecting rain water was the priority of

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<sup>10</sup> <http://plummyfashions.com>

this organization along with setting up EFTs to make waste water reusable. To minimize carbon emission to a certain level, they installed solar plants, power saving machineries and green energy. In terms of social sustainability, Pacific jeans considered addressing many social schemes for the employees along with introducing the voluntary overtime. A dedicated medical clinic for the employees were the special addition in the organization.

The latest company of this studies, Plummy fashions, the newest amongst the three companies but they were leveled as the greenest in this group as they successfully managed to use the green materials in the installing of the factories. Plummy fashion could able to reduce energy and water uses in half comparing with other factories. Green energy, energy efficient machineries and using green materials made the company attractive for the global clothing brands as well as provide economic benefits. Apart from having EFTs along with a natural water body and mechanism for saving each drop of rain water were the ways for minimizing the water uses in the factory. Keeping free spaces and a green zone for the visitor and the workers were the special addition in the company. Installing sensor for detecting carbon emission made the organization aware for the emission. For the social sustainability the company took the initiative for the safety and medical facilities for the employees.

Their sustainability practices and its impact are presented below:

| Criteria                      | Type of impact | Dulal Brothers' Ltd  | Pacific Jeans Ltd  | Plummy Fashions Ltd   |
|-------------------------------|----------------|--|--|---|
| Expansion of the organization | Economic       | 43000 employees are working there in 19 different textile; investing USD 100 million to set up a garments factory in Ethiopia in 2016. | 28000 employees working in the factories producing; over 40 million jeans annually for the global customers of more than 30 countries. | 2000 workers capable of produce 40000 pieces per day as it is comparatively new in this area. |
| Export                        |                | Exported worth USD 480 million and the annual turnover was more than USD 1 billion in 2022.  | Exported \$450 million in the year of 2020-21  | No data available.  |
| Foreign investment            |                | USD 52 million from UK   | No data available.   | No data available.  |

|                                 |             |  |   |   |
|---------------------------------|-------------|--|---|---|
| Reputed foreign buyers          |             | H&M, Marks and Spencer and BESTSELLER  | Puma, H&M, Marks & Spencer, Zara and Adidas   | Tommy Hilfiger, Juicy Couture, Calvin Klein, ZARA, Next, Dkny, Sergio Tacchini, Okaidi, Fila  |
| Economic benefits               |             | Save one million dollar yearly in dyes and chemicals;<br>Save \$4.67 million from its lower consumption of water, dyes and energy and lower carbon emission.   | A solar power plant of generating 3.5 mw electricity, 10% of its electricity requirement, saved electricity of tk 10 lac a month; installing 70 KW/H Solar Power plant for lighting in the production floor, installing 100% LED light.   | No data available.  |
| Reduce water/energy consumption | Environment | Producing one kg of dyeing fabrics required 50% less water; saving 1,741,815 KWh of energy; used 1.86 crore litres of rainwater and saved 2.12 lakh of salt for production in 18 months in 2021; save 330 million normal cubic meter of natural gas in a year; 1% of total energy generated from renewable sources | rain water harvesting, installing RO with UV lamp for clean drinking water for workers, installing water flow meter in the outlet and inlet of production process & others areas, spraying Enzyme in machine to reduce water consumption; | reduce energy use by 40%, water use by 41% and carbon footprint by 35%; LED lights replaced the incandescent to reduce the power uses to 80% in office area; 13% of total power came from the solar panel with capacity of 65KW which contributed to generate 110 MWH electricity each year; the factory set up a mechanism to store every single drop of water in the harvesting tank. |
| ETP                             |             | Sufficient ETPs.   | Waste water being treated in ETP carried the pH value 7.73 which was better than the standard value   | Sufficient ETPs.  |

|                                    |        |  |  |  |
|------------------------------------|--------|--|--|--|
| Reduce GHG/temperature emission    |        | 26.2% of GHG emission  | Planned to reduce their carbon emission by 65% within 2030   | High solar reflection index' in making roof which reduce the temperature in the factory; light color reflecting paving block' in pavements or any other hard landscape to decrease the thermal impact;   |
| plantation                         |        | 9,179 plants were planted in 2021  | No data available  | Planted a great amount of local trees  |
| For the wellbeing of the employees | Social | Selling more than 400 essential commodities with 5-10%subsidy in a Fair price shop for employees; 56 students who are children of the employees were under the benefits of the education scholarship program in 2021 | Provident fund, festival bonus, paid maternity leave, group insurance, production incentive bonus, attendance bonus, yearly earn leave encashment, transport allowance, food allowance, subsidized transportation, subsidized tiffin | Built a lifestyle centre with green architectural design for ensuring safest working environment   |
| Medical facilities                 |        |  | Medical facilities of the employees by taking day care facility, free eye care facility, yearly routine medical checkup, blood donation program  | ensured a small hospital of 6 beds with two full time doctors and nurses, a child care centre with the presence of trainedcare giver, an indoor amusement corner with TV, food zone where prices are subsidized, a wide prayer room, a training room with modern equipment etc., to create a congenial working environment |

|                |  |  |  |                    |
|----------------|--|--|--|--------------------|
| Women friendly |  | Selling the sanitary napkins to the women employees with 71% lower price; allowed 112 days of paid maternity leave for its female employee, keeping an extra break for 60 minutes for breastfeeding. | Mandatory maternity leave for 20 weeks twice the lifetime of the female workers. | No data available. |
|----------------|--|--|--|--------------------|

Source: Author (2023).

**5.6 Limitation of the study:**

It can be concluded that both of three factories took the initiative to bring SSCM in their operation, basically, focused on bringing the environmental sustainability. The challenges in bringing changes from a traditionally polluted industry to minimize carbon emission were not focused on study due to lack of data. Economic sustainability were not properly assessed as the data sources were not enriched with financial data. Social sustainability only focused on the wellbeing of the employees, the greater inclusion from the underprivileged or people with disabilities group were not reflected in this study.

## **Chapter 6**

### **6.1 Conclusion:**

The study was based on the impact of sustainable supply chain of readymade garments in the overall sustainable manufacturing of the industry. Basically, this impact was viewed through profit of the organization, positive externalities on the environment and wellbeing of the employees. Three garments were selected where it was found that they brought necessary changes, like, reducing water consumption, introducing green energy, installing green technology, using less harmful chemicals, keeping free spaces inside the factory area which contributed to improve the environment and to reduce the carbon emission. In addition, these companies emphasized on improving the wellbeing of their employees through limiting the working hours, keeping the voluntary overtime, providing vehicles facilities, improving the working environment, providing medical facilities, addressing maternity leave, incorporating provident fund & pension. Both of these initiatives supported the companies to be benefited economically as their initiative to sustainability attracted many foreign brands buy their product and expanded their business inside the country and beyond the border also.

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