University of Southampton

Faculty of Social Sciences

Southampton Business School

Supply Chain Sustainability Integration: The Case of Textile and Ready-Made Garment (RMG) Industry of Bangladesh

Submitted By

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Abstract

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Being second biggest exporter of Textile and RMG products, Bangladesh has been facing challenges to manage sustainability issues in the industry for ages. As sustainability literature in the sector mostly focuses on individual dimension and there is gap of integrated approach, this study tries to identify sustainability challenges in the environmental, social, economic, and macro-infrastructural dimensions. Respective initiatives taken to mitigate those issues along with the sustainability solutions are also addressed accordingly. Following qualitative framework, an integrated model of sustainable textile supply chain management has been proposed. Based on extensive literature review, a semi structured interview protocol was developed to explore the pertinent themes by interviewing relevant stakeholders. The transcribed data are analysed using NVivo to derive the results. In exploring sustainability outlook, triple bottom line (TBL) lens has been used as the guiding theoretical backdrop along with stakeholders' theory, stakeholders 'salience model, and stakeholders' resource-based view (SRBV).

Result shows that the industry has major gaps in sustainability practices in all dimensions. In social side, workers salary is in sub-human level, skill level of the industry and workers is low, health and safety issues are overlooked, working environment is not standardized, workers are overburdened and overstressed. In environmental front, there is no chemical management guideline, monitoring of Effluent Treatment Plant is insufficient, subcontracting units do not maintain environmental obligations, untreated wastewater is released to the water stream and there is no ground water extraction policy yet. In economic perspective, the industry is facing challenges in getting fair prices from the brands, there is gap in value addition, product and market diversification is in infancy stage. In macro environmental consideration, raw materials supply is import-dependant, crisis of energy supply is a regular phenomenon, logistics and transportation system is underdeveloped, there is corruption and capability gap from the regulatory side. The findings also provide some positive practices. The industry has gone through massive retrofitting processes after Rana Plaza collapse. Current working environment is much safer and workers welfare initiatives are in-place. Export-oriented factories are now environmentally concerned, many of energy and resources saving initiatives have been taken, number of LEED certified green factories from Bangladesh are leading the global chart. Surveillance and monitoring mechanism from government agencies, brands, and associations have increased manifolds.

The study incorporates solutions to each dimension of the existing sustainability challenges. Skill enhancement in line with automation, ensuring workers wellbeing, salary adjustment, health insurance and compensation can be offered as social solutions. Circular economy adoption, biological ETP, digital and tech-based monitoring, solid waste infrastructure, greening initiatives can make the industry environment friendly. For economic sustainability, better price negotiation, high-end diversified production, lead time minimisation, and positive global branding initiatives should be taken. This research offers a broader sustainability outlook of Bangladeshi RMG supply chain paving a pathway to reach the vision of exporting 100 billion USD by 2030. For which, infrastructure, communication and transport, port facilities, supplies and concerned stakeholders' effort must be coordinated along with factory-oriented initiatives.

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Research Thesis: Declaration of Authorship

Saiful Islam

Title: *Supply Chain Sustainability Integration: The Case of Textile and Ready-Made Garment (RMG) Industry of Bangladesh*

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my original research.

I confirm that:

1. The work was done wholly or mainly while in candidature for a research degree at this university;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this university or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission.

Signature: Date: 23.12. 2023

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Acronym Used in This Dissertation

ADB	Asian Development Bank
(C)ABS	Chartered Association of Business Schools
BGMEA	Bangladesh Garment Manufacturers and Exporters Association
BKMEA	Bangladesh Knitwear Manufacturers and Exporters Association
BIDA	Bangladesh Investment Development Authority
CSR	Corporate Social Responsibility
CM	Cost of Making
DoE	Department of Environment
DIFE	Department of Inspection for Factories and Establishments
EPB	Export Promotion Bureau
ETP	Effluent Treatment Plant
GDP	Gross Domestic Product
GRI	Global Reporting Initiatives
ILO	International Labor Organization
ISSCM	Integrated Sustainable Supply Chain Management
MNC	Multinational Corporation
NGO	Non- governmental Organization
RMG	Ready-made Garments
SLR	Systematic Literature Review
SSCM	Sustainable Supply Chain Management
SDG	Sustainable Development Goals
SRBV	Stakeholder's Resource Based View
TBL	Triple Bottom Line
WTO	World Trade Organization

Chapter 1: Introduction

1.1 Introduction

Supply chain has been one of the most significant considerations for business world for ages. With the emergence of extensive impact of supply chain in modern business operations, sustainability issues have started to gain increased focus among the practitioners and academicians (Turker & Altuntas, 2014). The stakeholders of a business firm are now diverse in nature and thus their demand varies. In this new millennium, stakeholders can influence the concerned firm or business entity to be sustainable in their performance towards all the dimensions: environmental, social and economic and presumably the supply chain operation is in the centre of this sustainability discussion (Chacón Vargas et al., 2018; Seuring & Müller, 2008). The management of these three dimensions and their respective impact on the supply chain of the enterprises are usually referred to Sustainable Supply Chain Management (SSCM) (Carter & Rogers, 2008). In simple words SSCM is the integration of Supply Chain Management (SCM) and Sustainability (Turker & Altuntas, 2014). To realize the comprehensive understanding of the concept, the definition developed by Seuring and Muller (2008) seems logical-

> *"The management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements''(Page-1700).*

According to this, management needs to decide which resources to be allocated for meeting the sustainability requirement as expected by the customer and other stakeholders. Although this standardized understanding of the SSCM is quite relevant, different businesses must have different way of dealing with the supply chain issues and this variable nature of business and industries reasonably lead to undertaking different supply chain approach from their internal point of view (Brandenburg et al., 2019; Turker & Altuntas, 2014). Thus, it can be said that a sectoral and industry specific perspective of the SSCM is necessary for specific understanding and applicability. For this reason, this research endeavour is aimed to gain deeper knowledge and broader insights of SSCM in terms of applicability and relevance in the Clothing industry commonly known as textile and Ready-made Garment (RMG). As the apparel industry has become significant globally and the giants of apparel businesses are becoming more reliant on the developing nations for supplying the final products, sustainability issues have gained

enormous attention (Köksal et al., 2017). As awareness of environmental degradation and human rights has become a vital issue for business of any kinds around the globe, the clothing industry in Bangladesh is of no exception.

From the time of its emergence, Bangladesh has gradually become dependent on the Garments sector for foreign remittances and export earnings. Greater economic stability, better GDP growth and stronger per capita GDP with other economic indicators are greatly influenced by Ready Made Garment (RMG) industry for Bangladesh as RMG sector accounted for more than 10 percent of the country's total GDP (World Bank, 2019b). As the country's major export earnings (84.21%) comes from this industry alone, the private organization and investors, independent entrepreneurs and Bangladesh Government have special concerns for the efficient operation and steady growth of the sector. Gradually, the country has turned into a major player in international market of RMG as currently poised to be second largest garments product manufacturing country in the world after China.

From the day of its independence, Bangladesh has been identified with poverty and natural disaster in the eye of global development players and developed worlds. The international community treated the nation as economically vulnerable and aid dependent which cannot feed its extremely big population of 161 million (World Bank, 2019a). But RMG and Textile export has changed the fate of the country , poverty reported to decline from 48.9 percent in 2000 to 31.5 percent in 2010 and 24.3 percent in 2016 (World Bank, 2018) which is largely because of RMG industry boom. According to World Economic Forum, the scenario changed dramatically in the late 80's-90's and for the last 20 years Bangladesh economy has been booming compared to the past (World Economic Forum, 2019). Researchers and academics see this growth as a surprise when they discovered that Bangladesh's export earnings have been increasing in multiplied rate even with the so-called weaker governance, especially in the RMG sector (Ahmed et al., 2014). They found evidence that despite weak government structures, mismanagement and poor regulatory organizations, the garment sector can perform exceptionally well. Following the constant growth, the sector has been generating biggest share of foreign earnings relating to total trade and commerce volume (BGMEA). In the World Bank's Bangladesh Development Update of tertiary education and job skill, October 2019, the GDP growth rate and per capita income has been reported more than 8 percent and 1867.9 USD respectively (The World Bank, 2019). The world economic forum forecast that the GDP growth rate trend will be continued to be around 8 percent in the upcoming years (World Economic Forum, 2019). The country has managed to get the recognition of 'Next 11' emerging market

and one of the 'Frontiers five' emerging economies in the world by renowned Goldman Sachs and JP Morgan (Goldman Sachs, 2007; JP Morgan, 2011).

All these promising progresses relating to the economic growth of Bangladesh are connected to the success story of the RMG sector. But along with the positive achievement of the RMG Industry in Bangladesh mentioned above, the negative externalities came along the way. Bangladesh RMG Sector has been facing myriad of challenges relating to economic and non-economic issues such as political instability, corruption, non-compliance issues, human rights violations, unsafe working conditions, low wages, and bad safety standards (Siddiqui et al., 2020). Negligence of Health, safety and environmental issues has been the highlights contradicting its successful journey so far (Kumar et al., 2020). Among other accidents, killing of 1100 people in the infamous incident of Rana Plaza factory collapse in 2013 has been the proof of health and safety disaster of the sector. Moreover, Kumar et al (2020) has reported Bangladesh to be placed 179th in the Environmental Performance Index Report, 2018 (Placed 162nd in 2020) among 180 countries proving significance of environmental concern.

In 2016 alone the textile industry of Bangladesh generated 217 million cubic meter wastewater for producing 1.8 million metric ton fabrics and projected that the industry would reach 349 million cubic meter wastewater by 2021 (Hossain et al., 2018). Again, most of the industrial energy usage (40% of the total power consumption) is connected to RMG industry (Habib et al., 2016). The industry is also being accused of not following the internationally established building construction practices, not having safe and secure working environments and violating human and labour rights (Barua & Ansary, 2017). In one hand, firms must focus on minimizing the negative externalities of supply chain operation on the broader environment (Shumon et al., 2019) and on the other hand, they have to deal with people and human rights sensitively (Huq et al., 2014). Huq et al (2014) observes that big fashion brands and global MNCs face severe criticism for their upstream suppliers. Many of these MNCs have their supplier of finished textile products in developing countries such as Bangladesh and they transfer these pressures to their respective supplier to follow the code of environmental and social sustainability issues. Based on this background information, the study directs its focus towards the country context in the following section where it will become evident that RMG sector is the single most important industry for Bangladesh.

1.2 Contextual Discussion

According to Bangladesh Garments Manufacturers and Exporters Association (BGMEA), in 1984/85, there were only 384 garment factories in operation in the entire country (BGMEA) (Retrieved from www.bgmea.com.bd/home/pages/TradeInformation, 2020). With the inception of the industry in the late 80's, within next 15 years, the number rose to 3,400 and in the following next 10 years the number reached to 5,000. During the year 2012/2013, the highest number of factories got registration and membership leading to 5876. According to BGME, after Rana Plaza shock, the numbers dropped a bit and currently Bangladesh has 4500+ factories operating. This huge boost in the number of factories have contributed to the soaring growth of overall business, simultaneously it has become difficult for the regulatory agencies and government bodies to monitor and control the total operation and production chain. This is where Bangladesh requires continuous knowledge development, thorough exploration and investigations based on further research.

1.2.1 Export Share of RMG to the total export of Bangladesh

According to EPB (Export Promotion Bureau Bangladesh) , in 1983-84 the RMG exports worth was only of 31.57 Million USD in reference to total national export of 811 Million USD indicating the percentage of only 3.89%. Within the next few years, the scenario changed dramatically with an RMG growth boom. In 1990/91, the total export share of RMG reported to more than 50 percent of the country's total export earnings and total worth of RMG export reached to staggering 866.82 million USD. In 2013/2014 this percentage of RMG's share reached to 80% for the first time. This steady growth continues still to date as the data source shows that the share reached to 83.49% in 2018 and 84.21% in the year 2019. These statistics are supported by World Trade Statistical Review 2019, according to WTO, clothing has been the most dynamic manufactured product with 3.3 percent increase in 2018 alone in the world and the garment production for Bangladesh has tripled during the time span of 2008-2018. The same review also reports that the growth of merchandise export for Bangladesh during 2008-2018 has been second to only Vietnam among the developing economies leading the growth to 9.8 percent and among LDC (Least Developed Countries) Bangladesh is having the highest exports of manufactures (World Trade Organization, 2019).

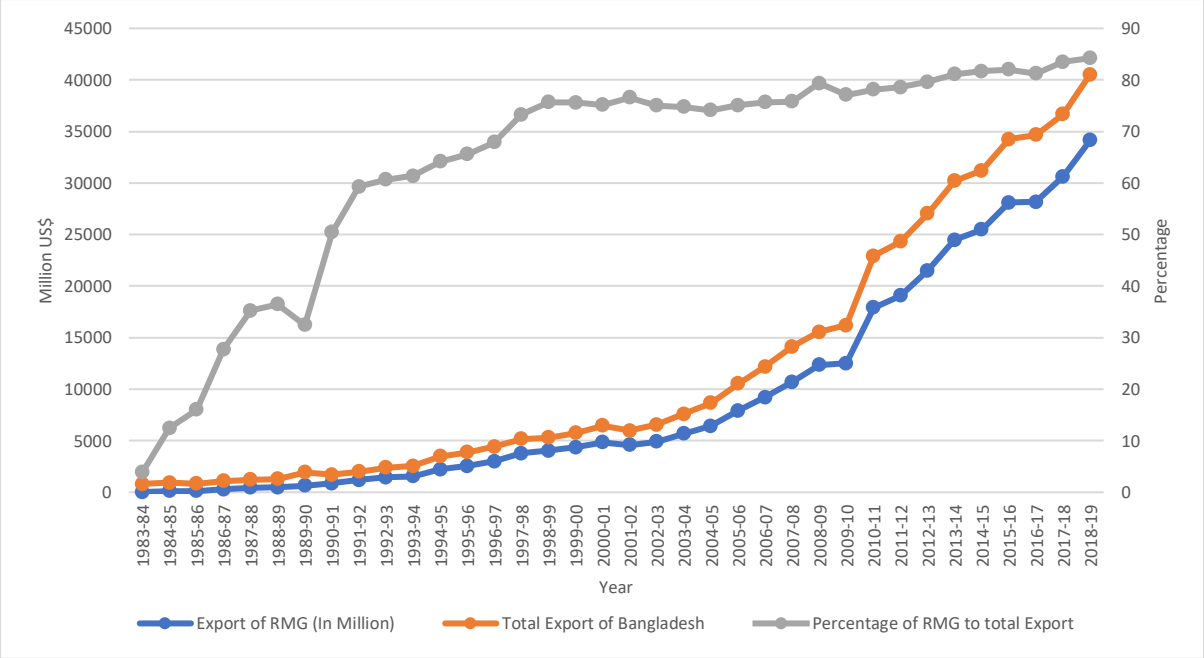

Figure 1: Comparative Export Share

Source: (BGMEA, 2019)

This phenomenal growth of the industry in Bangladesh is highly acknowledged by researchers, academics, and practitioners in the field. The RMG sector is positioned uniquely for the entire economy of Bangladesh (Hossain et al., 2018). According to the projection of the said researchers (Hossain et al., 2018), this growing industry could reach to the export value worth of 50 billion USD by the end of year 2021 which proven to be close to the real data. The apparel manufacturing industry has been growing exponentially in Bangladesh, thanks to the lower wage rates and operational costs leading to minimum production costs (Awasthy & Hazra, 2019). The clothing industry has been the most important contributor to the GDP of the country for years providing 11.23 percent of the country's total GDP according to EPB report of 2018 and BBS 2018 report. The sector alone has created employment opportunity for 4.4 million people among which 80 percent are women from the underprivileged portion of the society (Hossain et al., 2019).

1.2.2 Sectoral discussion of RMG and their respective Export share in Bangladesh

RMG sector is divided into two subcategories: woven garments and knitwear. A Knitwear garment is produced from a single yarn which is continuously looped to make them braided and in case of Woven garment multiple yarns cross each other at right angles to form the grain like a basket (Durupınar & Güdükbay, 2007). According to EPB, both knitwear and woven

garments export have been equal in total value in the 2018-19 financial year as woven garments belong to 42.54 percent export share compared to 41.66 percent knitwear. For both woven garments and knitwear, the growth curve was astoundingly uprising, but the knitwear sectors have seen the most dramatic growth compared to its counterpart. In the year 2007-2008, for the first time in the history of apparel export, the knitwear subsector exceeded the net export of woven garment providing the country with 5532.52 million USD export earnings. Knitwear industry maintained this lead till 2010-2011. In 2011-2012, the woven garments revived the lead again and continues until now. In the process of this growth, both sub-sectors obtained 10000 million USD landmark in 2012-2013 and 15000 million USD in 2017-2018 as export earnings.

Although the apparel industry alone produces more than 81 percent of export earnings for Bangladesh, there are some other players playing significant role in the export scenario of the country such as: leather and leather products, agricultural produces, home textile and diversified jute and jute goods. All these sectors along with some miscellaneous smaller industries combinedly exports less than 19 percent of the total export share. This scenario indicates the importance of RMG in overall development of Bangladesh as a whole (Figure-2).

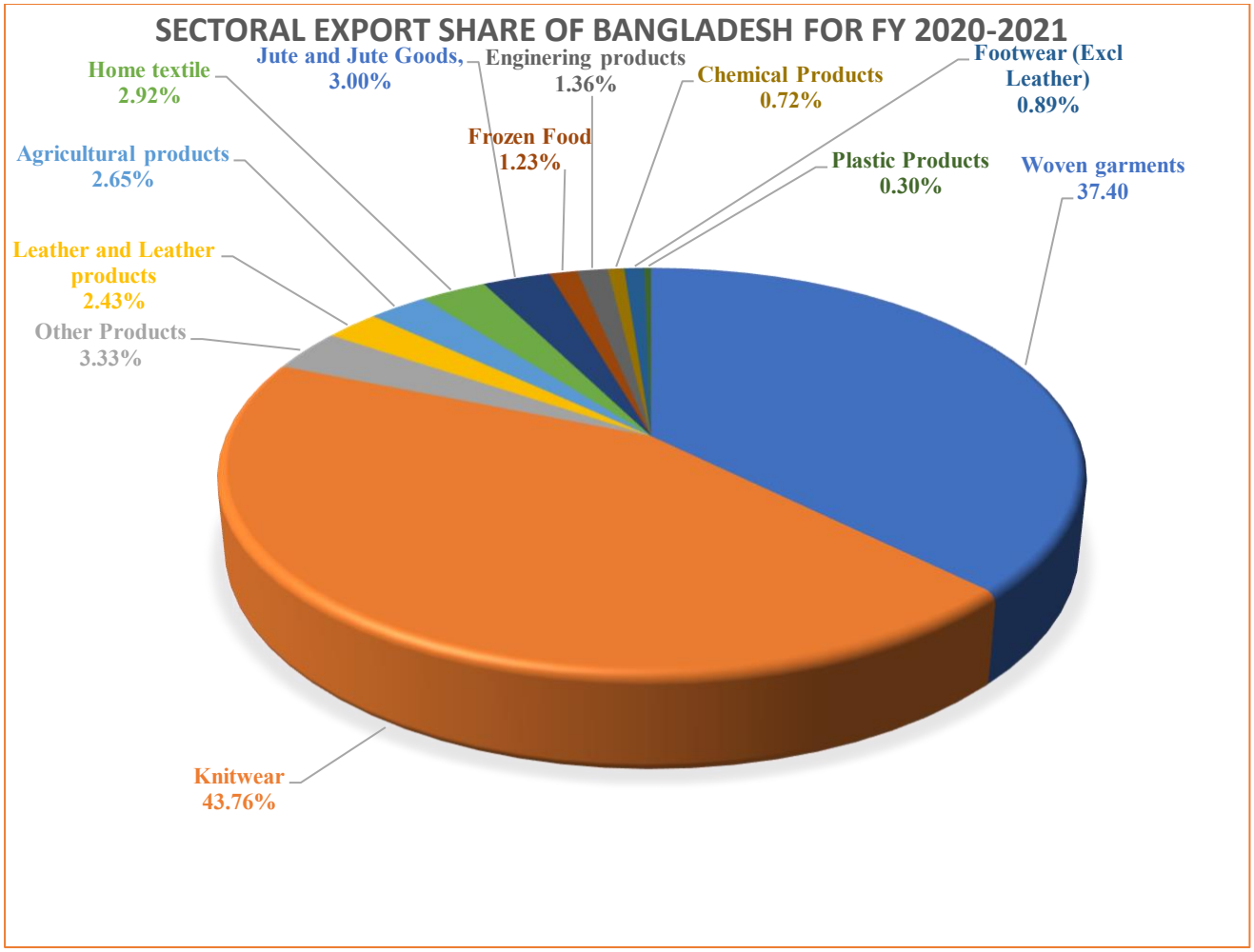

Figure 2: Sectoral Export Share of Bangladesh, 2020-2021

Source: EPB

1.2.3 Region Wise export

Although RMG products of Bangladesh is widely exported around the world, the EU remains the biggest customer of the country's apparel manufactures from the very beginning. Bangladesh Knitwear Manufacturers and Exporters Association (BKMEA) reports that 73.38 percent of knitwear export goes to European countries alone while second largest exports goes to America contributing 12.74 percent of Bangladesh's knitwear export share (BKMEA). But if the whole of the apparel sector is considered the EU is the destination of 61.91 percent of total Ready-made garments according to the data source of 2018-2019. Second biggest market has been the USA alone purchasing 17.97 percent of apparel exports in 2018-19. As compiled by RDTI cell of BGMEA from the data source of EPB, the third biggest destination can be traced as Canada where around 3.5% of the textile products reaches. In a nutshell it can be

concluded that Bangladesh has become the hotspot destination for sourcing clothing material for the developed world especially for Europe, USA, and Canada.

1.2.4 Most popular export items of RMG from Bangladesh

EPB identified the most common and popular apparel items into five categories as such: Shirts, Trousers, Jackets, T-shirts, and Sweater. A ten-year quantitative value of the item's exports is given below.

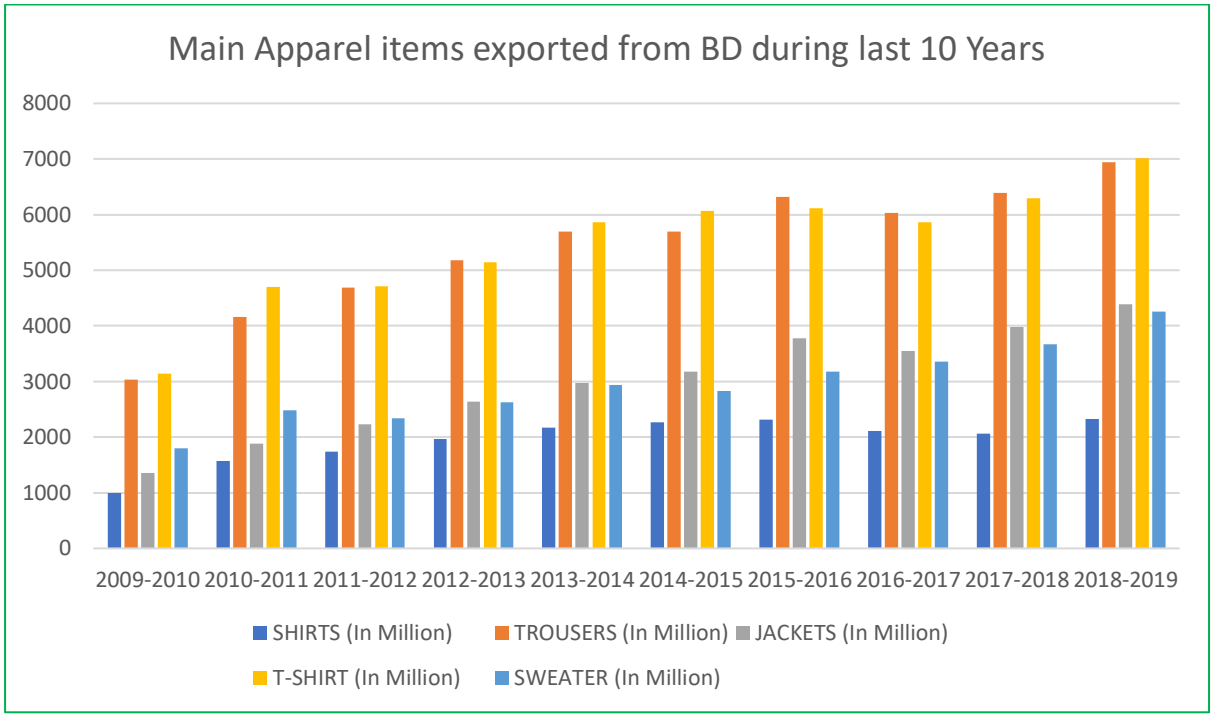

Figure 3: Apparel Export Items of Last 10 Years

Source: EPB and BGMEA

The details category of these five major items are identified by HS Code. The woven garment and the knitwear both have around top ten RMG export items codified. Other more specified categories of items are Jerseys, singlets and vests pull over, boys and girls brief and under-garment's, breeches, brassieres, girls' anoraks, windcheaters, blouses. Major international brands like Primark, Walmart, Costco, Adidas, H&M, GAP, Levi's, Nike, PVH-Phillips Von Heuson, US Polo, American Eagle, Zara, Sainsbury, Hugo Boss, and many more relies on Bangladesh for sourcing their apparel products made of all these fabrics.

1.3 Economic and Development Significance of RMG Sector to Bangladesh

The RMG sector's contribution to the socio-economic development of the country is unparallel. As it is the main source of export earnings and foreign remittances, the apparel sector can be termed as the lifeline of Bangladesh economy. Predominantly Bangladesh has been an agricultural economy having almost no industrial backbone, textile sector has created the pathway to industrialization and boosted the GDP growth rate of Bangladesh. Alongside to this economic contribution, other major significant role of the industry in employment generation, women empowerment, poverty reduction, health, and Nutrition improvement are briefed below:

Rapid socio-economic development

Bangladesh has historically been dependent on foreign aid and credit from international financial establishments. However, with the industrial expansion, especially with the emergence of garment sector, Bangladesh can claim as a trading nation now. The rapid growth of the RMG sector resulted initially from the MFA agreement helping the country to switch from jute and jute industry towards apparel manufacturing (Ahmed et al., 2014). As MFA ended by 2004, Bangladesh was in a shocking position, ILO forecast the potential consequences could have been job losses, closure of factories and loss of forex earnings. In an IMF working paper, Mlachila and Yang (2004) argued that RMG export of Bangladesh could be declined by 20% along with the loss of employment by 5-13% (Mlachila & Yang, 2004). But contrarily, after MFA, export of apparel manufacturing and rate of employment impacted positively, the number of industries increased, overall efficiency, performance and productivity improved (Ahmed et al., 2014). This continuous proven performance and business commitment has strategic significance and multiplier impacts on social and economic development of the country.

Women empowerment

Almost 75 percent of the labour force/ workers of the RMG industry are women. As they have the basic earnings, they are no longer dependent on the male counterpart which offered them freedom and inclusion in decision making and led them towards improved bargaining power in the family (Ahmed et al., 2014). With the earnings, women now can have access to standard

education for their children, access to basic health services and social safety as par Centre for Policy Dialogue (CPD) Policy paper (Bhattacharya et al., 2002).

Poverty reduction

According to Bangladesh Trade portal, every year the country is reducing 2 percent of its poverty (Bangladesh Trade Portal). As the main workforce of the garment industry are women and they have the tendency to save, they can easily pull-out families from the extreme poverty line even with tiny income. According to ADB's Basic statistics, 2019, the population living under the national poverty line (in 2016) was 24.3 percent compared to 31.5 percent in 2010 (ADB, 2019), ADB reports further drop of this to 21.8 percent in the year 2018.

Employment generation

Bangladesh is a signatory of Sustainable Development Goals (SDG) and according to goal number 8, creation of decent work for sustained growth is mandatory. Global unemployment rate is reported 5.7 in the year 2017 indicating that the world has 192 million people unemployed with no scope for livelihood. For Bangladesh this unemployment rate is 4.2 percent (SDG-Bangladesh Progress Report, 2018). This is where RMG sector has ignited the revolution employing total of 4.4 million workers, 80% of whom are women.

Improving purchasing power

RMG sector provides the opportunity for the underprivileged to be employed and earn livelihood which in turn improves the purchasing power of the workers and staffs. They can directly take part in the economic activities and can support their family, can buy daily necessities for the family, and can afford education for their children (Ahmed et al, 2017).

Greater accessibility to health and education

With the emergence of the RMG sector, the health and wellness of the rural and urban poor has been improved significantly. Having minimum income level, people can now afford the basic health services and life-saving medicines, they can reach a doctor occasionally. Being economically independent, women's (as mother) can spend more on the wellbeing of their children.

Backward linkage industry development

Historically, Bangladesh's Apparel sector has been dependent on India and China for raw materials and accessories supply. Government policy agents, private sector investors and the entrepreneurs have been trying to reduce abovesaid dependence. The knitwear industry association (BKMEA) claims that they have become almost self-reliant in fabric and yarn production with their investment in the 'allied' backward linkage industry. It is reflected on the World Banks Working paper, 2019 '*The Textile Clothing Value Chain in India and Bangladesh'* where it is reported that locally produced yarn can meet up to 90 percent of country's knitwear demand and 40 percent of country's woven demand. Primary Textile Sector (PTS) investment is getting higher each year along with the expanding operation of BTMC (Bangladesh Textiles Mills Corporation) in the three sub-sectors: spinning, weaving and fabric processing (Kabir et al., 2019).

Shipping and logistics industry

RMG industry is the biggest client of the shipping and port operation in Bangladesh. Transportation of finished RMG products from the manufacturers to the buyers helps the shipping and logistics industry to flourish, to install more container yards, cargo handling and storage facilities, extensive port facilities and to develop the entire road facilities. The very existence of the port authority, customs house, Clearing & Forwarding Agents, loading-unloading facilities and so on are largely dependent on channelling RMG goods. Despite congestion, loading-unloading delay, procedural complexities and extremely bad service, Chittagong Sea Port and Benapole Land Port are considered critically important (BKMEA and CPD policy paper, 2002).

1.4 Challenges facing by The RMG industry of Bangladesh

Although the textile sector has been booming in Bangladesh since early 80's and has seen undisputable rise ever since, the industry facing innumerable challenges ranging from accidental disruptions, accidents, delay in production and mismanagement of the entire supply chain. The most devastating example was the Rana Plaza incident, arguably the biggest and worst accidental tragedy in industrial production sector around the globe (Jacobs & Singhal, 2017). According to statistics, on April 24, 2013, 1133 unfortunate soul died and 2438 got injured in the accident. This was not a unique case, four months before the rana plaza incident, there was another accident of Tazreen fashion fire causing death of 112 workers. Other major

accidents are reported as spectrum factory collapse resulting 64 fatalities in 2005 and Phoenix Garments factory accident resulting 22 deaths in 2006 (Ansary & Barua, 2015).

Although government has taken initiatives to rectify the prevailing working conditions, factory level reality is still hazardous and unsafe. Government of Bangladesh made a tripartite agreement in May 2013, with the garment's factory owners and RMG workers and initiated a plan of action called National tripartite plan of action (NTPA) along with forming National Tripartite Committee (NTC) involving state agencies, BGMEA, BKMEA, employers federation and trade/labour unions (Barua & Ansary, 2017). Following the NTPA, Government of Bangladesh signed a sustainability pact with European Union (EU) and International Labour Organization (ILO) called '*The Sustainability Compact: Compact for Continuous Improvements in Labour Rights and Factory Safety in the Ready-Made Garment and Knitwear Industry in Bangladesh'*. Standard workplace safety and compliances for garment workers has been a serious issue for the country's garment sector for years (Barua & Ansary, 2017). In their study, Barua & Ansary (2017) identified the challenges in the industry as; industrial accidents, political instability, lack of enough energy supply, supply chain mismanagement, crisis of inefficient infrastructure accompanied by labour strike and labour rights. McKinsey report 2011 identified five major challenges for Bangladesh and projected that Bangladesh's prospect as a sourcing destination back in 2011, which is still relevant. According to the report following five challenges are identified:

Infrastructure

Necessary infrastructure development is probably the biggest challenge for the RMG industry of Bangladesh. Safe and modern factory establishment maintaining the building code and setting up efficient transport network should be the priority for the future growth. The international buyers and CPOs of leading garment companies always push the Bangladeshi suppliers to reduce the lead time and to maintain the timely delivery. Expanding port facilities, building dedicated and proper roads for quicker communications leading to reliable and fast spaced inland transport with a deep-sea port can solve the problem.

Compliance

Compliances to the established norms, practiced regulations and international community's direction for better working condition, for safer and secure production plants, clean and hygienic production process and to the environmental sustainability measures are basic

prerequisites for garment industry nowadays. Poor local regulatory bodies and weak governance structure of the industry makes it a real issue. Installing effluent treatment facility for wastewater and safe disposal of textile by-products has been significant environmental compliance issue for years.

Poor performance and Unskilled Workforce

To meet the growing demand, suppliers of the finished products must become more efficient, and performance driven. Although Bangladesh has competitive advantage of cheaper labour, most of the labour force are unskilled (Siddiqui et al., 2020). Gaining efficiency in terms of economies of scale, performances and increasing productivity level should be given priority. As the workers need to be paid more, making them skilled, efficient, and productive through training and skill development program can be the solution. Moving towards diversified products and installation of advance technology can complement the crisis ahead.

Raw materials supply

Bangladesh has been trying to reduce dependence on the raw material imports by investing more on establishing backward linkage industry. As reliance on imported raw materials creates uncertainty in the production process and thus increase lead time, timely delivery of the orders can become challenging. If raw materials are produced within Bangladesh, average lead time of woven fabric can only be seven days which increases up to 30 days if it is imported from India and China.

Economic and political stability

Economic uncertainty and political instability seem to be another challenging issue to be addressed by Bangladeshi apparel suppliers. Unrest and strikes, serious movement can affect the security of the factories, can affect the whole transportation and delivery process. On the other hand, capital market along with the interest rate and inflation may influence the smooth operation of the production and distribution process.

Challenges relating to RMG supply chain Management of Bangladesh

Transformation and growth of the industry could not ensure consistency of production and distribution of RMG products in Bangladesh which is turned to be a supply chain failure (Bala et al., 2019). The drastic reduction of the number of garment factories from 5876 in the year

2012-2013 to only 4222 in the following year (2013-2014) resulted from Rana Plaza tragedy. This failure of maintaining the production line and backward supply chain safe directly impacted the export of Bangladesh readymade garments. Although no direct impact of Rana Plaza could be asserted and global apparel retailers were not reactive to the shock, reputation of the industry of Bangladesh impacted significantly (Jacobs & Singhal, 2017). As profit maximization and economic aspects drive industry, face of sustainability often being ignored which makes the process vulnerable to long term existence. It is difficult to keep focus on the ecological considerations and social issues simultaneously while driving for profitability. Thus, the focus of this discussion in the following section will be around triple bottom line of Sustainability aspects.

1.5 Sustainability in supply chain management of RMG

1.5.1 TBL of Sustainability in the RMG Sector (Of Bangladesh)

Along with economic performances and consideration of businesses, social and environmental perspectives have become important among academics and practitioners of business world (Govindan et al., 2013). These sustainability issues are directly linked with the supply chains, forming the Sustainable Supply Chain management (SSCM) terminology which is a pathway to overall integrated sustainability paradigm (Cortes, 2017). The integration of the said supply chain sustainability initiatives requires more focus on the balance of economic, social and environmental goals rather emphasizing to traditional age-old economic goal alone (Hollos et al., 2012). These three-fold dynamics are termed together as Triple Bottom Line (TBL) of sustainability incorporated by Elkington (1994). According to the author, all parties concerned (the company, the customers, and the environment) should be benefitted from a business to be sustainable. Following this TBL approach, parties are explained and expressed as Profit, People and Planet (Carter & Rogers, 2008; Kleindorfer et al., 2005). Like any other businesses, RMG industry of Bangladesh and its supply chain must be sustainable to survive in this ever-increasing competitive era. To be considered a sourcing hub and a major supplier of finished RMG products to buyers and top brands like Adidas, H&M, Walmart, Nike and so on, entire supply chain of apparel industry must focus on meeting social and environmental pressure while maintaining quality, flexibility and profit maximization focus (Govindan et al., 2013). In most cases, influential brands must go through serious public and media scrutiny and are held responsible for the unsustainable behaviour of their respective distant supplier. This is where

Bangladesh RMG industry is forced to analyse the necessity of integrating the three dimensions of sustainability into the supply chain.

1.5.2 Environmental Dimension

Among the three-bottom line, environmental considerations have gained much prominence among the researchers and academicians. Impact of business and industries on the natural balance has been the most widely studied and researched dimensions. Although other dimensions are appearing in the scene, the focus of sustainability has been on the environmental consequences of supply chain and measures to be taken (Ivanov, 2017). RMG industry of Bangladesh is of no exception, number of studies have been conducted understanding the impact of RMG industry on the natural environment of Bangladesh. The most common impact relates to the pollution of the water body and 'depletion of the ground water' levels. Alongside the socio-economic significance, textile and apparel industry has been poisoning the water resources by releasing waste water containing pollutants to the rivers and water sources (Hossain et al., 2018). Common pollutants that carried by untreated waste water contains oil, grease, NaOH, ammonia, sulphur nitrate, led, sulphide, metals, biochemical and chemical oxygen demand (BOD, COD) which can cause serious harm to water quality and ultimately have serious consequences on the human health, water lives, livestock's and natural bio-diversity (Islam et al., 2011).

1.5.3 Social Sustainability

Social sustainability is comparatively a recent development in sustainability literature considering the emphasis given to the environmental aspects and thus extensive study on social sustainability is limited (Carter & Rogers, 2008). Some researchers claim that social dimension is 'under-valued', 'under-explored', 'under theorized' and neglected leading to lack of enough exploration and investigation (Morais & Silvestre, 2018). But social sustainability has been gaining importance gradually alongside the environmental issues for the international sourcing agencies and international buyers (Huq et al., 2014). Companies and enterprises are forced by stakeholders to oversee social issues not only within the organization but also in the distant supplier networks (Nakamba et al., 2017). In their study, Huq et al (2014) linked social sustainability to human life including issues such as: human and labour rights, health, safe working environment, child labour, wage discriminations, rights of association, healthy community, adequate training facilities etc. The incident of rana plaza and other man-made disaster in the garments factory of Bangladesh have exposed the dark side of the industry;

especially horrible health and safety conditions and severely dangerous working conditions (Reported in New York Times by Manik and Yardly, 2013).

1.5.4 Economic Consideration

Businesses cannot exist if they consider environmental concerns and social responsibilities only without economic agenda or profit. Elkington (2002) advocates in this regard that three aspects of sustainability: economic, social and environmental are interconnected, interdependent and must be given the equal focus (Elkington, 2002). Among these, economic aspects are directly linked with sales figures, market share, operational efficiency and system upgradation (Gimenez et al., 2012). Organizations can obtain economic stability and competitive advantages by incorporating sustainable business policies allowing low energy consumption, less waste and improved systems of operation (Nidumolu et al., 2009). Thus, the best economically feasible practice should not be aimed solely at profit maximization rather an integrated sustainable approach would be the best feasible option ahead.

1.6 Research Motivation and Knowledge Gaps

Bangladesh is a major supplier of RMG for global supply chain and thus, explorative investigation into sustainability issues of the country's RMG sector is crucially relevant. The industry alone provides the highest foreign remittances for Bangladesh and works as lifeline for economic growth. For these very reasons, understanding contemporary sustainability practices of supply chain network of Bangladeshi RMG industry is important. Sustainability paradigm of Bangladesh RMG industry has far-reaching global significance and major policy implications for the country's development. But unfortunately, the position of RMG supply chain of Bangladesh is volatile, risky, and disruptive comparing to the global standard. This vulnerability is self-evident from the successive accidents and disasters like Rana Plaza and Tazreen Fashion. These disruptive incidents have a synergistic effect on the total supply network affecting global buyers and thus sustainability consideration is critical to the garment and knitwear industry (Chowdhury & Quaddus, 2015). In the given context, proposing an integrated sustainable supply chain management framework has become significant research agenda for the RMG industry of Bangladesh.

Although it is almost impossible to continue sustainability discussion without considering the integration of the triple bottom line (TBL) (economic, ecological and social dimensions) into single eco-system (Hollos et al., 2012), empirical work on these three dimensions in the supply chain of Bangladeshi apparel industry is scarce. Among the few studies in this regard, Esfahbodi et al (2016) emphasizes the interrelation of economic and environmental dimensions focusing financial efficiency (Esfahbodi et al., 2016) and leaving social aspects behind, on the other hand Gunasekaran et al (2016) specifically focuses the social side perspective of sustainability. Environmental and ecological perspectives seem most widely researched area focusing on industrial waste, water waste, chemical and its impact on the natural balance of the country. A few numbers of researchers focused on the social sustainability emphasizing people's perspective (Köksal et al., 2017; Morais & Silvestre, 2018). But no study yet has been found where all three sustainability dimensions referred as planet , people and profit (Kleindorfer et al., 2005) are linked and integrated to offer a comprehensive understanding. No attempts yet have been made to propose an integrated sustainable supply chain management framework for RMG in a developing country setting like Bangladesh. Evidently most studies done focusing on a single or double bottom line, leaving no trace of integrative approach covering all three dimensions together (Köksal et al., 2017). Following this knowledge gap and

lack of integrated sustainability literature in the clothing industry of the country, considering the criticality of RMG supply chain of Bangladesh, an integrated sustainable supply chain management (ISSCM) framework is proposed in this study.

Taking evidence from the relevant literature in second chapter and from the proposed theoretical framework, the present study aims to combine stakeholder theory and salience model with Stakeholders Resource Based View (SRBV) in developing a theoretically grounded sustainability framework. For the RMG industry to be truly sustainable, stakeholders' identification and their proactive involvement, their influences and power dynamics plays crucial role. As a result, to understand the problems and prospects of RMG supply chain of Bangladesh, the detail exploration of the issues relating to sustainability should be done through stakeholder's views. The stakeholders of RMG supply chain identified by Huq et al (2016) are the groups who can stimulate the complex process of achieving sustainability goals positively or adversely. Thus, stakeholders' theory lens seems most suitable in the current study. Moreover, the extended SRBV proposed by Sodhi (2015) says that along with the focal firm's strategic strength and resources, the stakeholder's capability should be enhanced accordingly. It is proposed in this study that true sustainability of RMG can only be achieved by mutual collaboration of tangible and intangible resources of focal industry with concerned stakeholders. Hence, Combination of SRBV and stakeholders' theory with a view to achieve integrated sustainability in the backdrop of developing country RMG supply chain would be a unique contribution to the current literature.

1.7 Research Questions and Research Objectives

In modern world, pressure from various stakeholder groups is increasing to include sustainability issues in organizations supply chain management (Herremans et al., 2015; Kua, 2016; Nawrocka, 2008). Moreover, vulnerability of global supply chain are ever increasing which requires more organized supply chain actions to remain sustainable (Christopher & Lee, 2004). As Bangladeshi RMG supply network is facing numerous disruptive events and causing negative impacts on natural environment frequently, flexibility and resilient capabilities are important for the sustainability of the industry. In the given context, no empirical work has yet been found where all the possible dimensions of sustainability studied in an integrative manner and established an interactive relation among the sustainability bottom lines in respects of Bangladesh. In such circumstance, the current research endeavor is directed to investigate the following research questions through a wider explorative study:

RQ1: *What are the challenges and barriers of sustainability practices of Textile and RMG industry of Bangladesh in line with TBL lens?*
RQ2: *How to find solutions to the sustainability challenges and concerns considering the contemporary industry practices?*
RQ3: *How to develop an integrated sustainable supply chain management (ISSCM) framework for RMG sector of Bangladesh?*

Research Objectives

The specific objectives of this research which flows from the above research questions are:

1. *To explore how the RMG supply chain of Bangladesh addresses Triple bottom line (TBL) integration of sustainability.*
2. *To identify the challenges and factors responsible for disruptions of RMG supply chain of Bangladesh.*
3. *To understand the current sustainability practices of the RMG industry in the country*
4. *To propose solutions and measures to be taken for a truly sustainable RMG industry.*
5. *To formulate an integrated sustainable supply chain management (ISSCM) framework in the context of RMG sector of Bangladesh.*

1.8 Theoretical and Practical Contribution

Proposed Theoretical Contributions

Numerous studies have been conducted on sustainable supply chain management in the recent decade (Carter et al., 2011; Carter et al., 2019; Carter & Rogers, 2008; Hutchins & Sutherland, 2008), many of which are specifically focused on RMG sector and fast fashion industry. But sustainability studies in the realm of textile supply chain of Bangladesh have been getting momentum slowly, most of which have primarily focused on accidental, environmental and pollution issues. Rana Plaza and Tazreen fashion incident triggered influx of social sustainability research in Bangladesh but the field is still in the infancy level. Although all the sustainability dimensions have complementary effect on each other and achieving sustainability goals can only be possible if integrated sustainability practices can be ensured, contemporary sustainability literature predominantly refers to environmental issues ignoring wider social and economic consideration. It is notable from the detail literature review in the next chapter that studies focusing on TBL integration where different angles of sustainability (Social, economic, and environmental) can be comprehended elaborately in RMG supply network are non-existent. Scholars agreed that there is interrelation, interconnection and inter-dependance among these sustainability directions for attaining an integrated sustainable supply chain management (ISSCM) but still no theoretically grounded studies centered on total sustainability integration in the RMG sector of a developing country setting has been found. In the given context, this study explores the TBL integration of sustainability in the RMG sector of an emerging economies like Bangladesh which is a true addition to the textile sustainability literature. From the extant literature, it is also evident that there is a possibility to think beyond the triple helix of sustainability, where macro-environmental consideration and infrastructural angel can be explored which can be a unique contribution in understanding existing TBL lens. This study finally aims to take the challenge to come up with an Integrated Sustainable Supply Chain Management (ISSCM) Framework where all the possible sustainable directions including the newly proposed macro dimension can be aligned in a systematic manner to achieve true and meaningful sustainability in the Bangladeshi RMG industry.

In the given settings, along with the modified TBL lens, the study explored different theoretical angels and foundations on which the contextual analysis and discussion can be grounded. From the literature review part (chapter two), it is evident that many theories have already been adopted for studying supply chain sustainability. Prominent theories include Resource Based View (RBV), Institutional Theory, Resource Dependence and Orchestration theory, Dynamic

Capability View, Natural Resource Based View, Transaction Cost Economies, Stakeholders Theory and Salience and others. After detail consideration of the research premise, extended literature and RMG context of Bangladesh, current study found rationale to explore stakeholders and supply chain actors engaged in different tiers in the concerned industry of the country with a view to understand the Multi-Tier Supply Chain Management engaged in sustainability focus. Research premise in this study suggests that stakeholders, their relative power dynamics and strategic resources can influence sustainability outlook of the industry in both positive and negative direction.

With this understanding, this study combines the knowledge of Stakeholders theory, Salience model and Stakeholders Resource Based View (SRBV) as foundation in addition to triple bottom line of sustainability. A comprehensive understanding of the stakeholders actively engaged in the RMG supply chain of Bangladesh, identifying their respective strength and strategic influence on the sustainability goal of the industry is the unique contribution of this research endeavor. Locating relevant sustainability stakeholders of textile industry and exploring their respective power move, legitimate stakes in a developing country setting is an extension to the current knowledge of stakeholder's theory. While Stakeholders theory and its extension helps to understand all the stakeholders and their critical roleplays in the garment industry setting, SRBV provides the insights into the dynamic strength and weakness of the industry actors. According to SRBV, partnership with strategic stakeholders strengthen the firm's competitive proposition and enhance greater sustainability. As RMG industry operates in a highly volatile and uncertain business environment, stakeholders' complementary resources can offer strategic advantage for obtaining sustainability vision. In case of Bangladeshi RMG industry, strategic resources gap and incapability of concerned stakeholders provides a negative externality to the output rather complementing the sustainable business goal. Lack of skill and efficiency of the workers, mid-level management incapacity, inability and resource gap of government monitoring bodies, opportunistic behavior from the buyer's side provides that stakeholder's resources are not generating any synergy. This unique theoretical blend between stakeholders' theory, Salience model and SRBV in line with TBL in the textile sector provides a new literature avenue. These established theories and their generalized context have been extended to investigate sustainability of supply chain in textile and fast fashion industry.

Practical Contribution

This study highlights sustainability concerns and barriers of RMG supply chain of Bangladesh as the industry has been suffering from functional challenges accompanied by negative social and environmental impact. It is expected that the proposed ISSCM framework will help the RMG supply chain managers, suppliers and factory owners, regulatory authorities and retailing brands to forecast the disruptive events, evaluate negative practices and thus help to create a practically attainable sustainable RMG supply chain for Bangladesh. Moreover, the detail exploration of the industry's sustainability outlook will help the practitioners obtain better idea about sustainability practices of their organizations. It will enable them to set target and improvement plan in specific area in their operation keeping sustainability goal in the agenda. Subsequently, this knowledge will help supply chain players and concerned stakeholders to trace weaknesses and threats, potential disruptions of the forward and backward linkages and offer probable solutions in designing appropriate measures.

1.9 Structure of the study

The study is organized in 6 chapters. The chapters are arranged in following orders:

Chapter 1 Introduction: Introduction focuses on providing the overall context of the research setting starting with the global context of SSCM and leading to sections like: SSCM in Readymade Garments, context of Bangladesh RMG industry and its contribution to the economy of the country and finally finding the motivation behind the study along with the research objectives and research questions.

Chapter 2 Literature Review: This chapter is focused on the extensive review of the TBL of Sustainability in supply chain literature, its relevance to the RMG industry worldwide and Bangladesh in particular. Scholarly articles, studies, books, research projects and reports have been explored to gain insights into the previous academic works relevant to the study. Theories such as Stakeholders Theory, salience model and SRBV are reviewed to support the research.

Chapter 3 Research methods and Methodology: This chapter is organized following the interpretivist paradigm based on qualitative research method. Both secondary and primary data have been collected and analysed. The process of interviewing the concerned respondents for collecting primary data and the pattern of the interview protocol has been incorporated here together with the data analysis methods.

Chapter 4 Qualitative Data Analysis and Findings: Collected data has been analysed and extracted in this chapter to satisfy stated research objectives and to answer the research questions. The transcribed data collected via semi-structured interview protocol have been thematically extracted, analysed, and explained. NVivo is used for the purpose of qualitative data analysis.

Chapter 5 Discussion of the analysis: A functional connection between the theoretical backdrop and the analytical outcome of the qualitative data is presented in this chapter. A rational and reasonable correlation has been drawn between the concerned literature, analytical results, and the research questions/objectives.

Chapter 6 Conclusion and recommendations: The final chapter is developed based on the summation of the whole study along with the theoretical and practical contributions, recommendations, and suggestions for the future research. The limitation of the current research is also acknowledged.

Chapter 2: Literature Review

Textile Supply Chain Sustainability Trend: A Systematic Literature Review (SLR) Approach

This systematic search of the contemporary literature aims to analyze the recent trend of research in the field of sustainable textile supply chain in the 21st. century. Understanding and analyzing the current development of knowledge in textile sector through systematic reviews following already established the triple bottom line sustainability framework allows the pathway for better scholarly discussion in the field. The goal of conducting this SLR is to combine two concepts (sustainability dimensions and textile and apparel supply chain) together and explore recent theoretical and empirical advancement. By doing so the review focuses to find '*the issues and themes of Triple bottom line of Sustainability which have been explored in the contemporary literature of textile supply chain in the 21st century* and *'to integrate TBL in the textile supply chain to obtain a comprehensive sustainability approach'*. This review exploration has also been used as the foundation to build upon the research framework and complement the current research's aims and objectives. Explored themes and findings framed the research direction for the current study and directed the researcher in right path of formulating interview protocol.

2.1 Why conducting SLR?

A literature review process is a standard procedure to delve into a specific knowledge field with a target to explore the contemporary concept, debate, theories and body of knowledge (Tranfield et al., 2003). Tranfield et al (2003) suggested that, in the field of management science, the traditional review processes have been criticized for being too descriptive in nature and having lack of critical assessment. In response to the critic of the conventional reviews , it is proposed by the management scholars to deploy a more scientific and systematic approach called Systematic Literature Review (SLR) which has already been proven effective in the field of medical science (Denyer et al., 2006). It is also argued that this evidence-based approach can produce more generalized, agreeable, compact, and reproducible results and thus considered most reliable in the research community (Denyer et al., 2006). Although it's

difficult to define the concrete boundary of Systematic Reviews, SLR is broadly understood by Denyer and Tranfield (2009, p.671) as: " *a specific methodology that locates existing studies, selects and evaluates contributions, analyses and synthesizes data, and reports the evidence in such a way that allows reasonably clear conclusions to be reached about what is and is not known." (Denyer & Tranfield, 2009)*

Both Denyer and Tarnfield (2009) and Denyer et al (2006) emphasized the notion that a systematic review should be looking for objectivity by reducing biasness and be replicable, scientific, and transparent (2001). Some academics considers that systematic reviews can be used as a foundation for building a research project and it can separately be taken as an independent research endeavor (Dienes et al., 2016). Dienes et al. (2016) strongly argues that the end results produced by a systematic review can be considered evidentially sound and procedurally robust and can be a scientific tool for finding research gap. With the given context, for a comprehensive, updated insights of the current literature and academic debate into TBL of sustainability in the textile sector, this systematic approach has been chosen. The current researcher hopes that by critically examining and analyzing 21st century's scholarly work on the subject will add value to the current academic discussion.

2.2 Inclusion and exclusion criteria

For this review purpose, two databases have been selected for searching the relevant literatures: SCOPUS and Web of Science core collection. To validate the reviews and build a constructive approach, other databases and relevant articles are used as well where appropriate. For descriptive analysis and thematic discussion of relevant literature on sustainability of textile supply chain in global context, specific criteria, guidelines, and directions are set to use in this systematic study. It's not realistic to study all the materials in all directions without setting any boundary and it's not rationally feasible either. Thus, under the main thematic umbrella "Sustainable Textile/apparel supply chain" this systematic literature study includes scholarly studies and journal articles depending on the following criteria:

1. Sustainability in Textile/ RMG /apparel supply chain is investigated and analyzed.
2. Two databases SCOPUS and Web of Science are used as these are acknowledged by scholars as the leading academic database.
3. Only academic scholarly journal articles are considered, books and other news articles are excluded

4. Only English language articles are investigated.
5. Journals included and ranked in Chartered Association of Business Schools (CABS) are evaluated. The ABS 2018 and the latest 2021 ranking is being followed. Journals ranked 2 star or above are given emphasize.
6. Initial search strings developed as: Sustainab* AND Textile OR Apparel OR RMG OR Ready-Made Garment OR Clothing OR Fashion OR Cotton OR Knit OR Woven AND "Supply Chain"
7. Initial search for the whole text of the documents produced around 15562 search results which is a large number to be analyzed and is not comprehensive for the study.
8. Thus, the researcher goes for running the above search strings in Three criteria: TITLE-ABSTRACT-KEY WORDS. The same above search strings produces a rather rational result of 645 looking into Title of the article, Abstract and Key words given.
9. These 645 searches were then explored for relevance according to the inclusion criteria and a literature matrix is prepared where 133 articles are put in a format for the final analysis. Only ABS ranked peer reviewed scholarly journal articles are included.
10. Among the above search 645 results, the articles excluded in this study were purely of engineering and technical natures, some were book chapters, conference proceedings, and most of them were published in Journals which were not included in ABS ranking.

With the above inclusion and exclusion criteria a matrix has been prepared to extract the summary of the relevant articles. The matrix has been imported from Microsoft excel in the last part of this report as **Appendix 1.** After reading the full text of these 133 materials, the researchers found 21 papers to be not specifically relevant to the theme of this study and thus, excluded from the descriptive and thematic discussion. Rationale of discarding these 21 papers even after meeting inclusion criteria are presented below:

2.2.1 Exclusions Rationale for thematic discussion

Out of 133 scholarly articles presented in the review matrix, 21 papers are excluded at this stage and 112 papers are finally used for thematic analysis. As the original aim is to find out the trend of sustainable apparel/ textile supply chain in this new millennium, the articles which are not focused on sustainability, textile/apparel and supply chain are ignored. Although the papers excluded at this stage met the previous search strings criteria, detail reading,

concentration and evaluation declared them unfit for the original theme. This study aims to explore the industry's sustainability agenda with a management and business focus but some of these papers are too technical. Articles and scholarly works which are discarded at this stage are presented below with respective logic of elimination (A representative sample are provided in the table 1):

Author/s (Year)	Title	Elimination logic
(Tayyab & Sarkar, 2021)	An interactive fuzzy programming approach for a sustainable supplier selection under textile supply chain management	Excluded from thematic analysis due to technical computer programming without sustainability and business-management focus
(Gomez-Campos et al., 2021)	Flax fiber for technical textile: A life cycle inventory	Focusing on the technical perspective, excluded from thematic analysis without business and management focus
(Agrawal et al., 2021)	Blockchain-based framework for supply chain traceability: A case example of textile and clothing industry	Too technical not Sustainability focus
(Lowe & Vinodrai, 2020)	The Maker-Manufacturing Nexus as a Place-Connecting Strategy: Implications for Regions Left Behind	Manufacturing focus. Without a business/management focus on sustainability
(Macchion et al., 2020)	Static supply chain complexity and sustainability practices: A multitier examination	Excluded from thematic analysis due to Leather Focus not textile

Table 1: Sample Elimination Logic

2.3 Descriptive analysis

2.3.1 Journals Distribution

As mentioned earlier, only ABS 2021 ranked Journal articles are considered in this study. One-fourth of the total articles are being published in a single Journal: 'Journal of Cleaner Production' which is a good quality journal consisting of ABS score 2. Second highest articles

are from 'International Journal of Production Economics' which is a 3 scored journal of ABS 2021. Other dominant journals are 'Journal of Fashion Marketing and Management' (With 7 entry), 'Supply Chain Management: An International Journal' (With 6 entry), 'Transportation Research Part E: Logistics and Transportation Review' (With 5 entry), 'Production Planning & Control' (With 5 entry). There are 4 journals which have 4 entries in the list: 'Business Strategy and the Environment', 'International Journal of Operations & Production Management' and 'Journal of Business Research'.

Specific (ABS) field wise Journal Numbers:

ABS scholars developed 22 distinct categories of Journals related to business and management among which all the 36 Journals of this study fall into 10 categories. More than one-third of the Journals can be traced in the field of Operations and Technology Management (16 to be exact). Two field (Marketing and Regional Studies, Planning and Environment) contains 4 articles each and two other field (General Management, Ethics, Gender and Social Responsibility and Sector Studies) have 3 articles included. Economics, Econometrics and Statistics field have two articles in the category. Rest of the four field consists single article in the distribution. Understandably Operations Management is found to be the most dominant field as this current research focuses on supply chain, the overall distribution of fields shows the versatility and comprehensiveness of the review design.

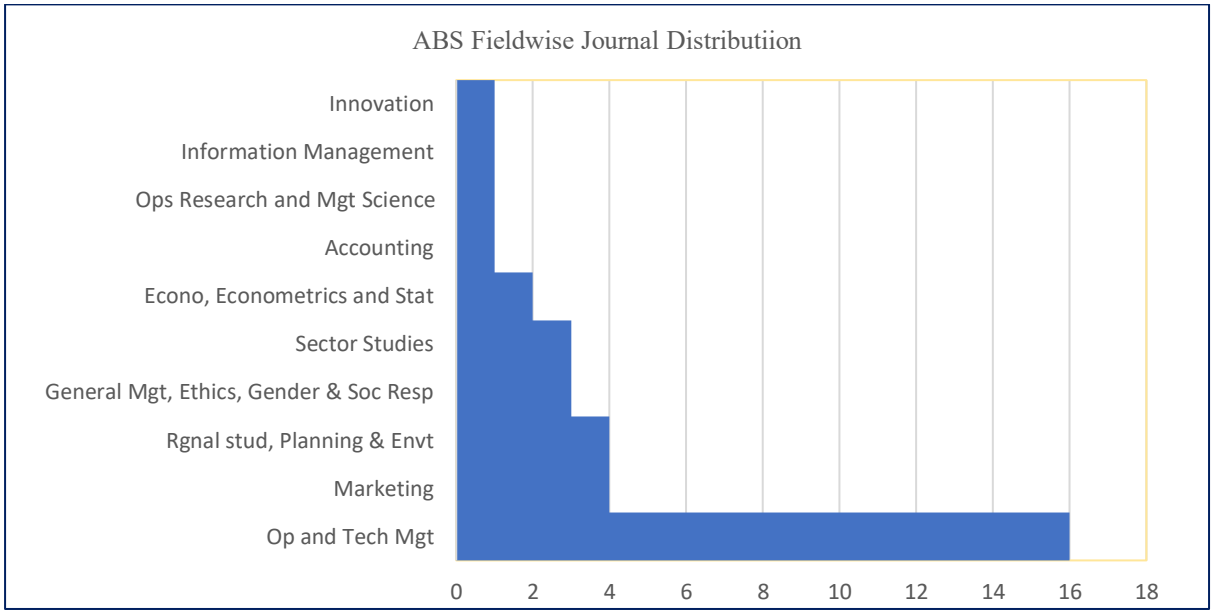

Figure 4: ABS Field wise Journal Distribution

The percentage of articles to the respective AJG score in the study as par ABS'21:

From the above list it is evident that highest quality articles 4*-Journal of Distinction are only 2, while rating 4-the most original and best- executed journals are 5 among all 112 entries. The most entries (49 articles) belong to rating 3 which is regarded well executed and original research journal. Journals scoring 2 in ABS rank are 39 in numbers which is also termed original research of acceptable standard.

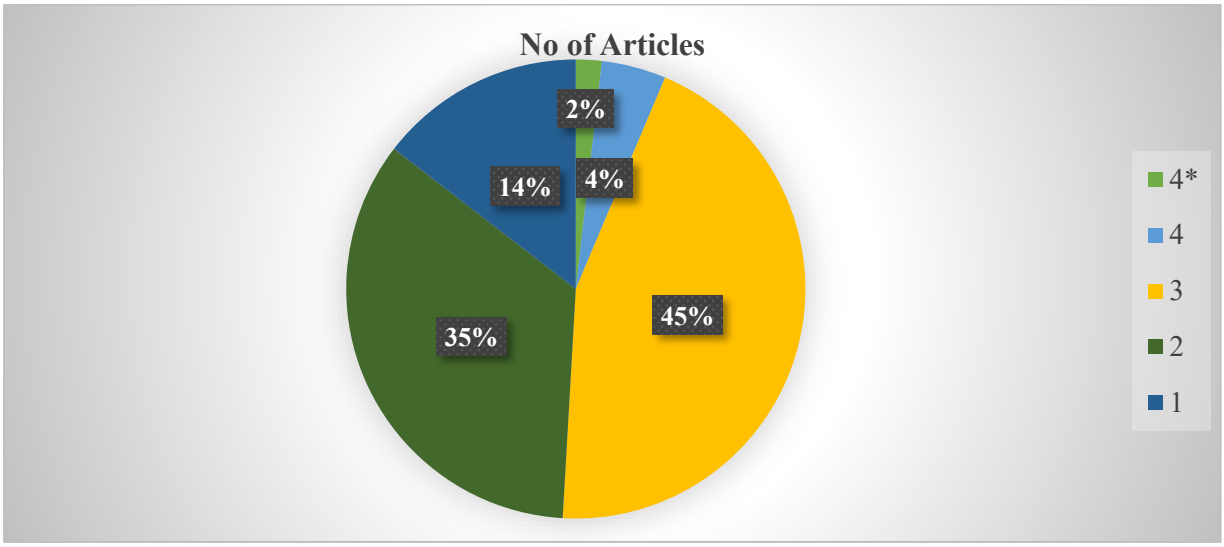

Figure 5: No of Articles based on ABS score

2.4 Research context

Contextual analysis is a good way to understand geographical focus of the recent trend of study in a specific field. Although RMG is a global industry, its geographical concentration follows a general pattern where most of the global brand and retailers are from developed nations and the suppliers/ producers of textile products are from developing countries. For taking advantage of low-cost labor, production of apparel mostly transferred to poorer countries. Although defining and categorizing countries by developed, developing or emerging economies is not always easy and there is lack of clear boundaries among them, still it's a reasonable way to understand the sustainability research focus of apparel sector.

2.4.1 Discussion of Contextual Framework

It is evident from the analysis of sustainability research trend that most of the studies have been conducted focusing the developing countries. Among the 112 articles included in this study, almost half of the papers (51 papers) specifically focused developing countries whereas 33 articles concentrated on studying developed country settings. 4 articles found to be mixed focusing both developing and developed country settings. The rest of the article's (29 Articles

to be exact) geographical concentration found to be unspecified or globally concentrated where specific focus cannot be traced. Apparel supply chain operation involves multiple countries where retailers are usually from developed countries and final product suppliers originates from the emerging economies.

Emerging/Developing Economies

Among the 51 articles focusing developing economy, Bangladesh appeared to be the most popular to conduct apparel studies among the researchers. The country has been the contextual focus of 14 studies while the bordering country India has been the focus of 13 articles. Other dominant countries in this regard can be listed with respective entries as follows: China-05, Hongkong-03, Turkey-03, Vietnam-03, Taiwan 02, South Africa 02. Sri Lanka, Malaysia, Iran, Pakistan, Ghana, Korea, Brazil, and Philippines are the countries with the single entry. From this summary, it is self-explanatory that most of the researchers focused Asia for their study as most of the apparel suppliers of the world can be tracked in Asian countries. It came as a surprise that China's entry can only be found five times in the list which is lower than Bangladesh and India as China supplies more apparel products than all other countries combined. Still Bangladesh managed to top the list which indicates that Bangladesh is at the center of sustainability discussion in apparel sector in recent times. Comparing Vietnams entry with India seems insignificant although Vietnam is the third biggest supplier of apparel goods. A few countries name entered the list from outside Asia which are discrete in pattern and thus negligible.

Developed Economies

In the textile supply chain discussion, retailers end is not given equal importance comparing to the supplier's end. Europe is the biggest market of apparel finished products supplied by Asian suppliers' country. Analyzing the developed country focused articles, the evidence can clearly be traced as out of the 33 entries 27 articles focused European context. Other than Europe, USA and Australia are the only countries being studied by researchers. Within Europe, the countries being studied most are Sweden-7 times, Italy-6 times, and UK-4 times. Germany, France, Netherland, and Finland are also appeared single time. With 4 times entry USA also being studied by sustainability researchers.

Unspecified and mixed

Out of the 112 papers included for discussion, 29 papers finally came out without any specific contextual focus rather aiming to address generalized global issue. Some of these are

conceptual and review papers which understandably does not have any country or geographical focus. Some of these papers studied MNCs global operation and some explored worldwide operation of multiple companies.

2.5 Sustainability Dimensions (Triple Bottom Line) and Integration:

After the introduction of triple bottom line concept by Elkington (1994), it has gained much appreciation from the business practitioners, research community and academics in the field of business and management around the globe. Over the period, Sustainability has become synonymous to triple helix (TBL) which comprehensively refers to environmental, social, and economic dimensions representing Planet, People and Profit. While coining the concept 29 years ago, Elkington expected that it would be a great tool for fighting against unplanned capitalism and focus would be given to improving people's lives and ecological balance. But in 2018, John Elkington expressed his frustration in a Harvard Business Review article that the primary goal of TBL has not been materialized thus he wanted to revisit the concept. According to him, TBL was meant to be the triple helix of change for business, but it has become a mere accounting tool. Although in the article he wanted to recall the concept out of frustrations, he was hopeful that a new wave of TBL innovation can bring "a triple helix for value creation, a genetic code for tomorrow's capitalism, spurring the regeneration of our economies, societies, and biosphere" (Elkington, 2018).

As the TBL concept has been used extensively in sustainability literature for the last 29 years and still relevant to the modern world, it needs a fresh start of innovation and brand-new outlook. Following the suggestions of the creator, modern business world needs to adopt the concept with greater care and depth. Keeping these suggestions in mind, current study focuses on understanding the concept from the sustainability literature perspective in the field of apparel business. The first step of realizing the scenario of the TBL is to categorize and analyze all the articles thematically following the triple dimensions:

2.5.1 Analysis and Discussion

Among the finally scrutinized papers, current researcher tried to distribute them in their respective TBL dimensions. Environmental dimension is used to categorize those articles which focuses on ecological balances and environmental consequences and social dimension is used to refer to the articles focused on human life, rights, safety and security, society, and people. The Economic dimension is not explicitly mentioned as this is by default the moto of

businesses and enterprises. Apparently, from the pattern it seems that all business activities are inherently aimed at the profit, revenues and operational excellence and thus need not to be given individual focus. Although the general notion among the scholars is that all the directions of TBL are complementary and linked to each other, integrative approach is not common (Köksal et al., 2017). As a result, the current researcher divides the papers into three categories: environmental focus, social focus and comprehensive TBL focus. Some of the articles cannot be clearly defined by the TBL dimensions but developed on sustainability issues which are aligned to comprehensive category. This third category mainly describes the combined effect of TBL or overall sustainability where economic goal is coincided to the other two environmental and social goal.

From SLR matrix (Appendix-1), it's evident that most studies do not specifically focus on any single bottom line of sustainability as 54 of the 112 articles are included in this third type. Some of the studies acknowledged environmental consequences equivalent to the comprehensive understanding of overall sustainability. Between two leading environmental and social sustainability bottom line, environmental issues found to be the focus of 49 articles which is almost double in number comparing social sustainability issues which is focused in 27 articles. This signifies that most of the earlier studies considered environmental sustainability as an alternative to the concept of Sustainability. Social Sustainability is a more recent concept which evolved from the suggestions and recommendations of the earlier sustainability researchers.

As ecological issues have been the center of discussion in the sustainability spheres for a long time, some narrowed down idea have emerged under the big spectrum of environmental sustainability. Thus, the current researcher tried to categorize those ideas under environmental bottom line such as: Circular Economy, Carbon emission and footprint, green technology, water accounting, organic cotton, closed loop supply chain, Life cycle assessment (LCA). On the other hand, social sustainability mainly refers to the impact of business on people's lives focusing issues such as: safety, security, human rights, human welfare, labor standard and labor governance, wage discrimination, gender differences, CSR, modern slavery, working conditions etc.

A handful of articles are included into more than one category. Roy et al (2020) in their study presented sustainability as a whole idea but they mainly focused on environmental issues. Some scholars tried to incorporate specific sustainability idea into TBL. For example, Rovanto & Bask (2020) studied Circular Economy touching all three dimensions which is by default a

section of environmental sustainability. Similarly, few articles are placed in the 'Environmental' umbrella along with the 'Comprehensive' category such as: Illge & Preuss (2012), Boström (2014), Joa et al. (2014), Beh et al. (2016), Li et al. (2016). Hannibal & Kauppi (2019) and Lueg et al. (2015) are included in both 'Social' and 'Comprehensive' dimensions. Hannibal &Kauppi (2019) concentrated to investigate social issues in their study with an aim to evaluate third-party assessor's role in a multi-tier supply chain scenario while Lueg et al. (2015) studied CSR as a value addition mechanism. Articles like Freudenreich & Schaltegger (2020) and Fulton & Lee (2013) cannot be excluded from any of the dimensions, thus included in all three. These articles could only be put into the 'Comprehensive' category but along with general sustainability discussion, these articles have special focus on environmental and social issues. In their effort, Moretto et al (2018) tried to specifically focus on environmental and social bottom line, but ultimately pictured the integrated sustainability scenario. Same argument can be placed for Nassivera et al. (2017), Macchion et al. (2017), Winter & Lasch (2016), Wilhelm et al. (2016), Da Giau et al. (2016).

Half of the articles generalized or blended economic viability and profitability of business with other two leading dimensions. Main umbrella topics in this section can be summed up as follows: Sustainability Governance and compliances, Sustainability Reporting, Multi-tier Supply chain, Supply Chain Traceability and Transparency, Sustainable Supplier selection and integration, Sustainability risks, Sustainability planning and Strategy, Barriers, and sustainability Finance. In these articles, none of the bottom lines are explicitly focused rather presented in a comprehensive style.

The following section would attempt to developing a conceptual map for each of the TBL dimensions using different themes explored by the researchers.

2.5.2 Environmental Sustainability (Themes and Umbrella concepts)

Although 'Sustainability' of supply chain is understood as the combination of environmental and social aspects aligning with economic concerns, most of the sustainability literature focused mainly on ecological sides and comprehend sustainability only by green supply chain (Bevilacqua et al., 2014). Many of the academics use environmental helix synonymously to the broader spectrum of sustainability issues, thus, this review is aimed to differentiate each dimension and take an integrative approach to understand and interlink complementary nature of broader concept. Some researchers use the term 'sustainable' as an alternative to refer the environmental issues (Fung et al., 2021). A significant number of research endeavors being

investigated in this study have their focus on Carbon Tax, Carbon emission, Carbon Trading and environment friendly cotton production but used the comprehensive term 'Sustainability' to indicate environmental/ green aspects. Sustainable product offerings indicate that production and distribution processes must be environment friendly (Pal & Gander, 2018). As the environmental impact of apparel industries are significantly higher and public awareness is now at peak on natural conservation issues , Environmental Sustainability has been gaining significant strategic and managerial attentions (Caniato et al., 2012). The production processes of textile and apparel products involve greater damaging impacts for the planet which makes it critical for the industry, thus, environmentally sustainable green product adoption is crucial (Shen et al., 2020). The following section discusses the concepts originated from the broader spectrum of environmental sustainability (Figure-6).

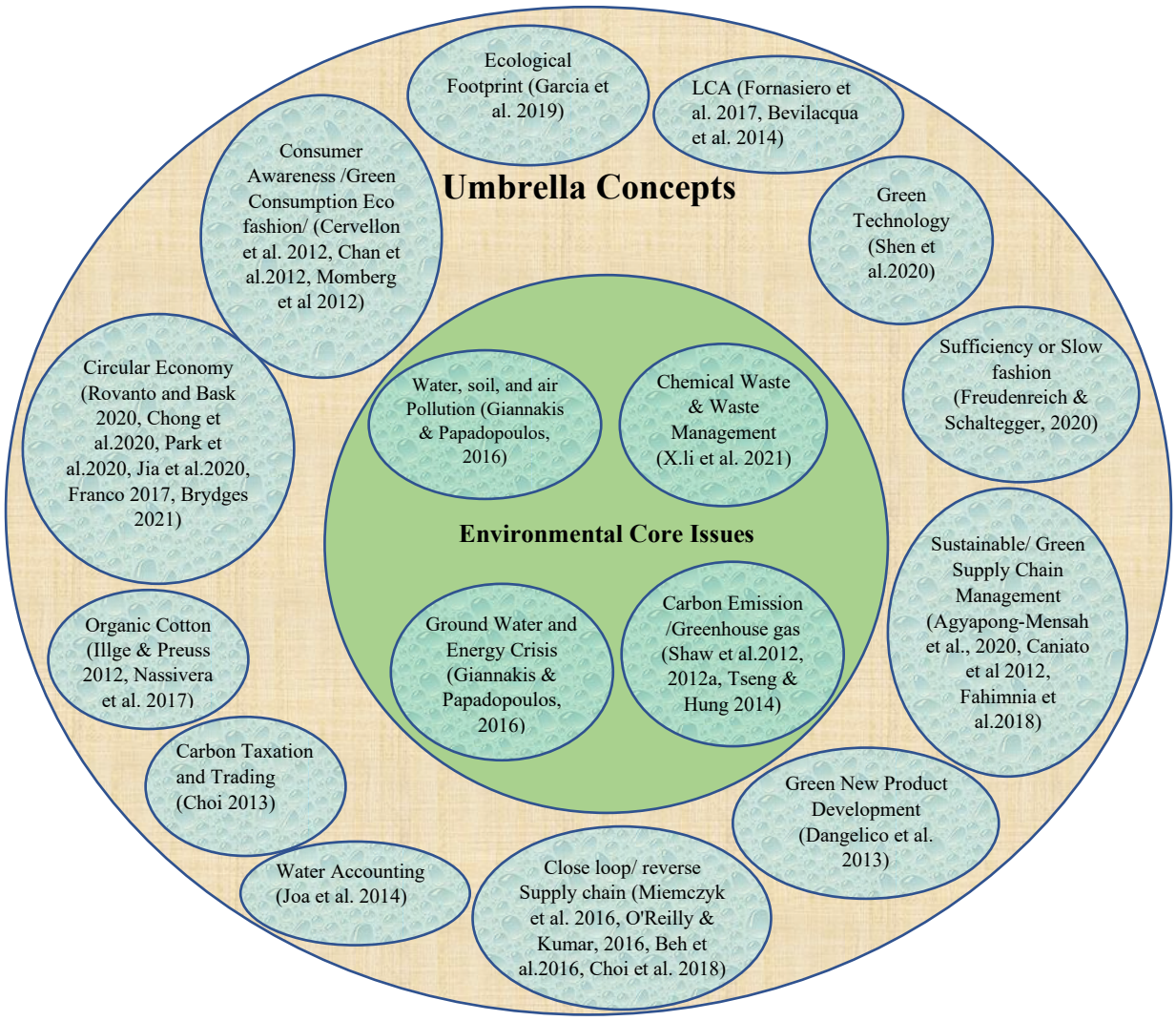

Figure 6: Sub-themes of Environmental Bottom line (Author construct)

2.5.2.1 Circular Economy/Close loop Supply Chain

The term circular economy aims to describe a system where resource mobilization and production process would be circular rather than being linear "take-make -use-waste " system to reduce negative environmental impact (Brydges, 2021). It is designed to reduce wastage and strain on greater environment by reuse and thus sometimes termed as Closed loop fashion (Jia et al., 2020). According to Jia et al (2020) the main target of circular economy is to nullify the 'unintentional destructive impacts' of apparel industry on nature. Although circular economy has been in the discussion for a while, the practical implementation involving all the stakeholders, especially consumers are not investigated enough (Ki et al., 2020b). To employ a true circularity, all the external stakeholders such as: consumer, government, investor, academics and recycling agents must be recognized along with internal retailer-supplier relations (Ki et al., 2020a). Involving companies, its supply chain and society, a Circular Business Model (CBM) has been proposed by Rovanto and Bask (2020) in their scholarly work. According to them a company built on CE principles always value environmental and social sustainability more (Rovanto & Bask, 2020). A similar method called SBM (Sustainable Business Model) being proposed by Pal and Gander (2018) illustrates triple helix of narrowing, slowing, and closing.

Following circular fashion directives, firm level implementation of circularity is a complex task where product design, pattern of consumption and recovery of the product at the end of life should be crucially examined (Franco, 2017). Institutional preparedness, new organizational culture have to play a vital role as apparel businesses transition to circular operation (Fischer & Pascucci, 2017). The 'fast fashion' has become the leading trend with considerably short product lifespan, which is in turn, a major concern of environmental degradation and thus the concept of Reverse Supply Chain or Closed Loop Supply Chain evolved. Circularity involves recycling of apparel goods from the final point of use to the points of disposition which may take several forms: re-sell, re-use, repair, remanufacture, recycle or disposal (O'Reilly & Kumar, 2016). Strategic, technical and operational resources are required for proper execution of close loop supply chain (Miemczyk et al., 2016).

2.5.2.2 Greening the Supply Chain and Green Product Development

Out of 49 environment focus papers, a significant share of 9 articles focused either Green Supply Chain or Green product development or Green Technology adoption. In an earlier attempt to understand the environmental sustainability, Caniato et al. (2012) used the word Green in the same sense of environment friendly. In their study, they tried to establish a

framework of green supply chain including factors such as drivers of green practices, practices that ensure environmental sustainability and how these practices can be performed (Caniato et al., 2012). For a fashion brand, aiming to achieve green sustainability need to focus on supplier integration. Greening strategy combined with greater supplier integration not only can boost up firms financial performances but also can offer mitigating strategies to recover from crisis (Li et al., 2016). To overcome the challenges of Green Supply Chain Management (GSCM) in an uncertain environment, Hashim et al. (2017) proposed a mathematical model for choosing green supplier. They suggested that companies prefer selecting strategically viable supplier first than giving sustainability a priority (Hashim et al., 2017). In a macro perspective of managing greening crisis, government intervention can influence by choosing different tariff strategies- first, a soft taxation approach to give flexibility for the business, second, a strict approach to minimize the environmental impact and finally a balance between two depending on the ultimate objectives (Mahmoudi & Rasti-Barzoki, 2018). More environmental taxes always influence the manufacturers to adopt greener technologies in the supply chain (Shen et al., 2020).

In a more recent study Agyabeng-Mensah et al. (2020) introduces three related concepts to complement green supply chain: Internal Green Supply Chain Practices (IGSCP), Green Human Resource Management (GHRM) and Supply Chain Environmental Cooperation (SCEC) which as a combined effect increase the financial performances of the firm (Agyabeng-Mensah et al., 2020). The research endeavor shows that internal green practices like green production can improve process efficiency, environmental impacts, and quality of the products offerings. The challenge of incorporating greening and environmental issues in the new product development has been explored by Dangelico et al. (2013). Manufacturing process reengineering , product design, understanding newly created opportunities and sharing technical knowhow with vertical cooperation networks are important consideration while incorporating green new product development programs (Dangelico et al., 2013).

2.5.2.3 Carbon Emission/ Footprint/Carbon Taxation

Carbon (CO_2) emission has been the center of discussion for ages due to causing significant ecological degradation and natural imbalances by releasing greenhouse gases to the atmosphere and leading to global warming (Shaw et al., 2012a; Tseng & Hung, 2014). Carbon emission is a natural byproduct of industrial production and supply chain network possesses one of the biggest threats of releasing carbon to the air (Transportation, freight, physical distribution). Reasonably supply chain optimization and selecting appropriate supplier based on the carbon-

footprint is of highest importance (Shaw et al., 2012a). In this review endeavor, this significant trend is quite evident in all six papers focusing carbon footprint issue such as: Shaw et al. (2012a), Shaw et al.(2012b), Choi (2013), Jaegler & Burlat (2013), Tseng & Hung (2014) and Mair et al. (2019). The target is to find an optimal apparel supply chain network and best supplier considering carbon emission and associated costs. Shaw et al. (2012a) have contributed to the literature by linking direct carbon emissions and embodied carbon footprint. Shaw et al.(2012b) proposed a linear programming model in the same year for selecting an optimal supplier based on low carbon criteria. Retailing firms are in constant pressure to reduce carbon emission from their entire operation, they look for low carbon supplier to reduce the overall carbon footprint (Shaw et al., 2012b).

To reduce carbon emission, several approaches have been employed by government agencies and international bodies, such as: carbon trading or emission trading scheme, agreed emissions targets and carbon taxation scheme (Tseng & Hung, 2014). Among these, carbon taxation scheme has been used by many government around the world and has the potential to be the most promising tools in reducing carbon emission (Choi, 2013). Exploring optimal supplier selection problem, Choi (2013) found that supplier with shorter lead time offers less carbon emission. In a Make to Stock (MTS) environment, among four types of location choices (Local, regional, continental and global), the worst case of carbon emission has always been found to be global signifying the farthest distance of supply chain means the most emission increase (Jaegler & Burlat, 2013). Direct environmental side effects of carbon emission and greenhouse effect such as: global warming, sea level rise, irregular precipitation have been discussed extensively but indirect social side effects and economic threats of the supply chain has remain underexplored (Tseng & Hung, 2014). The study argues that all the indirect cost such as: damages to human health, property and spoiling the ecosystems must be calculated and an optimal carbon tax should be equal to the damage caused by any economic activities.

2.5.2.4 LCA

Life cycle assessment (LCA) is a mechanism of encountering environmental issues and a great way to quantify the environmental impacts of a specific product or industry throughout its product life cycle (Bevilacqua et al., 2014). This study evaluated environmental impact of cotton yarn production calculating carbon emission for per KG cotton in four different countries by using life cycle assessment technique. The results say that dying and spinning are the most impactful activity and can be controlled by effective measures. LCA methodology can be used in apparel supply chain on mass scale from production to suppliers to transport to

final customers. Different supply chain strategies can be combined with the LCA approach to assess the environmental impact of a specific supply chain throughout its entirety (Fornasiero et al., 2017).

2.5.2.5 Water Accounting

Life cycle assessment (LCA) approach includes water use and its impacts in the process, but one paper is found to be specifically directed towards water accounting. In their article Joa et al. (2014) tried to propose a new framework (Regionalized cumulative Water Intensity-RCWI) for calculating water usage along the total supply chain of an industry taking cotton sector as a case. In a nutshell, water performances and impacts of water usage should be evaluated at the different level of the supply chain among the suppliers and supplier's combination to overcome environmental challenges (Joa et al., 2014).

2.5.2.6 Environmental Awareness and perception/ Eco-consumption

As consumers are continuously becoming aware about the environmental and social consequences of buying decisions, their behavior and perception plays important role in choosing sustainable pathways in textile supply chain (Nassivera et al., 2017). Proving the notion of increased consumers consciousness right, 6 articles found to be focusing consumer perspective - (Cervellon et al., 2012), (Chan et al., 2012), (Momberg et al., 2012), (Egels-Zandén & Hansson, 2015), (Nassivera et al., 2017) and (Garcia et al., 2019). These studies investigated diversified issues related to consumer decision and its effect on sustainable textile initiatives. Research shows that consumers are not especially willing to pay substantive premium price for a sustainable fashion product but still careful pricing and tangible representation of sustainable attributes can influence their final decisions (Chan et al., 2012). Moreover, consumers are becoming matured and conscious in evaluating sustainable fashion with greater expertise in supply chain and distribution channel, material, production and manufacturing processes (Cervellon et al., 2012). Surprisingly environmental knowledge of the consumers is not found directly reflected on their choice of apparel rather their priority was based on price, aesthetics and functional performances (Momberg et al., 2012).

Consumers are not forcing lead companies to be more transparent in sustainability practices rather being played by big corporations for generating revenues is a significant notion in the industry (Egels-Zandén & Hansson, 2015). In their consumer survey, Egels-Zandén & Hansson (2015) provided the insights that consumers does not possess the power of influencing the firm to become more sustainable, but the corporation can communicate their transparency and

sustainability practices to influence consumers buying willingness in favor of corporate wellbeing. Same findings can be traced in a more recent study conducted by Garcia et al. (2019). Their study indicates that consumers are not practically aware about sustainable production processes, textile chain and its impact on environment (Garcia et al., 2019) but still they are concerned of sustainability issues.

2.5.2.7 Organic Cotton/ Product

Two scholarly papers found focusing specifically to organic cotton initiatives. Replacing the conventional cotton by organic cotton is almost impossible but with the help of Better Cotton Initiatives (BCI), retailers trying to avoid harmful cotton (Illge & Preuss, 2012). Illge & Preuss (2012) conducted a comparative study of organic cotton initiatives of H&M and German niche player Hessnatur where they evaluated financial viability of engaging in sustainable cotton initiatives. Overcoming the tradeoff between sustainable cotton and economic viability is the prime concern here. Similar findings echoed in the study of Nassivera et al. (2017), according to them, apparel companies should try to improve their sustainability performances to attract more consumer responses and influence the consumers' willingness to pay extra for organic products (Nassivera et al., 2017). The study argues that consumers perception of organic and sustainable clothing and their willingness to support these initiatives plays important parts. Simultaneously, clothing industry and textile companies have their own responsibility to stimulate the sustainable consumption, eco-friendly products demand, and organic clothing.

2.5.3 Social Sustainability Themes

Although studying social aspects is new trend compared to scholarly discussion on environmental issues, numbers of research endeavor have been catching up the sustainability literature. In their work, Huq et al. (2014) focused Bangladesh trying to understand developing country suppliers adopting socially sustainable practices. They found that social sustainability helps retain skilled labor but cultural differences with developed country buyers make code of conduct difficult to follow, thus open communication and trust works better than controlling mechanisms (Huq et al., 2014). Social malpractices by suppliers are also identified in their paper. Huq et al. (2016) conducted a scholarly study exploring 'Social management capabilities' where they found that Rana Plaza and Tazreen Fashion tragedy made all the concerned RMG stakeholder cautious and thus Bangladeshi suppliers have faced major challenges and scrutiny from brands (Huq et al., 2016). With the lens of stakeholder's theory, the researchers primarily identified five major types of stakeholders (Media, NGOs, trade unions, RMG associations and regulatory bodies) along with traditional Buyers-Suppliers-

Consumers group, whose power dynamics force industry to follow social sustainability guidelines. Huq and Stevenson (2018) in their study tried to engage intuitional theory in the same developing country set up to explore social sustainability practices. Understanding institutional arrangement to pressurize developing country suppliers in implementing social ethical practices and realizing suppliers decoupling practices needs deeper attention (Huq & Stevenson, 2018). As the apparel supply chain are complex, diverse, and social issues are even more critical, offering final solutions is impossible. As a result, strategic approach and involvement of multi-dimensional stakeholders is necessary for mitigating negative externalities of social issues (Bubicz et al., 2021).

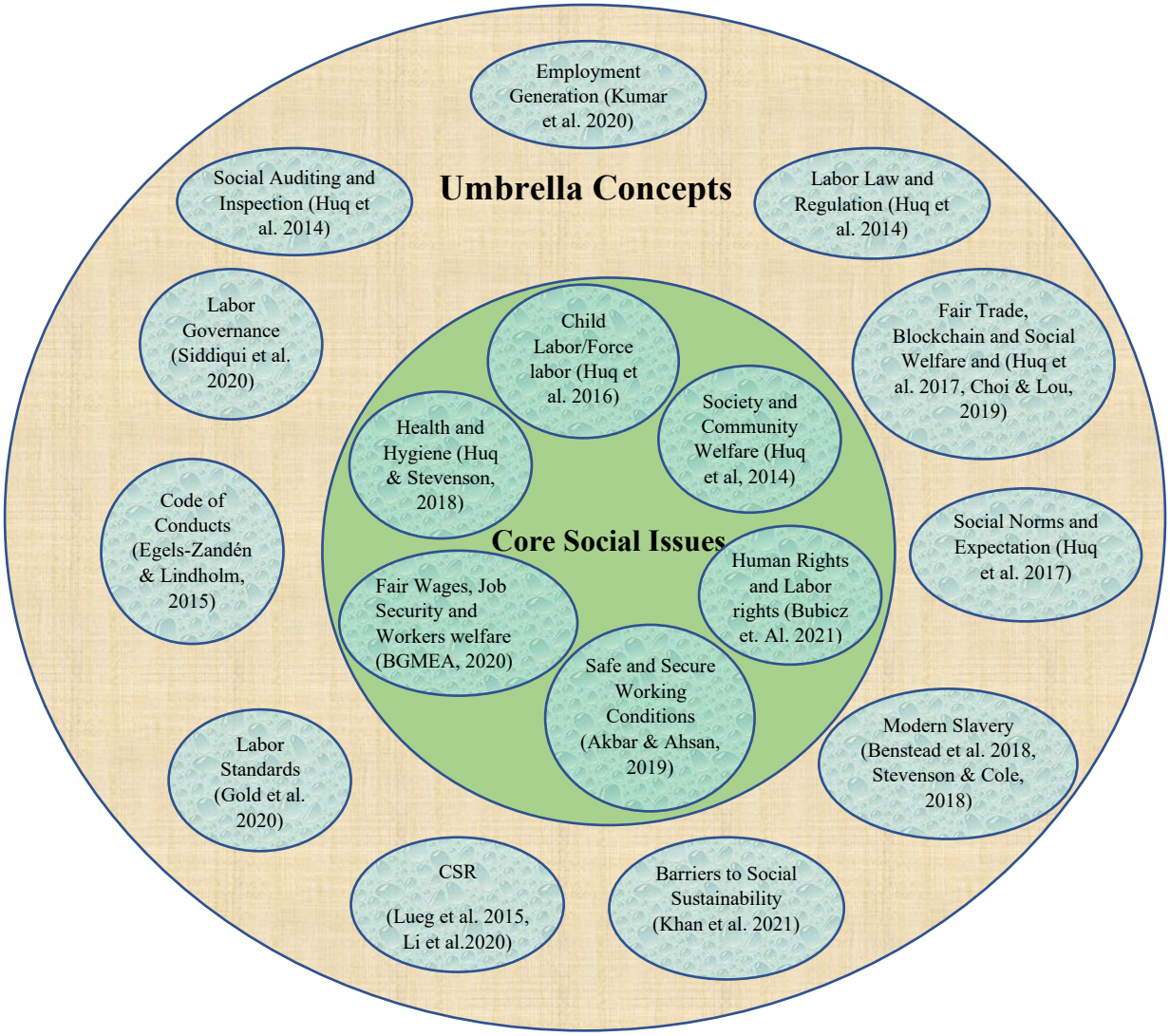

Figure 7: Sub-themes of Social Bottom Line (Author Construct)

Subthemes and Umbrella concepts under social Sustainability:

2.5.3.1 Labor standard/ Labor Governance

Stakeholders (consumer, media, NGO's and civil rights groups) always ask the brand to take responsibility for any irregularities of labor rights, child labor or force labor down the line (Gold et al., 2020). According to the study, sub-contracting is the most common practice in apparel sector which makes it problematic to implement labor standard by the suppliers. Rana Plaza collapse case in 2014 in Bangladesh can be taken as a classic example of labor governance failure. The biggest accident in the history of RMG sector forced international retailer community to undertake private monitoring and certification process seriously (Siddiqui et al., 2020).

2.5.3.2 Workplace safety/ Working Conditions

Although safety, security and working conditions are the core of social sustainability bottom line and discussed widely in the social sustainability literature, two articles found giving special focus in this important sub-topic: Akbar & Ahsan (2019) and Antonini et al. (2020). Workplace safety is the most important element of social sustainability. Initiation of safety measures in the workplace can make production efficient, can increase brand image which in turn can generate revenues and profits (Akbar & Ahsan, 2019). Akbar & Ahsan (2019) investigated the challenges of incorporating workplace safety measures and ranked them using AHP (Analytical hierarchy process). According to the findings of the study, two most significant challenges appeared as: 1. Costs and financial concerns and 2. Capacity and capability of the concern factory. As workplace safety maintenance is costly, defining and setting reporting boundaries for working conditions in a highly contested business environment is critically important (Antonini et al., 2020). The same paper argues that as RMG sector is one of the biggest employers in the world and subject to accusation of human rights abuses, gender discriminations, unfair wages, slavery and obviously questionable working conditions, sustainability reporting measure like GRI (Global Reporting Initiatives) must be utilized with care.

2.5.3.3 Code of Conducts

Following the deterioration of working conditions and labor rights violation, monitoring sustainability issues by private regulatory bodies has been increased tremendously worldwide. Along with these auditing firms, international bodies like ILO and concerned state-run agencies have been trying to improve working conditions and ensure labor welfare via code of conducts for the producer-suppliers (Egels-Zandén & Lindholm, 2015). In the study the researchers

found that code of conducts marginally improves the workers' rights but in a multi-stakeholder's, multi layered channel setting, significance of codes of conduct and regulatory audit framework is debatable.

2.5.3.4 CSR

Corporate Social Responsibility refers to a corporate body's action and policy which meet the demand of different direct and indirect stakeholders and simultaneously taking triple dimensions of sustainability into consideration (Lueg et al., 2015). Lueg et al. (2015) found CSR as a performance booster which brings positive brand image and thus creates competitive advantages. Whether consumers see CSR as a positive contributor to the society and positively approach the company is the focus of Nassivera et al. (2017). Their study of consumer perception about the social and environmental efforts suggests that for positive outcome apparel companies should not only focus implementing CSR (social and Environmental) initiatives but also should reach out the consumer and communicate their good deeds (Nassivera et al., 2017). By the way they can be ahead of serving green consumer and getting green consumers from the competitors. With the help of existing literatures and expert's opinion Li et al. (2020) identified 13 important CSR factor and organized them according to their relative importance. They found 'Government Initiatives' as the most important success factors followed by 'Improve human rights, law, safety, and wellness, Customer pressure' and 'Environment management system' to be significant other factors (Li et al., 2020).

2.5.3.5 Modern Slavery

In this review effort, two articles finally came out with special focus of modern slavery concept in the textile industry keeping Modern Slavery Act, 2015 of UK in consideration: Benstead et al. (2018) and Stevenson and Cole (2018). Modern slavery is the highest form of exploitation of any individual labor's talent, skills, expertise, and experiences. In response to the Modern Slavery Regulations (Modern Slavery Act, 2015, UK for example) and to handle the challenging and complex issues revolving the slavery, horizontal collaboration competitors in the same industry, civil society and NGOs are required to improve the status quo (Benstead et al., 2018). The importance of collaborative efforts with traditional and non-traditional actors has been complemented in the study of Stevenson and Cole (2018) too. The study tried to trace the disclosure pattern of companies making annual modern slavery report and how those reports detect the modern slavery issues, resolve, and remediate. The findings suggests that companies statement can be categorized into five tier where 'Ethical leader' takes the top leadership position, on the other hand, there are companies whose main target is 'Compliance

only' to the regulation mainly focusing to defend against the law and there are firms practicing in between (Stevenson & Cole, 2018).

2.5.4 Comprehensive (Business, Economic and Logistics) Sustainability Issues

There are articles which aim to understand the concept of sustainability as a whole, not leaning to any of the dimensions of TBL. Overall operational excellence, economic performance along with the sustainability goals, governance, and management of sustainability, understanding the different tier of supply chains, reporting the sustainability practices are discussed here. As RMG s and its supply chain's existence mainly depends on the viability and operational performances, the core economic bottom line focuses on Investments, ROI (Rate of Returns), competitive edge, proper planning, and financing and obviously on profitability.

Elements of comprehensive (Economic) Issues:

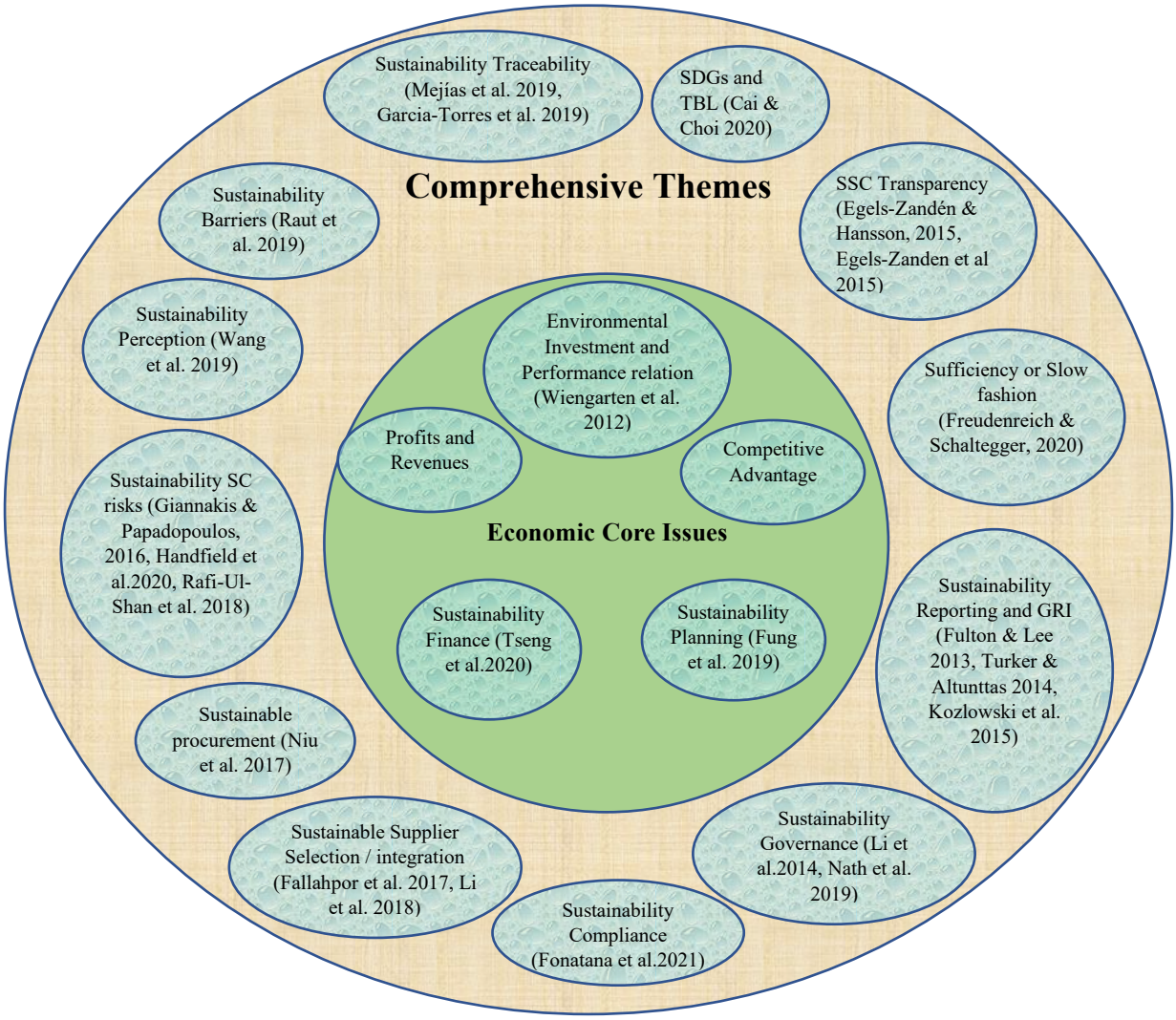

Figure 8: Sub-themes of Comprehensive Bottom Line (Author Construct)

2.5.4.1 Sustainability Governance

The concept of sustainability governance denotes a regulatory framework involving institutional arrangements, structural set up and controlling mechanisms by which the supply chain stakeholder's operations and activities are being observed, monitored and guided to achieve a balanced economic, social and environmental outcome (Li et al., 2014). In the same study they proposed seven factors influencing governance mechanisms 4 of which are internal to the lead firm: supplier's capability, centrality of focal firm, supply chain density, transactions complexity and 3 of which are external: nature of consumer demand, government regulations, NGO disclosure capacity. Studying H&M as a case company, seven commitments are also proposed as such: serve fashion for conscious consumers, choose and reward responsible partners, be ethical, be climate smart, reduce, reuse, and recycle, use natural resource responsibly and strengthen communities. From the viewpoint of lead brands, supply chain sustainability governance mechanisms are sometimes understood as the collections of processes and practices to manage and maintain the relationships with the suppliers for achieving sustainability in operations (Nath et al., 2019). From the evidence in a multi-tier and developing country context, it is found that first tier and second tier suppliers feel coercive and normative pressures, but third tier always get coercive powers of second tiers suppliers as a way of governance. All these coercive powers and pressures originate from the buyer's requirement, third party auditing, government regulations and NGOs.

2.5.4.2 Sustainability Reporting

Sustainability reporting is a modern mechanism of sustainability governance where organizations produce and publish their reports stating sustainability initiatives, action, and performance. After introduction of GRI (Global Reporting Initiatives) by United Nations Environment Program in 1997, this international initiative has become the main platform of sustainability reporting with quality content and has globally been accepted by the sustainability stakeholders (Fulton & Lee, 2013). GRI reporting framework categories sustainability by triple dimensions: social, environmental, and economic front where environmental aspects: energy and water usage, nature conservation, emissions, waste and pollution, transport and compliance, social aspects: labor governance, human rights, employment, safety and security, training and education, diversity and social welfare and finally economic aspects like performance, market presence and larger economic impacts are covered. Another study used the same GRI framework and found that retailers in the developed countries integrate their suppliers mainly from developing countries in their system by

proposing a common code of conducts, commitment and compliance mechanisms along with monitoring and auditing procedure (Turker & Altuntas, 2014).

2.5.4.3 Nominated procurement

Fontana et al. (2021) studied that some brands ensure Sustainability compliance in their upstream supply chain by nominating sub-suppliers. They illustrated that sometimes buyers nominate sub-supplier for their main or lead supplier based on their own evaluation leaving no choice for the lead supplier by which buyers meet mandatory compliance (Fontana et al., 2021).

2.5.4.4 Supply Chain Transparency and Traceability

Sustainability reporting complements supply chain transparency by disclosing information required to understand the impact of an organization on the greater external society. Along with the corporate reporting, the issue of transparency extends to the whole supply chain network, and it has other dimensions like environmental declarations and certifications (Egels-Zandén et al., 2015). The same article argues that transparency is a way of disclosing information to the external stakeholders such as consumers, governments and NGOs and supply chain transparency takes place when suppliers name, their respective sustainability conditions and purchasing firm's practices are also disclosed. Locating the origin of the product along the supply chain with suppliers' lists are sometimes used interchangeably to transparency but it's only the one dimension called traceability. Working on the same premise of transparency and traceability, Egels-Zandén & Hansson (2015) found that transparency can be both consumer and corporate tools but does not always leverage consumer buying decisions and it can provide legitimacy and power to the retail firm (Egels-Zandén & Hansson, 2015).

Traceability management as mentioned in Egels-Zanden et al (2015) is the subject matter of two later article included in this study such as: Garcia-Torres et al. (2019) and Mejías et al. (2019).) In their systematic literature review Garcia-Torres et al. (2019) proposed a Traceability for Sustainability (TfS) framework. They offered new insights calling TfS as an ability to combine and share information and visibility accurately, in timely manner, with trust, operational excellence and reliability within the supply chain actors (Garcia-Torres et al., 2019). They claimed that traceability is particularly important for apparel industry as it involves long, complex, diverse, multi-party supply chain (Garcia-Torres et al., 2019). In a setting of multi-tier, most diverse and complex apparel supply chain , traceability becomes challenging (Mejías et al., 2019). Mejias et al. (2019) advocates that tracing the sustainability performances and evaluating the functionality is a daunting task due to lack of transparency in the

identification. Compliance and relationship management of suppliers beyond the first tier requires traceability management, training and capability formation and long term cooperation (Mejías et al., 2019).

2.5.4.5 Supplier selection

One of the most important decision apparel retailers must take is choosing the most suitable supplier(s) for the upstream supply chain. It is a critical decision as appropriate supplier selection involves uncertain environment and complex interaction (Fallahpour et al., 2017). Fallahpour et al. (2017) observed that economic dimensions have been the most critical aspect in selecting suppliers followed by environmental aspects and finally social aspects placed third.

2.5.4.6 Supplier Integration

Supplier integration is understood as collaborative approach between the corporate retailer and the supplier which involves long term relationship, partnership building, sharing of knowledge, know-how and information and cooperation along the supply chains (Li et al., 2016). The goal of Supplier integration is to bring competence, capability, and efficiency in the supply chain operation by mutual collaboration and synergic effect.

2.5.4.7 Sustainability risks

Three articles found to focus on sustainability risks associated to supply chain of apparel products: Giannakis & Papadopoulos (2016), Shan et al. (2018) and Handfield et al. (2020). First two papers specifically focused on sustainability related risks differentiating from typical supply chain risks while Hanfield et al. (2020) examined supply chain risks in the low-cost countries. Traditional and typical supply chain risks can take different forms such as: *supply risks* involving capacity, quality, delays and design problems, *procurement risks* including exchange rates, inventories and stockouts, *logistics and transportation risk, demand fluctuation risk* involving vulnerability, inaccuracy of information, stocking and *infrastructure and system failure risks* while sustainability related risks can be different and originated from triple dimensions of sustainability: environmental, social and economic crisis (Giannakis & Papadopoulos, 2016). Aligning to triple bottom lines, sustainability risks can be diverse such as: environmental degradation, wastage, pollution, greenhouse effect, disasters, water body disturbance, accidents, energy shortage and consumption, human and labour rights violation, child labour, slave labour unsafe and unhealthy working conditions, strike and boycotts, non-compliances, frauds, litigations etc and can cause a great threat and risks for the companies. Giannakis and Papadopoulos (2016) suggests that environmental sustainability risks which are

internal to the companies (endogenous) seems to be the most critical of all. Management of sustainability and risk management has been studied independently by most of the scholars and academicians but a combined approach is necessary to deal with the complex interplay of this two field (Rafi-Ul-Shan et al., 2018). Keeping that interconnectivity of two concepts in line, Rafi-Ul-Shan et al (2018) conducted a structured and systematic literature review to propose a supply chain sustainability risk management framework specifically towards fashion sector. The idea of 'sustainability risks' introduced by Giannakis and Papadopoulos (2016) has been used as the key concept in this paper and explored a possibility of a conceptual design of Supply Chain Sustainability Risk (SCSR) management. Both articles argued that although sustainability issues and risk management are inter-linked and inter-dependent, they are studied and treated separately using separate models and still no integrated conceptualization and framework development been done. According to Hanfield et al. (2020), social issues such as human resource management risks, working conditions, safety and welfare issues along with economic concerns are on top of the lists of long-term supply chain risks (Handfield et al., 2020).

2.6 Research Methods and Design used

Although every single scholarly article is unique and different than others, still a pattern can be found in selecting research methods, tools, and design. Choosing the appropriate design and tools determines appropriate result and outcome. Among various approaches and methods, most of them can be broadly categorized as: Quantitative, Qualitative and Mixed. Within these three-broad spectrums, there are myriads of variable ways to design a research endeavor which are broadly summarized below considering the target 112 articles:

Design and Methods	**Number of Articles**
Quantitative: Survey, Hypotheses	15 (Li et al., 2021 &…)
Fuzzy Set/ optimization modelling	7 (Khan et al., 2021 &…)
Mixed: Qualitative and Quantitative	5 (Chowdhury & Quaddus, 2021 &…)
Systematic Reviews and Content Analysis	19 (Fung et al., 2021 &…)
Qualitative in-depth Interview/ Semi-structured	32 (Fontana et al., 2021 &…)
Case Study approach	40 (Fontana et al., 2021 &…)
Mathematical/ computer Simulation modelling	12 (Gold et al., 2020 &…)

Conceptual model/ framework development	8 (Shen et al., 2020 &…)
Multi Criteria Decision Making (MCDM) tools	5 (Li et al., 2020 &…)
Delphi Study using Fuzzy AHP techniques	(Kumar et al., 2020)
Quantitative full-text bibliometric word analysis	(Beyers & Heinrichs, 2020)
Theoretical Modelling	5 (Antonini et al., 2020 &…)
AHP (Analytical Hierarchy process)	(Akbar & Ahsan, 2019)
Game theory Modelling	(Choi et al., 2018)
Action research Approach (Qual)	(Benstead et al., 2018)
Qualitative/ Interpretative Structural Modelling	3 (Lim et al., 2017&…)
Quantitative, Life cycle Assessment (LCA)	(Fornasiero et al., 2017 &…)
Qualitative Approach, Essay Writing, FGD	(Momberg et al., 2012)
Interview, Grey Approach	(Baskaran et al., 2012)

Table 2: Design and Methods used In the Articles

From the above summary table its evident that most of the studies follows the path of qualitative, semi structured, in-depth interview and case study approach. Although a few papers used **Case Study** in accordance with systematic reviews and quantitative research, most of the **Qualitative in-depth interview** papers are developed in combination with **Case Study.** The highest numbers of **40** papers used Case study as research setting to examine a particular case or multiple case. On the other hand, **32** papers are found taking exploratory semi structured interview approach following qualitative path.

Systematic reviews and content analysis design came out to be another major type of research in current summary where 19 papers either done a systematic review of contemporary literature or done content analysis of published report. **Quantitative Studies** using structured questionnaire, survey, hypotheses, construct development and model or hypotheses testing have been the primary methodology of 15 papers. Other prominent methods found in the summary are conceptual modelling, theoretical framework, computer aided mathematical modeling, structural modeling, simulation development, FGD, LCA, action research, game theory approach, analytical hierarchy process, MCDM, meta-analysis, fuzzy settings etc. A few numbers of papers (around five) used **mixed** approach combining both qualitative and quantitative methods.

2.7 Theory/ Theme used

Not all the papers included in this analysis used a specific theory to build upon the research framework, there are a few numbers of systematic reviews, content analysis and conceptual papers found. Still a range of diversified theories and structured concept enriched most of these studies. Some of the articles used theory and relevant concepts interchangeably such as: Triple Bottom Line (TBL), Multi-Tier Supply chain, Circular Economy, Ecological Footprint, Corporate Social Responsibility, Green Supply Chain, Reflexive responsibility. The most common theories are as follows:

Resource Based View (RBV) is a well-established theory which focuses on the firm or companies' resources and internal strength can be traced in Eight articles. Related theories developed based on the premise of RBV such as: Stakeholder's Resource Based View (**SRBV**-Sodhi, 2015)- a theory developed by combining RBV and Stakeholders Theory, which is found in three articles, Theory of Dynamic capability (In two articles), **Dynamic Capability View (DCV**- In three Articles), **Natural Resource Based View (NRBV)-**two articles, **Resource Dependence Theory**-used in three papers and Resourced Based Theory in one. These theories complement each other and develop and used to denote the organizations resource strength and capability. Another theory which is commonly used to complement RBV is **Stakeholders Theory**/Stakeholders Salience and Management which mainly focuses to understand all the concerned parties involved in a business operation, benefitted, and affected which is tracked in five articles. On the other hand, **Institutional Theory** (used by 4 articles) along with Neo Institutional Theory (Used Once) tries to explain social structure and organizational environment by exploring socio economic aspects. **Game Theory** (Used by three articles) is a strategic decision making and mathematical modelling tools used in a competitive setting while **TCE (Transaction Cost Economies) and Transaction cost theory**- (utilized in two papers) aims to obtain the highest efficiency by reducing cost of complex transaction. **Life Cycle Assessment (LCA)** is a concept which theorizes the impact of a product into the greater environment over its whole life span which is being referred in tree articles.

Mathematical Modelling: A significant number of papers used mathematical modelling for supply chain strategy, supplier's selection, and integration to choose the best possible supply chain solution. Most common decision theories used are such as: fuzzy set theory in an uncertain and volatile environment (used in more than 5 papers), multi-Objective optimization framework, Schema-congruity theory, Information processing Theory, Quantitative RCWI

model, Hesitant Fuzzy set Theory, Decision making trial and evaluation laboratory (DEMA-TEL) and Input output modelling/ Information processing theory. Some of the articles used consumer perception and attitude survey using Consumer behavioral theoretical support such as: Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA)

Other prominent theoretical backdrops can be summarized as follows: Systems Theory, Cumulative Prospect Theory, Nominated Procurement, Adaptive Theory, Moral Responsibility Theory of Corporate Sustainability, Supplier nexus theory, Organizational Learning toward management (OLRM), Reinecke and Ansaris (2016) Political Responsibilisation framework, Utility Theory, Supply chain risk theory, Sufficiency Approach of Sustainability, Reflexive Modernization, Prospect theory, Practice based view (PBV), System of Systems (SoS) theory, Theory of modern slavery, Theory of Bounded Self Interest, CSF (Critical Success factor) theory, Contingency Theory, Supplier Evaluation theory, Discrepancy Theory, Ecological Modernization Theory, Agency Theory and others theoretical support.

2.8 Summary Framework of the Review findings

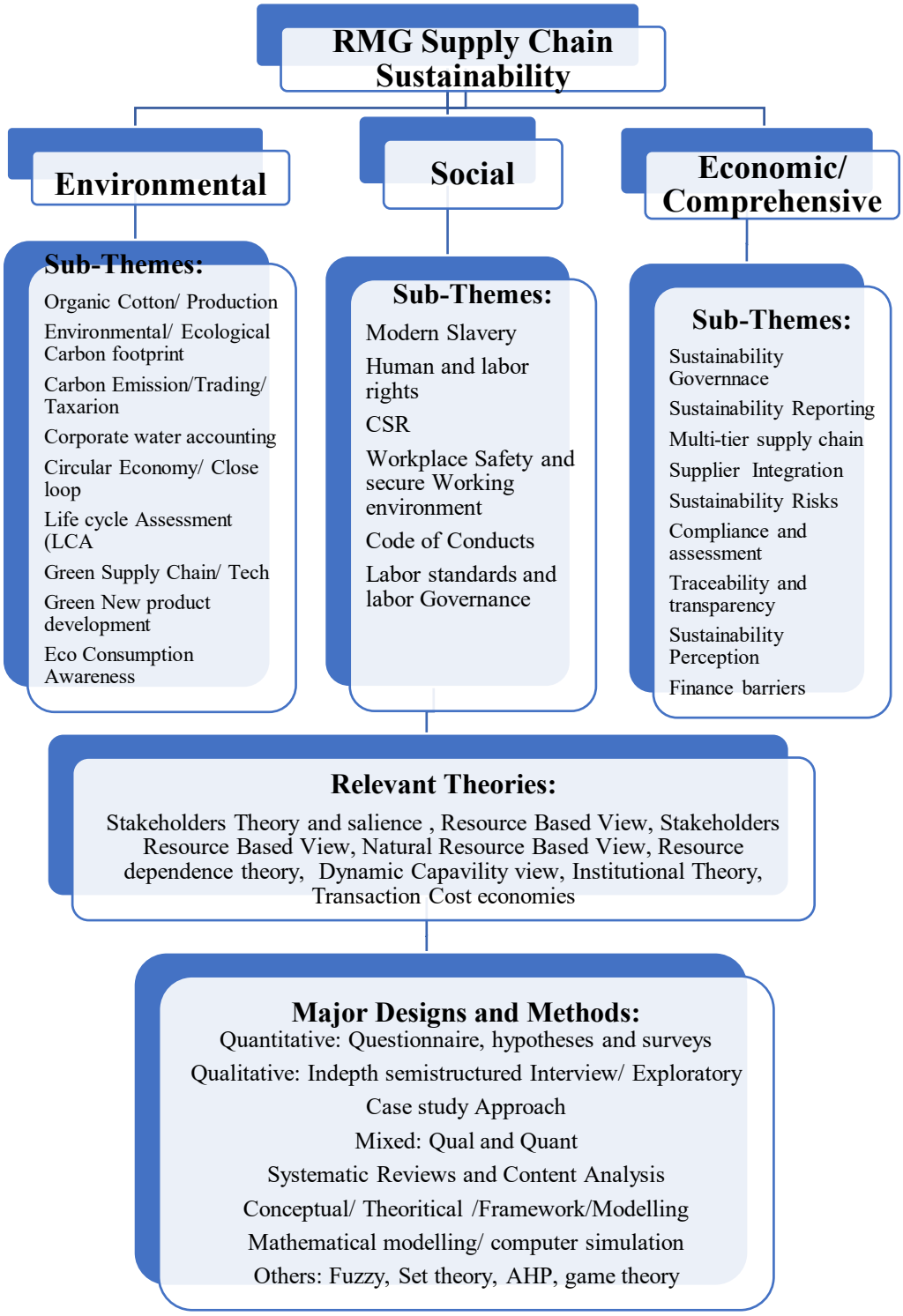

Figure 9: Summary Review Findings

2.9 Theoretical and Conceptual Framework of the Study

2.9.1 Triple Bottom Line (TBL) of Sustainability and other theories

Historically Bangladeshi RMG sector is vulnerable to disruptions, Covid Pandemic has made the RMG supply chain struggling and war scenario globally posing greater threat too. So, sustainability issues have become far more important for the industry. From the above discussion, it can be summarised that for an industry to be truly sustainable, all the TBL dimensions (Social, Environmental and Economic) should be materialized and integrated. Focusing a specific bottom line would result in partial sustainability achievement. Some scholars argue that social and environmental issues should be looked for in sustainability literature while economic aspects are inherent in the concept of business itself thus requires no special focus. Although the notion is rational, business viability, profitability, revenues should not be ignored, as it will hamper the very existence of the business model. With the research aim to explore the challenges and barrier of sustainability and proposing viable SSCM solution in respect to the Bangladeshi apparel sector, logically the notion of integrating triple bottom line (TBL) theoretical lens has become the rational choice. Keeping research questions and objectives in mind, an Integrated Sustainable Supply Chain Management (ISSCM) framework has been proposed. Extensive Systematic Review procedure outlined that RMG industry of Bangladesh should not leave any of the bottom line behind, rather all three dimensions should complement each other and integrate into a single ecosystem.

Among the theories used in the textile and RMG supply chain management, Resource Base View (RBV) has been found most popular in the above analysis, along with Dynamic Capability (DC) and Dynamic Capability View (DCV), these theories emphasize the focus on the firm's strength, inimitable internal resources, and strategic resource mobilization in a dynamic environment. Natural resource base view (NRBV), Resource dependence theory, and institutional theory too tries to align organizational structures, strengths, and resources. These theories are great to evaluate and formulate internal mechanism of the focal firm but to understand the industry from the field level practical perspective and propose complete SSCM framework, stakeholders view, and their own conviction is the best possible way. To make the industry responsible for its social and environmental actions, stakeholders are the most important groups who can influence from within or from outside environment and can be influenced too, thus stakeholders' theory seems most relevant here. Stakeholders' relative importance and power move, legitimate stakes influences sustainability scenario greatly. This

is where stakeholders' theory and salience model has been chosen in this research to identify, explore and explain the sustainability scenario of Bangladeshi RMG sector.

For keeping stakeholders happy and becoming socially and environmentally responsible, an industry or a firm needs strong resource base. Hence, the extended stakeholder's resource-based view (SRBV) dictates that true sustainability can be achieved if the resources of focal firm or industry is complemented with the strength and resources of stakeholders. While triple bottom line (TBL) provides the scope of understanding sustainability from broad spectrum and defines the completeness of the concept, Stakeholder's theory provides the pathway to identify the people involved in the process and how they affect and influence the attainment of true sustainability. As a result of natural selection, the study relies on these theories to make connection among all the bottom lines of sustainability. Aligning sustainability challenges, contemporary practices, and possible solutions in line with TBL bottom lines and stakeholders' perspective a conceptual model is presented (Figure-2.10) below:

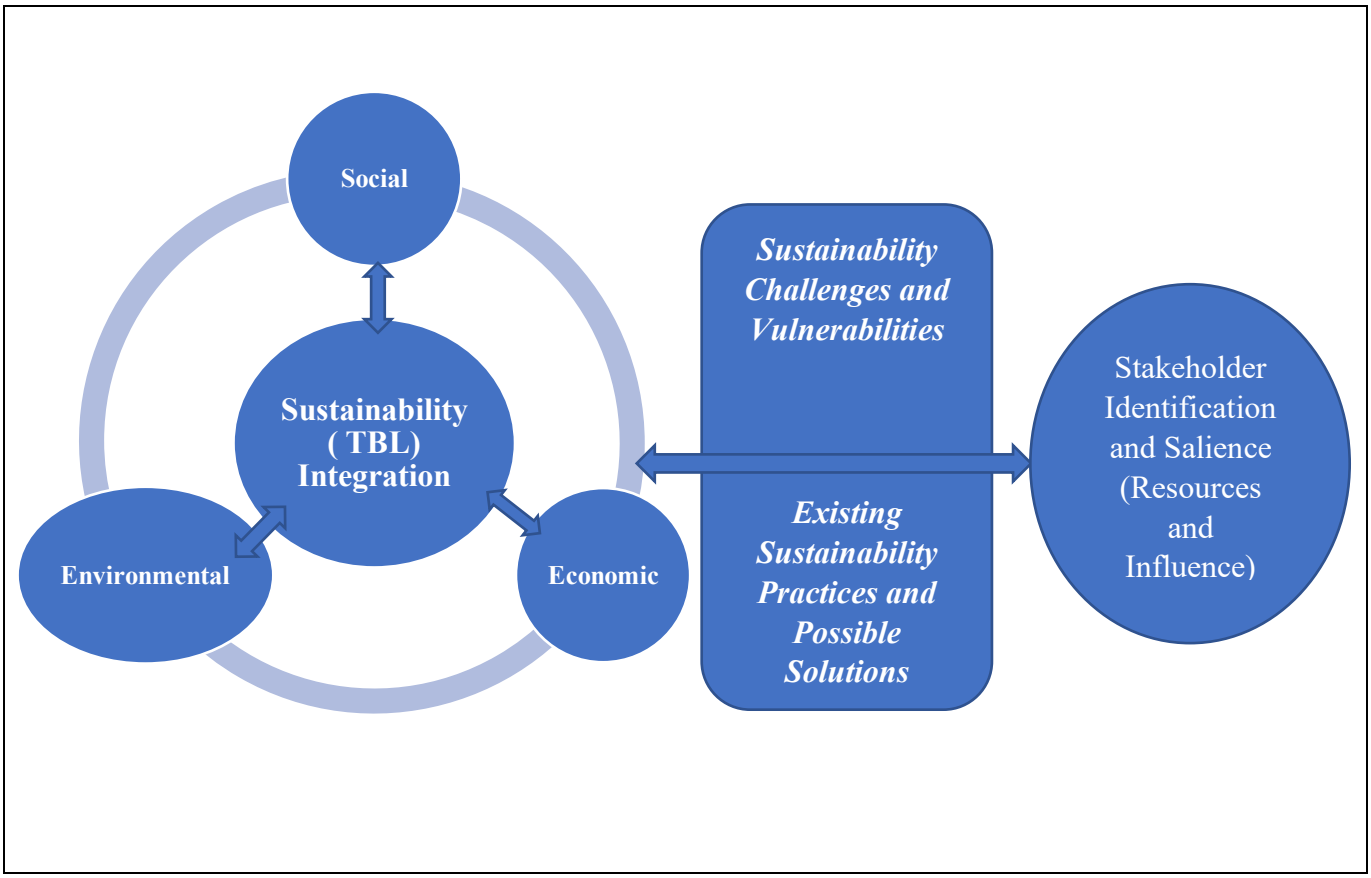

Figure 10: Conceptual and Theoretical Framework

2.9.2 Stakeholders Theory and sustainability of RMG

The common understanding of stakeholder in an industry or business entity is anyone who has stakes in the operation of that very industry, business, or firm and who can affect or get affected by the entity's operation. In a formal way Freeman (1984) defined a stakeholder in an organization as "*any group or individual who can affect or is affected by the achievement of the organization's objectives*" (Freeman, 2010). Following the development of strategic importance of stakeholder's point of view, stakeholder theory emphasises the interactions between an organizations or company's customers, suppliers, workers, investors, communities, and other concerned stakeholders (Freeman et al., 2004).

From the point of a RMG supplier, the industry comprises of diversified set of primary and secondary (or internal and external) stakeholders and thus, ensuring sustainability of the industry blending interactive triple dimension together and understanding the synergic effect all the bottom lines requires stakeholders' involvement (Roy et al., 2020). Roy et al (2020) also argues that the operational response and process orientation must be aligned to the various stakeholder's salience. As the whole supply chain of Apparel and clothing business is a complex set of processes and inter-connected parties are diverse, multivariate in nature, the stakeholders are now aware and concerned about sustainability practices (Shumon et al., 2019). To understand the ground reality of sustainability issues attached with the industry and to get an insightful realization of the realm of apparel sector of Bangladesh, reaching out stakeholders and have their opinion is crucial. This is where the stakeholders' saliences and their influences require broader exploration leading this research aligned to stakeholders' theory.

2.9.3 Stakeholders' salience and influence on Bangladesh RMG Supply chain

To obtain sustainability, relation between the lead firm and its stakeholders should be reciprocal towards attaining social, economic and environmental goals (Kannan, 2018). Understanding stakeholders' importance and managing them successfully can help the organization become sustainable (Roy et al., 2020). According to Seuring and Muller (2008)'s definition of sustainable supply chain management, sustainability requirement derives mainly from the stakeholders. Thus, depending on the nature of the stakeholders and their variable influencing strategies, lead organization must deal with their respective salience accordingly. Following Freeman's (1984) understanding of stakeholders who can affect or be affected the organization, their influence is classified based on the attributes of 'Power', 'Legitimacy' and 'Urgency' (Mitchell et al., 1997). According to the study of Mitchell et all (1997), stakeholders

must possess ‘power’ and influence over the concerned organization or firm, they must have legitimate institutional or legal authority (Legitimacy) to exercise that power and can get feedback and treatment based on relative ‘Urgency’. Stakeholders relative power against the firm and mutual dependence determines the intensity of influence and relationship (Frooman, 1999). If a stakeholder can offer all three attributes, then the manager of the firm consider them a salient enough (Neville et al., 2011). Only having enough ‘power’ cannot make a group stakeholder unless they have legitimate stake in the business (Ali, 2015). As these three attributes have already been accepted by the academics in understanding stakeholders and their potential influencing strategies, in this current research setting stakeholder salience has been used to identify and explain stakeholders roleplay in Bangladeshi RMG supply chain sustainability. In their sustainability report, BGMEA emphasizes that stakeholder engagement enables business to maintain a fruitful and productive communication with internal and external stakeholders to achieve sustainable development (BGMEA, 2020). Different stakes of different stakeholders are summarized by BGMEA (2020) Sustainability report as follows: RMG Workers and employees push for safe and secure work environment, job security, fair wages and bonus, overtime, Government body and regulatory agencies aim for employment generation, sustainable growth , compliances, workers welfare and tax and tariffs, Buyers and retailing firms wants social and environmental management, healthy and hygienic work environment, workers welfare, no force or child labour, overall goodwill and reputation, Media and NGOs/ Communities work for human rights, protection against exploitation, child or force labour, safety and fair remuneration, environment and society while RMG association care for smooth business, secured rate of return and growth for the members and for the industry as whole. If properly managed and treated based on their ‘power’, ‘legitimacy’ and ‘urgency’ saliences , stakeholders themselves can become resources for the firm and can become part of the team aiming for sustained business (Mani et al., 2020). The importance of stakeholder’s involvement and meeting their requirement in the process of attaining total sustainability is a must for achieving long-term goal (Chowdhury & Quaddus, 2021).

2.9.4 Stakeholders Identification of RMG Supply chain of Bangladesh

It’s mentioned before that RMG supply chain stakeholders are diverse in nature, thus identifying and locating all the possible stakeholders is a challenging task (Roy et al., 2020). In an earlier attempt of proposing a generic conceptual framework for sustainable supply chain management Seuring and Muller (2008) found that clothing retailer as a focal point has to face ‘power’ pressures firstly from customers as its particularly important that they accept the

product positively, secondly from the government (either local, national or multi-national) agencies and thirdly from the NGOs (Seuring & Müller, 2008). They have found that in response to the pressures, the focal company transfers the responsibility to suppliers. Taking European context into consideration, De Brito et al (2008) tried to show how sustainability proposition can influence and impact the fashion supply chain organization and performance (De Brito et al., 2008). In their endeavour, De Brito et al (2008) mapped fashion stakeholders who can exercise 'power' and have 'legitimacy' in operation into six distinct groups such as: Suppliers, Manufacturers, Retailers, Post consumer actors, Service Providers, and Independent Experts.

Fashion SC Stakeholders	**Details**
Suppliers	Weaving and Dyeing Machineries, Fibers, Yarn, Cotton Technology, Chemicals
Manufacturers	Clothing, Fabrics, Textiles (Knitting and Woven)
Retailers	Shop, mail, online
Post-consumer actors	Recyclers, Charity, Recycle Association
Service Providers	Agencies, Software Industry, Consultants, Media, Associations
Experts	Academics, Ex-employee, Designers

Table 3: Fashion Stakeholders Map in Europe: De Brito et al (2008)

This earlier stakeholder's framework worked as a guideline for other studies as well. Later studies found evidence of similar stakeholder group in analysing RMG supply chain and its sustainability. Exploring Global Production Network (GPN) approach and Multi-Stakeholder Initiative (MSI) in Bangladeshi clothing governance set up, Tighe (2016) expressed that business enterprise enters into a permanent relationship with its stakeholders and stakeholders consists of "consumers, employees, suppliers, workers, governments, trade unions, NGOs and the media" (Tighe, 2016). Following the stakeholder theory lens in a social sustainability setting, Huq et al (2016) identified five major influencing stakeholders in clothing supply chains beyond formal institutionalized stakeholders (Buyers, Supplier and Consumers) which includes: Media, NGOs, Trade Unions, RMG Associations and Policy and regulatory agencies (Huq et al., 2016). Although the study did not specifically follow the framework of Mitchell et all (1997)'s 'power', 'legitimacy' and 'urgency' attributes, these stakeholders possess the

characteristics. The study's stakeholders mapping is particularly important for the current research as it specifically focused on Bangladesh RMG industry.

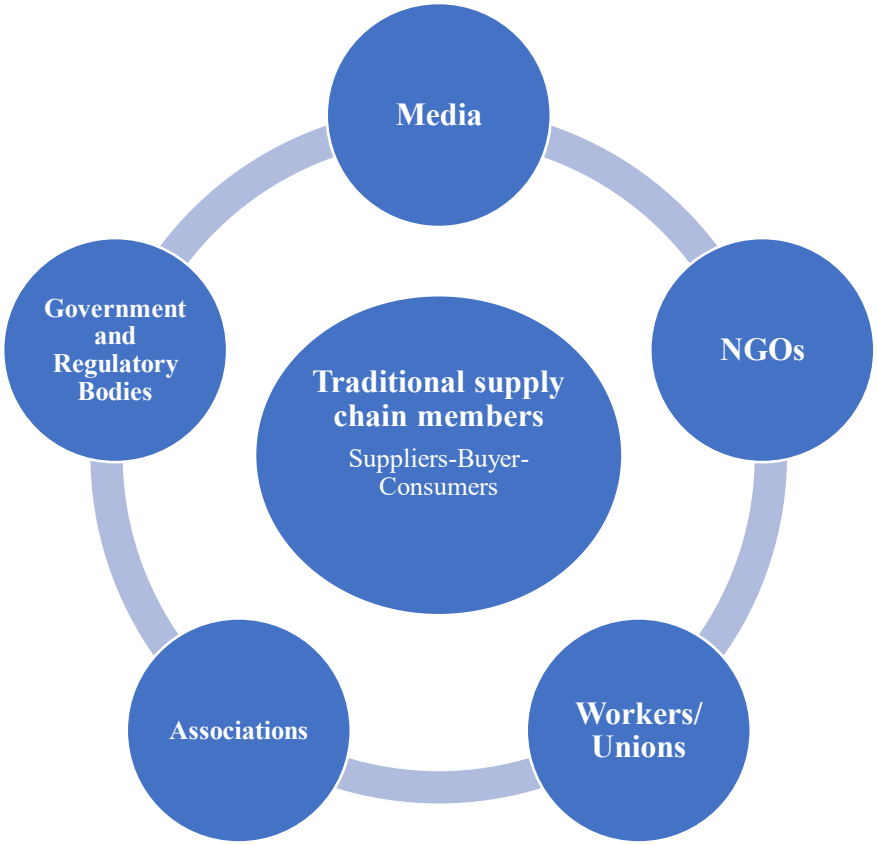

Figure 11: Stakeholders Map (Adopting Huq et al 2016 and Tighie 2016)

In case of Bangladeshi RMG sectors, manufacturers of finished clothing products, factories (Mainly the members of BGMEA and BKMEA) and their owners are termed as Suppliers where the term **Buyer and Retailer** refers to international clothing brands and fashion companies who mainly outsource the production capacity from Bangladesh (BGMEA, 2020). **Media (**Whether local or international) plays a significant role in keeping the industry accountable in terms of social and environmental responsibility as the RMG industry is known for unsustainable practices (Huq et al., 2016). Adverse media coverages in TV, print or electronic channels can trigger final **consumers** outrage affecting international buyers' business reputation. **Regulatory Agencies** includes the monitoring and controlling bodies, policy initiators who can legally impose laws, public policies, and regulations upon all the industry actors. According to BGMEA Sustainability Report 2020, being the main regulator, Bangladesh government and **Ministry of textiles and Jute** is mainly responsible for making and implementing policies regarding RMG industry. **NGOs** role-play in reshaping the RMG

industry aligning to the requirement of workers wellbeing and ecological balance in Bangladesh cannot be ignored (Huq et al., 2016). **RMG Associations** (BGMEA and BKMEA for Bangladesh) can also exercise some power and authority forcing its members (Factories and suppliers) to become sustainable. In return, they provide policy support, security against social and political pressures and bargaining capability to the factory owners with other stakeholders (Huq et al., 2016). Garment **Workers** and Labor organizations, national and international trade **unions** can pressurize the supply chain institutions, factories to implement employee welfare practices in operations and activities (BGMEA, 2020). All the above actors have varied degree of 'power' to influence the sustainable operation in the textile industry in a legitimate institutional setting (legitimacy) and demand timely attention (urgency).

2.9.5 Stakeholders theory and SRBV

Resource base view (RBV) suggests that the resources and opportunities should strategically fit together bringing distinct competence to the house and competitive edge over the rivalry (Beh et al., 2016). The pool of resources can then be called special capabilities if they can perform specific job offering differentiating strategic advantages and competitive edge (Mani et al., 2020). Following Beh et al. (2016) and Mani et al. (2020) s approach, it is evident that intangible resources such as: relationship, trust, commitment, and reputation with key stakeholders (Clients and customers, supplier, and partners) weighs as much importance as the tangible resources such as: infrastructure, warehouse, stores, systems and processes, logistics and promotions to build the capability. This is where the Resource Based View and Stakeholder theory complement each other providing the foundation for Stakeholder Resource Based View (SRBV). The idea of valuing stakeholders and considering them as strengths and resources is the notion of Stakeholders Resource-Based View (SRBV) where Sodhi (2015) tried to combine Resource-Based View (RBV) and Stakeholder's theory together. SRBV emphasize that a firm should not only focus to build its own strategic resources but also try to develop all the concerned stakeholder's capability. A factory should focus to enhance the capacity of its employees and workers, should coordinate with the regulating bodies and equip the merchandizer with real time information. By developing capabilities of its stakeholder simultaneously , organization can ensure best utility of the resources (Sodhi, 2015).

From the above discussion it can safely be said that Stakeholder Theory, salience model, and SRBV are relevant in sustainability discussions of the clothing supply chain context. On one hand, understanding the stakeholders, their relevance, impact, and influence on the business sustainability cannot be undermined, on the other hand industry's strength and available

resources should be matched to ensure sustainable operations. To become truly sustainable in the face of fierce competition and challenges, firms should rely on their core resources aligned with the stakeholder's dynamic demand in a dynamic era. From the above extant literature, it is initially proposed that Stakeholder Theory and Stakeholder Resource Based View can become appropriate theoretical lens in this research endeavour.

Chapter 3: Research Methodology

In this chapter, the philosophy of research and knowledge will be introduced first with a view to rationalize the currents study's stance, then proposed methods, tools and techniques will be discussed along with the overall research design and settings.

3.1 Introduction

The study aims to understand the overall sustainability scenario of the RMG industry of Bangladesh in a developing country setting using TBL lenses; environmental, social, and economic aspects. Apparel sector is one of the leading industries of modern times which is specifically blamed for greater environmental and social impacts on larger society. Thus, to gain insight into the global sustainability issues, understanding apparel/textile sectors and its direct and indirect effect on greater society and environment is important. With the given context, detail exploration and deeper understanding of sustainability scenario of leading RMG supplying country Bangladesh is necessary. As broader understanding of the complex inter-play requires interpretivist paradigm and exploratory approach as a natural methodology, the current research follows the path of qualitative investigation. The contextual analysis and prevalent literature support this approach for in-depth knowledge. Considering these significant aspects, the research methodology, research tools and the research design for this study has been planned. The detail process of choosing the right approach along with the rationales are discussed in this section.

3.2 Critical evaluation of research philosophies and Strategies

Understanding the nature of the knowledge one seeks; how internal thought processes influence the knowledge development and the ways to search for an answer to a particular problem can affect the whole research endeavour. A well-planned research effort based on the practical and appropriate philosophy can direct the whole process of choosing methodology, research strategy and data collection and analysis towards achieving the research project's goal perfectly.

3.2.1 Ontological position

Ontology is a philosophical position which deals with the nature of social phenomena, interactions, and social events as individual entity or in a word the reality. How to look for the real world can take different forms such as Objectivism (Positivism), Subjectivism (Constructivism) and Pragmatism (Realism) where objectivism sees the singular form of truth, independent of external factor while Subjectivism argues that truth or reality can take multiple form depending on the actors perception, emotion, feelings and actions (Saunders et al., 2007). Social construct is important to realize the nature of truth thus alternatively it's called constructivism. Constructivism indicates that reality can be interpreted from different angel and multiple spheres is possible thus, sometimes it is called interpretivism. Beyond to the positivist and constructivist point of view, the pragmatism philosophy explains that reality is continuously debated issue and whatever methods required can be pursued to reach the reality.

Being accustomed to these philosophies, the current study focuses mainly to follow the Constructivism paradigm. The main agenda of this endeavour is to have a thorough understanding of the complex interplay of sustainability issues in the RMG industry as a whole and, in Bangladesh perspective. To find the answer to the research questions raised in this work, to know that whether the RMG industry of the country is sustainable or not, to what extent it is sustainable, there is no single straight forward way. Only statistical and numeric inference cannot provide the ultimate solution. It requires a wholistic view and different interpretation, variable opinions and thoughts must be incorporated.

3.2.2 Epistemological Background of the Current study

Epistemology is a research philosophy which deals with the question of what knowledge is, what type of knowledge a particular research field seeks. While there are several positions to take into consideration, most common are: Positivist and Interpretivist philosophy. Positivism offers the opportunity to produce observable and factual reality like natural scientific research where a valid generalization can be drawn based on the visible reality. In positivist research set up, it is expected to draw some hypotheses based on existing theory and being tested those rigorously whereby the researcher can identify himself independently (Saunders et al., 2007). Like positivist paradigm there is another epistemological notion called Realism where physical existence or reality is the basis of truth and thus need scientific enquiry. While these philosophical positions emphasise the observability and scientific procedure, Interpretivist philosophy values human feelings, perception, emotion and human understanding and human are treated as social actor which cannot always be measured with rigid quantifiable structure.

Here comes interpretivist paradigm where understanding human interaction from the differing angel (of parties involved) is the most critical consideration. As a natural consequence, current study aligned to the Interpretivism/Constructivist philosophy as the current research is aimed to explore complex scenario of Sustainability issues in RMG industry of Bangladesh (Mertens, 1998). The most important element of sustainability issues and its triple bottom line involve People, Planet, and profit revolving around human interaction. The rich and in-depth analysis of social constructs in the industry only can produce the whole picture and total grasp of critical nature of Sustainability. Business world is ever changing, RMG business is unique in nature and context is different from enterprise to enterprise, thus logically this study accepts Interpretivism as the prime philosophical notion.

3.2.3 Research Approaches and Strategies

The current research endeavor is designed to be explorative in nature following the interpretivist philosophy which directs the study to follow the inductive approach. Between the two research approaches **(Inductive and Deductive)**, deductive approach requires scientific research procedure where a theory is proposed along with some hypotheses and the proposed hypotheses are being tested to validate the theory using quantitative data and highly structured procedure. On the other hand, the inductive approach requires interviewing the concerns population and stakeholders to gain a deeper understanding of the problem, analyzing the data collected via interview and formulating or advancing a theory based on the analysis of the data. While the deductive approach is applied to scientific field, the inductive approach offers solution to social sciences problem (Easterby-Smith et al., 2002). Understanding the complex interactions of the feelings, emotions of the RMG workers, employees and their physical and mental wellbeing, wages and financial freedom, safety and security, the overall context of the industry, sustainability issues facing by the sector, way out of those challenges and overall comprehension of the RMG business in Bangladesh along with the triple bottom line of sustainability needs wide range of ideas and solutions. Hence, **inductive approach** fits perfectly with the current study. As broader and deeper understanding of the complex inter play requires interpretivist paradigm and exploratory approach as a natural methodology, the current research follows the path of qualitative investigation following the combination of grounded theory and case study strategy (Saunders et al., 2007).

3.2.4 Rationale for Using Qualitative, Exploratory Research Design

Research and detailed studies on sustainability of apparel supply chain have gained momentum recently and scholarly focus on the area has been noticed mainly over the last decade. Although

Bangladesh has been major player as finished textile products supplier for a while, the sustainability studies on the country's context have not been developed accordingly. Thus, for bringing broader picture of the industry, capturing the attitude, feelings of the relevant stakeholders and understanding better insights, qualitative interview is the best solution (Nath et al., 2020). Five specific reasons are described as follows:

1. Sustainability study and research in the developing country context especially in the Bangladesh textile sector is yet in the very early development stage and thus need an explorative approach to better capture the in-depth understanding.
2. Textile stakeholders of Bangladesh are complex in nature comprising supplier, sub supplier, factory owners, workers, regulating agencies, management, government bodies, NGOs, Merchandisers and Buyers. Reaching this people, catching their industry level experiences, and understanding requires inductive approach.
3. Bangladesh's RMG sector is developed sporadically, mostly unplanned individual entrepreneurs driven and thus not properly organized and managed. As a result, survey research can leave sensitive areas of study untouched.
4. In-depth one to one interview /personal connections enable the researchers to obtain feeling and emotions attached to participants respective role and bringing their original opinion becomes eminent.
5. Non-verbal communication is not possible via survey or any other research design, which is important to capture emotions and expression during the interview session.

3.3 Data Collection strategies

This exploratory research endeavor uses a qualitative approach to collect data using both primary and secondary data sources. Data collection process of the study follows several approaches. Firstly, the contextual data collection focuses on contemporary literature, research studies (Peer reviewed and open access journal), industry reports (EPB, World Bank, World Economic Forum), working papers, official websites (BGMEA, BKMEA, Govt Trade portal), Garments associations publications online, Bangladesh Government portal etc. After reviewing the relevant literature extensively, exploring background data and history of the garments industry in Bangladesh, its strengths and weakness through secondary data sources, the direct primary data collection process is done by semi structured interview protocol (Appendix-4).

Stakeholders concerned to the RMG supply chains of Bangladesh including factory owner and officials, merchandiser, suppliers, workers, executives of the RMG association, administrative officials from the ministries and departments and other relevant parties have been interviewed. Telephone and online interviews have been used to conduct the interviews. As the main language of the people of Bangladesh is Bengali and most of the respondents are from Bangladesh, interview has been conducted in Bengali for better and clearer understanding. Interview time has been flexible, and each interview took approximately 45 minutes to 1.5 hours depending on the respondent's willingness and interests. All the interviews have been audio recorded with the permission of the concerned respondent. Tape recorder (Mobile recording device) has been mainly used for recording purpose along with the smartphone's recording facility whereas feasible. The current researcher used their official capacity to reach concerned parties through ministry of commerce and industries and the ministry of textile and jute. In this regard, Prime Minister's Office (PMO) has helped in coordinating with all the concerned agencies as the sponsoring authority of this study. As information redundancy and saturation point is suggested as the ending point of data collection (Lincoln & Guba, 1985), data collection continues until repetitive information was coming out and stopped as while no new insights could be obtained from the interviews anymore.

3.4 Sampling and Respondents Profile

As the study aims to understand the supply chain sustainability of Bangladeshi RMG sector following Stakeholder's theory, salience model and SRBV lens mainly, the sample must comprise of the concerned individuals, groups, organizations which has direct or indirect stakes and influences in the business. Understanding the stakeholder's perspective, their respective strength and capability to persuade achieving the sustainability targets of the RMG supply chain in the country is the primary motto of this endeavour. Thus, it's no surprise that the respondents and participant list cover the stakeholders of RMG industry (Especially involved in the supply chain of RMG) of Bangladesh including the regulators and policy initiators, administrative officials, garments manufacturers association, factory owner, factory officials, workers. The current researcher has used his official capacity and administrative authority to reach to the concerned parties through the ministry of commerce and industries and the ministry of textile and jute. In this regard, the Prime Minister's Office (PMO) helped in coordinating with all the concerned agencies as the sponsoring authority of this study. As the study takes the whole apparel industry of Bangladesh and its sustainability backdrop as a practical case

context, the respondents of the interview protocol have been selected from diversely relevant groups. For this, non-probability purposive/ purposeful sampling has been the primary sampling procedure along with snowballing techniques as to meet the requirement of this research endeavour. According to the researchers and experts, this exploratory and investigative endeavour needs thorough understanding of the respondent's views and detail opinion. Keeping this in mind, 35 participants are interviewed using a semi structured interview protocol. The respondents list finalized based on reaching the saturation point. Once it is found that no new information or points of view are coming, the interview process has been stopped and gone for analysing. The respondents' profiles are given below:

Respondents Profile	**Numbers Interviewed**
Government officials (Secretary, Ministry of Textile and Jute, DG of The Department of Textiles, Director, EPB)	05
Government Regulating Agencies (DoE and DIFE), Bangladesh	04
RMG Association (BGMEA- Chief Sustainability Officer, Joint Secretary Labor Cell BKMEA- Joint Secretary, Compliance, Assistant Joint Secretary, Labor)	05
Garments Factory Owner / Finished apparel Supplier Conditions apply: 1. Member of Either BGMEA or BKMEA 2. At least 7 years in garment Business 3. Export/ supply to US and EU	05
Garments Workers 1. Women 04 2. Men- 03 (At least 5 years of working experience in RMG works)	07
Merchandiser and Brands Representative	04
Third party Auditors and Independent Consultant	02
Environmentalist group/NGO/Media/Human Rights Group	03

Table 4: Respondents list and Profile

3.5 COVID-19/ Alternative Plan for Data Collection

As the world has faced one of the greatest pandemic challenges of the history of mankind and most of the global economic and social activities were at halt, the research field is also highly affected by the COVID-19 and its consequences. Physical movement of people around the world has been limited since March 2019. Any travel other than emergency has been at standstill and all the international travels were highly discouraged.

Following the crisis, the research focused on collecting data and taking interviews using alternative means. In such a context, the researcher conducted interviews over virtual online medium and telephone. The primary Telephone interview included interviews recorded over messaging services, internet calling, WhatsApp, and direct phone call. Initial emphasis was given to Teams video calling but WhatsApp video call and messenger video call also been used. There were participants like workers having no good internet connection and thus video calling were not possible. These interviews are by direct mobile phone calls and recorded by smartphone or laptop based on the ease of access.

3.5.1 Drawbacks of Interviewing over Video call or Telephone Call

Problems and technical issues Faced:

1. Replacing the best strategy of qualitative data collection: the interview method which makes it impossible to make personal connection with the respondent not getting physically in touch.
2. Poor internet connection for video or messaging calls
3. Poor mobile network
4. Security and privacy threats of Internet Services
5. Uneasiness of the respondents hindered them to open which otherwise direct physical contact could remove
6. Due to Covid-19, the mental peace and health was a concern too

3.5.2 Strategy taken for overcoming the challenges

1. Prior communication and connection to prepare the mental state of the respondents and overcome the uneasiness.
2. Proper security and privacy measures ensured.

3. Alternative time option for interview. Once network or internet connection become strong the interview scheduled accordingly.
4. Friendly introduction and positive attitude over video calling
5. Flexible timing of the interview/ Split the time into two or three sittings

3.6 Strategies for Data Analysis

Following open-ended interview protocols and semi structured questions, all the digitally recorded interviews have been transcribed and translated into English as it is given by the interviewee for reaching the goal of grounded theory direction. The transcribed interviews have been then codified and analyzed using Computer Assisted Qualitative Data Analysis Software (CAQDAS) NVivo's latest available version to produce comprehensive understanding. All the interviews (Participant of the interview) are assigned to a case code and each case code is used to keep track of the data from each case or participant. Based on the case, the data is coded, first level and second level code and attributes are assigned to categorized relevant data and suitable analysis. By examining the interaction and intersection of the relevant data the leading trend and themes have been identified to draw results with strategic implications. NVivo is already well suited and in an established position to conduct a grounded theory based research guided by a constructivist philosophy (Hutchison et al., 2010). Maintaining validity in a qualitative research setting is always difficult but NVivo is said to be the best tool for the task (Siccama & Penna, 2008). Following the suggestions of Siccama et al. (2008) the current researcher believes that the software added vigor to the study by applying different level of coding, screen shots and matrix queries. Data scoping, interrogating the interpretation and saturation have been achieved for maintaining research validity. By doing so, the study contributes to visualizing the theories in a new setting, benefitting practitioners in identifying disruptive events and measures to be taken, understanding the combinations of sustainability dimensions and its integration in the context of Bangladeshi RMG sector.

Coding and Theme Development

According to Braun and Clarke (2006), thematic coding refers to a process of identifying analysing and reporting patterns or themes from a bulk of qualitative data. As current study follows thematic coding; after transcribing all the interview, first stage was taken by the researcher to get used to and familiarizing with the data and then the analysis started with open coding. In the first level, the transcriptions and each case were searched for emerging first level

codes, but only the sentence or paragraph is coded keeping the central theme in mind. From the initial codes the themes were developed by categorizing codes and accumulating ideas together, after further analysis and refinement and comparing codes from different case, finally second level themes were defined and aligned with the broader research themes. Finally, after going back and forth with the codes, themes, and research initial plans, finally the findings and results are presented.

Phases in Data Analysis in this research	
Familiarizing with Data	Transcribing, reading, re-reading, taking notes
Generate Initial Codes	Coding Relevant ideas, Accumulation of ideas
Search for Initial Themes	Developing initial themes from the codes
Reviewing Themes	Checking relevance of the codes inside and with research aim
Defining and Naming themes	Refining, finalizing, and naming themes
Writing	Producing report analyzing the selected constructs and themes aligning with research objectives.

Table 5: Data Analysis Steps (Following Braun and Clarke 2006)

Thematic development

As mentioned above, all the interview case were given a code name so that anonymity can be maintained, and researcher's own bias can be avoided. In first level, open coding and construct development has been done going through each case again and again as iterative process. In developing first level constructs, the study consulted with literature regularly and themes have been developed keeping research objectives in mind. While categorizing the constructs and developing emerging themes, sustainable textile and RMG supply chain and TBL dimensions were used as guideline. In the current study, all the issues/ sub-themes of sustainability challenges and solutions of textile supply chain of Bangladesh were developed from initial open codes and categorically explored following sustainability dimensions. Along with already existing TBL bottom line, one additional macro environmental dimensions emerged from the data, all four dimensions and their respective subthemes, constructs are shown below with sample quotation of test case (Table-6):

Sustainability Dimensions	Themes under each Bottomline	Constructs and Initial Code	Sample Quotation
Social	Challenges and Barriers	1. Poor Wage and Salary 2. Gap of Skill and Efficiency 3. Bad Working Environment and Work Overload 4. Safety and Security Issues 5. Medical and Health Concerns 6. Workers Movement/ Unrest 7. Labor Compliance Issues 8. Legal and structural Issues	*''For developing countries social sustainability is more important. Labor rights and social welfare, impact of these issues pinch the workers and community immediately''* - ***Interview10-CNSK***
	Current Practices	1. Labor Compliance Initiatives 2. Workers Welfare and Empowerment 3. Skill Initiatives 4. Safety Initiatives (Factory) 5. Medical, Family Planning and Hygiene	*''Bangladesh has achieved significant improvement in core issues of compliances such as occupational safety, fire safety, structural safety, and welfare issues''*- ***Interview18-BKMF***
	Solutions	1. Skill Enhancement 2. Safety Measures 3. Wellbeing and Productivity 4. Salary Review 5. Proper Health Insurance and Compensation 6. Employment and Women Empowerment	*''If workers get better environment, facilities, they feel good, their efficiency, energy, productivity will be good''*- ***Interview4-KDBL***
Environmental	Challenges and Barriers	1. Chemical Sustainability Concerns 2. ETP Malpractices 3. Water and River Pollution 4. Water Usage and Saturation 5. Challenge of Solid Waste Management 6. Product Sustainability Issues 7. Traceability and Certification Issues 8. Malpractices in Sub-con and Accessories	*''Here, the highest impact is of chemical use. Dyeing, washing, and printing, which we call wet processing unit, huge chemical is used''*- ***Interview15-CNHR***
	Current Practices	1. Chemical Management Practices 2. Greening Initiatives 3. Resource and Energy Saving	*''The highest number of green factories globally are from*

			4.	Solid (Jhut) Waste Management	*Bangladesh. We have 168 LEED certified factories, among which we have 50 of Platinum LEED category''*-***Interview21-BGMM***
	Solutions	1. ETP and Wet Processing Management 2. Circular Economy and Recycling 3. Waste Management Infrastructure 4. Chemical Management Guideline	5. 6. 7. 8.	Ground Water Policy Green Initiatives Rigorous Certification Digital and Tech Monitoring	*''Those factories have ETPs, they should run it. We must go for online monitoring''*- ***Interview13-DEDD***
Economic	Challenges and Barriers Current Practices	1. Unfair pricing 2. Demand Reduction 3. Challenges of value Addition and Diversification	4. 5. 6.	Cost and Investment Functional Disturbance Raw-materials Issue	*''The first challenge of our industry is that we are not getting the fair price from the buyers and our customers''*- ***Interview30-ZDBL***
	Current Practices	1. Production and manufacturing Initiatives 2. Branding and Market Diversification 3. Entrepreneurship Practices	4. 5.	Best Practices of Big factories Partnership and Cooperation	*''Now our factories and owners are focusing on that. To produce the high value products, they are adopting their machineries, technologies''*- ***Interview24-EPBM***
	Solutions	1. Production and Manufacturing Strategies 2. Marketing and Branding Strategies 3. Price Bargain Initiatives	4. 5.	Sustainability, growth, and Development Vision 2030-Coordination	*''With diversifying and quality improvement, competitive pricing (Fixing price)- no less than a certain price point can be offered''*- ***Interview12-DGTN***
Macro-environmental	Challenges and Barriers	1 Logistics and Operational Challenges 2 Communication and Transport Concerns 3 Manpower and Capability Barrier	4	Mismanagement and Corruption	*''Internal communication and road facilities are bad. Roads like Ahsulia and Gazipur Road are bad for many*

			5	Gap in Unregulated Factories Management	*years now. There are factories where big trailer cannot reach''*- ***Interview10-CNSK***
	Current Practices	1. DIFE and DoE Roleplay 2. Ministry and Departments Action 3. EPB and BIDA role	4. 5. 6.	Accord-Alliance and NI BGMEA-BKMEA Initiatives NGO and International Bodies	*''A taskforce formed including labor ministry and department, factory inspection department, DoE, and DC office representatives. It is working now''*- ***Interview13-DEDD***
	Solutions	1. Transport and Communication Infrastructure 2. Enabling agencies and Coordination 3. Ensuring energy and resource supply	4. 5.	A Sub-con Framework A Macro Study	*You must improve ease of doing business, you must improve the infrastructure Bangladesh is facing huge gas and electricity crisis; factories are badly affected*- ***Interview31-TON***

Table 6: Theme development

3.7 Research Ethics

Ethical consideration is very important in qualitative research settings which normally includes the informed consent of the respondents and explaining them the data usage process along with maintaining anonymity, confidentiality and data safety (Bell & Waters, 2014). The privacy and individual values must be respected, the data must not be used otherwise than agreed between the researchers and the interviewee. In this regard, current researcher applied for ethical committee approval before starting data collection and got approval where all the necessary precautions are reported in the ERGO2 form (ERGO2 Approval Reference No-72690).

After the approval of the ethics committee, before interviewing, each of the participant was provided with a consent form so that they can decide whether to attend or decline. As participants are from Bangladesh mainly and native language of them is Bangla, they have been supplied with a Bengali version of consent form for better understanding. Along with the consent form, all the participants were also supplied with the draft interview protocol and Personal Information Sheet (PIS) beforehand so that they can have idea of the nature of questions and discussion. As most of the interviews have been conducted via online platform, immediately before starting the interview the participants again were briefed about the aims of the research and nature of the information sought from the interview. The researcher kept the option open to the participants to withdraw their consent any time before starting data analysis and during data analysis every attempt made to keep the identity of the respondents anonymous. Interview recordings and their transcription are kept in the University of Southampton's secure online one drive portal only with proper security and password. The firsthand data is accessed by the interviewer and supervisors only. All the interview participants are given a codename for keeping their professional and personal identity anonymous.

3.8 Reliability and Validity

Any research endeavor must obtain trustworthiness despite the differences in its research design; qualitative and quantitative. For maintaining reliability and validity in qualitative research Lincoln and Guba's (1985) four criteria have been widely used and accepted in academic arena. According to them trustworthiness can be ensured by four criteria: credibility (Internal Validity), transferability (external validity), dependability (reliability) and confirmability (Objectivity).

Credibility: Credibility refers to the authenticity of the information collected and truthfulness of the investigation. This can be attained by some validation techniques (Lincoln & Guba, 1985). Firstly, all the interviews were recorded, and transcripts are prepared listening to the records and rewound to ensure transcriptions were done correctly. As the interviews were conducted in Bengali, transcribing in English has the possibility to distortion of meaning. Thus, after taking the interviews and transcribing, some randomly selected written transcripts have been sent to the interview participant to check whether the information shared by them are adequately reflected or not. All of them returned their transcripts saying that the information was authentic and contains right information they wanted to share. Moreover, one supervisor himself is a Bengali speaking individual and checked the transcriptions for quality assurance purpose. By these techniques the authenticity and validity of data is maintained.

Transferability: Transferability refers to generalizability where the findings of the current research can be applied elsewhere if similar context is considered, and findings can be utilized in a new research setting (Lincoln & Guba, 1985). Current study is conducted in a developing country fashion supply chain setting which can be applied in similar other RMG supplying countries like India, Pakistan, Sri Lanka, Vietnam, and China. Literature supports that to some extent; the findings are transferable to similar context.

Dependability: Dependability or reliability refers to the extent the current results are consistent and can be reproduced with similar context and research setting (Lincoln & Guba, 1985). In the current research, detail records and documentation have been kept for maintaining reliability. All the recordings, transcripts, codes, themes, and sub-themes are databased for iterative process and cross checking. Discussion with the industry expert and experienced practitioners reduced the risk of biased information. Current researcher's administrative identity helped him to gain trust and confidence of the participants in sharing sensitive information and in-depth data which also helped gain reliability.

Confirmability: Confirmability refers to the neutrality of the findings and how objectively findings reflect the reality where audit trails and documentation plays important role (Lincoln & Guba, 1985). In the current study audit trail was maintained by recorded interviews, signed consent forms, demographic details of the participants. Some of the checked and returned transcripts also works as evidence here.

Summary Statement

The study is an endeavour to understand and explore the textile and Readymade Garment Industry (RMG) of Bangladesh through the lens of triple bottom line (TBL) of sustainability which by default requires an in-dept inquiry and wholistic viewpoint. With the given context, the current researcher has decided to follow Interpretivist (Constructivist) philosophy along with inductive approach as a natural consequence to conduct a qualitative study.

4 Chapter Four: Findings and Results

Part-A: Sustainability Issues and Challenges

In this part of the chapter, major ideas and themes which are outlined by the responses of the interviewees are presented. As the research is poised to explore the sustainability dimensions of the garment industry of Bangladesh, the interview questions were designed to navigate through the pertinent issues of sustainability challenges of the sector. The interview protocol used for the interview was a semi-structured one where some of the questions were placed for anchoring the interview whereas spontaneous discussion responses brought many newer windows of discussions. The research premise investigated in this research endeavour can be presented in three broad dimensions called as triple bottom line or triple dimensions of sustainability. Following the first research question of what the challenges and issues of sustainable practices of textile and RMG industries of Bangladesh are following TBL lens, each of the social, environmental, and business and economic sustainability dimensions generated from the transcribed data are categorically identified in the code (themes and sub-themes) using NVivo. Additionally, macroenvironmental and infrastructural issues relating to the industry and supply chain emerged from the data are presented. To answer the second research question of how to find the sustainable solutions of the challenges and barriers considering the existing industry practices and the positive changes adopted along the way are also being expressed. Those positive initiatives are narrated in the second part of this chapter. Finally, possible solutions to the challenges and issues extracted earlier are elaborated with evidence.

For presenting all the issues, initiatives and solutions, adequate evidence is provided from the data as quotes; to substantiate the data the background of the interview participant is also associated in some cases. In presenting the findings, the researcher tried to follow the order of sub-themes according to the relative importance where interview responses and their relative strength is estimated. For keeping the anonymity of the interview participants so that they cannot be directly identified, each participant is given with a code name which is given at the end of each quote.

4.1 Social Sustainability Issues and challenges

Social sustainability issues and challenges are related to people's life, workers and employee welfare, their safety and health are predominantly negatively associated to the garments industry of Bangladesh. As a poor developing nation, ensuring human and labour rights has been a challenge ever since for the country. The success story of the garments industry of Bangladesh is often linked to arguably the cheapest labour force availability around the world which in turn offers a chance of workers exploitation. Although environmental issues have been the dominant force in the discussion of sustainability literature, the social issues have emerged as equally important phenomenon to the field. The wide variety of issues and concerns regarding social sustainability in textile and garments sector of Bangladesh expressed by the interview participants in this research project signifies the relative importance of it. Issues revolve around human life, human and labour rights, workers salary, welfare, their living standard, health, safety-security, inclusiveness, freedom of expression and association and similar perspectives are the field of discussion here. One of the significant social sustainability issues is the factory internal working environment, structural safety arrangement involving fire and electrical safety. As human life is directly attached with the concept, social sustainability demands more prompt and immediate attention as the impact can be felt immediately. Including the above generic understanding of issues and challenges relating to the social sustainability, wide range of other diversified but pertinent issues are elaborated by the interview participants (A representation of all the themes and sub-themes of social sustainability issues is provided below in table -7). The issues, challenges, themes, and their respective sub-themes under the umbrella of social sustainability are discussed in the following section with proper evidence (quotes) as follows:

Social Sustainability Challenges and Barriers	
Key Themes	Challenges and Barriers
Wage and Salary Issues	➢ Low wage and salary ➢ Increased inflation and Living Cost ➢ Commodity Price Hike ➢ Livelihood Struggle/ Low standard of living ➢ Delay of salary and overtime payment
Issues of Skill and Efficiency	➢ Lack of critical skill

	➢ Lack of Professionalism (Workers and management) ➢ Domino Effect of unskilled workforce on productivity ➢ Challenge of technology adoption ➢ Threat of Automation and Robotics for job reductions ➢ Inefficient Mid-management ➢ Lack of education and Literacy Issues
Working Environment	➢ Bad working environment ➢ Space management issue
Work Overload and Burden	➢ Overburdened workers with workload ➢ Long working hours (up to 15 hours) with overtime ➢ Negative Effect on mental and Physical health
Safety and Security Issues	➢ Multi-storied factory facility ➢ Issues of Evacuation and safe exit ➢ Lack of awareness of workers and management ➢ Major weakness in Electrical safety and appliances ➢ Issues of Fire accident and Safety ➢ Multiple operation in same building ➢ Structurally unstable factory buildings
Medical and Health Issues	➢ Lack of health facilities ➢ No health Insurance in place ➢ No proper compensation for accident ➢ No occupational health management system
Workers Movement and Unrest	➢ Worker's Unrest and agitation ➢ Leave disputes and strike ➢ Rumors and miscommunication ➢ Lack of redressal and grievance mechanism
Other Labor Compliance Issues	➢ Gap of Freedom of expression and association ➢ Human rights concerns ➢ Target fulfilment pressure ➢ Sexual harassment outside the factory ➢ Child labor in informal factories

	➢ Lack of properly functioning trade union/Bad Unionism ➢ Modern slavery Issues ➢ Workers Exploitation
Legal and structural Issues	➢ Poor implementation of labor law ➢ Police Harassment of Workers ➢ Sub-con and small factories no compliance ➢ Worker Shortage and dropout

Table 7: Social Sustainability Challenges and Barriers

4.1.1 Poor Wage and Salary Issues

One of the biggest social sustainability concerns facing by the RMG industry of the country is the current salary structure of the workers, where the minimum salary for an entry level worker is 8000 Taka (which is equivalent to 75 USD). Although there are many tiers of the salary structure depending on the skill and experience level, the current wage framework is in a vulnerable condition. According to a worker:

> *8000-taka minimum salary is for those who first enter the factory as helpers, the operators who have work experiences, their salary is more, 10000, 10500, 11000, 12000, like this and they have the overtime*.
>
> *-Interview17-GWSFM*

With the salary and earnings from the overtime, workers are struggling to survive with minimum food requirement, if family is considered the challenge can become bigger, a member of civil society member and workers solidarity organization chief said:

> *The criteria from the ILO and other organizations, their standards, some say it should be about 4 members family, some say 6 members family, 2300 calory or 3000 calory food intake for each, for productivity they should be given food for energy generation.*
>
> *-Interview22-WST*

Taking the inflation rates into account and rising costs of daily necessary commodities price, surviving with the current salary structure for a worker is almost impossible. Price of energy bill, house rents, foods are already skyrocketed. Workers must engage themselves to overtimes for earning more to survive which sometimes stretches beyond a working day of 12/14 hours.

Workers are now rightfully demanding a salary review asking for a better structure with a minimum salary of 20000. There is no way to deny the miserable life of the garment's workers, their **inhuman living conditions**. In the area of RMG factory concentration, in a single room, 10/12 workers sleep at night without any liveable facilities. Even a Deputy General Manager of a big factory confessed the challenge the workers are facing now:

> *Energy cost is going high, with energy costs all the commodities (price) going high, so our workers are struggling, with the current salaries, their living standard, because their rent, their food cost, their treatment and medical cost and everything they are struggling.*
>
> *-Interview4-KDB*

Although most of the export-oriented suppliers and factories pay the salary of the workers by the 7th of the month or 10th, **delay payment** and other payment issues are still a reality. As the workers livelihood dependant on the wage and money they get, any delay to their salary has a direct disastrous impact on their lives.

4.1.2 Challenge of Skill and Efficiency

Although cheap labour is the main strength of RMG industry, low skill and efficiency level of the workers and employees is one of the biggest challenges here. As most of our workers are uneducated and coming to the factory with raw experiences, their overall skill level is generally believed to be below 50%. Due to the cheaper cost of labour, factories employ more labor to produce more which again cause system inefficiency and make the productivity level low. A sustainability auditor puts the scenario perfectly in the following statement:

> *We are not 50% of our skill level, we don't have a good organization or institution for skill development, if anyone get skilled, they learnt it by seeing and doing, we learn by doing and do it by learning… It is a huge industry but nothing for skill enhancement.*
>
> *-Interview15-CNHR*

If the skill and productivity level of our workers is compared with the competing RMG exporting countries, we are far behind. As there is no proper skill development organization and training centre, most of the workers learn by doing and with the help of the factory internal mechanism. Bangladesh export in bulk quantities but earn less, the main reason of focusing on basic t-shirts and simple garments is the lack of efficient and **critically skilled workforce**. The

following statement of a factory owner echo the same understanding that due to poor skill and lack of critical thinking; they cannot move towards advanced products category:

> *Bangladesh cannot go for high-end value-added products because of the poor skill, our workers don't have that critical thinking capability, they don't have that capability.*
>
> *-Interview31-TON*

Lack of Professionalism and professional practices is a challenge in the garment arena, culturally people of Bangladesh driven by emotions and thus waste time by gossiping and engaging in non-productive activities, value of time is not properly understood in the country's culture. According to a Joint Secretary of BKMEA compliance team (Bangladesh Knitwear Manufacturers and Exporters Association):

> *In Bangladesh, no workers are professional...we are directed by the emotions…Workers are leading the job to OT, going slow, gossiping, or resting in the washrooms, taking longer time for lunch, these one minutes delay make a big delay at the end.*
>
> *-Interview18-BKMF*

The production lines in the garments factories run in a sequential and coordinated way known as assembly line manufacturing method. Thus, an unskilled worker can affect the whole production line. One of the reasons of low productivity and inefficient production process is the **scarcity of efficient and skilled middle level supervisory workforce**. When they become the supervisors from workers level, they cannot bring creative way in their supervision. This point is perfectly demonstrated in the following statement of a renowned brands representative (merchandiser):

> *Mid-level management…most of them started their job as helpers or operators…when you standardize the job for workers, they will follow the instructions, as mid-level people lack huge in education, awareness, communication, and innovation, naturally they cannot increase the output in the process.*
>
> *-Interview8-BSDN*

Advanced technology is a blessing for the industry and for sustainability too, but this upgradation is posing a serious threat to the huge unskilled workforce of the country's RMG

industry. As most of the workers are mostly illiterate, they are not adaptive to the new advanced technology. According to a top government official:

> *If the technology spreads quickly, I don't think they would be able to survive with their current skills…there would be robotics and artificial intelligence (AI)… many machines will be needed command where technological knowledge would be a must…unfortunately our 4 million workers most of them are little literate or purely illiterate.*
>
> *-Interview7-TSR*

Skill, efficiency, and management capability, all these have a direct positive correlation with **proper education and training**. Operating machines, understanding the manuals, instructing the workers, leading them require proper understanding and a basic education. Finally, blaming the workers and mid-management only for inefficiency and low productivity in the RMG industry is not justified, the owner's side and **top management have gaps** and lacking too. As many of the factory ownership comes to the new generation entrepreneurs from their previous generation by inheritance, they lack proper business knowledge, thus they behave unprofessional which also cause performance bottlenecks.

> *There is lack of good governance in the factory management. Owners' son may be the owner by inheritance, but they don't know anything about the business, due to the lack of knowledge…there is a compliance challenge too.*
>
> *-Interview16-BSJ*

Moreover, not only the owner's side, in the lop leadership and management role, there is a huge gap of qualified personnel which affect the performance of the workers they lead.

4.1.3 Working Environment and Work Overload

The factory environment and working conditions plays a pivotal role in determining whether a factory is maintaining social sustainability criteria or not. A standard, safe and comfortable working area is the prerequisite written in the labor law and thus constitutes basic element of compliance. On the other hand, the work of garment sector including sewing, washing, operating machines is tiresome and tedious, moreover, in most cases the duties include 10/12 hours' time. Basic amenities and facilities such as: a proper working and clean toilet, a canteen and dining area for lunch and snacks should be there. Apart from the established factories,

working environment is still an issue as factories do not employ resources to keep the surrounding environment healthy and tidy:

> *The workers work in an environment full of clothes, yarns, cotton to yarns, yarns to fabrics, from fabric to clothes.*

-Interview22-WST

Space management is an important component of working environment. As workers work in a floor, there must be a minimum space gap between two machines and worker. Garments workers are over burden with the work overload, on one hand, they have long working hour, on the other hand their work is monotonous and tiring. On top of it, most of the workers must do overtime after office hour, this continuous hard work takes toll on their health and wellbeing. Normal office hour span is of 9 hours including a one-hour lunch break, but a working day can prolong to 14/15 hours for a worker which is by default an inhuman situation. According to a finishing manager:

> *Working hours start at 8 am, the general duty is till 5 pm, after that is the overtime, generally our working hour span from 8 am to 8 pm, including 3 hours overtime, sometimes it stretches until 10 pm, if the amount of shipment is very high then the duty can be increased but payment is given properly.*

-Interview17-GWSFM

Overtime is a sad reality in the garment sector of Bangladesh, it is a burden on the physical and mental health of the workers. Although workers do the overtime willingly, in the surface level this is the truth, but they get such poor salary that they cannot survive without the earning of the overtime.

4.1.4 Safety and Security (Factory Building) Issues

Historically Bangladeshi RMG factories and exporting firms have been associated with bad reputations of having safety risk and issues prevalent inside the production facility. Garments factories in Bangladesh have been set up sporadically with entrepreneur's spontaneous initiatives, thus there was no proper planning and structural issues have been ignored. Most of the factories are housed in multi-storeyed building, in congested area, near to market and residential buildings which makes them inherently unsafe. According to a brand side compliance auditor:

Our factories could be set up in a one or two storied building, not in the high-rise building and those buildings should be in more open area. Most of the building in Bangladesh don't have the space for fire evacuation because factories are on the roadside.

-Interview10-CNSK

Electrical arrangement of the factory facilities in garments sector is one of the major reasons of accident and safety compromise. Although fire safety has a different precaution measure, electrical issues lead to most of the fire accidents. Lack of proper electrical wiring and its management, old and obsolete circuit and distribution board, load management and constant power cuts, shortage of safe and efficient electrical appliances makes the electrical safety difficult. An official of DIFE pointed that in his comment:

It seemed to me that the main reasons of the accidents are electrical issues, it is a big problem. Due to the electrical problems, most of the fire accidents happen.

-Interview5-DIFA

Fire incident is a constant threat for industries and production units around the globe. But it is even more relevant for the Bangladeshi RMG factories because of the building's inherent structural weakness. Most of the Bangladeshi factory buildings are not specifically designed to be a production unit or factory. Although Accord and alliance did a great job retrofitting the fire safety system in the factories after Rana Plaza tragedy, still it is a big concern. The factory management and workers have the responsibility to stay alert and vigilant all the time-

If you set up many sprinklers, if you make the stairs fire and smokeproof, even then there would be unsafe factor by default. From 6 storied building, the time it would take to evacuate a female or a pregnant lady, if there is fire in a six storied building, evacuation is very difficult…our factories are not like a traditional factory, if you search for an emoji for a factory, the emoji and icon would appear, our factories are not like this. We have 10, 7, 6 storied building where factories are established. If 5000 workers work in the 6 storied building factory, it itself is unsafe.

-Interview10-CNSK

The practice of safety precautions and taking enough safety measures are another neglected area in RMG sector of Bangladesh. Every job has its own risk factors, assessing those risks and taking actions accordingly should be given priority.

4.1.5 Medical and Health Issues

Although most of the export oriented big factories have clinic facility, occasional doctors and nurse, workers mental and physical health issues are largely ignored. Factories do not take responsibility of workers treatment if any worker fall sick critically, they only provide basic pain relief and paracetamols. Occupational health is also a neglected issue here. According to the chief of a worker's solidarity organization:

> *They don't get the chance to go the hospitals even, inside the factories they are given with paracetamols, saline, basic medicine… workers depend on informal and unreliable medication, they suffer from clothe rash, working in such environment is problematic to proper breathing.*
>
> *-Interview22-WST*

Along with insufficient medical facilities, there is **no health insurance system in Bangladesh**, as a result there is no way workers can cover cost of critical illness. Although health insurance is a basic requirement around the globe, all the factories and industrial sites lack in the area. A factory owner himself confessed the situation as follows:

> *In Bangladesh, there is no health insurance in any sector…for illness and hospital cost coverage there is no health insurance in Bangladesh.*
>
> *-Interview32-TON*

If there is any accidental death or serious injury, there is no social welfare protection for the workers in the RMG of Bangladesh, there is no national or industry level arrangement of true **Compensation**. There is a onetime payment system as compensation which is an insult to the deceased worker. An ex-Accord auditor, now a consultant says:

> *Workmen compensation if workers get workplace death or injury, there is no protection from national level. From BGMEA there is a 2 Lac Taka compensation requirement. Which means welfare system in Bangladesh is very weak.*
>
> *-Interview10-CNSK*

When a worker dies in the workplace, globally the worker's whole future working life is counted, and dependent family members are considered but in Bangladesh the provision of a lumpsum onetime payment is given. As the nature of the work in the garments factories is

rigorous and tiresome, continuous duty of 8/10/12 hours, day after day, month after month must have physical and mental health impact. Even after the retirement of the job, impacting the health years later must take into consideration. According to a DIG of Factory and Establishment inspection department:

> *We need do a lot of work for occupational health issues. If a worker work for 8 hours, he is working standing, a sewing operator is sewing for 8 hours sitting, with some minors breaks in between… there is ergonomics problems.*
>
> *-Interview6-DIFB*

The stress and exhaustion results in various critical illness and diseases including fatigues, chronic headache, heart, and kidney issues, breathing difficulty, asthma, cough etc. The working condition of clothes, fabrics and wastages can contribute rashes, skin problems too.

4.1.6 Workers Movement, Unrest and Strike

Worker's strike, agitation and unrest is a common reality of the garment industry of Bangladesh. Sometimes they shut the factory down, go for blocking the nearby roads and collectively raise a point of demand to the owners, management, or the government. As the salary structure is poor and hard-earned money is their only source of survival, in most cases salary issues or payment issues cause the agitation. According to the leader of a workers solidarity organization:

> *The worker's movement is all about their salary, during Coronavirus, they have faced lay off/ job sack, for the last one year the price of the commodity has increased at a compound rate starting from rice, flour, oil, soyabean oil, eggs, fish, teas, everything. Since the last salary review, 4 years have passed, still the minimum salary 8000 Taka.*
>
> *-Interview22-WST*

There is an issue of **discrimination of salary and bonus** among the factories. Some factories offer better salary and give more bonuses than others and as the workers live in colonies and they share everything with other workers, low paid workers then get agitated against the factory management. As workers living is salary dependant, if they do not get the salary in due course, natural outcome is their rage and agitation. If the factory owner misses the shipment on time and does not get the money from the buyers, they **cannot pay the salary of the workers** and

thus situation of chaos created. One of the finishing managers of a factory also provided the same insight as follows:

> *Salary should be given by 7 or 10th of the month but due to shipment failure the owner could not give the salary, this is the main cause for unrest… if salary cannot be given by 10, or go beyond 15th, workers stop working.*
>
> *Interview17-GWSFM*

In Bangladesh, there are two big occasions called EID, when workers go to their country house/village home, if the workers do not get their payment before EID, they cannot buy new stuff for the festival and get to the roads. **Allowing leave** is another sensitive issue for the worker, as mentioned above, especially leave before Eid-Ul-Adha and Eid-Ul-Fitre have a huge sentimental impact on the worker's mind. If not allowed, they go for strike. One of common cause of unrest is **rumour among the workers**, as most of the workers are uneducated, they sometimes fail to separate the fake news from the truth and go along with the sentiment and emotions. As one factory owner described:

> *Someone spread a rumour of happening something fishy, the worker gets ignited, but there are some factories whose management is not ok, these issues start from mid-management level in most cases*.
>
> *-Interview14-TOM*

Mismanagement and miscommunication between the workers and middle management creates the chaotic situation very often. There are **fake workers and union leaders** deliberately create chaos to take undue advantage from the owner's side, sometimes they ignite the workers with a fake cause. According to a labour compliance manager of BGMEA, there are workers group who creates a chaotic situation in the factory and get away with the termination benefits-

> *There is a group who creates the chaos to take the advantages and benefits, they go out of the factories with benefits…There are Jhut (Gutted fabrics) buyers, there are groups…they use workers to ignite a situation to create unrest. After that they bargain with the owners saying that I will stop this.*
>
> *-Interview23-BGMR*

When workers find themselves in a difficult situation to communicate their demands to the top management and owners table, if they cannot place their concerns and logical demand to the authority, they feel neglected and then go for movement.

4.1.7 Issues of human rights and Labor Compliances

Social compliance issues are mostly linked with labour and workers welfare and their rights. Although Bangladesh is a signatory of International Labor Organization (ILO) and there is a separate government agency to look after the labour issues on behalf of the government following Bangladesh Labor Act, 2006, there are concerns and non-compliances of labour aspects. Along with the discrimination based on any human traits, workers get fired from job instantly without any compensation and payment, physical violence is also used in some cases as narrated by an associate professor of textile engineering:

> *Sometime workers are forced to leave job instantly. Specially supervisors and quality control staff, sewing machine workers are fired without prior notice. Sometimes they face physical violence's. People from owner's side attack them.*
>
> *-Interview1-APDUET*

Consensus in the industry is that there is no serious case of **force labour** in literal meaning where workers are confined and severely pressurized, tortured and forced to do the job but there are indirect coercion and force used in the system. When there is pressure of catching a shipment, the workers are bound to continue their duty over the night. Another form of passive force labor is the hourly job target given to each worker or to a production line. A finishing manager own confession is like this:

> *Forceful duty means that today there is shipment… tomorrow the vessel cannot be reached, then the duty increases, a bit coercion can be there, then 10/12 pm or even 1 am duty can be extended to catch the shipment.*
>
> *-Interview17-GWSFM*

Sexual harassment has been a concern for Bangladesh RMG sector but at present the issue has been largely minimized. But still there are cases of sexual violence around the factory environment, on the way to the factory and still women and girls are threatened to sexual crime. As the middle management of RMG sector is unaware of management techniques, they use **oral abuse** and bad behaviour as a tool of getting the work done. When there is pressure of

achieving target production, the supervisor misbehaves with the workers, harass them. Sometime tapping the girls, manipulating them, it can take different form. According to a sustainability auditor and consultant:

> *There are many incidents of verbal abuse…Production workforce is 90% female, but their immediate supervisors are 90% male, the male supervisors have the tendency to abuse orally to the workers, in some cases physically hitting.*
>
> *-Interview10-CNSK*

There is a consensus among all the participants that on the surface, there is almost **no child labour issues** in the export oriented established factories. But beyond the surveillance of the association and other regulatory bodies, in the informal and unregulated factories, case is different where child labour gets entry in the industry with fake National ID with fake age. As most of the factories check NID now, there is an issue of producing fake ID.

> *Although the workers supposed to get entry into the job at the age of 18, they come to work in far younger age by increasing the age in the documents, many of them produce NID and register their age by increasing it for the job issue… We have found around 4% underage workers falling in the range of 13-17, under 18 years in Rana Plaza tragedy.*
>
> *-Interview22-WST*

Although the garments workers work in the factory willingly, they can quit the job as they want, nobody chain them, confine, or torture them still they do not have freedom in true sense. As the job is their only way of survival, they must be in the industry, they can change factory, but they cannot change their destiny. As the workers cannot freely protest and raise their demands, claim their rights, thus this can be termed as modern slavery. A labour activist and workers organizer said it perfectly:

> *It seems that in this time of capitalism, workers are working freely, but they are free to the extent that they can quit the job but must find another job. As a result, the workers get trapped again in a new chain, so you can say this as modern slavery. When they go for protest, they face police torture, case, attack, and threat, they are facing this constantly.*
>
> *-Interview22-WST*

4.1.8 Legal and Functional Issues

Besides the issues already discussed, there are issues relating to the labour law implementation, lack of legal and police support for the workers, workers drop out from the industry and thus skilled workers crisis and non-compliance social practices in smaller and sub-contracting factories. To monitor and control labour and social issues in the factory, there is a labour law called Bangladesh Labor Act, 2006 followed by Bangladesh Labor Rules, 2015, the implementation of which has not been great so far. The DIFE itself is overburden as they have limited number of offices and limited workforce. The labour court is also overburden with the number of cases to settle. According to a DIFE DIG:

> *In labour court, currently 26000 cases are pending, there are not enough court…the worker themselves must lodge the case in the court, for salary and wage claim, DIFE give a testimonial after inspection, now for a worker going from Maona, Sreepur, Gazipur to Dhaka labour court and filing a case, the time, transport cost, they do not want to go for it. Sometime owners take this chance.*
>
> *-Interview6-DIFB*

The common case in a developing country setting is that police does not play legal duties against the powerful and rich, but against the poor and defenceless workers. When workers go for agitation and movement, the police create environment of havoc and fear. According to humanitarian activist and civil society member:

> *Then these injustices happen, payment is delayed months after month, when the workers go for strike then the industrial police take immediate action against the workers. There are many cases filed in the garment's region, Ahsulia and other areas, where it is seen that unnamed 200/300 to 2000/3000 workers are included in the police case, then they are harassed en masse. As a result, in the whole garment region, an environment of fear is created, the workers feel fear and terror.*
>
> *-Interview20-PAM*

There is agreement among most of the interview participants that maltreatment of labours and exploitation of their rights mainly happen in the smaller scale factories who do not directly take export orders from the established brands. The factories who engage in subcontracting orders from lead suppliers, smaller in size and mostly unregulated are the riskiest form labour

compliances. Along with the existence of child labour and other compliance issues, they do not have safe and secure working environment. Non-payment and payment delay is a regular phenomenon in those smaller factories. As previously discussed, for workers unrests, these subcontracting factories are primarily responsible.

4.2 Environmental Sustainability Issues and Concerns

From broader perspective, environmental sustainability denotes a mechanism where business operation would not have negative externalities on the natural environment or would have minimum effect on the ecological balances. In one side polluting the water, land, and air and on the other hand using the natural resources to the extent that it saturates along with the carbon emission, these are the main concerns in environmental bottom line. Although the primary motif of doing business is to earn profit, irresponsibly destroying natural balance is not acceptable, business must be environmentally concerned. In the context of garments manufacturing, the most common pollution is done by chemical usage and chemical release to the water stream, then the solid waste release to the landfill is another big concern. The most significant environmental issues raised by the interview respondents are described according to their relative importance as follows (Summarised in table 6).

Environmental Sustainability Issues and Concerns	
Key Themes	Challenges and Barriers
Chemical Sustainability Issues	➢ Heavy chemical usage ➢ Hazardous chemicals are used ➢ Chemical Safety and Handling concern
ETP malpractices	➢ Local and unregulated factories have no ETP ➢ Factories keep ETP inactive ➢ Smaller and sweater factories use domestic laundry ➢ ETP monitoring during office time only ➢ Installing ETP and Running is Costly
Water Pollution	➢ RMG is the main Water stream Polluter ➢ Wastewater and untreated water are released ➢ Wastewater is released underground via Pipe

Water Usage and Saturation	➢ Excessive ground water usage ➢ No ground water usage policy ➢ Ground water saturation
Challenge of Solid Waste Management	➢ No formal solid waste management structure ➢ No infrastructure for hazardous waste disposal
Product Sustainability Issues	➢ Artificial, manmade, synthetic fiber is used ➢ Decreased demand of organic products ➢ Scarcity of organic cotton supply
Traceability and Certification Issues	➢ Tracing back to origin is difficult ➢ Weak Third-party certification ➢ Fake certification
Environmental Malpractices in Sub-con and Accessories	➢ Sub-con factories are unmonitored ➢ No ETP and awareness in sub-con ➢ Environmental Non-compliance in Accessories firms ➢ Unregulated factories do not follow environmental guidelines
Profit centrism and Weak legal Framework	➢ Too much profit centrism ➢ Weak environmental law and weak implementation

Table 8: Environmental Sustainability Issues and Concerns

4.2.1 Chemical Sustainability Issues

In textile and composite factories, the highest environmental pollution is believed to be done by chemical usage and chemical pollution. In the process of yarn making and fabric preparation huge amount of chemicals are used. Dying, washing, and printing in the wet processing units are basically chemical processes. Some of the chemicals used in the fibre process and manufacturing line are environmentally viable and friendly but there are hazardous chemicals used in the process too. The chemical process, usage and release poses very high risks of environmental disaster and chemical safety risks as well. An Associate professor of Textile Engineering said:

It starts from dice chemical or yarn process, fibre process, garment manufacturing, here different chemicals in huge amount are being used. Some chemicals are environmentally sustainable, but some are not environment friendly. For sustainability, this chemical management, the way we release these chemicals to the nature is an issue.

-Interview1-APDUET

A sustainability consultant says that to produce 10/12 T-Shirts, up to 30 litre of chemical is used. This chemical infected water is sometimes released to the natural water without treating:

You are scouring by chemical, dyeing also by chemical, you are removing the extra colour by chemical too, the total process is chemical…It means for producing 1 KG t-shirts, meaning 10/12 t-shirts, 150-liter water on an average and minimum 30/35-liter chemical will be needed.

-Interview15-CNHR

As chemical substance is by default a risky element to deal with in the textile industrial processing, it warrants special precautions and care. There is a specific arrangement of PPE, boots, gloves, and goggles needed to handle and use the chemicals and there should be separate pool of chemical management people. But this arrangement is not always respected in Bangladeshi garments factory. A third-party auditor of Brands said:

As the workers are not educated, they use the chemicals they feel the way fit, sometimes they use the bare hands to pick the chemicals and pour, sometimes they are not wearing the gumboot, sometimes they don't use the face and gasmask which is prescribed, PPE is not used properly, this is a big area of making awareness.

-Interview15-CNHR

For Bangladeshi RMG factories, there is no specific guideline or law of handling the chemicals from the Government side, this is a harsh reality. There is no common ground or conformity of chemical management in Bangladesh, as there is no government guideline, the export-oriented factories follow the guideline of the buyers but when it comes to informal, local, and smaller factories, then there is nothing to follow.

4.2.2 ETP Practice Issues

Composite and wet processing units of the garments factories are legally bound to install ETP (Effluent Treatment Plant) in the factory facility as they use chemicals and dying-washing agents. Although most of the export-oriented big factories have ETP for treating wastewater, many factory owners do not respect the legal obligation. There are many ETP related irregularities including no ETP installation, keeping it inactive, not up and running. There are cases of the factories treating the wastewater with ETP, but the released water found to be not within the parameter. According to a Deputy Director of Department of Environment:

> *I worked in Gazipur where 450 around ETPs are there among 490 factories…some dishonest factories and owners take advantage, to save the electricity and chemicals which is required to run the ETP they keep the ETPs down. Sometimes they run ETP without drudging, we have found many factories ETP not running while sudden inspection.*
>
> *-Interview13-DEDD*

There are unregulated small scale local factory operations who produce for local market, there are smaller subcontracting factories which cater for big suppliers having no ETPs. As there is basically only one government department, DoE (Department of Environment), which is responsible of ETP and its operation monitoring, and their workforce and officer number is very limited, the factories take advantage and bypass ETP and release wastewater untreated. DoE operates during the office hour from 9am to 5 pm but the factories go for their peak operation after the office time. As a result, DoE cannot monitor the malpractices of ETP operation. Deputy Director of DoE Enforcement cell said the same:

> *DoE monitor in day times, they run ETPs during daytime while our monitoring team and District team, lab monitoring team, enforcement team are active. As these ETPs are chemical ETP, they stop operations of ETPs at night, so these sub-contract or small factories are the mainly responsible for environmental pollution.*
>
> *-Interview13-DEDD*

There are third party auditor and monitoring agencies work for the buyers, they also work during office hour only. One of the biggest challenges of installing ETP for a new entrepreneur and smaller factory is the huge amount **of cost and investment**. As smaller factories do not

have that big cash flow, it is difficult for them to go for such investment portfolio. In Bangladesh factories must invest on their own ETP, there is no government initiative of central ETP. An auditor and ex accord consultant said:

> *The biggest weakness is the factories need to install own water treatment plant. As our industries are established near the residential area, not in an industrial zone, for which installing water treatment plant for each factory, invest in it, this is a major investment.*
>
> *-Interview10-CNSK*

4.2.3 Water and River Pollution

Water pollution is probably the biggest threat poses by the garment industry in Bangladesh. Most of the prominent rivers are badly affected by the massive industrial pollutions. Among all the sector, RMG and composite is believed to be the highest contributing factor of river pollution in the country. Most of the interview participant agreed in this regard. According to a Civil Society member and prominent intellectual:

> *Most of the factories ignore the environmental sides like water is getting polluted, the ecological system of the region is being damaged. Fearing of losing profits, protection and measures against water pollution and investing for that, the garments owners are not doing anything and from the Government side either there is no headache.*
>
> *-Interview20-PAM*

Factories release chemical mixed water and effluent to the nearby rivers or other waterbody or any surface water source. The effluent release does not only change the colour of the water, but it also changes the water quality and dimension so that the flora and fauna live in it cannot survive anymore. Fish, other aquatic life, and plants face existential crisis. According to DD of DoE:

> *The RMG or composite factories we have, they produce huge amount of effluent, if we do not treat these effluents, if we release them directly to the rivers, the flora and fauna in the rivers, the animal, and plants, they will be destroyed.*
>
> *-Interview13-DEDD*

The factories of the garment industry do not only pollute the surface water by releasing effluent to the rivers and canals, more dangerously there are practice of dumping the untreated wastewater in the underground by tube. The factories extract ground water by tube well and dump the wastewater using the same channel.

4.2.4 Water Usage and Saturation

Bangladesh is called a riverine country as the living organisms mainly depends on the rivers. Farming, cultivation, communication, and collective life is affected by the existence of the river and waterbody whether its surface water or ground water. As supply of water is limited, responsible water usage must be there. But in the garment factory, the most used natural resource is water and factories use it irresponsibly. A washing unit manager says:

> *First a chemical is given, the chemical is discarded via washing, the cloth is washed again by normal water, another chemical is given. By this step-by-step washing is done, according to the necessity of the instruction. Huge water needed; we have our deep motor pump.*
>
> *-Interview28GWAQC*

In Bangladesh, ground water extraction is being done continuously without any monitoring. Water is being wasted, there is no initiative of efficient water usage. There must be a threshold of ground water extraction, but water accounting system is not properly implemented in the factories. If the current trend of ground water exploitation and exhaustion continues without any proper **ground water policy,** it will have a disastrous impact on the ground water level. A sustainability expert of the industry says:

> *If I withdraw ground water continuously once the ground water source will be exhausted and I will not be able to do the business. In case of water, we have a huge regulatory gap, in this area Government should work on. Because you cannot run business for indefinite times depending on ground water, right? There is no extraction threshold.*
>
> *-Interview21-BGMM*

4.2.5 Challenges of Solid Waste Management

For treating liquid-waste, there is ETP and other arrangement but for solid waste, there is no framework available in Bangladesh. Textile composite units produce huge amount of fabric waste, which is locally known as Jhut. There are many hazardous solid wastes produced by the industry too. There is no guideline or government policy regulating the treatment of hazardous waste and Jhut in Bangladesh: The solid wastes (Jhut and others) in Bangladesh are basically

either thrown away by the factories to the open field or being collected by the local muscleman and goons for further informal processing. Pure cotton fabric part may dissolve in the land overtime but there is synthetic, polyester and nylon fibres and material which can create havoc for long run. As A textile engineering faculty pointed out as follows:

> *Huge amount of garments wastage or cuttings are thrown in open field. We don't know whether its toxic or harmful or not, many think that clothes mean biodegradable but in clothes the cotton part or environment friendly would be dissolved and landfill will not be affected but majority garment like pants or shirt are produced using synthetic fibre Like polyester or nylon materials, these are serious threats for our environment.*
>
> *-Interview1-APDUET*

Most of the Jhut are collected by the local musclemen from the factories and then they sell it to the recycling industry, the recycling firms then use the fabric locally or export outside which is purely informal in nature. According to a factory owner cum BGMEA Board member:

> *Jhut management is done locally, many by products are prepared from it. The collection process is still informal, those who developed the recycling industry, they are still buying the Jhut from the local people, if they want to buy it directly from the factory, local goons will attack.*
>
> *-Interview31-TON*

There are many other solid wastes produced by the RMG industry which is by default hazardous. While disposing their non-hazardous solid waste to the landfill, factories do not separate the hazardous solid particles from the fabric waste and throw altogether to the open field. There is no infrastructure for the disposal of these element, not enough licenced collectors or no such organization who would collect hazardous solids and incinerate on behalf of the factories. According to an ex-Accord Auditor and now independent consultant:

> *They generate many other kinds of waste, chemical container, the chemical mixer pot, for these there are not enough licensed collectors in Bangladesh by whom the factories can dispose solid hazardous waste. Most of our hazardous wastes are disposed with the solid waste…So, the weakness for solid waste management is that we have very few designated landfills.*
>
> *-Interview10-CNSK*

4.2.6 Product Sustainability Challenges

Product sustainability is a concept which mainly aims to produce environment and eco- friendly products, easily biodegradable, causing little or no impact on the greater environment. Bangladeshi RMG sector uses huge amount of synthetic fibre which is a serious threat to long term environmental sustainability. As the cotton supply cannot cope up with the global demand and production of enough organic cotton is practically not feasible, the whole textile industry is leaning towards artificial, synthetic fibres. The danger of this polyester and nylon mixed fibre is that it's not biodegradable and thus harmful for the environment. Chief executive of a government office related to textile exposed the reality as:

> *Now a days, we are using artificial fibre and polythene in such amount that whole country from here to Bay of Bengal everywhere polyethene's are spread, due to which serious environmental crisis is happening, for which it is not biodegradable…we are using artificial fibres so easily, it is convenient to use because of low cost, affordable.*
>
> *-Interview7-TSR*

In one side the manmade synthetic is cheaper and readily available, on the other hand, a truly sustainable and organic product always has to offer a bit more premium price. Due to the complexity in the production and a segregation process, extra cost adds up in each stage of the process. The point is expressed in the following statement by a consultant:

> *There is a segregation process, if you want to use organic, you must keep it separate. Starting from production process, each stage there would be separation. So, for sustainable materials, there would be little up charge, 5% to 7% cost added here extra.*
>
> *-Interview15-CNHR*

The challenge is that everybody likes organic and sustainably sourced product, but they are not ready to pay extra price for a product. Moreover, due to Covid and War effect, ultimate consumers have become price sensitive.

4.2.7 Traceability and Certification Issues

Traceability of the processes and materials is very important for organic and sustainable product. The claim of 'sustainably sourced' should be readily verifiable. As the RMG and

apparel supply chain is long and often consist complex structure, tracing back to the original source is a great challenge. To provide the answer of traceability and verification, the third-party audit, monitoring, and certification processes come into force. This certification processes and verification also has its limitations. They cannot trace the sub-contracting factories if the order is offered to them by the lead suppliers. The third-party Auditor and consultant provided an elaborated response here:

> *From compliance and sustainability department, we conduct some audits and give some certificates, by which we ensure traceability. Where the main supplier is sub-contracting the order, tracing this out is difficult. There is no chance that I would trace out the sub-con unit and go check there whether they have ETP or not.*
>
> *-Interview15-CNHR*

Global big brands and buyers cannot directly monitor the operation, ethical and sustainable practices of the manufacturers, thus they rely heavily on third party auditing and third-party certifications. For organic cotton products, there are OCS and GOTS certification, for recycled cotton materials there are RCS and GRS certifications, for chemical sustainability OEKO-TEX certification is there. As there is huge demand of organic cottons but supply is limited, there is a chance of fake certification. The cotton is certified as organic, but it is not originally organic, there has a been an incident like this. As a merchandizing manager said:

> *2/3 years ago, there was big news about India that there were lots of fibres of organic which were not actually real organic, they were fake, after that organizations like GOTS, different certification body they have become very strict, started scrutinizing better and found that almost half of the mills or fields that they were claiming to be sustainable are not actually that.*
>
> *-Interview3-BSN*

4.2.8 Environmental Challenges in Subcontracting and Accessories Industries

The biggest threat of environmental non-compliances come from the smaller, unregulated, local, and subcontracting factories. Buyers, Accord, third-party monitoring, government agencies surveillance, BGKMEA and BKMEAs suggestion and guidance, all the concerned

parties focus their concentration on the environmental practices of export-oriented factories. But most of the interview participant agreed that ETP malpractices, wastewater release, water pollution, these activities are centred on the unregulated factories. According to an experienced sustainability auditor:

> *In the main unit, from buyers and third party, there is huge monitoring, we are rarely auditing to the sub-contracting unit. So, whatever happens in the sub-con unit nobody cares. If there are 1000 wet processing units in Bangladesh, which is related to tier 1, there are double number of factories operating as sub-contracting units which has no ETP, chemical sustainability is not maintained, no action taken for hazardous wastage, no sustainability practices are there.*
>
> *-Interview15-CNHR*

Sometimes unregulated sub-con factories are difficult to trace and identify, thus maintaining environmental regulations by the controlling agencies is difficult. These smaller unregulated factories either cater for the lead supplier as sub-contractor or they serve the local market and take the risk of violating the regulations, where the export focused supplier cannot take that risk. The factories who produce trims (buttons, zippers, lining, beads etc) and accessories for the lead manufacturers, they do play a big role in polluting the environment. Most of these factories use acids and different colour agents. A button producer explains that they use chemical agents with water.

> *We must dye and colour the buttons after production, there is two processes of colouring, one is electroplating and another is DTM, which is painted colour. For painted colour we use chemicals, and the full electroplating process is done by chemicals, So, when we directly release that in the open, it is a threat to the environment, it has negative impacts.*
>
> *-Interview11-ACCS*

4.2.9 Profit Orientation and Weak Legal Framework

The factory owners in Bangladesh, they should take some blame for the environmental damage being done. Most of the factory owners aims for profit maximization and earning highest possible dollar bypassing the legal restrictions. They mostly think the investment in ETP and other environmental initiatives as waste of money. There is legal weakness too, the environmental protection law is by default weak, and the implementing authority is weak too. A DD of Environment Department puts the perspective accordingly:

There are some dishonest businessmen who have the tendency of breaking the laws, profiting more. I don't think that those who don't set up and run ETPs, it is because financial loss, it is a tendency of breaking the laws, stealing, and earning more profit.

-Interview13-DEDD

Although there is a law for environmental protection, the overall legal framework for environmental issues is not strong. There is only one government agency looking after and monitoring the environmental concerns, Department of Environment (DoE). But DoE has serious workforce crisis, and its officers are not adequately equipped. According to an ex-Accord consultant and currently chief of a consultancy and auditing firm:

Our framework is by design weaker in environmental side, our overall chemical management is weak comparing to China, Vietnam…Our environmental law is very weak, enforcement is weaker, actual implementation is even weaker.

-Interview10-CNSK

4.3 Economic and Business Sustainability Issues

Economic sustainability is self-explanatory, the aim of any commercial or business endeavour is to sustain economically, earn profits and generate revenues, get greater return on the investments made. Without generating enough revenues to cover the expenses and make profit, no business can operate and sustain. But on the other hand, business has responsibility to the earth's health and to the society and community. Exploiting the environment, broader stakeholders and the community for short term gain cannot ensure long term sustainability goal. Not only earning profit and sustaining, thriving the business in future, process upgradation and continuous improvement is also part of business sustainability. Economic goal focuses on a balanced business operation and development goal considering environmental and social elements in the process. For garment manufacturing business in Bangladesh, there are variety of challenges including drastic reduction of profitability, gap of fair price, decreased demand, reduced orders frequency and size, cost of investment, timely return challenges, raw materials supply crisis on time etc. These challenges identified by the interview respondent are summarized below with statements and quotes (Table-9).

Business and Economic Sustainability Issues	
Key Themes	Challenges and Barriers
Unfair pricing and Low CM (Cost of Making)	➢ Unfair price offering and opportunistic buyer behavior ➢ Lack of price bargaining capability of suppliers ➢ Unhealthy price competition among suppliers ➢ No floor price can be set
Demand Reduction and Marketing challenge	➢ Dropped demand due to global inflation ➢ Market saturation to Europe and USA ➢ High cost of production vs Low CM ➢ No Bangladeshi Global clothing brand
Challenges of value Addition and Diversification	➢ Reliance on basic items ➢ No value-added high-end products ➢ No design offerings from Bangladesh ➢ No strong R&D platform
Cost and Investment	➢ The capital investment is risky ➢ No price incentives for sustainable investment ➢ Increasing cost of doing business ➢ Force investment of Accord and Alliance
Functional Disturbance	➢ Challenge of Leadtime management ➢ Weak Backward linkage infrastructure ➢ Poor and backdated production planning
Raw-materials Issue	➢ Scarcity and lack of raw materials ➢ High cost of cotton and raw materials import ➢ Raw materials crisis for Accessories ➢ Gap of vertical integration

Table 9: Economic Sustainability Issues

4.3.1 Challenges of Fair Pricing (Cost of Making)

Proper and fair pricing has become the biggest economic challenge for the RMG industry of Bangladesh. This is not a standalone case of less profitability; this is causing trouble to all other sustainability issues too. If the factories do not get proper price, they cannot offer a reasonable salary to the workers, they cannot invest in environmental upgradation and greening practices. Almost every interview respondent mentioned this as a crisis for the whole industry. According to a social compliance manager of BGMEA:

During the last 10 years orders received by the owners, it is called CM, the valuation of CM has not been increased with the rate of price hike of commodities, the salary increase of the workers, accessories price increase. As a result, the owners are feeling out of breath.

-Interview23-BGMR

The industry practioners complain that the buyers and brands are not offering fair prices for RMG. As buyers have the upper hand in the negotiation process and manufacturers are unable to influence the pricing process, suppliers are struggling. Historically, the garments business has been labour-intensive and attached to the notion of cheap labor. The global clothing brands look for a cheaper destination to outsource their products and thus they find Bangladesh a better choice. As per the statement of a sustainability practitioner of BGMEA:

If I see the history, once the RMG was in Europe, after that it went to Japan, from there it went to Taiwan, then it came to China, to Bangladesh… Whenever the cost goes up, they shift the destination, so when the RMG (productions) will be expensive in Bangladesh, it will shift to Africa.

-Interview21-BGMM

Most of the interview participants think that global brands and buyers force the suppliers to be sustainable in terms of workers salary and welfare, in terms of environmental initiatives but do not want to share the burden of the investment. Retailers promote themselves by marketing the initiatives as their own but do not cover the cost. As LDC country, Bangladesh gets quota and duty-free access to the developed country market, this benefit is aimed towards Bangladesh, but the brands do not share the benefits to the Bangladeshi manufacturers and workers. The prevailing market condition and business situation force the manufacturers to go for a cheaper price order and lowest CM. Sometimes suppliers feel the pressure to pay banks monthly instalment along with the salary, thus they feel helpless having weaker or no bargaining option. The critical situation is explained perfectly by the Director of EPB:

In Bangladesh, factories run by Bank loans, if factory is in operation, they can at least pay the EMI, and for keeping the factory running they take the orders in minimum CM… They are not thinking of the profit rather they think about the break-even point at that time… then they can pay the worker's salary. Our bargaining is weak, buyers are taking advantage of it from us.

-Interview24-EPBM

Sometimes the suppliers cannot present their condition properly and lack the skill of negotiation and bargain. The suppliers of Bangladesh go for ugly price competition while accepting orders from the buyers. The buyers always get the upper hand in setting the price.

4.3.2 Decreased Demand and Marketing Challenge

Due to the Covid pandemic and on-going war, globally the price of daily necessities has increased by manyfold, the crisis of energy and bill added up proportionately. As a result, the living wage has decreased, cost of living has reached to record high. Understandably consumers around the globe cut their fashion and clothing budget to spend on survival products. As a natural consequence, the demand of clothes and fashion items has decreased drastically. Thus, order from the buyer's side decline by 30 to 40%. Some of the biggest brand's sales dropped critically, as most of the ultimate consumers have become cost sensitive. A DGM of a leading manufacturing house of Bangladesh expressed his concerns:

> *People are buying less clothes now a days, maybe they are spending more money into the food, spending less money into the clothes. This is how the sale is dropped, suddenly war started, many brands are selling with discount rate, subsequently they are placing less orders. Due to the inflation, they can't give us the same FOBs. Buyers are facing challenges to give the price level on the other hand, our raw materials cost gone high, so from both side we are in a pressure.*
>
> *-Interview4-KDBL*

The garment industry of Bangladesh is going through a challenging time as it is facing two-fold pressure. In one side, due to the decreased sales and consumer demands, buyers giving less orders and asking for lower price, on the other side, the cost of raw material, energy, workers salary, everything is increasing which in turn pushing the manufacturer.

Historically, Bangladesh RMG industry has been supplying clothing and apparel products mainly to Europe and USA. All other market combined is insignificant comparing these two markets. As all the market has a limit to reach, Bangladesh probably has reached to a saturation level to those two-market region. According to the top sustainability executive of BGMEA:

> *Every market growth has a saturation point… Whatever markets I have in Europe-America, that's Ok, but now for growth, I must catch other market.*
>
> *-Interview21-BGMM*

It has been half a century that Bangladesh producing clothes and apparel products for European and American buyers. During this period, Bangladesh RMG industry has witnessed rise of many big group of industries, giant manufacturers. But throughout this period, Bangladeshi entrepreneurs failed to establish a single global fashion and clothing brand which is why the local manufacturers need to rely on the global retailers.

4.3.3 Challenges of Value Addition and Diversification

One critical concern of the RMG industry of Bangladesh is that the country mainly produces low priced basic products, t-shirts, undergarments, basic innerwear. As a result, although the industry manufacture in bulk amount, they get lowest possible profit margin. For meeting the sustainability challenges, Bangladesh must move towards producing more high-end and value-added fashion items. This will bring better profit margin which can be spent and invested in the upgradation process. A Dhaka based sourcing manager of a global brand narrated:

> *We produce very cheap product, maximum products are t-shirt, some t-shirt is worth of 1.6 USD, 2.50 USD… After making huge quantity of productions, your ultimate value addition is low…we cannot do value addition product, jacket, suit, formal pant, we are not strong producing these items.*
>
> *-Interview3-BSN*

Along with the lack of critically skilled workers, capability of the backward linkage industry is also a big issue here. The critical accessories and parts are mostly being imported from China for high-end product and thus this increases the cost and price of the finished products which weaken the price competitiveness globally. According to a finishing line manager:

> *There are some gaps of skill here in Bangladesh, the high price product cannot be produced in Bangladesh, most of these are produced in China, we import critical parts from China, and we do the finishing product.*
>
> *-Interview17-GWSFM*

Bangladesh has been in the business for half a century now, still factories produce the clothes following the design supplied by the buyers and brands. They do not have any creative people or design section to offer designs of their own. As a result, suppliers do not have control over the price bargaining mechanism. There is no central research and development institute or wing

for the industry where new technologies, new design and working solutions will be developed. According to the sustainability manager of BGMEA:

> *Always designs are provided by the brand to me, I just directly replicate it, I cannot negotiate in the value chain arena. If you could produce your own design, you could show the upper hand in the negotiation.*
>
> *-Interview21-BGMM*

4.3.4 Cost of Sustainability Investment and Increase production cost

Sustainable measures warrant cost, requires capital involvement. Most of the factories feel the pressure to arrange the money for this where they see no direct return. There are many long-term capital investments like ETP installation, modern technology upgradation and short-term maintenance cost as well. According to a sustainability auditor, responsibility of the sustainability investment is not shared by the buyers, solely impose upon the factories:

> *You are making huge buzz about sustainability but the costs behind it are ignored. Suppose you want to build Zero Liquid Discharge… for installing 100/150 cubic meter such ETP it would cost 70 to 100 million takas. The factory, which is using such big sustainable technology, do you have some reward for it?*
>
> *-Interview15-CNHR*

Sustainability maintenance and investment is a big challenge for smaller factories and thus critical for their survival. Most of the interview participants mentioned the difficulty facing by the manufacturers as buyers are offering a standard price for their product while pushing for updated sustainable practices. When the buyer's community get any pressure from the wider social community, they transfer it to the suppliers. A Joint Secretary and Sustainability officer of BGMEA identified their opportunistic approach as follows:

> *They give all the pressures, investment pressures, compliance pressure on the suppliers, they are saying now that go for renewable energy, for 1 megawatt capacity solar panel fitting, I need one million USD. As I will do this investment, they will not give single penny to me, but they will claim it. The responsibility is not shared, they are not taking the risks, but brand image claimed fully.*
>
> *-Interview21-BGMM*

Bangladesh has developed around 178 green platinum LEED certified factories, there are many on the pipeline, but the owners of those factories are not happy as they are not getting any price benefits from the international brands. The cost of production and operation has been on the rise for a while and overall cost of business is at the peak. A finishing manager of a factory speaks on behalf of the owners:

> *Cost of everything is high, communication and vehicle cost, price of gas, oil and the carriage cost has increased, electricity cost has increased too. Workers costs are increasing, the owners cost also increasing but income is decreasing from the business.*
>
> *-Interview17-GWSFM*

4.3.5 Functional Disruptions

Bangladeshi textile and RMG sector are a production-based business model where the factories manufacture the clothes according to the demand and order of the foreign buyers. As a result, any issue that hinder the production process, ultimately create concern for the economic health and business sustainability of the industry. Thus, the functional and operational disruptions need to identify urgently. Internally Bangladesh has many complexities in regards of timely production and reaching FOB, shipments. Buyers do not feel confident that their product would reach the destination on time or not, sometimes they impose penalty, sometimes order get cancelled. So, lead time is one of the most critical issues here. A Director of EPB of the government described the issue as below:

> *Due to the Leadtime, many buyers don't feel confident placing orders here, with the Leadtime of 145 days, many buyers think that this is such a long time, where China can manage in 15 days. Here port is related, raw material is related, garments are related.*
>
> *-Interview24-EPBM*

Although Bangladesh earned RMG exported 46.9 billion USD worth last year (2022-23), a big chunk of this dollar currency is being spent to importing back-end materials from outside countries like China and India. The total textile and clothing industry of Bangladesh is dependent on importing materials and accessories. This dependence on the foreign countries for the materials reduce the competitive advance by increasing the production cost and increase the vulnerability of the process. As par the quote of a sourcing and merchandizing manager:

Back end of the chain, there is the big challenge…probably 30 to 40 % of value addition we do, because we must import raw materials and fabric and everything, the vertical factories we have in Bangladesh, they all also buy yarns, spinning mills buy fibre from India, 90 % of the fibre come India, China so this is the biggest problem, the supply chain.

-Interview3-BSN

The production planning teams of the industry are inefficient, rely on the traditional, old approach, cannot adopt new technology for a systematic production planning. Capacity planning is another weakness in the industry. Some factories take orders beyond their capacity and struggle to meet the production target on time. Some factories take more orders thinking to go for subcontracting which again create compliance and quality issues.

4.3.6 Raw Materials Supply Issue

There is a consensus among all the interview participants that scarcity and lack of raw materials supply is one of the biggest concerns of RMG production in the country. As Bangladesh is almost fully reliant on imported raw materials and cottons, any issue in the importing channel makes the whole industry vulnerable and in a risky position. Among the two-product category of knit and woven, woven sector is more vulnerable for raw material crisis. Some practitioners in the field believes that Bangladesh import more than 70% of the woven fabric from foreign countries. According to an independent sustainability consultant:

We need to increase our raw material manufacturing facilities within country, our RMG sector is sometime termed as Tailor House, we buy fabrics and yarns, and we just sew it, we are still reliant on import for 70 to 80 % fabric.

-Interview10-CNSK

There are issues of international borders, supply chain criticalities, there is a war already going on, thus, uncertainty is a grave concern. More importantly, Bangladeshi factories rely on the timing of the raw materials reach to the factory, if there is any issue in the transportation or port release, the whole workforce and production chain gets struck. The cost of cottons has increased drastically over the years as there are organized syndicates working to control the price globally. Not only cotton, but other raw materials price also including the chemicals has increased dramatically. One button producer executive claimed as follows:

The price of chemicals increased astonishingly, the materials we used to buy before by 5 dollars, now the same materials we are buying now with 10 dollars. Materials cost got almost double, but the item price which I used to sell at 3 dollars, now I cannot sell it at 6 dollars…We are almost fully dependent on China for this. We bring our raw materials from China and Hongkong.

-Interview11-ACCS

The accessories industry of Bangladesh is in the rise, there are many of such subsidiary factories in the process of operation. But the same challenge of raw materials must be encountered by the backward industries.

4.4 Macroenvironmental (Infrastructure) Issues

Bangladesh is a global player in apparel manufacturing, competing with countries like China, Vietnam, India, Cambodia, and others. Bangladesh have around 5000 factories in operation producing in bulk finished clothing goods. But the overall industry structure and logistics support is not in a standard shape, whether the factory level or macro infrastructure is considered. Energy and gas supplies has been a constant issue from the initiation of the RMG sector in the country, raw materials and other production materials supply have concerns and there is a big gap of internal communication infrastructure. Most of the roads suffers from congestion, blockage, the waterway is not properly developed, thus making it a challenge to reach the finished products to the port destination from the production houses. So, from the perspective of logistics and infrastructure issues, Bangladesh RMG sector is in a constant state of uncertainty. As the RMG and its backward linkage supply industry is created and flourished by the entrepreneurs, Government of Bangladesh has not been the planner and initiator, thus central facilities supply, and infrastructural development has not been synchronized and upgraded as per the demand of the industry. Broader macro-environmental issues of the sector are presented below (Table-10).

Logistics and Infrastructure Issues	
Key Themes	Challenges and Barriers
Logistics and Operational Challenges	➢ Shortage of energy and electricity supply ➢ Scarcity of gas and other supplies ➢ Operational Inefficiency (Less productivity) ➢ Weak banking infrastructure ➢ Shortage of land and space

Communication and Transport	➢ Insufficient road and transport ➢ Conditions of roads are bad ➢ Poor port infrastructure and services ➢ Complex supply chain route (Internal and international)
Manpower and Capability Barrier	➢ Shortage of manpower of monitoring agencies (DoE, DIFE) ➢ Lack of expertise and capability ➢ Inactive Civil society and NGO ➢ Multi-tier monitoring is problematic
Mismanagement and Corruption	➢ Corruption in Government agencies ➢ Money laundering ➢ Gap of coordination among government agencies ➢ Politics-Media and RMG owners' syndication
Unregulated Factories Management	➢ Sub-contracting is a reality ➢ No surveillance and legal framework for sub-con and smaller factories ➢ No sustainable practices in unregulated factories

Table 10: Logistics and Infrastructural Issues

4.4.1 Logistics and Operational Challenges

The most common crisis in respect of logistics supply is lack of electricity and gas supply. As most of the factories take electricity from the national grid, loadshedding keeps the factories idle for hours, again supply of gas can hindrance the operation of the factories where they generate their own electricity using gas as energy sources. There are other issues like operational inefficiency due to lack of employee and workers skill, there are issues of insufficient banking infrastructure to support the export business. Bangladesh has been failing to supply electricity to the household units, supplying electricity to the industrial site is one of the biggest challenges for the industry. Director general of a government agency relating to the textile sector said that:

> *Due to war, price of oil is getting high, due to oil price increase, our electricity production is affected as our industry use e-electricity, they have their own plant, they produce their own electricity, they don't take electricity from the national grid.*
>
> *-Interview12-DGTN*

Shortage of gas and electricity supply is one of the biggest concerns of smooth and continuous production, which again affect the Leadtime and on time shipment. The crisis has a multiplier effect on the export performance of Bangladesh. Alongside, the cost of energy has reached to a dangerous level.

There are regular cases of system loss and thus the overall productivity of the industry is low. Most of the participants expressed that the industry level efficiency is below 50% which means more than 50% of the existing resources are wasted on regular basis. One of the compliance managers of a RMG group of factories in Bangladesh said-

> *The productivity in Bangladesh is not as expected. Our productivity is not even 60%, below 50% is the productivity level of Bangladesh. If you see China, it is 70%, in other countries it is higher.*
>
> *-Interview16-BSJ*

This operational and production inefficiency leads to lack of global market competitiveness. Last year Bangladesh has exported around 46.9 billion USD worth of garments products worldwide. The huge amount of export and import oriented transaction requires swift and efficient banking service and adequate banking infrastructure facilities. But like many other Bangladeshi offices, banking service is slow and inefficient and thus affecting the critical export import transaction system. Again, chief sustainability officer of a group of companies identified the banking issues as follows:

> *There are problems with all the banking facilities and channels in terms of LC and forward and all. If the banks default, it will hit back. Being import and export country the banking system should be synchronized.*
>
> *-Interview30-ZDBL*

4.4.2 Communication and Transport

It is noted before in this chapter that Leadtime management is one of the biggest challenges of RMG industry of Bangladesh. This is due to the inadequate communication and transport infrastructure of Bangladesh, coupling by road congestion, broken, narrow and shattered roads, roadside shops and illegal structures. Bangladesh mainly depends on one port for its export and import operation which is 300 kilometres away from the capital city where the most of the garment's industries are concentrated. Sometimes it takes 8 to 14 hours to reach Chittagong

from Dhaka via highways. If it is a loaded freight and lorry, it can take more than 2 days. According to a former consultant of Accord and Alliance turned into a third-party auditor:

> *Internal communication and road facilities need to be improved. If you think about roads like Ahsulia and Gazipur Road, these are bad for many years now… Think about the road to Chittagong Port. There are factories where big trailer cannot go, products need to carry by truck to reach the big carrier.*
>
> *-Interview10-CNSK*

The road transport communication system is already over stressed, the waterway communication is not developed through the rivers yet, railroad capacity is not sufficient, the industry is expanding, the country's RMG sectors vision is to touch 100 billion USD landmark. Dhaka-Chittagong highway is a shared transport system, the same road is used for passenger transport, carriage of goods and materials, private cars and other smaller vehicles making the road too busy and sometimes unusable.

Bangladesh mainly depends on a single port, Chittagong Sea Port, although there is Mongla land port via which a tiny portion of total export-import delivery is done. Being the exclusive export-import corridor, the Chittagong port facilities are not up to the mark, the loading, unloading, clearing, forwarding, documentation and all other activities take time longer than required, there is severe corruption allegation against all the port authorities, there is shortage in staff and employees in the port too. Director General of Textile Department expressed his concern in this regard:

> *According to our trade volume, we import and export through the same port, as our trade volume is increasing, we were not able to increase the port facilities. If you see the last 10 years, the number of ports and its facilities, manpower remained the same.*
>
> *-Interview12-DGTN*

A big issue mentioned by the interview participant is that from the time the ship reaches the port with raw materials, it takes 10 days to release the product which in turn affect the delay in production and shipping the final products. More importantly, there is **no deep seaport** facility available in Bangladesh, as a result Bangladeshi entrepreneurs must make shipment twice, they first reach to the mother vessel in Singapore or Colombo, then again unload the goods and reload to the mother vessel, this cost at least 10 days system loss and involve monetary loss. One of the garment manufacturers expressed his concern as follows:

If Bangladesh could have the deep seaport and mother vessels could come here, setting could be done without going to Singapore or Colombo, our lead time would be reduced far, we could at least save 10 days or a week.

-Interview14-TOM

There is **lack of coordination between port authority and customs house** and there is allegation of mismanagement and corruption too. Most of the global freight carriers love to come Bangladesh and Chittagong port as they come with full container, goes with loaded with garments apparel but only issue is the mismanagement of the port authorities and complex bureaucratic documentation culture.

4.4.3 Challenges of Manpower and Capability

There is major gap of organizational and institutional capability in the RMG sector, in one hand the government agencies monitoring and controlling the RMG business have limited workforce and manpower along with the organizational capability, skill and knowledge, on the other hand the factories, management and other related owners and workers association also face the same crisis of manpower and capacity shortage. The factories are huge in numbers and government agencies like DIFE, and DoE have limited capacity, limited expertise, and far limited workforce. As a result, the continuous vigilance is almost impossible and thus the monitoring and control mechanisms do not work properly. DIFE is mainly responsible to look after the labor issues in the factory, their welfare, safety-security issues, working condition and other welfare issues. But in comparison to the number of factories and industrial sites in Bangladesh, the departments capacity and capability is insignificant. As one of the DIG of DIFE of Gazipur region logically put:

Our current DIFE's resources (is limited), according to our analysis and calculation, in comparison to the number of our workforce to the shops and factories in Dhaka, it will take 26 years for full inspection, even if inspection is done for once.

-Interview6-DIFB

There are roughly 30000 and more factories and establishments for DIFE to look after whereby they have around 200 inspectors, this is an impossible situation to cover all the factories. The same crisis of workforce and manpower can be found present in case of the DoE (Department of Environment), which is the sole authority to monitor and control the environmental issues in Bangladesh. According to DoE Assistant Director of Gazipur region:

There is huge gap of our monitoring as we don't have enough manpower currently in DoE, if I speak about my area Narayanganj, here we have only one inspector, if he daily inspects 100 of factories leaving other job behind even, he cannot cover…how can you monitor them at night, which is the peak hour of their production. For this gap the industrial entrepreneur takes the advantages.

-Interview9-DEM

DoE officials openly confess their capacity gap, there is another issue of monitoring is that they only operate during the office hour, but the factories go for peak production at night when the DoE cannot monitor. There are many NGOs working for workers in the Gazipur, Dhaka and Narayanganj area but they do not fight for the workers right properly. The NGOs are foreign fund dependant, cannot function properly as they are not totally independent. NGOs and Civil Society could have played a role of watchdog but failed in case of RMG sector. According to a human rights activist and leading intellectual of Bangladesh:

NGO does not work as an independent organization; they are dependent on funds. Those who are giving the funding, many things depend on their own agenda. So, with many NGOs, there are many problems created. Sometimes it is found that they have some form of communication with the owners.

-Interview20-PAM

As the owner's community is politically strong and have more muscle power in control, most of the civil society workers cannot protest and stand beside the workers. From the perspective of buyers and their representative in Bangladesh, merchandizers and buying houses, reaching to tier zero is most common, reaching to tier one is rare but reaching beyond tier 1 is almost non-existent. The buyers have resource and capability gap in monitoring the operations beyond their lead supplier. According to a compliance manager of a sourcing office of a global brand:

We can reach only the cut to pack level in the supply chain or to the vertically integrated factories but there is tier 2, mills, there are button factories, zipper producers, it's not easy for us to manage those levels, we are managing those by the supplier's team, we are empowering the suppliers team.

-Interview16-BSJ

4.4.4 Mismanagement and Corruption

Lack of proper management and coordination among government agencies regulating the garment and subsidiary industries is a grave concern. Shortage of required management skill

and mass corruption pose a threat to sustainable RMG business in Bangladesh. There are issues like gap of transparency in business operation, lack of proper accountability of the concerned parties, corruption among the government industry actors. The garments entrepreneurs need to get different government certificates and approvals in each stage of the operation. Starting from site clearance certificate to environmental clearance, trade licence, land records, DIFE approval, export certificates, EPB renewal, corruption in these agencies make the business more critical. There is complaint against the officials of DIFE and DoE that they collect undue money giving the factories undue favours. According to an owner of a sweater factory:

> *They are corrupt to the extreme level. When they get information of any sub-con or smaller factories, they take the envelope… DIFE try to create mess. DoE, that is another place… you constructed your factory, got your energy connection, but you will not get the clearance unless you give the bribe. Customs departments are corrupted and give sufferings to the entrepreneurs.*
>
> *-Interview32-TOJ*

Not only the DIFE and DoE but also the police of the garment's region, the customs in the port, corruption in these agencies make an environment of mess for the business. There is another big issue, some of the dishonest business use this export business for money laundering purpose making a poor nation like Bangladesh poorer. There is major issue regarding the boundary of responsibility and jurisdiction among the ministries of Bangladeshi and their sub-ordinate departments which are related to RMG businesses. The chief executive of the ministry, secretary himself confessed that:

> *We have a bit of gap between the officers of Textile and Jute ministry with the RMG factories, we have department of Textile under the ministry… We have gap in our regulations too, for garments some issues are monitored by Environmental ministry/ department, some issues are looked after by Textile and Jute, some of the factors are controlled by ministry of Industries, some of the issues by commerce ministries…unless there is a compact relationship developed among the authorities, it will be difficult to coordinate.*
>
> *-Interview7-TSR*

There is no clear jurisdiction of boundary for the water management agencies and thus these offices try to dodge their responsibility pushing it to other offices. In Bangladesh, there is an evil nexus working among the media houses, political powerhouse, and business ownership. As a result, when there are major anomalies of sustainability practices, no media house reports

it. If workers get exploited, their voice never reach to the media. Again, if there is environmental malpractice, no news outlet goes for reporting, no intellectuals write about it in the newspaper. One of the leading civil society activists and intellectual of the country narrates the scenario as follows:

> *The media houses, television channels or daily newspaper, owners of most of them have garments factory. As a result, when there is movement in the garments factory, you will not find any detailed report in the newspaper. When they go for reporting, they follow the government and BGMEA guidelines…as a result, the owners side get the advantage.*
>
> *-Interview20-PAM*

In the industry, there is a big challenge of transparency and accountability from the side of the factory practices too. Factories which exploit the workers, violates the environmental regulations do not do the operations transparently. They do not maintain proper documentations, sometimes they use fake documents too. There are factories who continue their operation underground, beyond the surveillance of government agencies and buyers.

4.4.5 Subcontracting and Unregulated factory Management

As there is uncertainty of business and orders, some factories take orders beyond their capacity aiming to give part of the job to subcontracting. On the other hand, there are smaller scale factories who cannot win direct orders form the buyers, but they serve the lead factories. Most of the regulatory gaps and compliance and sustainability malpractices occur in these smaller factories. These smaller factories are not member of BGMEA and BKMEA and buyers also do not monitor them directly, only the government agencies are responsible to monitor these. But as the government agencies are facing manpower crisis, they operate without almost any kind of monitoring. According to an economist and activist:

> *Many factories known as compliance factory are producing a big chunk of their received order by the sub-contracting factories for maximizing their profits or minimizing their cost. They take the order to beat the competition and they know that the order will be done by sub-contracting, they keep their compliant factory in front as the showpiece. The condition of the factory there is very bad, wages are not paid right, working condition and environment is far more critical.*
>
> *Interview20-PAM*

There is no framework or legal system by which the subcontracting and unregulated factories can be brought within the surveillance mechanisms. As these factories do not go for direct

export, they do not require many licences, thus tracing them out is difficult. As a result, most of the smaller subcontracting factories can keep their operation without any monitoring mechanism. According to DIG of DIFE, Gazipur region:

> *They operate without our license or approval…when there are orders, they take workers on ad-hoc basis, after finishing the work, they can't give the benefits to the workers according to the law, which cause various type labour unrest. It is difficult to locate where they are doing what.*
>
> *-Interview6-DIFB*

When the main factory gives the job to a subcontracting factory, they do not monitor their operations closely rather the lead supplier wants the job to be done anyhow. There are factories who cater for local market, these informal factories also create chaos and bypass the sustainable practices. These factories operate in home environment, in smaller scale, do not care about the ETP or any environmental regulations, they do not have any idea of labor law or formal culture.

Part-B: Contemporary Sustainability Practices and Initiatives

After the biggest industrial disaster, Rana Plaza collapse in 2013 killing over 1100 people, the RMG industry faced an existential crisis in Bangladesh. The catastrophic accident received so much backlash and international criticism that it felt that RMG sector of Bangladesh would never recover from this massive hit. Most of the international buyers were threatening to stop outsourcing from Bangladesh, some big brands like Nike and Disney withdrawn their operation. But the initiation of Accord and Alliance (European and American Brands organization) followed by the Rana Plaza incident changed the entire business landscape of RMG industry in Bangladesh. These two organizations, Bangladesh government and other international body's rigorous factory auditing, retrofitting initiatives, export-oriented factory monitoring, safety and security codes, relentless pushing for restructuring and investment put the RMG sector of Bangladesh in a top position in regards of compliance and sustainability. Although initially the factories struggled and felt pressure to follow the instructions and retrofitting guidelines as there were huge investment involved, but the results of the monitoring and restructuring have brought blessings for the sector. After the massive structural transformation following the Rana Plaza, currently the factory environment, safety and security, compliance practices can be considered standard to some extent. At present if a new factory is being constructed and start operation, most of the compliance practices and sustainability checklists are ensured. All the changes and practices happened in all the dimensions of the sustainability are narrated below through the understanding of the interview participants and quotes are inserted as evidence.

4.5 Social Sustainability and Workers Welfare Initiatives

In the area of social sustainability practices and compliances, Bangladesh has been through massive positive changes, the improvement has been radical and its clearly visible now. Especially, the issues of safety and security including fire, electric and structural adjustments, Bangladesh RMG has been through a revolution. Almost 100 percent of the factories were being though safety inspections of Accord and Alliance, legal reforms been done, government agencies been strengthened, the industry has become pioneer in the safety and compliance department in the world. The more details of the contemporary social initiatives and current practices are elaborated in the following section of this thesis (Table-11)

Table 4.5 Social Sustainability Practices and Welfare Initiatives	
Key Areas of Initiatives	Measures and Initiatives taken
Labor Compliance Mechanisms	➢ Anti-Harassment counselling and administrative measures ➢ Anti-harassment Committee ➢ Amader Kotha helpline ➢ No child labor recruitment ➢ Direct force labor and coercion is not present. ➢ Worker's participation committee
Workers Welfare and Empowerment	➢ Daycare Centre. ➢ Fair price and discount shop inside the factory ➢ Workplace programs like family education support ➢ Women empowerment and welfare ➢ Provision of welfare officer in the factory
Skill Initiatives	➢ Skill enhancement and training initiatives ➢ SEIP program (Skill for Employment Investment Program) ➢ Tech literacy and 4IR initiatives
Safety Initiatives (Factory)	➢ Fire station installation ➢ Arrangement for fire equipment's ➢ Electrical wiring and safety management ➢ Building Structural stability is ensured ➢ Inspection following BNBC ➢ Building Safety committee in action ➢ Safety training, awareness and new investment
Medical, Family Planning and Hygiene	➢ Medical services inside the factory ➢ Wellbeing initiatives for women ➢ Menstrual and maternal health initiatives ➢ BKMEA OSH unit ➢ Family planning Department and BKMEA joint program ➢ Regular cleaning and hygienic practices

Table 11: Social Sustainability Practices

4.5.1 Labour Compliance Mechanisms

As RMG is a labour-intensive industry, managing labour issues is one of the priorities of social management agenda. At the early stage of the industry in Bangladesh, most common non-compliance issue was employment of child labour and sexual harassment, there were issue regarding force labour as well. These issues are no longer big concerns. The industry is not 100% harassment free now, but the number of the cases are insignificant. The factory level counselling for both male and female workers is there so that both knows there boundary well. Factory's mid-level management is very much aware about the issue, and they are regularly trained to handle any such incident. According to a finishing manager:

> *We guide them and consult them for this all the time, we instruct them to be careful and our factory management stays on alert all the time so that there cannot be any sexual accident.*
>
> *-Interview17-GWSFM*

According to the honourable high court's instruction, in all the factories anti-harassment committee is formed and functioning now. There is 24-hour third party helpline available throughout the RMG industry to help the girls and women protect themselves from violation of their privacy and honour. Apparently, there is no longer any **Child Labor** is being employed, almost all the participants seem to agree that that due to the strict legal requirement and international buyers' pressure, the factories do not recruit anyone under 18 years old. According to the Bangladesh labour Act, 2006 recruitment of child labour is strictly prohibited and on behalf of the government side DIFE ensures the legal obligations. According to an assistant joint secretary of BKMEA labour cell:

> *The industry has become child labour free during the year of 2000, as we must work with the international buyers and as there are many forms of audit being conducted in the garments factory, so if any factory faces any child labour complaint, they will lose the orders.*
>
> *-Interview19-BKMS*

Force labour is also reduced dramatically over the years, although it cannot be denied that the workers are exploited in many forms, but direct force labour and use of coercion cannot be traced anymore. A proper grievance mechanism can solve the issues which lead to workers unrest and agitation. For bridging between workers and management there is Workers

Participation Committee (WPC) in action where workers can express themselves freely. According to a sustainability auditor and third-party consultant:

> *They (WPC) are responsible for talking about issues on behalf of the workers, from workers level to management level. Via this committee, they have a scope of expressing themselves. Then it is easy for the management that this issue can be solved now.*
>
> *-Interview15-CNHR*

4.5.2 Workers Welfare Initiatives

Factories now advancing their initiatives beyond compliance, focusing workplace programs and welfare initiatives including extra bonuses, fair price shop, day-care centre etc. Factories aiming to attain happy workers to get better efficiency. Some factories are offering value proposition offering different education programs for the family members, career development, and other benefits. According to a compliance manager of a sourcing office in Dhaka:

> *Some factories are giving attendance bonus which is not in the law. Some are giving money for earned leave as a benefit, some are doing rationing for the workers, some have fair price shops where the workers can save 500 takas if they buy 2000-taka worth goods which are beyond compliance.*
>
> *-Interview16-BSJ*

There are many workplace programs being taken by the market leaders in association with ILO and other international organizations. One of such workplace programs is running school for the worker's children having within threshold of salaries. As more than 70% of the workers are female, **day care** for the children is a necessity in the factories. Some of the factories have designated areas for taking care of babies, carer is appointed by the factories to look after the babies of working mother. Bigger factories are trying to set up **discount shops** within the factory facility for the workers so that they can buy daily necessary commodities with much lower prices. According to the chief sustainability officer of a big group:

> *We have 8 fair price shop… On an average worker are getting products with discounts from 10 to 15%. We sale the products at the same price which we buy from the wholesale market. It is subsidized, the operational cost, we are bearing it.*
>
> *-Interview30-ZDBL*

Currently most of the supervisors, line managers and upper-level management people are male. But the situation is changing and there are initiatives to prepare more female mid and upper-level management positions. BKMEA and BGMEA are also taking initiatives to increase the numbers of female supervisors and to empower more women in leading positions. According to a sustainability officer:

> *Females are coming as supervisors. In our own organizations we have now 120+ female supervisors, withing next 3/4 months we will have 300 female supervisors.*
>
> *-Interview30-ZDBL*

To look after the welfare of the workers and to listen to their problems, there is a provision of recruiting a welfare officer in every factory if the factory has minimum of 500 active workers. In most cases, the welfare officer is female and thus listen to the complaints and concerns of the female workers carefully.

4.5.3 Skill Initiatives

For enhancing the skill level of the workers and staffs of the industry, two owners' association of garment factory, BGMEA and BKMEA are working continuously. They have taken many initiatives on their own, additionally they have collaboration with ILO and other international NGOs. According to the Director of the textile wing of EPB, they have joint programs with these two organizations:

> *For mid-level management, BGMEA has their own BGMEA Fashion and Technology University, we are offering three/four courses by EPB there. Side by side, we are giving training to thousands of workers, with the help of BKMEA and BGMEA. We are familiarizing the workers with the new machines and continuing the training for increasing their productivity.*
>
> *-Interview24-EPBM*

The factory management also arranges training and induction sessions for their staff and workers to introduce with new machines. This on-the-job training arrangement is an important part of factory management. There is big initiative has taken jointly by of Commerce Ministry of Bangladesh Government funded by ADB to enhance the skill level of the industry, popularly called by **SEIP** (Skills for Employment Investment Program). According to BKMEA top executive:

Government initiated a project called SEIP (Skilled for Employment Investment Program), although the grant is taken from ADB, the project is taken by the commerce ministry. This is the biggest megaproject in terms of skill development in Bangladesh.

-Interview18-BKMF

Keeping challenges in view the government body and associated agencies are preparing their subsidiary institutes. Ministry of Textiles and Department of Textiles have some vocational colleges and textile institutes, they are updating the syllabus according to the current demand.

4.5.4 Safety Initiatives (Factory)

Following the aftermath of the great Rana Plaza disaster and after the initiation of Accord-Alliance and national initiatives, massive reforms and restructuring has been done in the Bangladesh RMG industry. Factory level safety inspection, retrofitting, new fire door installation, widened entry and exit door in case of emergency and all other safety precautions have been in place during the last 10 years. Buildings have been constructed following 100% BNBC guideline during this period. During that time the BNBC (Bangladesh National Building Code) has been amended and all the necessary safety precautions were added taking reference from the National Fire Protection Association (NFPA) of USA. According to a merchandizing team manager:

Many works been done through Accord and Alliance, during the last 5/7 years there has been massive improvement in these areas, we are following BNBC (Bangladesh National Building Code). After the role play of Accord and Alliance, 95% factories reached to the up-mark position.

-Interview8-BSDN

In fire safety section, Accord-Alliance focused whether there were any fire protection and detection system, firefighting arrangement and preparation, emergency doors are kept open or not and enough wide or not. It is evident that bigger factories have their own mini fire station and firefighting people. Some foreign NGOs like GIZ of Germany also helping them to build firefighting infrastructure. This view can be further validated from one of the quality control managers of another factory:

If any fire incident occurs, primary medication and treatment, all the training is given. Now the fire service vehicles can reach to 8 to 10 storied building, there is such system that if the heat is felt a bit higher, alarm starts ringing.

-Interview28-GWAQC

Massive transformation has taken place in the electrical safety area too. Electrical connections were thoroughly checked, distribution boards were replaced, electrical fire door installed. With that massive transformations, electrical side is now updated, safe and modernized. According to a compliance manager of Bestseller United Group:

Before or during the Rana Plaza tragedy, the electrical distribution boards were like a bird's nest. Electric connections, cables were inspected according to NFPA, BNBC codes. Though this process, after 3/4 years we saw that our electrical distribution boards have become like a shining mirror.

-Interview8-BSDN

Many initiatives have been incorporated to check buildings structural strength and load bearing capacity. One of such initiative is to form a building monitoring committee headed by the IGP of DIFE involving professors from BUET and other experts. Factories are taking responsibility to make their workers aware, informed and trained regarding safety precautions. According to a midlevel finishing manager:

Our company arrange training, if there is any accident, how do they go out for exit, they are given instructions on that, how to take the stairs, not being in rush and making any chaos, we train on these.

-Interview17-GWSFM

Following the instruction of the Accord, Alliance and national Initiatives, factories have invested heavily to bring structural reforms inside the factory and to make it safer for the workers and factory itself. Moreover, safety committee is formed in combination of the workers and owners, or their representative and they are responsible to look after the health and safety issues of the worker, identify the risk factor, trace the possible hazards, resolve those.

4.5.5 Medical, Family Planning and Hygiene Practices

Along with safety issues, occupational health, wellbeing, hygiene and cleanliness, standard working environments issues are properly addressed now in the factories. Export centric

factories have medical, and clinic set up inside, providing medical advises and primary medicines. A supervisor level staff narrated their medical set up:

> *We have separate MBBS doctor, nurse, everything. In each floor 150 machines, in each floor we have separate clinic, in Ashulia region, there are 100 factories they have clinics in factories.*
>
> *-Interview28-GWAQC*

Medium scale and smaller factories do not always have full time doctors in the factory but still they keep nurse full time and doctor visits time to time. Not only the factories, BGMEA-BKMEA, NGOs, many other non-profit organizations are working for the health and hygiene issues in the factory level. Occupational health should be given top priority. According to a labour cell joint Secretary of BKMEA, the following initiatives are taken by her organization in this regard:

> *We are working for the menstrual hygiene for the girls, their nutrition, for building harmony-sexual relationships we are working. We have an OSH unit under the compliance cell in BKMEA where occupational health and safety related services are given.*
>
> *-Interview18-BKMF*

The government agencies like DIFE are closely monitoring the health and safety initiatives taken by the factories. Although there is no formal organization in Bangladesh to study **Occupational Safety and Health (OSH)**, one such institute is under way. BGMEA have 12 health centres of their own, they have joint program with family planning department too. There are many family planning programs taken to ensure the reproductive health issues, maternity benefits programs initiated to help the prospective and early-stage mothers. One top BKMEA official stated:

> *We have joint program with family planning department, as workers enter the factory by 8 am, they cannot take the family planning commodities from the government offices, because government offices are open till 5 pm, thus we have provided family planning services within the factory, so that the mothers and children can stay healthy, girls can keep themselves safe from unwanted pregnancy.*
>
> *-Interview18-BKMF*

Another such program is Lactating Mother initiative. In case of maternity leave, the female workers get highest 6 months leave with pay in Bangladesh. Additionally, All the workers and

concerned stakeholders agree that current hygiene and cleaning practices, especially after the outbreak of Covid, are of global standard. Factories have enough cleaning staffs and routine wise they clean the working space. According to a supervisor:

> *There are sufficient cleaning arrangements…In each line there is a cleaner for cleaning in every hour. We have separate cleaner for toilet, floors and for nurturing the water supply and everything there is dedicated person.*
>
> *-Interview17-GWSFM*

4.6 Environmental Practices and Initiatives

For the last decade, environmental issues and initiatives have gained much attention and momentum in RMG sector of Bangladesh. The issues of energy and water saving, rivers and water conservation, circular economy and waste minimization, renewable energy sources have been in the centre of discussion and actions. Those initiatives and proactive actions by the industry actors and factories are recognized globally too. One of the best proofs has been the increase of the numbers of green factories in recent years. Bangladesh is currently leading the chart of LEED certified green factories in the world. Bangladesh must move for these environmental initiatives as the natural resources are shrinking, water source is getting saturated, gas supply has been scarce. Cost of energy is going record high, supply is becoming extremely challenging, thus businesses are investing in energy efficient systems. Following the pressure of energy crisis, Bangladeshi factories have moved to more advance technologies and more energy efficient machines, simultaneously finding creative ways to reuse energy options and save resources as much as possible. All the environmental and chemical initiatives and management practices are briefly discussed in the following section with quotes (Table -12).

Table 4.6 Environmental Sustainability Practices and Initiatives

Key Areas of Initiatives	Measures and Initiatives taken
Chemical Management	➢ Buyers monitoring and chemical Compliance code. ➢ Follows MRSL and MSDS ➢ Biological ETP /Wastewater lab Test/ DoE Monitoring ➢ Buyers Approved lab test before shipment. ➢ Chemical management guideline underway
Greening Initiatives	➢ 178 LEED green factories of USGBC ➢ Tax Rebate for green factories

	➢ Tech Upgradation Fund and green finance ➢ Environment Award and appreciation ➢ Organic Initiatives ➢ Enactment of environment law
Resource and Energy Saving	➢ Renewable Energy and solar panel initiatives ➢ Energy savings: Energy saving bulb/ machines/ motors. ➢ Using the day lights, modern roofing ➢ Heat preserving and later usage. ➢ Water Efficient machines/ Water Accounting ➢ Rainwater harvesting ➢ Circular Economy/ Waste minimization, recycling, and reuse
Solid (Jhut) Waste Management	➢ Informal Jhut Management industry ➢ Jhuts recycling and export

Table 12: Environmental Sustainability Initiatives

4.6.1 Chemical Management Practices

To encounter chemical infused wastewater release and side effects of chemical usage, some buyers have their own chemical management guideline, their MRSL or RSL list, other follows ZDHC guidelines. There are factories and buyers who chose to take certificate from Higg index. As Bangladesh mainly export to the European and American market, export focus factories try to follow their standard. They do not use the chemicals restricted by the buyers. Bangladesh must install ETP by the developed country standards. According to a quality in charge of a factory's washing unit:

> *The chemicals buyers instruct us to use, we only use that. Because the product is being tested in lab… the chemical we should be using whether we are using that or not, that is tested in a lab taking a complete body there.*
>
> *-Interview28-GWAQC*

From 2010 onwards, Bangladesh government made it mandatory in the law that factories in the wet processing portion and composite units must have ETPs and there is a high court (Apex court of the country) ruling for all the liquid waste releasing factories to have ETP. According to another assistant director of DoE, Gazipur area:

We have been able to set up ETPs among the factories, in the backward industries, dyeing factories, every facility needs to install ETP as they release water following specific standard. There is a 2009 high court ruling in this regard.

-Interview9-DEM

Most of the industry insiders said that export oriented, BGMEA member factories are now moved towards installing biological ETPs which are not possible to keep inactive. Factories must share the design and technology of ETP to the brands and retailers. Once invested in Bio-ETP, the operation cost is minimal as there is no chemical needed. If any of the ETP treated water is found to be violating the accepted parameter limit, they are brought under the legal jurisdiction. According to a deputy director of DoE:

We check whether they are running the ETPs, if running we collect the samples, send them to the laboratories and collect the test reports, we check the reports with the parameters prescribed in the Bangladesh Environment protection Act, 95 and Rules, 97…there is a condition given in the clearance certificate that the release water should be tested 3 / 4 times in a year.

-Interview13-DEDD

Buyers supply the factories the instruction and MRSL lists so that no unapproved hazardous chemical can be used in the process. They also test the finished product to check whether there is any residue of forbidden chemicals can be found. As Bangladesh mainly targets two regions, Bangladeshi factories must be obliged by the chemical management rules of the Europe and USA. According to a garment factory owner:

European and American market, in their country they have many restrictions of chemical that you can use certain chemicals and cannot use certain chemicals, buyers time to time test us for this chemical, before shipment test, sample test is done so that no hazardous chemicals cannot be there.

-Interview31-TON

4.6.2 Greening Initiatives and Incentives

If the journey of Bangladeshi RMG factories towards obtaining green certification is considered, from 2015 onwards every year more than 15 factories have been getting LEED green certification. According to the latest information, at present Bangladesh has 178 LEED certified green factories among which 58 factories are platinum certified and 106 factories are gold certified. The numbers suggests that Bangladesh is leading the greening factory initiatives

globally. More than 550 factories are in the pipeline for becoming green. According to Director General of Textile Department:

> *We have industries which are green, US Green Building Council certified them green, among the top 10 global green factories, 7 are from Bangladesh. We are going ahead in this regard.*
>
> *-Interview12-DGTN*

RMG and textile industry of the country is moving towards attaining greening goals and becoming environmentally responsible. Factories are taking program to minimise the CO2 emission, reducing the carbon footprint. Green initiatives like planting trees in the factory premises are there. Some of the Government green initiatives are giving environmental awards for best practicing factories, offering green finance and technological upgradation funds, tax rebate for the green factories. According to the chief sustainability officer of RMG association:

> *Government policy is that corporate tax for green factories will be 2% lesser, a regular factory pays 12% percent corporate tax while a green factory pays 10 %...We literally pushed Bangladesh Bank for a Technological Upgradation Fund or TUF, if a factory buys environment friendly technology, they will get the low-cost finance.*
>
> *-Interview21-BGMM*

To protect the environment from industrial pollution, there is legal framework, Bangladesh Environment Protection Act, 1995 and Environment Protection Rules, 1997 following the law. There is Department of Environment (DoE) and environmental court too to mitigate environmental malpractices. Every export-oriented factory must take environmental clearance certificate from the DoE, so they are within the purview of the government monitoring. According to a Deputy Director of DoE head office:

> *We appreciate the factories who are doing good environmental management, follow specific parameters and those who never fail the parameters. These factories are awarded environment award, which is given by the honourable prime minister, financial incentives along with certificate is also provided.*
>
> *-Interview13-DEDD*

4.6.3 Resources and Energy Saving Initiatives

Energy, water, gas, and other natural resources are scarce, thus energy and resource saving initiatives is a survival strategy for the industry. In the given circumstances, apparel and textile sector of Bangladesh has adopted many resource and energy saving initiatives such as, circular

economy adoption with recycle and reuse strategy, waste minimization, water and energy saving projects, solar etc. According to the chief sustainability officer of a manufacturing group:

> *There is energy saving initiative in the industry, there is recycling of the energy, for example, 500-degree Celsius heat comes out of gas engine, that is now recycled and comes to exhaust gas boiler, where the heat is utilized for steam generation.*
>
> *-Interview30-ZDBL*

Bangladeshi is heavily investing on solar energy, installing panels on the rooftop of the factory has been widely adopted practice for a while in the RMG facilities. One of the most common energy-saving practices is replacing the conventional bulb with the energy saving bulb. In sewing and other section traditional motors consume huge electricity; thus, the factories are moving to SERVO motor. A factory owner advocated his initiatives as:

> *We have changed the whole lighting system with LED lighting… we have changed 100 percent motors to Servo motors, electricity consumption is far less with Servo motors, we are not green factory, but we have reduced 20% electricity consumption.*
>
> *-Interview32-TOJ*

There are smaller but creative ways of saving energy, sometimes the heat generated by the processes can be preserved and used later. Modern factories are built with bigger glass windows and glass roof ceiling in a way that maximum sunlight can enter the building. Some factories harvest and store rainwater during the rainy season and use later according to the demand. With the updated technology and modern machine, far less water is required in the chemical process. Some factories started water accounting mechanism following the buyer's pressure and Higg Index's instruction. According to an assistant director of DoE:

> *Some factories (maximum 5%) started water accounting initiative due to the buyer's pressure…5-10% facilities are doing it in RMG sectors.*
>
> *-Interview9-DEM*

In Bangladeshi factories, circularity is in operation is getting momentum slowly. The sewing and stitching section produces huge fabric waste locally known as Jhut, this Jhut waste is collected by local traders and recycled, recused, sold to third parties. Although, there is no formal framework, backdoor industry is exporting the recycled Jhut to many countries and earning foreign revenues. According to BGMEA sustainability coordinator:

Bangladeshi factories are entering into the realm of circular economy, they are recycling their pre-consumer waste, Jhut and they are getting back those resources to the production…After taking jhut from the factories, these are sorted, exported to India, Sweden and other countries…In last fiscal year, around 127 million USD worth of (Jhut) fabric waste have been exported to different destinations.

-Interview21-BGMM

4.7 Business and Economic Initiatives

It is fact that the textile and RMG industry of Bangladesh has come to this far by the entrepreneurs' spontaneous initiatives and relentless efforts. Although Bangladesh government is trying to facilitate the industry as much as possible today and creating a policy support eco-system, the economic and business sustenance of the sector largely depends on the homegrown entrepreneurs. Bangladeshi entrepreneurs have gained the trust and confidence of the global buyers and fashion brands by their quality and quantity of product delivery, the industry itself has proven resilient surviving the great Rana Plaza disaster. The industry has not only survived the crisis but thrived by taking so many positive business initiatives. Established businesses and export focus factories have upgraded their business machine so that revenues and profitability can be maintained and investment towards sustainable manufacturing practices can be maintained. In this following section, the sustainable business and economic initiatives are narrated as expressed by the stakeholders of the industry (Table -13).

Business and Economic Sustainability Practices and Initiatives	
Key Initiatives	Initiatives Taken
Production and manufacturing Initiatives	➢ Value addition along with product diversification. ➢ Development of Backward and accessories industry ➢ Smart production planning ➢ 3D design initiatives ➢ Smart technology and automation adoption
Branding and Market Diversification	➢ Market expansion and market diversification initiatives ➢ Development of local brands
Entrepreneurship Practices	➢ Home grown entrepreneurs. ➢ Resilient and brave investors

Best Practices of Big factories	➢ Compliance and environmental guidelines ➢ Welfare pathway for workers
Partnership and Cooperation	➢ Merchandisers and suppliers' partnership. ➢ Buyers and suppliers' positive relation

Table 13: Economic Sustainability Practices

4.7.1 Production and Manufacturing Initiatives

Historically Bangladesh has been dependant to the foreign countries for raw material and accessories. But for the last few years, there is a web of entrepreneurial initiatives in setting up backward linkage factories and accessories production. Still Bangladesh import cotton from outside, but the wet processing side and other accessories industry is in a standard shape, some of the trims like button, zipper, hangers are being exported too. Additionally, there are initiatives on the way towards product diversification and value addition, obtaining latest technological intervention, and production planning strategies too. Manufacturers and suppliers are moving towards producing high end, fashionable items for better profit margin. A factory owner himself ensures this as:

> *High Brand job has started, and many high brands are coming to Bangladesh, for Hugo Boss, Lacoste, they are working in Bangladesh already which is a positive side for us.*
>
> *-Interview14-TOM*

Along with servicing Primark, Inditex etc, Bangladesh is targeting to serve the high value product segment. Not only targeting big value brands, but Bangladeshi industry is also trying to add more product in the product mix and having a diversified product portfolio. Previously for the accessories and trims, Bangladesh has been dependant on China. Now the situation changing rapidly with the emergence of local home-grown accessories industry. Unless the buyers specifically demand any brand or any specific design, Bangladeshi factories are using local accessories. Director General of Textile Department has confirmed this as follows:

> *We have given registration for 500 accessories factories so far; it is a recent development. They also have an association formed, which is in a baby stage yet. As a result, they will have their strength.*
>
> *-Interview12-DGTN*

With the changes taking place globally in the technology and automation system, Bangladesh is trying to adjust accordingly. Everyday new, efficient, and modern machines are being

installed in the factories replacing inefficient machines, now 3D design innovation is taking lead. No factories no longer go for physical product sample presentation before going for bulk production rather digital 3D designs are placed. According to a buying house executive of Bestseller group:

> *We go for 3D presentation of the samples. We launch the sample in software and expert in counter office will digitally view and check, after confirmation we go for bulk production.*
>
> *-Interview2-BSR*

Automation is taking place solving the problem of workers crisis as well. Factories are now using smart and advanced software for planning optimization by which system loss can be minimised. Demand forecasting, order management can be done using computer aided technology. According to a top executive of DBL group:

> *For better planning we are using Fast React, a costly and highly sophisticated software. We have around 30-35 people who are graduated from engineering university, so we believe better plan can minimize many bottlenecks, so we practice plan-based production.*
>
> *-Interview4-KDBL*

4.7.2 Branding and Market Diversification

Bangladesh RMG industry has been successful in producing some local brands and aiming now to diversify the market destination. Export Promotion Bureau (EPB) has been trying to be branding Bangladesh globally by trade fairs and market expansion initiatives. Although no international brand can be originated from the country yet, well-respected home brands have the possibility to go global. According to the sustainability coordinator of BGMEA:

> *Our garments factories made many local brands, Yellow from Beximco, Twelve from Tin Group, Sailor from Epyllion group…The current condition of Yellow, after 50 years it will become a global brand.*
>
> *-Interview21-BGMM*

As Bangladesh RMG factories are still led by mainly first-generation and rarely second generations entrepreneurs, the next generation can aim for global presence. Most of the buyers and international brands operating in the country are either from Europe or America. As these markets have become saturated, Bangladeshi entrepreneurs are trying to find new market in the global business sphere and market diversification is on the table. According to a Director of Textile of EPB:

For market diversification, we attend to 40 to 50 global trade fairs… We take our businessmen there to exhibit their products, they get the chance to have meeting with the buyers directly. Now we are not limited to EU and USA, we are trying Brazil, South America, North America too, India is a big market for us now.

-Interview24-EPBM

4.7.3 Good Entrepreneurship and Best Practices

So far, the achievement of the RMG industry of the country today must be credited to the entrepreneurs. They have taken the risks, they have established this business by trial-and-error basis, nobody was there to guide them. Now the industry alone is offering job to more than 4 million people and providing the country the most foreign remittances. Bangladeshi entrepreneurs are high risk taker by nature, they keep the option open for flexible decisions. Moreover, they have shown their resilience capacity during Rana Plaza crisis and recently they have proved it again during the Covid pandemic closure. One big change can be noticed in the new generation entrepreneurs is in their attitude and outlook towards the staff and workers, they are much more friendly, approachable, and reachable. According to an experienced sustainability auditor and independent consultant:

We have self-grown entrepreneurs which is good, here we have predominantly local businesses. our entrepreneurs are also forward looking… they have managed good, especially during Covid in the Bangladesh RMG sector.

-Interview10-CNSK

Factories working with the global big brands, member of BKMEA and BGMEA maintain the culture of best practices in the industry. These factories take care of their workers and invest in environmental management too. These factories never go for treating the workers bad, the middle management also practices good behaviour with the workers. One of the finishing managers of a factory said:

Our management, MD and the owner's position is that no workers should be abused, nobody misbehave with us, we also don't misbehave with anyone. All workers and staff, they are well and happy here.

-Interview17-GWSFM

Alongside the already established factories, new factories initiated by the fresh entrepreneurs are also good in all aspects. They come in the business knowing the practices and with a mindset to maintain the compliance regulations, workers' rights and welfare and environmental protection.

4.7.4 Partnership and Cooperation

For RMG industry of Bangladesh, both brands and suppliers understand the need of cooperation, partnership, and bondage, they go for a coordinated approach. As business growth cannot be attained alone, partnership development is very important. The buyers and buying house side must listen to the suppliers and manufacturers problems before punishing with penalty or cancelling orders. According to one of the representatives of a famous brand in Bangladesh, a senior merchandizer of sourcing department:

> *We treat our manufacturers as our partner…We continue to support our suppliers, to grow them with us. Because, if the suppliers do not grow, then the brand itself will not grow.*
>
> *-Interview2-BSR*

4.8 Macro (Government and Non-Government) Interventions

After the independence of Bangladesh in 1971, the industry has been operating on its own, the entrepreneurs developed the whole sector the way they felt right. But as the industry has become the economic backbone for the country providing the single biggest foreign remittances and employment, Government of Bangladesh took stand to support the business flourish. There are ministries (Specifically ministry of commerce, industry and ministry of textile and jute) providing relentless policy supports to the garment industry. Additionally, there are government departments, bodies and agencies working for the better governance and regulation of the sector, there is a trade promotion body too. Current government structures and standard practices by the regulatory bodies are trying to establish a culture of discipline in the sector. Direct stakeholders of textile sector and Government are not the only concerned parties here, there are other non-government organizations who have played significant role in shaping the sector, these stakeholder roles are presented in brief here (Table-14).

Macro (Government and others) Interventions	
Key Actors	Measures and Initiatives taken
DIFE and DoE Roleplay	➢ Regular inspection and monitoring ➢ DIFE hotline for workers-16357 ➢ Court proceeding by DIFE and Environment court ➢ Awareness campaign ➢ Three-way monitoring-PPP, Case file to the court and Mobile court ➢ Enforcement of labor and environment act ➢ DoE environmental clearance certificate ➢ Site clearance, EIA, IEE
Ministry and Department	➢ Policy supports for the Textile and RMG ➢ Textile Department is the sponsoring organization. ➢ One stop service from the Department
EPB Role	➢ Export policy support ➢ CIP awards initiatives ➢ Incentives and appreciation for exporters ➢ Support and subsidy for new entrepreneurs
BIDA Initiatives	➢ One stop service for foreign and new investors ➢ Legal and documentary support
Legal Reforms	➢ Textile Act, 2018 and textile rules adoption ➢ Laws and acts are amended and modernized
Accord-Alliance and NI	➢ Thorough inspection and CAP generation (Corrective Action Plan) ➢ Auditing ➢ Retrofitting and sustainability investment ➢ Ensured Fire, electrical and structural safety. ➢ Followed BNBC, NFPA and ASHRAE standard

BGMEA-BKMEA Initiatives	➢ Cleaner production initiative-**TextilePact** ➢ BGMEA Innovation Centre for productivity ➢ Skill, Safety and Engineering Cell set up. ➢ Social cell for workers welfare ➢ Collaboration with international agencies-GIZ, UNDP for sustainability ➢ Surveillance and Monitoring ➢ Awareness and training programs ➢ Owners' session arrangement ➢ Productivity improvement cell
NGO and International Bodies	➢ Bargaining for salaries and workers' rights ➢ Documenting workers life and movement ➢ International bodies and NGOs are actively engaged in improvement process

Table 14: Macro (Government and Others) Interventions

4.8.1 DIFE and DoE Role Play

Department of Inspections for Factories and Establishments (DIFE) is a government body established under the ministry of labour, focus of which is to implement the existing labour law and enact the labour rules accordingly. Following the Bangladesh labour Act, DIFE designed a 100 points checklist for their inspection processes of the factories by consulting with ILO and BGMEA-BKMEA. According to a DIG of DIFE Rajshahi region:

> *According to the labour law we look after security of workplaces, health issues along with workers general issues like salary (wage), leave, working hour, maternity welfare benefits.*
>
> *-Interview5-DIFA*

DIFE initiated a hotline number for all the workers and staff working in the industry. If any worker feels unsafe, threatened, or exploited the hotline is there to inform the DIFE. DIFE investigate the incident and take legal action against the perpetrators. According to a DIFE official:

> *We (DIFE) have a number 16357, if there is any issue, they phone this number, then inspectors go there, find a solution, due to that owner have become aware mostly.*

-Interview5-DIFA

If DIFE find any non-compliance practices and anomalies, a notice is being sent to the factories for follow up actions, finally they go for labour court filing. DIFE has awareness programs for both the owners and workers, they arrange workshops and training programs to make the owners and workers conscious about the compliance issues. When the inspectors go for inspection, they mandatorily take workers interview to take their viewpoint. According to one DIFE executive:

> *Awareness for workers and owners, workshops, these are the things we do, alongside, when we go for inspection, we take workers interview, whether they have any problems or not.*
>
> *-Interview6-DIFB*

After the incident of Rana Plaza, Bangladesh Government has taken initiative to strengthen the DIFE. Now many energetic fresh officers are working for DIFE including graduates form the top public universities. On the other hand, for composite and wet processing units, DoE is one of the most important and influential government agencies. To monitor chemical and waste management, to control environmental pollution, DoE has the prime authority. According to a Deputy Director of DoE enforcement wing of the head office:

> *Among RMG factories, those which are composite factories, factories which start from yarn to fabric, fabric to dyeing, after dyeing cutting and sewing, RMG is produced, we visit these factories.*
>
> *-Interview13-DEDD*

From the beginning of construction of a factory, the DoE regulation and monitoring starts, it continues throughout production life span. If DoE find that the factories are not running ETP or even if they are running, the released water is not following the parameter given in the law, the enforcement wing impose penalty. The whole process is elaborated by the Deputy Director of Enforcement wing as follows:

> *If the wastewater goes beyond the parameter or they operate keeping the ETPs down, factories are imposed fine by the Enforcement, we call polluters pay principal (PPP)…If found guilty of harmful wastage release, mobile court can be conducted by the Magistrates of the District administration where DoE district offices give prosecution.*
>
> *-Interview13-DEDD*

DoE and its offices can file case against the accused factory to the environment court. For instant remedy of environmental mal-practices, mobile court is conducted by the magistrates of District Administration. For making the factories, owners, and public conscious about environmental consequences of their actions, DoE arranges many awareness campaign throughout the year. Factories must take environmental clearance certificate before going for the production operation, before that, factories must finish the construction with appropriate EIA (Environmental Impact Assessment) and other necessary environmental initiatives. According to an assistant director level official of DoE Gazipur office:

> *Composite units require Environmental Clearance Certificate…The clearance is given following the section 12 of Bangladesh Environmental protection Act, 1995 …if we find that factory has fulfilled the conditions then we issue environmental clearance.*
>
> *-Interview9-DEM*

4.8.2 Role of Textile Ministry and Department

For serving textile and RMG sector specifically, there is Ministry of Textile and Jute and a Textile Department under the ministry. The ministry level provides policy supports to the entrepreneurs and businessmen of the sector, while the role of the department is to give more practical solutions for the factories. According to the Textile Act, 2018, the Director General of Textile Department is declared as sponsoring authority. Along with administrative role, department of textiles have many textile institutes, vocational institutes, and textile engineering colleges. According to DG himself:

> *According to textile Act, 2018, the DG, Textile is defined as the sponsoring authority of the Textile industry. Producing skilled manpower for textile sector, we have textile engineering college, textile vocational institute, from these institute three types of workforces is delivered such as executives/ officers, mid-level skilled employees, and floor level employees.*
>
> *-Interview12-DGTN*

4.8.3 Role of EPB and BIDA

Export Promotion Bureau (EPB) is a statutory body works under the ministry of commerce. As the name implies, EPB promotes the export of goods from Bangladesh to the foreign markets. As a Trade Promotional Organization (TPO), EPB tries to facilitate the export operation, giving

documentation support, simplifying the export process and administrative system. EPB of Bangladesh tries to promote the garments product globally by arranging trade fairs, attending international trade fairs, and giving subsidy for the entrepreneurs. According to the director of EPB, textile wing:

> *EPB is a statutory body, works under the Commerce Ministry, and the main job of EPB is to support the exports. Globally this sort of organizations is called Trade Promotional Organization. In some cases, EPB itself invest, we are investing crores of money giving training to garments workers, we are offering courses for the development of the mid-level management. Besides this, EPB does promotional works, one way is market expansion, another is bringing product diversifications, how to add new products in the existing product line.*
>
> *-Interview24-EPBM*

EPB incentivise the entrepreneurs by giving state honours and awards. One of such honour is giving CIP (Commercially Important Person) status to the businessman. EPB organizes award ceremonies for the best exporters of the year and give medals in the presence of the Prime Minister and Honourable President-

> *We help the new entrepreneurs, especially supporting the women entrepreneurs, giving them highest subsidy in the fares, we give 50, 60 and even 70 % subsidy. We are giving training from our own fund.*
>
> *-Interview24-EPBM*

Bangladesh Investment Development Authority (BIDA) is the highest investment promotion agency of Bangladesh, formed in 2016 operated directly under the supervision of Prime Minister's Office (PMO) of the country. For the first time in Bangladesh, BIDA is trying to implement One Stop Service centre for the investors. To facilitate licencing, registration, and approval processes along with all other subsidiary services, BIDA is aiming to achieve excellence in process simplification for investment. According to a chief sustainability officer:

> *Now, there is BIDA (Bangladesh Investment Development Authority), it is working as one stop service Centre. New investors are getting one stop services from the BIDA.*
>
> *-Interview30-ZDBL*

4.8.4 Accord-Alliance and National Initiatives

After Rana Plaza incident, European and American brands and fashion retailers formed two organizations, Accord, and Alliance. These two and National Initiatives worked relentlessly to rectify the gaps in the industry by physical inspection. During their operation, they generated Corrective Action Plan (CAP) for each factory detailing areas to take initiatives, retrofitting their factories. They formed inspection team including engineers from specific field, fire, electrical and structural engineers evaluated the building facilities. One former consultant of Accord and Alliance currently working as an independent third-party sustainability auditor explained the functioning as follows:

> *Fire safety assessment was done by fire engineer, electrical safety assessment was done by electrical engineer, building safety assessment was done by structural engineer (Civil)…There was issue of training, grievance, and safety assessment, these three major components were the basis of Accord-Alliance work.*
>
> *-Interview10-CNSK*

When the team started inspection, it was found that almost no factories followed the BNBC code while constructing their facilities. These two organizations were very strict and forced the manufacturers to change the fire set up if found faulty, they made the supplier obligated to install new fire doors, sprinkler linkage, fire trident etc. According to sourcing and merchandizing manager of Vero Moda brand of Bestseller groups:

> *Accord and Alliances were very strict in terms of getting the factory up to the mark, some factories had to change their entire set up, new fire trident doors had to install, sprinkler for fire, some factories had no strength in piling, they had to retrofit.*
>
> *-Interview3-BSN*

Alongside of BNBC, NFPA standard also being followed in the process of CAP generation and retrofitting. For air quality and thermal comfort, ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) standard was followed. Government also supported financially in realizing the massive changes. After half a decade of their operation Accord was dismantled and rebranded as RMG Sustainability Council (RSC) in 2020. Alongside these two organizations, there was a Bangladesh government and International Labor Organization joint initiative taken.

4.8.5 Initiatives of BGMEA and BKMEA

Although Bangladesh Garment Manufacturers and Exporters Association (BGMEA) is not a legal entity and does not have any regulatory authority over the practices of the factories, they supervise and control most of the exporting factories in Bangladesh. Along with the policy advocacy for the RMG sector, they take many initiatives and organize programs jointly with local and international organizations in respect of workers skill and welfare, training, awareness programs for owners and workers, workplace programmes etc. According to the head of sustainability cell of BGMEA, the BGMEA roles are:

> *In BGMEA, we work in two fronts, one is we do policy advocacies with Government, and we develop projects through partnering the stakeholders to support the RMG factories become more sustainable. We have cluster wise monitoring, we check the condition of the factory workplace safety issues, whether the ETPs are up and running in the factories or not, whether their chemical management system is alright or not, their licenses and ECC and environmental clearance certificate.*
>
> *-Interview21-BGMM*

At present BGMEA have around 4000 members, halves of them are active and took renewal. BGMEA have their own university and fashion institute, innovation centre and many more such programs. BGMEA has cleaner factory initiative called *TextilePact* financed by the IFC (International Finance Corporation) in association with some global brands such as: Gap. Levi's, Puma, Tesco and others. From this, they have already worked with around 500 factories for making their production clean and sustainable. BGMEA have their own training centres across the country where after training and skill orientation is done. According to an additional secretary of BGMEA who oversees labour compliance:

> *For skill development we have some training centres in remote corner of the country. Another cell is of safety, they have two wings in it, one wing gives training only. Another wing deal with the evacuation and they check the factory fire safety issues. Engineering section which mainly works for checking the factories before giving the license that building is as per planned constructed and followed BNBC, they check.*
>
> *-Interview 23-BGMR*

It has a social sustainability cell which monitors the labour and human rights, working conditions, medical and health issues, welfare sides, harassment and child labour perspectives, workers grievance and unrests etc. BGMEA has been in close association with ILO, they have

joint initiative with WaterAid for rainwater harvesting project. They are trying to initiate a cloud based environmental reporting in association with GIZ. BGMEA is taking the lead coordinating with SDG cell of the government prime minister's office is sustainability reporting initiatives too.

BKMEA (Bangladesh Knitwear Manufacturers and Exporters Association), likewise BGMEA, is another strong owner's association who operates in knitwear sector only. BKMEA influences government policy formulation in respects of garments business and exports, arrange training, workshops, owners' session, and other skill enhance mechanisms for their regular 850+ plus members. BKMEA has a control room by which they keep surveillance of the factories whether there are any malpractices going on or not. According to a Joint Secretary of BKEMA compliance unit:

> *Monitoring is done in several level: by control room surveillance, handling and directly mitigating any labour disputes and grievance, if we find a factory is not taking renewal, then immediately we reach to the factory.*
>
> *-Interview18-BKMF*

BKMEA arranges many awareness programs and campaign for better practices by the owners and workers. BKMEA works to increase owners, mid-management and workers knowledgebase relating to issues like supervisory skills, best human resources practices, labour law, grievance mechanism, labour compliance and labour law etc. They organise owners' session with regular intervals for workers and mid-level management handling and many more persistent issues.

> *We have three type of awareness program, one is with the owners, one is with the mid-level employees, and one is with the workers. Now the programs we are designing all are aimed to mid-level management and workers, we are trying to keep mid management on a same platform, so that trust building, and bonding can be obtained.*
>
> *-Interview18-BKMF*

BKMEA has a productivity improvement cell also from where they arrange training for the management and workers, consultancy services are offered to find better solution to improve efficiency.

4.8.6 International Organizations and NGO collaboration

For the development of the Bangladeshi RMG industry and to bring orders in the operation and production system many international organizations and NGOs are working in collaboration

with Bangladesh Government, BGMEA, BKMEA and worker organizations. Especially organizations such as ILO, UNESCO, WaterAid, IFC, ADB, USAID, GIZ and World Bank are working continuously for improving overall conditions of RMG sector of the country. In this regard, the statement of the head of BGMEA sustainability team can be relevant:

> *We have joint programs with all the broader stakeholders in Bangladesh, with almost all the development partners and concerned Government authorities that includes but not limited to DoE, ministry of industries, ministry of commerce, ministry of labour and form the private sector, from the development partners I think of GIZ, ILO, USAID, World Bank, IFC, and all the stakeholders.*
>
> *-Interview21-BGMM*

Part-C: Possible Solutions and Policy Recommendations

For GDP and economic contribution, Bangladesh largely depends on the RMG sector alone. Globally, major international brands have been sourcing from Bangladesh for years. Thus, the garment industry of Bangladesh has global presence and big business influence. Although, there have been crisis like Rana Plaza collapse and Tazreen Fashion fire incident which negatively affected the image of Bangladesh across the globe, the industry bounced back to counter the challenges it faced. In the first two part of this chapter, the issues, challenges, and existing and contemporary practices have been presented through the eyes of the interview respondents. Logically, the participants have not commented on the challenges and existing practices only, they have provided important insights on how to tackle those challenges and how to solve the contemporary issues facing by the industry. As this whole thesis is guided by the triple dimension of sustainability in the context of Bangladeshi RMG sectors and issues and practices have been presented in the same light, this part of the chapter would follow the same structure. All the sustainability solutions provided by the interview respondents are presented in line with the sustainability dimensions. The solutions and policy suggestions are presented below categorizing in three dimensions such as: social sustainability solutions, environmental suggestions, and economic strategies. Beyond this three-dimensional approach to the solutions, there is a fourth support strategy provided by the interviewees where the government and government bodies involvement and infrastructural issues are incorporated.

4.9 Social Sustainability Solutions and strategies

In the first part of this chapter, many social sustainability issues have been discussed and explored. Lack of skills, bad working conditions, salary and leave issues, safety and security issues, unrests, health and hygiene, human and labour rights and such issues dominated the discussion. Providing remedies to each and all issues require proper attention from government, buyers, and other stakeholders. Social sustainability perspectives concern directly to the people involved in the industry, more specifically the workers and employee wellbeing is critical for the factory operation and thus deserve immediate attention. Business cannot run successfully without the active participation and owning by the parties engaged. Specific suggestions and solution proposals for social issues are discussed briefly below (Table-15):

Social Sustainability Solutions and Recommendations	
Key Themes	Solutions and Measures
Skill Enhancement	➢ Enhancement of Workers and industry skill ➢ Diversification of skill sets ➢ Adaptation with the modern technology and automation ➢ Ensuring literacy and quality of education ➢ Talent management needed ➢ Capability development of Mid-level management ➢ Incorporating advance management techniques ➢ Develop critical skill among employees ➢ Better skill, better salary, and sustainable workforce
Safety Measures	➢ Continuous vigilance and proactive approach ➢ Safety awareness of employees and workers ➢ Post construction verification for new factory
Wellbeing and Productivity	➢ Healthy and happy Workforce ➢ Worker's quality of life and productivity ➢ Better environment and better facilities ➢ Standardized working hour
Salary Review	➢ Practical and pragmatic Salary structure ➢ More frequent salary review
Health Insurance and Compensation	➢ Proper health insurance policy ➢ Proper compensation framework for workplace death and injury

Employment and Women Empowerment	➢ Women Workers Welfare Initiatives ➢ Women empowerment Initiatives

Table 15: Social Sustainability Solutions

4.9.1 Skill Enhancement

Skill gap is one of the most important areas where factory owners, workers, government, and other stakeholders should respond immediately, the world is advancing fast but the workers and staff of RMG Bangladesh are lacking behind in skill offerings. International buyers and manufacturers have their responsibility in this regard, Government of Bangladesh should come forward and act swiftly too. A sustainability consultant proposed that government should take some institutional initiatives:

> *Government can take some initiatives and prepare more skilled manpower from institutional side, institution means we only have a BGMEA university and BUTEX, for this such big industry, other than these two institutions, there is no other big initiatives.*
>
> *-Interview15-CNHR*

Skill gap can be multiplied by the incorporation of automation and modern technology in the industry in the face of fourth industrial revolution (4IR). Workers and staff, management must be equipped with modem knowledge and expertise for this. Although, there are some initiatives in place, but the skill improvement takes time. Some textile colleges and vocational institutes are trying to produce smart and efficient workforces. Textile ministry and department must play active roles here.

Quality Education and Talent Management

For skilled and expert manpower, quality of the education and schooling is important. As production units are adopting more intuitive and smart machines, the management science has advanced, there is no alternative to knowledgeable and smart workers and employees. Fresh graduates with modern business outlook and expert employees can take the current industry efficiency level from 50% to 70%. According to a chemical and environmental sustainability a manger of Bestseller merchandizing office of Bangladesh:

If talented people are engaged in the business operation, this 46-48% efficiency can be taken to 70% within next five years. And the current 42 billion USD export would naturally become 65 to 70 billion USD.

-Interview8-BSDN

Enabling Mid-level Management

Mid-level management people think shouting and misbehaving is the way to get the target jobs done by the subordinates and workers. There is a cultural phenomenon in the country that threatening to punish can only increase the work volume. Thus, training and counselling the mid-level employees is very important here, they should be trained and equipped so that they can bring creative measures in the production line. A mid-level management personnel, quality in charge himself described it as:

There are some techniques of making others done their work. Some people think that I am boss and can misbehave. That is not right approach. With right attitude/technique, smaller number of workers can do the work for you.

-Interview28-GWAQC

Critical Skill Development

There have been many initiatives already started to catch the high value market and produce hight profit margin products. But for that, factories need specialized, expert, and smart people who can handle critical design. According to a sustainability consultant and third-party auditor:

We need to think about the skill of manufacturing workforce, making them a bit more skilled so that they handle more complicated design. Solution is to increase the workers skill, going for higher profit margin product, and offering better salaries to the workers.

-Interview10-CNSK

Additionally, not only for the productivity increase, but also for sustainable operations, factories need employees and workers who are aware and conscious. To achieve the sustainability and carbon footprint goal, industry needs skilled manpower.

4.9.2 Safety Measures and Solutions

Although, there are numerous safety initiatives have already been taken in the sector, there is no scope of becoming reluctant. There are two specific points to focus on in this regard, such

as: constant monitoring and continuous vigilance. Generator, boiler, distribution boards, any mechanical or electrical small defect can lead to a massive incident. As factory is a living organization, constant vigilance is needed. According to a DIFA executive, head of a divisional office:

> *The most important point is staying vigilant all the time and the employees, workers, officers should be continuously checking the safety devices they have, workers should be trained continuously… Factory is a live organization, there is mobility all the time, so awareness and monitoring is essential.*
>
> *-Interview5-DIFA*

Now most of the factories follow BNBC code in constructing new factory building. But here is a gap in the process. The authority goes through pre-construction approval process, verification, and inspection but there is still no post construction verification process in place. A post construction verification must be incorporated. An independent sustainability auditor said:

> *For building safety our governance is weak, here only pre-construction approval and inspection is available, but still now there is no post construction inspection procedure.*
>
> *-Interview10-CNSK*

4.9.3 Workers Wellbeing and Productivity

Now the factory management want their workers healthy and mentally strong, thus they treat the workers well. Proper rest, goodnight sleep, proper food, good working environment, better behaviour pattern can boost the workers mood to deliver more. Thus, workers welfare must be maintained. A finishing line manager expressed his opinion in this regard as:

> *Most of the owners now think that if the workers stay well, if they stay healthy, their productivity will be more. If anybody misbehave with a worker, their mental set up will be different, he cannot concentrate to their job, productivity will automatically decrease.*
>
> *-Interview17-GWSFM*

From the study, the factories found that overstressed and overburdened workers cannot be productive. As overtime stress workers, shifting and rotating duty schedule so that workers do not get over burden with workload can be done. An accessories industry executive narrated their shifting process which is applicable to some of the RMG factories too:

In our factory, we don't need to force, we maintain a system here. We do shift. When we follow shifting, if even the factory run for 24 hours, when are shifting, the amount of overtime is getting reduced.

-Interview11-ACCS

4.9.4 Frequent Salary Review and Better Salary

Workers are struggling to maintain their living standard; they are in an impossible situation to maintain their families. Thus, a salary increases, and wage revision is badly needed for them. Many of the interviewee feels that current salary structure is exploitative for the workers, thus an immediate review of the salary is required. According to a sustainability expert and auditor:

Our wage revision should be more frequent. It is said from the government and labor division that it (the review) would be done in every 5 years which is not frequent enough. So, workers need to get to the road for the wage, which is not a good trend.

-Interview10-CNSK

A standard salary along with basic amenities should be implemented so that nobody can complain about the RMG industry of Bangladesh for running sweat shops and modern slavery.

4.9.5 Health Services, Insurance and Compensation

Bangladesh has been infamously known for accidents and lack of safety measures, but irony is there is still no health insurance system in place, thus a health insurance mechanism should be in place immediately. Moreover, medical facilities and emergency services around the factory premises are quite insufficient which need immediate attention of the factory authorities. According to a factory owner who is also an elected board member of BGMEA said:

In Bangladesh, there is no health insurance in any sector, there is no health insurance industry in Bangladesh.

-Interview31-TON

If there is any accident or workplace death, even then there is no system of proper compensation. There is a system of giving the workers family a lumpsum amount via BGMEA. A proper compensation mechanism calculating the workers future life span and family welfare should be initiated. A sustainability expert opined in this respect that:

In China compensation is calculated the workers age at the time of death and their retirement age, subtracting it, the months are calculated, then their monthly earning is multiplied by that many months, Bangladesh should follow this.

-Interview10-CNSK

4.9.6 Women Employment and Empowerment

Predominantly, the RMG factories are female workers dominant, but still the working environment of the garment sector is not women friendly. For a working mother childcare facility is a necessity, a breast-feeding corner must be there. While more than 70% workers are female, more than 90% supervisory role are filled up by male. A favourable environment for a working mother and a girl must be ensured. A workers solidarity leader and a free NGO activist speaks on behalf of the female workforce below:

Childcare centre inside the factory, breast feeding corner, arrangement of breakfast and lunch, if these facilities can be availed only then a worker (female) can concentrate more. We want women workers as supervisors, but after changing other areas of the society and the factory administration then the females will be encouraged to prove their worth.

-Interview22-WST

4.10 Solutions and Policy Suggestions to Environmental Issues

Environmental sustainability issues are widely discussed in the business field and academia altogether, but in Bangladesh, this side has been neglected for long. The overall environmental management in the country is in infancy stage, the entrepreneurs are not fully aware about their responsibility, the regulatory side is weak, still Bangladesh does not have a proper environment protection infrastructure to handle the issues and concerns. The issues and challenges relating to environmental management already addressed in the first part of this chapter must be resolved. Most of the interview participants identified the issues and emphasized to address those on priority basis. Specific suggestions and policy recommendations provided by the interview respondents regarding environmental initiatives are discussed below:

Environmental Sustainability Solutions and Recommendations	
Key Themes	Solutions and measures
ETP and Wet Processing Management	➢ Proper monitoring of ETP ➢ Proper monitoring of dyeing and wet processing unit ➢ Proactive DoE and environment ministry ➢ Industrial zone and central ETP option
Circular Economy and Recycling	➢ Circular Economy adoption ➢ Implementing recycling and reuse
Waste Management Infrastructure	➢ A solid waste management framework and guidelines ➢ Jhut handling infrastructure ➢ Hazardous waste authority
Chemical Management Guideline	➢ Initiation of a chemical management guideline ➢ Uniform Chemical Practices
Ground Water Policy	➢ A Ground water extraction policy ➢ Water accounting and metering
Green Initiatives	➢ Green space and green plantation ➢ Energy efficient light, machines, solar Panel ➢ Reduction of Carbon and water footprint
Rigorous Certification	➢ Rigorous Third-party certification ➢ Proper monitoring and frequent visit
Digital and Tech Monitoring	➢ IP Camera monitoring ➢ Online platform
Positive Mindset	➢ Owners Positive and patriotic mind

Table 16: Environmental Sustainability Solutions

4.10.1 ETP and Wet Processing Unit Management

The owners of the textile and composite factories do not want to run ETPs to save energy and chemical cost, they want to earn more profits. In this regard, government bodies should increase

their monitoring, stricter legal implementation and punishment must be done. A prominent economist, intellectual and activist of the country suggested:

> *For the environmental concerns, it should be monitored that they do use the ETP certainly. Ensuring the proper management of dyeing or wet processing unit is a difficult task. The environmental ministry should be independent from external influence.*
>
> *-Interview20-PAM*

Wet processing units and their ETPs should be brought under live online monitoring as DoE cannot monitor all the industrial facilities visiting physically due to capacity gap. There is a proposition to set up some central ETP on the river and seafront where all the factories liquid converges. Local and subcontracting units of wet processing units must bring under the surveillance mechanism for ETP and chemical release management.

4.10.2 Circular Economy and Recycling Policy

Circular economy practices should be instilled in the system for lesser pollution and resource conservation. Using the materials in recycling order until the end of its life, reducing the waste and reusing should be made a culture and such technology should be adopted. An associate professor of department of textile engineering opined that:

> *If we want to save nature, we should go circular. Whatever the material is, until its end life, we must use it. A material can be recycled up to a limit, we must reach that limit.*
>
> *-Interview1-APDUET*

A circular economy and recycling guideline and policy along with such infrastructure development can have positive impact on environmental conversation strategy of Bangladesh. Minimising the waste and system loss in the manufacturing process adopting lean manufacturing philosophy can have positive effect too. According to the head of sustainability cell of BGMEA:

> *Bangladesh government does not have a circular economy policy, there should be a recycling facility developed in our country. If I can recycle by myself, I can sell the cotton to the spinners and weavers but there is no framework.*
>
> *-Interview21-BGMM*

4.10.3 Waste Management Framework and Infrastructure

Without any formal structure, there is a big informal Jhut recycling industry developed already which is totally unregulated. Fights and violence erupt occasionally to control this business. Factory owners are in critical situation following involvement of local muscle man in the process. To bring discipline in this sporadic business model, Legal framework and structure should be implemented from the government side. Head of sustainability of BGMEA said:

> *There is no legal framework, factories must give those waste almost free. If there is a strong government regulatory framework, then this would not happen. And waste is not waste here, waste is resources. The cutter fabric which you are throwing away, if it can be recycled, it can be turned into cotton again.*
>
> *-Interview21-BGMM*

There is no designated area for hazardous solid waste release and there are no private organizations to manage that too, no incinerators to dissolve. This area also needs to bring under a management system.

4.10.4 A Chemical Management Guideline

Factories follow the guidelines of their respective buyers and their MRSL, RSL restrictions for chemical management which are different from factory to factory due to buyer-to-buyer differences. For uniform chemical practices, a common chemical management guideline is essential. According to a joint secretary of BGMEA:

> *We don't have a chemical management guideline. So, in case of chemical management, the export-oriented factories follow the rules and guidelines provided by the brand they cater for.*
>
> *-Interview21-BGMM*

4.10.5 Ground Water Usage Policy/ Saving Initiatives

Bangladesh does not have any system in place to regulate and monitor water extraction and usage from the underground thus, ground water extraction and usage policy and water accounting system is a must initiative government should take. All the factories currently set up deep motor tube to withdraw water from underground without any oversight and monitoring. According to a sweater factory owner:

Experts and environmental engineers, those who knows about the environment, those people, and stakeholders, bringing them together a policy should be developed for water extraction and use.

-Interview31-TOJ

Factories should not only be dependent on the ground water, rather they should look for alternative sources such as: surface water and rainwater harvesting. Water saving and reusing can be an alternative too. Factories should give efforts on saving water and minimizing the usage.

4.10.6 Green Initiatives

Green initiatives such as plantations, keeping at least 30% green space in the factory set up, transparent glass use on the roof or window so that enough natural lights can enter the building, using energy saving lights etc can have a positive impact towards obtaining carbon neutrality. A DD of DoE gave his suggestions as follows:

There must be 30% green space and plantation in the factory…solar energy and light setting up, temperature control, using transparent tin so that electric bulb dependency can be reduced, sunlight can be used.

-Interview13-DEDD

Buying energy efficient machines and technology can help attain green objectives. Tech Upgradation Fund and Tax rebate for green practices, policies like these should be incorporated more. Once again, a sustainability officer proposed:

A green factory can reduce the water footprint up to 40%, they can increase the energy efficiency up to 50 to 55%, when you are buying green and efficient machines.

-Interview21-BGMM

4.10.7 Rigorous Certification, Digital and Tech Monitoring

As brands and retailers largely depends on the third-party certifications, they must look for valid, established and globally acknowledged certifiers. In this regard more rigorous certification process and stricter vigilance and verification needed. A sustainability consultant cum third party auditor said:

More rigorous, and well binding certification should be in place. The certificates which can be easily achieved, and possibility of faking should be avoided.

-Interview10-CNSK

Taking help of modern technology, 24/7 monitoring of the factory operation and ETP management is possible. Live IP camera can report back to the server constantly and the inspectors and legal body can get updated information. Devices can be installed which can report the dissolve chemical in the released water live. A DD of DoE said-

> *We must adopt more technology, every ETP should not be monitored physically going there…if we could monitor these factories by online IP camera, if we could check all the parameters online.*

-Inter13-DEDD

4.10.8 Positive Mindset

For environmental conservation and sustainability, factory owner's positive mindset and reasonable behaviour is necessary. If the concerned factory management understand that society, environment, and business are part of the same broader eco-system, they would behave more responsibly-

> *The owners of RMG factories in our country must own it that this is their country, and the environment is theirs and their successors will be here…for keeping the ETPs running, owners' good intentions and responsibility is required.*

Interview13-DEDD

4.11 Strategies and Policy Suggestions to Business and Economic Issues

If business cannot become stable and economically sustainable, maintaining social and environmental compliance is not possible. Taking environmental initiatives need financial support, social issue like workers welfare and salary require the factories to generate revenues and earn profit. As a result, business sustenance is the prerequisite to social and environmental sustainability. For stable economic and business growth, increased productivity, efficiency level, price competitiveness, product and market diversification, proper branding and marketing, these issues must be settled. Bangladesh government and other stakeholders are targeting to touch 100 billion of export by 2030, to achieve this, garment sector of Bangladesh must obtain business sustainability first by addressing the issues which directly impact the profitability and revenue generation (Table-17).

Strategies for Business and Economic Issues	
Key Themes	Strategies to adopt
Production and Manufacturing Strategies	➢ Value addition and product diversification ➢ Increased Productivity and efficiency ➢ Ensuring System efficiency ➢ Waste minimization and lean manufacturing ➢ Proper production planning ➢ Smart Middle management ➢ Reduce cotton dependance ➢ Better lead-time management ➢ Technological upgradation and innovation
Marketing and Branding Strategies	➢ Better serve Current Europe and USA Market ➢ Market Expansion and Diversification ➢ Positive Global Branding ➢ Ensuring Brands Responsibility
Price Bargain Initiatives	➢ Demand better and fair price ➢ Bargaining and negotiation initiatives
Sustainability, growth, and Development	➢ Balance between sustainability and growth ➢ Proactive government involvement ➢ Proper estimation of Social and environmental cost
Vision 2030-Coordination	➢ 100 billion USD export by 2030 ➢ Coordinated Stakeholders Effort ➢ Proper infrastructure and investment ➢ A wholistic strategic Plan

Table 17: Strategies for Business and Economic Issues

4.11.1 Production and Manufacturing Strategies

Textile and RMG business in Bangladesh are mainly manufacturing and production service centric. Following buyers' orders and specifications, Bangladeshi factories import raw materials from China, India and other countries and go for sewing, washing, dyeing, and producing end products for the brands. For modern production and manufacturing management, proper strategies and initiatives must be taken.

Value Addition and Diversification

Factories in Bangladesh are reluctant to go for diversified product category. For better business prospect and profitability, targeting variety of product mix is a must now. The demand of clothes and fashion items is flexible, thus creating new demand is possible. There is opportunity to go for high end design and fancy category production. According to the DG of Textile department:

> *The demand of clothe is elastic, can be stressed. Thus, we can create our own demand by producing our own clothes. Focusing on diversification in terms of clothes types, shirt, pant, sweater, blazer, variety types of clothes can be prospective solution.*
>
> *-Interview12-DGTN*

The competing countries of Bangladesh RMG business are already ahead of producing high-end products including sports and swimwear, gym wear, suits and jackets and non-conventional clothing items. If factories and manufacturers focus on fashion and fancy items, more value addition is possible down the line and better revenue will be generated.

Productivity and Operational Efficiency

Bangladeshi factories cannot optimize the resources accordingly due to reason associated with the timely raw materials supply, energy crisis, supply chain trouble and thus face system losses. There is inefficiency from the side of workers and employees too. System loss must be minimised, and efficiency and productivity must be obtained. Lean manufacturing philosophy can help factory's production process optimization. Finding the best possible way to minimize the wastage of resources and maximising the output following the Kaizen approach can help achieve excellence in productivity. A compliance manager of Bestseller United China Limited advised that:

> *Each factory should go for lean manufacturing, lean culture should be developed in the factories. There is the issue of factory internal transportation, waste of time, for minimizing these you must adopt kaizen philosophy.*
>
> *-Interview16-BSJ*

An efficient production planning can save time and minimise the system loss too. Most of the factories do not follow a proper planning for the production processes, there are technology and computer aided planning mechanism which can help maintain the balance. Proper planning can save time, if 5 minutes time is saved, it may sound very little effort but if 5 minutes for

each worker is counted, it can create huge impact at the end of the day. The same compliance manager said:

> *We can save huge time by proper planning, if 5 minutes time can be saved for each worker, this could be a huge time saved, a win-win situation, you can give them incentives, they can go home earlier, operation cost will be far less.*
>
> *-Interview16-BSJ*

Decreasing Cotton Dependence

Bangladesh is almost fully dependent on imported cotton, which takes a lot of foreign remittance out of the country. Moreover, the supply of cotton is volatile. Thus, Bangladesh RMG should aim for reducing this overdependency and can go for recycled man-made fibre. According to the Director of Textile cell, EPB:

> *If we can use manmade cotton, then our productivity, our CM, profit share will be increased. we must reduce the dependency on the cotton import.*
>
> *-Interview24-EPBM*

Innovation and Latest Technology

Improvement in the Leadtime management system is a must for the long-term survival of the industry as brands don't want to take risk of longer transit and shipment time where value of money is determined by time. According to the sourcing and merchandising manager of Vero Moda Brand in Bangladesh:

> *Brands go for order cancellation if delayed by 3 weeks, we have huge transit lead-time, especially for Europe we need 46 days, then for America and Canada, we need more 52 to 56 days.*
>
> *-Interview3-BSN*

To meet the challenges of the lead time management and others, automation and technology adoption is a must. To reach a production and export target of 100 billion USD by 2030, there is no other alternative to install high productivity and efficient machines. A compliance manager of a merchandising team said:

> *Bangladesh should go for automation, if you go for automation, workers will lose their jobs but when you will think about 100 billion USD business, then you must go for automation.*
>
> *-Interview16-BSJ*

4.11.2 Marketing and Branding Strategies

In respect of RMG business, the name of Bangladesh is associated with Rana Plaza collapse. The positives changes and initiatives already taken are not properly communicated. Suppliers and manufacturers failed to negotiate their investment and efforts with the global buyers. Moreover, international pressure groups, NGOs, international organizations could do better advocacy if the industry be branded positively in the global spere. Thus, branding 'Made in Bangladesh' positively is the demand of the time.

Market Expansion and Diversification

Bangladesh serves only a little bit more than 6% of the global market share which indicates the industry has huge prospect to expand its business horizon. With more value added and diversified products, targeting new markets is possible. The industry not only need to try for market expansion, must be flexible and adaptive to the changing demand. The DG of the Textile Department offered his opinion as:

> *We have huge prospective market, if we could grab 10/15% demand of the global demand, if we can be ready to supply, the nature of the demand is also changing. If our production could adopt to that demand, the sector will not only sustain, but it will flourish too.*
>
> *-Interview12-DGTN*

Bangladeshi RMG factories mainly serve the European and American market, the whole wide world market is still under explored and not yet reached by the Bangladeshi entrepreneurs. Market diversification can be a solution for the Bangladeshi apparel producers.

Global Marketing and Branding Initiatives

Global branding of the RMG industry and letting the global buyers know that Bangladesh is one of the best global sourcing destinations is a necessity from the industry perspective. It seems that the global community are unaware of the positive changes happened in the industry. In this regard, employing global marketing and lobbyist team can be a solution. A Joint Secretary of BGMEA expressed disappointment as:

> *We are lacking behind of advertisement and marketing. 'Made in Bangladesh' tagline must be globalized, why nobody is noticing our improvement I don't know.*
>
> *-Interview18-BKMF*

In this regard, it is notable that although the industry has come a long way and has been in the business for about 40 years now, still Bangladesh could not be able to produce a global fashion brand to represent the country to global platform. This is another reason of Bangladeshi RMG is failed to gain due respect.

4.11.3 Price Bargain Initiatives

As suppliers are not organized, buyers always get advantage in fixing prices for the finished RMG. A common price negotiation table must be formed by the leaders of RMG factories, BGMEA and BKMEA can take such initiatives. The prevailing ugly price competition among suppliers is destroying the industry from within where a base price solution can be offered. Director General of Textile Department felt the need of such platform:

> *We need to have a collective measure, by uneven competition to serve the buyers is not right. We must find a way out. This can be done that nobody can offer under a CM under certain limit…with diversifying and quality improvement, competitive pricing (Fixing price) is possible.*
>
> *-Interview12-DGTN*

Most of the participants said that garments owners have very strong organizations like BGMEA and BKMEA, they should go for a common platform that for a specific category of clothes, no supplier can offer less than a base or floor price. Due to the unhealthy competition and owners' pressure of paying the rent of the facility, banks interest, the worker's salary, some suppliers accept break-even price. Whatever environmental and social initiatives are taken by the factories, they must adjust the spending from the revenues and profits earned from the product delivery. If buyers take most of the profit margin, the owners side struggle to survive and take sustainable initiatives. According to the BKMEA joint secretary:

> *If you want to practice a sustainable culture, you must do everything from the sale of the product. Where 94% of the revenues (Money) is retained to the buyers, we must manage everything by the rest 6% money.*
>
> *-Interview18-BKMF*

4.11.4 Balancing Sustainability Vs Growth and Development

Foreign currencies and dollars earned by RMG business controls the foreign reserve and economic activities of the country. But again, the industry is the leading cause of environmental degradation, river pollution and ecological imbalance. In this given situation, the sector must

maintain a balance between economic growth and sustainable operation. Bangladesh cannot afford to regulate the industry too strictly so that the business and production hampers, cannot keep it out of monitoring and control too. Government and the industry should evaluate the environmental cost and bargain with the global buyers accordingly. One of the prominent journalists who covers the garment bit said:

> *Our state only feels whether there is enough dollar is coming from the RMG or not, in exchange of what does not matter. The damage and the cost should be counted and must be bargained with the global buyers, raised in the global negotiations/platforms.*
>
> *-Interview29-PAI*

Development and economic growth must be done in a way that social and environmental costs cannot outweigh overall benefits. Giving livelihood and economic freedom to the current generation and simultaneously not destroying the future of next generation should be the aim. In this regard, an environmentalist, humanitarian activist given his opinion as follows:

> *To be sustainable, development should maintain some conditions: social and environmental cost must be less that the social benefits and environmental benefits. The development must be meaningful for the future generations.*
>
> *-Interview20-PAM*

4.11.5 Strategic Vision 2030 and Coordination

In the last financial year Bangladesh has exported 46.9 billion US dollar worth of textile and RMG products, as the sector is gradually growing, the industry has set a collective target to reach 100 billion US dollar RMG export by 2030. To reach this vision 2030, all the concerned parties and stakeholder must work together, in a coordinated manner. Only the factory initiatives cannot make this vision realized, government agencies, all the infrastructure, services agencies, policy level supports must be there. A Joint Secretary of BKMEA provided her prescription as below:

> *Government, owners, and all other stakeholders need to work together, policy should be reviewed. If you speak about banking, customs, port and tax authority, vat, utility services etc, there are many aspects of policy level coordination. If all around cooperation can be ensured 100 billion's dream can be achieved.*
>
> *-Interview18-BKMF*

For reaching 100 billion, current conventional production approach will not be sufficient, automated machines, updated systems, more advance investment portfolio, advanced skill level along with the combined drive is required. An Assistant Director of DoE said:

> *We need a balanced coordination, including our government side, the garments factory owners, workers, their association, these three to four institutions should move that we want our RMGs in this level.*
>
> *-Interview9-DEM*

4.12 Macro (Government) Support Strategies

From the last decade, government side has been actively involved in the dialogue and management of the RMG sector. After Rana Plaza, government bodies have taken active role in reform initiatives and during the last Covid Pandemic, Government of Bangladesh has helped factories with financial aid and covid management strategies so that they can continue business and pay their workers' salaries. But many of the government initiatives are not synchronized and many of the government bodies are not working in coordination with each other. A coordinated and cooperative government approach is required for the advancement of the industry in the future. Understandably, all the sustainability issues identified in the first part of this chapter (Environmental, Social and Economic and others) come under the purview of the government responsibilities. Specific suggestions for government and different concerned bodies are narrated below as identified and stated by the interview respondents (Table-18).

Government Support Suggestions and Recommendations	
Key Areas	Macro and Government Supports strategies
Transport and Communication Infrastructure	➢ Improved Internal Road transport infrastructure ➢ Smooth Logistics and supply chain routes ➢ Digitization and automation ➢ Better port facility and services ➢ Improved Airport Services
Enabling agencies and Coordination	➢ Capable and efficient DoE and DIFE ➢ One stop Service for Govt Services ➢ A common coordination platform for government agencies

	➢ Minimized Corruption ➢ Enable and Train inspectors
Ensuring energy and resource supply	➢ Continuous energy and electricity supply ➢ Regular Gas and water supply
A Sub-con Framework	➢ A sub-contracting guideline ➢ Sub-con surveillance and monitoring ➢ Mainstreaming Sub-contracting
A Macro Study	➢ A holistic study of the sector ➢ Measuring Economic value of the environmental damage

Table 18: Government and Macro Support Strategies

4.12.1 Transport and Infrastructure Logistics

Internal road transport communication and port facilities are already over-stressed with the current export portfolio, the industry set a mammoth target to achieve total RMG export worth of 100 billion USD by the year 2030. The communications, transport network and port facilities must be coordinated in a manner which can take the load. An additional secretary of BGMEA expressed his expectation as:

> *Current government is developing the transport facilities, The Padma Bridge is constructed, before this we could not use any other route other than the Chittagong port.*
>
> *-Interview23-BGMR*

To ensure ease of doing business, banking infrastructure, government approval and permission mechanism and total infrastructural reshuffle is needed. Digitization in the communication system and system simplification in the export processing is the demand of time. As Bangladesh is a riverine country having many rivers across the country, developing water ways can be a good option for goods carriage. Bangladesh has a land port, Mongla, after the construction of Padma Bridge, the potential of Mongla Port can be unfolded with proper planning. A sweater factory owner suggested:

> *There is opportunity to develop the riverine transport systems, Payra and Mongla port can be solution, after Padma Bridge initiation, there is a huge potential of Mongla port.*
>
> *-Interview32-TOJ*

Chittagong port and its service delivery system should go through complete system overhaul. System optimization, use of modern computer aided processes and coordinating all the port components are the way ahead. Dhaka international airport service is poor too, international buyers and their representative do not feel comfortable going through the airport procedures. According to a compliance manager of a merchandising house in Bangladesh said:

> *Chittagong port facility should be upgraded, the ports through which our goods are shipped should be modernized. Airport facility should be improved so that buyers feel comfortable to come to Bangladesh.*
>
> *-Interview16-BSJ*

4.12.2 Enabling Government Agencies and Coordination

Being the regulatory body, government agencies have the highest authority to monitor and control sustainable practices in the RMG factories. To discharge the duties and responsibilities, the agencies and bodies need to be enabled properly. Department of textiles, EPB, DoE, DIFE and other related agencies need to be properly equipped. There should be a common platform for these agencies to coordinate and combine their duties together. DoE and DIFE should be specially empowered which are responsible for maintaining social and environmental sustainability discipline in textile sector. Both organizations have manpower shortages and skill gaps. For environmental regulations and implementation, DoE should be capacitated and properly activated, inspectors should be given proper training. Head of BGMEA sustainability wing said:

> *It is necessary to capacitate the DoE, they should not increase the number of inspectors only but also, they have to increase quality inspectors.*
>
> *-Interview21-BGMM*

The most important organization for implementing labour compliance issue is DIFE. But DIFE inspectors cannot directly impose penalty and give any punishment to the factories for any non-compliance. In these regards, DIFE should be given some authority to impose instant penalty and mitigate labour dispute. According to an economist and activist:

> *In Bangladesh the DIFE and other government agencies are not discharging their duties. They cannot handle powerful and politically aligned class, secondly their workforce is limited. DIFE is not authorized to punish directly.*
>
> *-Interview20-PAM*

The RMG entrepreneurs need different government approvals, certificates, and permissions, for each of which there are different office and entities. BIDA is trying to initiate one stop service for the foreign investors and new industries, but it should be done for all the existing factories. A third-party sustainability auditor said:

> *Minimum 22 licenses are required for RMG suppliers and different license has different ministry, different department as authority where those must be updated. This is a complex system for the entrepreneurs. These services can be given from one stop service centre.*
>
> *-Interview15-CNHR*

One of the Director of EPB said that many foreign investors are eager to set up their operations in Bangladesh, but they feel discouraged by the bureaucratic and complex process of documentation and licensing. There are ministries directly associated with the sector and bodies like DoE, DIFE, EPB, local government to assist and regulate RMG business. There is overlapping of duties and responsibilities. A common platform for all these concerned bodies can be a solution. The Secretary of Textile and Jute ministry himself proposed:

> *A commission should be formed including all the authorities who have stake in RMG industry. The problem of not having something like this every agency try to bypass their responsibility, nobody is willing to take the responsibility.*
>
> *-Interview7-TSR*

4.12.3 Ensuring Energy, Gas and Other Supplies

Most of the interview participants think that Bangladesh has enormous prospect only if uninterrupted energy supply can be maintained. Some of the factories produce their own energy from their own plant, they are facing problems for gas supply as Bangladesh's gas reserve has been saturated already. A factory owner explained the criticality of the energy and gas supply as:

> *If we can ensure gas and electricity supply, there is a huge possibility of business expansion. Because of the current world situation, Russia, USA, Europe are aiming Bangladesh for their textile destination.*
>
> *-Interview14-TOM*

An assistant joint secretary of BKMEA said that proper transport and communication, energy supply and political stability can offer the best environment for RMG sector to flourish:

If Energy and gas supply, transport issues can be ensured, and the political stability is maintained Bangladeshi RMG export will flourish.

-Interview19-BKMS

4.12.4 Subcontracting Framework Development

Formal framework and a legal guideline should be developed for the subcontracting factories. Many of today's big suppliers and manufacturers once started their business as subcontracting factories. So, ignoring the huge number of subcontracting businesses or stopping them operate cannot be a solution. One sustainability auditor and sustainability consultant said:

We should ensure sub-contracting factories come under proper monitoring. I think that owners' association and labour department should make stronger oversight to those sub-contracting factories.

-Interview10-CNSK

Enacting regulation from the government side to regulate the subcontracting factories can help the owners' organization to reach that level and do advocacy on their behalf. There must be a subcontracting association too so that a discipline can be established. If all the subcontracting factories could be put together in a specific industrial zone, it could be easier to regulate and monitor them. Mainstreaming the business and bringing them under a systematic monitoring mechanism can help the whole RMG industry grow. Chief sustainability officer of a group proudly announced that:

When you start a business, you must be in sub-contracting initially. But if you have vison, long term aims and focus, you can become a big organization, that is what we have become now. There is nothing wrong in sub-contracting, only if there is a strong support system.

-Interview30-ZDBL

4.12.5 A Holistic Macro Study

So far there is no larger scale study has been conducted to measure and evaluate the impact of the RMG industry on the economic, social, and environmental life of Bangladesh. Especially, measuring the social and environmental cost to compare with the financial gain, a detailed report of the industry coining the positive sides and the negative consequence in economic term

must be done. The holistic assessment only can help the government and business to formulate the future strategies. An academician in this field proposed this in the following Comment:

> *We need a massive study of the sector, from the study all the vendors, policy makers, industry entrepreneurs will know sustainability sacrifice of textile sector. We are habituated to count the cash only; we must consider the damage too. Numerical cost of damaging rivers, fishes, cultivation, and clean water supply etc must ascertain. Coordinating all parties, RMG stakeholders, BGMEA-BKMEA together if we can conduct a study, a long-term planning can be done.*
>
> *-Interview1-APDUET*

4.13 Chapter Summary

In line with the research questions, the findings from the interview responses of the participants are presented in this chapter. The result of the first part shows that the industry has major gaps of sustainability practices in all dimensions. In social side, it is evident from the data that workers salary structure is still in sub-human level, skill level of the industry and workers are low, health and safety issues are overlooked, working environment is not par standard, working hour and workload is overburden and overstressed. In environmental front, it is elaborated with proper evidence that the sector of the country still does not have chemical management guideline and proper monitoring of Effluent Treatment Plant (ETP), subcontracting factories are not maintaining environmental obligations, factories are releasing untreated wastewater to the water stream and there is no ground water extraction guideline yet. The issues relating to severe challenges in getting fair prices from the brands, gap in value addition, product and market diversification barriers, raw materials supply criticality, underdeveloped logistics and transportation infrastructure and crisis of energy supply are also outlined in economic and macro areas.

Second part of this chapter mainly focuses the contemporary sustainability practices of the industry and role play of relevant stakeholders from the government, NGO and industry actors and organizational sides. The findings here suggest that after the Rana Plaza collapse, the sector has gone through massive transformations and retrofitting processes led by Accord (European Brands Organization) and Alliance (American Buyers Organization). Current safety standards (Fire, Electric and Structural) are much improved and safer for the workers. Many workers welfare initiatives already have taken, and grievance mechanisms are in place which validates

improved social practices. Export-oriented factories are now environmentally concerned, they have ETP installed, many of energy and resources saving initiatives have been taken, number of LEED certified green factories from Bangladesh are leading the global chart. Surveillance, auditing, and monitoring mechanism from government agencies (DIFE, DoE, ministries), brands, associations (BGMEA and BKMEA) have increased manifolds. Improved production mechanism, better planning, positive branding and marketing initiatives, cooperative approach have been identified as current business practices.

The third part of the chapter elaborates policy suggestions and solutions to each dimension of the existing sustainability challenges facing by the industry. Skill enhancement in line with the technological revolution, automation and fourth industrial revolution, ensuring workers wellbeing, salary adjustment with the price inflation and initiating health facilities, health insurance and compensation are identified as social solutions by the interview participants. In environmental side, Circular economy adoption, biological ETP, digital and tech-based monitoring, solid waste infrastructure, greening initiatives are presented as possible remedies. For economic sustainability, initiatives such as: a common pricing negotiation table, kaizen and lean manufacturing practices, more critical and fancy items production, Leadtime minimisation, positive global branding initiatives should be taken. This research provides an overview of the sustainability outlook of textile industry providing a pathway to reach the vision of 2030 of exporting 100 billion USD. For which, infrastructure, communication and transport, port facilities, supplies and concerned stakeholders' effort must be coordinated along with factory-oriented initiatives.

Chapter 5 Discussion

In this chapter the significance and implications of the findings presented in the previous chapter are discussed in an explorative way. The evidence provided by the interview data in the results part shows that there are numerous challenges and concerns prevailing in the Textile and RMG sector of Bangladesh in relation to the social, environmental, economic, and macro governance-infrastructural fronts which serves the first research question (Section-5.1). To encounter these sustainability issues from the ground reality, the contemporary practices and initiatives taken by the industry actors and other stakeholders are also presented to provide a more pragmatic insight in line with the stakeholder's theory and salience model (Section-5.2). Secondly, following the second research question, practically attainable solutions and recommendations for the industry practitioners and government and non-government actors are discussed aligning with the existing literature (Section-5.3). Combining all these issues, an integrated and comprehensive sustainable supply chain management (ISSCM) model is proposed in the final part of this chapter following the theoretical literature from secondary published sources and the findings derived from the first-hand interview data (Section-5.4). The model illustrates the integrated sustainability challenges and issues of the Bangladeshi Textile and RMG sector in all possible dimensions, contemporary practices and initiatives taken to address the issues and possible solutions and policy recommendations for the better, sustainable future of the industry.

Following the stakeholder theory and stakeholder salience model, relevant stakeholders have been identified in the review section. The internal and external stakeholders of the RMG supply chain regarding a developing country setting like Bangladesh have been explored based on their relative salience and attributes. As Freeman (1984) explained that stakeholders are those who can affect or be affected by the operation of any organization and Mitchell et al (1997) explored the stakeholders in details as the classes of entities who hold the 'Power', 'Legitimacy' and 'Urgency' for an organization or industry (Mitchell et al., 1997), the current research found eight different groups. First stakeholder group has been identified as the 'officials and authority in the Bangladesh government' consisting of the top executives of the textile ministry and department, EPB who can influence and has legitimate authority to the RMG operation from the policy and approval perspective, followed by government regulatory

bodies (DIFE and DoE) who directly intervenes in regulating the sustainable operations of the industry. Seuring and Muller (2008) already presented local, national, and multinational government agencies as the legitimate and powerful stakeholder group as they can offer pressures and incentives. In the same study they have shown that NGOs and brands and their representatives have important stakes in RMG operation (Seuring & Müller, 2008). Freeman et al (2004) considered suppliers and factory owners as internal stakeholders which is acknowledged later by De Brito et al (2008). In the literature part it is already noted that later studies like (Tighe 2016) and Huq et al (2016) provided rationale to include RMG associations, workers and employees and independent auditors as legitimate and powerful stakeholders. In the given context, in the following section, RMG sustainability challenges, current practices and respective solutions are presented in line with the triple bottom line of sustainability along with the macro perspective as perceived by the relevant stakeholders.

5.1 Challenges of Textile and RMG sustainability in Bangladesh

To satisfy the first research question of what the challenges and barriers of sustainable growth of textile and RMG industry of Bangladesh are, the findings suggest four different dimensions of current challenges supported by the literature. Along with the already well known and established TBL dimensions (environmental, social, and business and economic) and related challenges, an additional macro-infrastructural dimension and associated challenges have been identified by stakeholders of the industry as the interview respondents. Having the most diverse and dynamic supply chain and complex stakeholders, the textile and RMG industry has much greater impact and can influence the triple bottom line (environmental, social, and economic) and macro perspective of sustainability in an unprecedented manner. Before going for the discussion of all the sustainability challenges with existing literary evidence, the issues are presented in a table as perceived by the different stakeholder's group (Table-19):

Sustainability Challenges perceived by stakeholders				
	Social	Environmental	Economic	Macro-Infra
Govt Officials (Ministries, Departments, EPB)	Poor salary framework, Skill Gap, Unsafe working environment, No retirement plan for workers Challenge of Occupational Health issues	Chemical usage and wastewater release, Ground water saturation, Pollution by smaller and unregulated subunits, Release of Plastic part and polythene particles in the river and landfill	Bad Infudtry Image, Gap of Product divesification, Dependence on EU and USA market, Price competitiveness, Covid and War affected demand	Lack of Coordination and Monitoring from govt agencies, Energy Crisis, Poor Internal transport. Poor Chittagong Port Capacity, Corruption of customs and Port offcials
Regulatory Agencies (DoE, DIFE)	Risky work environment, Poor Salary, Delay payment, Labor Unrest, inadequate offices and resources, Non-compliance of labor rights and Challenge of locating and tracing of sub-cons	Hazardous chemical usage, No ETP for Subcon Units, Inactive ETP and related malpractices, Gap of Out of hour monitoring, Ground water use without restrictions	Uncertainty and rising cost of rawmaterial supply, Increased cost of energy, Price Competition, Decreased global demand, Smaller facotories loosing competitiveness	No framework to trace and monitor subcontracting units, No deep sea Port, Poor Chittagong Port services, Customs house corruption, Lack of DIFE and DoE workforce/ capability
RMG Associations	Lack of skill and professionalism, Safety and Health issues, Excessive overtime, Oral Abuse, Labors unrest, Workers exploitation, Excuse of Low cost labor	Industrial Pollution, Chemical Pollution, Water saturation and no water usage policy, Gas saturation, Carbon Emission and Global Warming, Solid waste release in landfill	Decreased demand and Orders, Unfair pricing, Cost and Investment of Sustainability, No Shared responsibility of brands, Lack of Value addition ,Dependence on Traditional market	Poor Internal Road and transport system, Gap of gas and electricity supply, No Non-member monitoring, Poor port services
Supplier/Factory Owner	Shortage of skilled manpower, Gap of Critical skill, worker crisis, Made up unrest and agitation, Cost of safety and stability investment, Efficiency Gap (Less than 50%), Bad Trade unionism, Owners-workers mis-communication	Water and river pollution, No Solid waste disposal framework, Cost of ETP installtion and maintenance, No ETPs in small washing factories, Sub-cons waste release are out of Oversight, Lack of regulatroy bodys capability	Import dependence of raw materials and cotton, Unused Factory Capacity, Challenge of Leadtime management, Low CM, Brands Opportunism, Added cost for organic product,Weak Accessories supply, Order cancellation due to Covid and war	Energy and Gas supply crisis, Weak banking Infrastructure, Sustainability pressures on Suppliers only, Corruption in regulating Bodies and Government Service system, Complex licensing and approval
Workers/Labor-Employees	Extreme poor salary, Skill Gap, Gap of Advance technical skill, No health insurance, Lack of proper	Gap in chemical storage and management, Gap of training and awareness for chemical handling,	High cost of raw materials, Inflation and cost of production, Order decline, Order cancellation by	Loadshedding and Electricity supply, Bad roads and communication to and from the

	accident compensation, Oral Abuse and intimidation, Lack of proper safety precautions	No formal Jhut management framework, Excessive Water use, Synthetic firbre use	buyers, Increased price of accessories, Gap of timely supply of raw materials	factories, Lack of Government body monitoring of labor issues
Brands Representattives(Merchandizers)	Unskilled labor and Middle management, Labor Unrest, Challenge of Tech adoption of workers, Pricehike and livelihood challenge of workers, Poor health services	Corruption of DoE, No regulation for ground water usage, No water accounting mechanism, Lack of formal management of Solid waste (Jhut), Fake Certifications, Traceability issues	Lack of product diversification, Increased cost of energy, Inflation and price increase of materials, Brands facing decreased demand, Increased shipping costs	Weak Transport Infrastructure, No Deep Sea port for leadtime and cost reduction, Congestion and delay in Ports, No Framework to monitor distant tier (Beyond tier 2)
Third Party Auditors	Poor salary and payment delay,Work-overload and long working hour, Inefficiency and poor Skill , Oral abuse and threat, Rumours and unrest, Occupational health, Cheap Labor business model	No Chemical Management Guideline, ETP Bypassing, Unregulated solid (Fabric) Waste management, Lack of traceability, ETP malpractices after office hour, No ETP in smaller Facrories, Waste water infusion to underground	Low industry Productivity, No High End product offering, Poor profit margin, Market Saturation, No home grown Global brand, Increased cost of materials, Poor Backward linkage, Unhealthy price competion among suppliers	Weak Transport and Shipping Infrastructures, Complex documentation and delay in Port, Longer lead time, Corruption in Public sector , Port and customs Process delay
NGO, Intellectuals and Media	Struggling livelihood of workers with poor salary, Work overload and Production target pressure, Child labor in informal units, No health insurance in Bangladesh, Oral abuse and misbehavior	Pollution of rivers and water body, Waste water release underground, Use of articial and synthetic fibre, No ground water usage Policy, Fake certifications, Polluting landmass	Unfair distribution of revenues, reduced CM, Exploitation of Brands, Sustainability investment pressure, No incentive for sustainability practices for Suppliers	Supply issue of gas and electricity, Customs and Governemnt office corruptions, Port incapability and corruption, Politics-media and owners syndicate

Table 19: Sustainability Challenges Perceived by Stakeholders

The following section is organized to discuss each of the above components of sustainability challenges and barriers as absorbed by the stakeholders following the first-hand data extracted in this study and available academic discourse.

5.1.1 Social Sustainability Challenges and barriers of Bangladesh RMG

The interview findings identified social sustainability issues which elaborates that the industry suffers from poor wage and salary structures, there is severe gaps in skill level, efficiency and professionalism, hazardous and unhealthy working environment is there, work overload and long working hours is a reality, still there are safety concerns in terms of building, fire, and electric facilities, lack of health, hygiene, and medical services is still prevalent. Moreover, worker's discontentment, grievance, and unrest along with labor compliance issues including human and labor rights violation, sexual harassment, lack of freedom of expression and association, police brutality, child and force labor and weakness in the legal-functional areas are also recognized by the respondents. These issues correlate with the existing scholarly literature of the social sustainability challenges in the Bangladeshi textile industry. In their study Khan et al (2021) found that in social dimension, the most common concerning and worrying issues includes salary and wages of the workers, bad working environments and longer working hours which are linked to the emerging economies (Khan et al., 2021; Raian et al., 2022). The same study argues that social sustainability issues are more prominent in the lower tier (tier two and beyond) of the supply chain which is mentioned by many respondents in the current study. Findings identified that most of the social concerns are prevailing in the smaller subcontracting units where monitoring and control of the buyers, first tiers suppliers and other regulating stakeholders are literally absent. According to existing literature, apparel supply chain involves fragmented smaller supplying entities and manufacturing units, coordination of the whole operation from a central point is literally impossible, the transparency and accountability cannot be always maintained (Bubicz et al., 2021). Social sustainability issues have gained much importance lately in the academic domain of supply chain literature in the textile and RMG sector to encounter negative social externalities created by the industry (Bubicz et al., 2021). Predominantly the issues related to labour and workforce and their welfare has been the primary concern (Li & Leonas, 2021). Li & Leonas (2021) identified issues like labour rights and safety concern, force labour, low wages, over burdening working hour, health and safety hazards, physical and oral abuse, and lack of worker welfare as the focused areas of debate which is supported by field data in the current study.

Findings suggest that an entry level worker gets 8000 Bangladeshi taka per month as minimum salary which is equivalent to 75 USD, in the face of current price hike and inflation, with the salary the workers are struggling with their livelihood. All the respondents (even including the factory owners) agreed that workers salary should be revised, and 25000 BDT should be considered a standard living cost for a family. Additionally, as workers rely completely on their salary and overtime payment for paying rents, buying daily necessities, a slight delay in the payment can make them vulnerable. Clothing and apparel manufacturing industry is by nature labour intensive and thus cost minimization directly linked to managing low cost labour leading to low wages and salary for the workers involved (M. Taplin, 2014). In one hand the industry has been leveraging on the cheap labour, on the other hand extremely low payment and wage, labour exploitation poised risks of unsustainable social sustainability framework (Raut et al., 2019). As workers and employees are defined as internal stakeholder groups (Roy et al., 2020), they supposed to have bargaining power over the factory management for their salary and payment but as previously mentioned due to inefficiency and skill gap they cannot exercise their 'power' properly. Although workers have 'legitimate' stake, factory owners can replace and employ new workers as existing workers pool do not possess any critical skill which can pressure the factory management.

Most of the respondent agreed that overall efficiency and productivity level of Bangladeshi RMG sector is below 50% and workers are inexperienced, raw, and unskilled. Empirical data suggests that Bangladesh focuses on basic products avoiding high end diversified product lines mainly because of critical skill among the workers. These notion is found relevant as studies indicates that most developing country suppliers and sub-suppliers, the factories and manufacturing units in Bangladesh face resources, skill and knowledge gaps in the processes (Soundararajan & Brammer, 2018). Another burning skill issue derived from the interview data is the existing skill gap of the middle management like supervisors, line managers, production leaders and quality control people. Industry practitioners opined that lack of proper education, inadequate management skill training and gap of understanding human behaviour make the mid-level management people inefficient. Lack of professionalism among workers and maturity from the top management and owners side pose challenge for the sustainability too. Interview data confirmed the notion that workers in RMG factories of Bangladesh get entry without any degree or bare minimum literacy. As a result, in the face of Fourth Industrial revolution, automation and robotics, workers would find them irrelevant due to their incapacity and incapability. There is evidence that most of the Bangladesh factories are run by people

inherited it with low education level and mid-level management people don't possess any specialized knowledge relating to their jobs, lower level workers also don't have literacy and training (Huq & Stevenson, 2018). These educational and skill deficiencies of the workforces pose significant challenges in the face of technological advancements. Given these circumstances, employees in Bangladesh find themselves with limited critical resources, translating into limited influence over their organizations (Frooman, 1999). In the specific context of Bangladesh's RMG sector, this limited power of employees complicates the path to sustainability.

The findings provide evidence that working area for workers in the textile factories of Bangladesh are not inherently safe, comfortable, and healthy. The issues like adequate space for free movement, available drinking water, clean and tidy surroundings, proper airflow and lighting, precautions for health hazards are not properly addressed. Although the situation has improved after Rana Plaza incident, workplace safety, health, and hygiene are still prevalent. The allegation of hazardous workplace and unhygienic working environment of the country's RMG sector is already evident (Chowdhury et al., 2018). Irregularities in the workplace and bad working conditions are frequent in the tier 2 and beyond which makes brands sustainability initiatives questionable (Bubicz et al., 2021). Along with the above issues, long working hours, stressed out overtime period and inhuman workload for the workers are identified by the field data. In RMG-factories, working hour is from 8 am to 5 pm, as textile factory work is boring and physically stressing, long working hour makes workers physically vulnerable. Workers disclosed that due to the pressure of shipment and delivery, there is practice of extending the working hour to 14/15 hours adding 5/6 hours of overtime. These issues are ground reality in Asian factories including Bangladesh (Antonini et al., 2020).

Vulnerability of working environment regarding fire safety, structural weakness, lack of emergency response readiness and avoidance of ILO safety and labour conventions have been exposed by Rana Plaza and Tazreen Fashion disaster and reported by the respondents accordingly in this study. From the results, it is evident that most of these accidents are caused by either fire and electric or structural issues, there are gaps and loopholes in these aspects of Bangladeshi textile factories. The main reason behind this structural anomaly is the sporadic and spontaneous development of the RMG industries in Bangladesh without proper planning. The factories are by-default unsafe as different production units (dying, washing, knitting) are placed in a single multi-storeyed building. Additionally, most of the textile factories are situated in commercial area, in crowded roadside buildings, and were constructed for other

purposes but later turned into production and wet processing units. Existing literature says that in the initial phase of the industry, most of the factory building started their operation in rented multi-purpose building, many of which are still in the operation posing structural threat to the safety standard (Akbar & Ahsan, 2019). Same study elaborates that despite the efforts from Accord, Alliance and the Government of Bangladesh, accidents and workers safety breach are still common in Bangladeshi RMG producing units. Historically Bangladeshi RMG factories have been associated with bad reputations of having safety risk and issues prevalent inside the production facility (Handfield et al., 2020). Field data shows that with the building's inherent stability issues, fire and electrical safety issues are directly linked, there is still limited exit space and evacuation area around the factories. Although the condition is much better now, still workers and employees are not aware, they do not take issues like fire incident seriously, regular fire drill is not available in the factories too. Although some academics and practitioners treat electrical safety separately, it is one of the reasons of fire incident.

Health and medical concerns in smaller sub-con units, and backward linkage factories are still relevant. Labour regulators confirms that even the big factories provide basic services ignoring occupational health and mental trauma issues and most of the factories do not even have any idea of Occupational Safety and Health issues. It is evident from previous work that occupational health is a major concern for RMG workers as respiratory and other illness issues are found to be more pronounced in the spinning mills and back ward linkage units (Raut et al., 2019). Expert auditors expressed that exploitation of workers health, reducing their life expectancy, longer health impacts are seriously ignored. In Bangladesh health insurance for the factory workers is almost non-existent leading to void of health services for more severe physical and mental condition. Moreover, there is almost nothing for compensation in case of any accident or physical damage or death of an employee caused by occupational duties. Lack of health insurance and compensation system tigger the organizational (strategic and institutional) legitimacy (Suchman, 1995) of the industry and deprive the legitimate rights of the workers. In the labour law there is provision for 2 lac takas (190 USD Approx) if a worker dies, which is like an insult to a worker value of life. It is commonly believed that in Bangladeshi factory environment, the health and medical regulations are ignored or avoided which in turn create health and medical risks for the employees and the workers (Akbar & Ahsan, 2019). Disguised child labour with fake documents can be still found, indirect force labour and excessive overtime is there, and verbal abuse is common scenario. Along with these instant termination without proper payment, some case of human rights violation is there. These

risky social issues are already categorically discussed in scholarly articles (Raian et al., 2022). The findings also indicated that the legal framework for the labour law implementation and administrative measures are by default weak and labour compliance authorities have limited strength. It is also noted that there are around 26000 labour cases pending as court numbers are limited, availing court by the poor workers are difficult. DIFE are not authorised to take punitive measures where only labour court can act, they have limited offices and understaffed. It is noteworthy that although DIFE is formed following labour law, they are not given 'institutional legitimacy' to fine or punish as presented by (Suchman, 1995). It is found that most of the social sustainability issues are prevalent in the subcontracting and smaller factories which acts as sub-supplier to the lead suppliers (Wilhelm et al., 2016). Due to the lead suppliers lack of control and surveillance over the sub-con units, social sustainability, safety, and labour issues can go unnoticed. From theoretical perspective, although brands are the most influential stakeholder groups for Bangladeshi RMG suppliers and they have legitimate authority, they do not have the capacity to trace and monitor tier two and beyond which indicates lack of functional 'power' over the whole supply chain. Moreover, lead supplying firms do not exert their institutional legitimacy to exert power over the distant tier smaller units which require greater resources and revenue cut.

5.1.2 Environmental Concerns and Challenges

From the extract of the interviews, the main environmental and ecological challenges and barriers identified in this study includes chemical sustainability issues, anomalies in the ETP practices, water (surface and underground) and river pollution via wastewater and affluent release, saturation of natural water sources via unregulated water usage, pollution of landmass by solid waste and hazardous waste release, usage of artificial fibre causing environmental havoc, a poor and weaker legal and administrative framework and traceability-transparency of the root level operation.

It is known already that in environmental front, the sustainability practices in the developing country context are not practiced adequately to achieve the desired outcomes (Suhi et al., 2019). Existing studies reveal that environmental issues and challenges revolve around three aspects mainly, firstly water related concerns such as water pollution, water consumption and ground water saturation , secondly carbon emission and carbon footprint issues and lastly the solid waste management issues which includes releasing solid waste and hazardous solid particles to open landfill (Islam et al., 2020; Li & Leonas, 2021). Usage of harmful chemical, hazardous impact, and lack of safety precautions are believed to be the most critical by the respondents.

Study identified that wet processing units in textile (dyeing, washing, and finishing) use huge amount of chemicals and water for fabric preparation, yarn making and final RMG production while polluting the waterbody, rivers and air (Islam et al., 2020). They also argued that harmful dyes and chemicals usage make the challenge even harder for the overall environmental compliance, the direct interview data aligns with this argument. Research suggests that average textile production facility produces 127 kilogram waste for a ton of finished product in which 4.62% waste is of hazardous nature (Li et al., 2021). Findings show that the accessories unit such as buttons and zipper producers also produce huge chemical waste every day. Respondents mentioned chemical safety and safe handling as an important chemical compliance issue in Bangladesh as workers are not aware, educated and properly trained to handle risky chemicals. PPE, proper boots, equipment, and safety apparatus are not always used in the ground of the factories. In the chemical management side, factories do not have any conformity as there is no chemical management guideline prescribed by the government.

The field level evidence supports the understanding that ETP practices in Bangladesh are not of global standard. A significant number of factories in Bangladesh do not have ETP, having non-functioning ETP are common practice in the country. This environmental non-compliance can sometimes lead to a crisis of legitimacy of the industry in the eyes of global actors. There is inadequate monitoring and enforcement by the regulatory authority due to their capacity and capability gap which again signifies 'power' gap although regulating bodies possess the institutional mandate and 'legitimacy'. Factories keep their ETP inactive after the office hours so that the authority cannot monitor. Studies found that only 40% factories in Bangladesh meet the criteria of releasing fresh water, while most of the chemical waste treatment criteria are not at the satisfactory level (Shamsuzzaman et al., 2021). According to their research the effluent treatment process of Bangladesh is well below the acceptable limit and thus damaging water quality, aquatic life, and soil fertility. Environmental and ETP noncompliance is mostly common in small scale sub-contracting units with limited financial affordability, most of which are unregulated, and beyond the radar of legal and administrative bodies (Sakamoto et al., 2019). Interview respondents says that factories serving the local clothing markets and informal sectors do not have ETP as installation and running ETP is costly.

Water pollution is identified by the interviewees as the single most devastating effect of textile and composite units and the root cause of destroying water resources and polluting the water streams in the country. In their scholarly paper, Hossain et al (2018) projected the total industry wastewater production of 217 million m^3 in 2016 and 349 million m^3 in 2021 based on the

average waste production of .12 m^3 against per kg fabric (Hossain et al., 2018). Data indicates that textile and composite factories pollute water in two ways, firstly, they release wastewater filled with chemicals to the surface water of rivers, canals, and other water streams, more dangerously, some of the factories release their untreated water to the underground using pipes. Pollution of rivers around Dhaka, Gazipur, Narayananj, Tongi and Narshingdhi area is already reported by researchers as untreated waste water is being released in these areas (Sakamoto et al., 2019). Water resource is the lifeline of the country and there is concern that the supply of this precious resource is getting saturated dramatically. The interview results shows that the RMG factories are accused of irresponsible water extraction and usage as wet processing units require huge water for fabric preparation, washing and dyeing. Factories withdraw water from underground without any restrictions and regulations. Literature supports the claim of current research that among the industries of Bangladesh, RMG is the biggest user of water resources most of which is extracted from the ground (Bhattacharjee et al., 2019). There is no proper ground water extraction and usage policy, the current policy is unable to provide any direction of extraction, use, monitoring and permission (Bhattacharjee et al., 2019).

Textile and its composite sector produce huge amount of material, solid and fabric waste alongside the wastewater release. Findings concern that there is no established framework and legal guidelines to manage material and fabric waste, no designated area for solid waste fill in the country and no professional entity developed to collect, incinerate, dissolve these wastes. Thus, most of the Bangladeshi factories manage solid waste (locally known as Jhut) by throwing into the open landfill. Globally the trend is the same as researcher suggests that 87 percent of global discarded textiles (pre and post-consumer waste are disposed into the landfills (Moazzem et al., 2021). Toxic substances get resolved into the landmass slowly and rainwater, get mixed with the local waterbody and pollutes the environment (Li & Leonas, 2021). In the same study they found that textile solid waste also includes huge plastic waste and packaging materials which again destroys the environment in the long run. Solid waste is a serious risk to the human society overall and harmful for the human health in particular (Li et al., 2021).

The industry stakeholders of RMG Bangladesh provides the evidence that Bangladeshi textile and RMG sector is leaning towards using manmade and artificial fibre as it is cheaper and longer lasting. Artificial materials are not biodegradable, the long-term environmental impact is disastrous. Reports says that globally 500 thousands ton of microfiber is used in the apparel and textile sector yearly most of which are made of either polyester, polyamides, nylons and other non-decomposing materials (Fung et al., 2021). One particular research in 2018 found

that globally 62% apparel products are made using synthetic fibre (Khairul Akter et al., 2022). Majority of respondents think environment friendly organic cotton is pricy and organic cotton products naturally adds price mark up by 7%, as a result consumer demand of organic cotton has decreased dramatically after Covid. According to the supplier's community consumers are concerned about the environment consequences until they pay higher price. It is evident that sustainable materials usage is one of the key challenges in RMG production at the stage of yarn and fabric production (Islam et al., 2020). Another associated challenge here is the scarcity of the organic cotton supply globally which leads to price hike and ultimately to the price increase of the finished products (Raut et al., 2019).

Current study identified that there are traceability issues as focal suppliers let their job to the subcontracting units behind the buyers back where the environmental practices are violated. This tendency of running composite units in secrecy lead to the crisis of 'legitimacy' from the perspective of monitoring and control. It is found that environmental non-compliance issues in Bangladeshi RMG sectors are mostly associated with the unregulated distant tiers as key stakeholders like legal authorities, buyers' auditors, and representatives, certifying bodies do not have any trace and monitoring over these factories. This makes stakeholders legitimate monitoring 'power' and influence capacity null and void. Literature provides the backdrop of it as from the raw material preparation to making the final RMG, the whole processes are so complex that tracing every single step and maintaining sustainability along the way is a challenging task (Egels-Zandén et al., 2015). Although these stakeholders (Government, buyers and auditors) have legal authority and suppliers feel 'urgency' too to address their concerns, tracing and locating these informal units remained a challenge till date. There is challenge with the reliability and use of certification as there are incidents of using fake certification in the past and certification without field level validation. The same situation has been found prominent in the accessories' and backward linkage industries (Khairul Akter et al., 2022).

5.1.3 Business and Economic Barriers

Challenges and issues pertinent to the economic and business sustainability goal is inherent in the sole purpose of setting up a business enterprise, to generate revenue and profits. The current study's data are aligned with the issues already addressed by the scholars in academia in this regard. Leading themes and subthemes in regards of business and economic barriers are: Unfair, predatory pricing and opportunism by brands, lack of bargaining skill of suppliers and unhealthy price competitions, cost of investment and capital expenditure, increased cost of

business, demand and sales decline globally along with inflation, challenges of value creation and diversification, challenge of managing lead time and backward supply, gap of proper production planning, high cost and timely supplies of raw materials. In maintaining economic sustainability, challenges reported in literature also include profit and value creation involving sales, cost of materials and services, value addition, returns, dividend to the investors , cost of governance, salaries, transparency and auditing costs, cost of waste management, cost of energy and other logistics (Chowdhury & Quaddus, 2021; Delai & Takahashi, 2011). Key challenges here are expressed as: improving the existing market and its share, generating greater profit and revenues, enhancing return on investment, sales and assets while discharging the social and environmental responsibility (Wang & Dai, 2018) which are coherent with the current study's findings.

Majority respondents perceive that crucial challenge RMG of Bangladesh facing now is the continuous price competition and price reduction from the buyers' orders and lowering per unit CM (Cost of Making). Suppliers expressed their frustration as the cost of operation is increasing day by day, raw materials, energy and gas price has become unreachable already. Scholars agreed that the biggest economic challenge for an enterprise is to create enough value to earn sufficient profit by balancing the environmental and social goals (Li & Leonas, 2021). Cheaper production cost is the business model for RMG, price exploitation and the unfair price offering by the brands is a reality. Suppliers believe that there are brands opportunistic behaviour as they force the suppliers for adopting better salary and social measures, better environmental initiatives but are not getting rewarded in return. This unfair price treatment is already acknowledged by the scholars (Alghababsheh et al., 2023). Suppliers lack negotiation and price bargain capability, thus, although brands set high retail price, the suppliers and workers get a tiny portion of it. Lack of coordination among the suppliers while fighting for the orders and engaging in unhealthy price competition gives the buyers opportunity to exploit and thus there is a definite 'power' imbalance. This bargaining failure of suppliers gives the brands upper hand and excessive 'power' to control the price. Moreover, global buyers treat the market based on low-cost labour and offer less. Suppliers can push the workers to their lowest limit of salary bargain due to availability and skill gap, this is where again factories exercise controlling 'power'. Moreover, there is no common platform of suppliers in Bangladesh where a common floor price or ceiling price can be determined for each product category. Empirical evidence suggests that although the cost of production has increased manyfold over the years influenced by many national and international events, the price

offering from the buyers side has not been adjusted accordingly (Uddin et al., 2023). There is evidence that considering the inflation rate the RMG products price in European and USA market has decline by more than 7 percent during 2011-2017 providing the validity of the Bangladeshi markets findings (Anner, 2019).

Results provide the notion that following Covid pandemic and Russia-Ukraine war, global supply chain has become agile, consumers become anxious and indecisive in buying fashion and clothing items. The living cost and inflation has gone beyond reach of many consumers that they had to rethink their regular buying habits. It is found that sales during and after the Covid dropped about 70 percent around the global developed market (McKinsey & Company, 2020) for fashion items, order cancellation reported around 2.5 billion by march 2020 (Mostafiz et al., 2022), these findings are complemented by the field evidence of current research. Previous research supports the claim of current study that during and after the Coronavirus outbreak, the demand and consumption of fashion and clothing items has decreased dramatically as consumers aiming to spend more on daily necessities and energy supply (Sumarliah et al., 2022). On one hand the demand has declined, on the other hand the cost of production has increased dramatically making it a sandwich situation for suppliers. Industry insiders opined that one of the bigger challenges for Bangladesh is to diversify the market from the traditional European and US based market to non-traditional countries. Bangladesh export more than 62% of export basket only to the European market and next big region is US market (18%) (McKinsey & Company, 2021). Data of EPB cited in the McKinsey & Company's 2021 report suggests that Bangladesh has reached to a market saturation point in these two regions.

There is consensus among interview respondents that RMG industry of Bangladesh has been known for basic item producer where diversification, value addition and product differentiation has been ignored from the very beginning. All the infrastructure and workforces are designed in the country to produce bulk simple t-shirts, under garments and daily wear, fancy high-end fashion items have never been the strength of the sector. As the workforce are not skilful, they are incapable of handling critical design and use creativity in the process. Moreover, Bangladeshi suppliers avoid risk of higher value investment and factories work as tailoring house having no design of their own. This tendency of avoiding high value market pose a critical risk for business (Hoque et al., 2022; Uddin et al., 2023). Taking orders with design from the buyers and sewing and stitching only put them in a situation of no control over the process. As there is no Research & Development facility, there is no creative design and value proposition to offer, which ultimately offers minimum price leverage. Reports suggest that Tee-

shirts, trousers and sweater items are the primary RMG export items from Bangladesh where Tee-shirts alone covers one fifth of the total RMG export to Europe and more than 55 percent of export consists of only 10 items (McKinsey & Company, 2021). Sustainability investment and cost is another challenge for the suppliers and factory owners, social and environmental practices require costly arrangement. Especially for the chemical sustainability and renewable energy sources, Biological ETP set up, green technological upgradation and green practices require huge capital investment. Suppliers are not assured that their investment will give them any competitive edge or not. These challenges are already established by McKinsey & Company Report of 2021 where they said energy transition, green energy supply assurance require mammoth investment. Sustainability costs have been found a major issue in many literatures too (Gardas et al., 2018; Raian et al., 2022).

Interviewees unanimously agreed that crisis of raw material supply is the biggest technical concern for the textile and RMG industry of Bangladesh. The industry operates on the foreign supply and thus any supply chain disruption directly affects the production and lead time management. The suppliers are especially concerned for the supply of cotton and its price volatility in the international market due to the presence of syndicate. In their study Raut et al (2019) found scarcity and supply unavailability is one the major concern for textile, the case is even serious for Bangladesh. The above claims of current study can be validated during Covid pandemic Bangladeshi Suppliers faced severe shortage of raw materials supply from Chinese counterpart due to lockdown (Mostafiz et al., 2022). Price of raw materials, its supply availability and quality of raw materials along with the complex and long supply route makes it critical for textile production (Gardas et al., 2018).

5.1.4 Macroenvironmental (Infrastructure and logistics Challenges)

Although current study is designed focusing the triple dimensions of sustainability, from the findings, it is found that in field level practices, macroenvironmental (infrastructure and logistics issues) concern is one of the biggest threats of achieving true sustainability for the textile and RMG supply chain of Bangladesh. The key barriers identified by the respondents can be summarised as challenge of continuous utility supplies (Energy, gas, and water), operational hindrances, internal transports issues, bad port services, gap of manpower and management capability in the factory and regulatory level, corruption, unregulated subcontracting factories beyond the umbrella of formal structure and weak financial and banking infrastructure. In their 2011 study, McKinsey & Company stated that the biggest challenges of the industry have been the vulnerability of the infrastructure, the main threats

were utility and transport infrastructure including internal roads, congestions, ports facilities, lack of deep-sea harbours (McKinsey & Company, 2011). After 10 years, the overall infrastructure framework still remains challenging (McKinsey & Company, 2021). In their 2021's report it is evident that energy supply, transport and digital infrastructure remains the biggest threat for the industry in Bangladesh. Current research findings correlate with both reports and find logistics and infrastructure is still one of the biggest challenges for long-term sustainability. Bangladesh's logistics performance has deteriorated significantly, according to the World Banks Logistics Performance Indicator, Bangladesh's current logistics performance position is 100th (World-Bank, 2018). Interview extract pointed out that Bangladesh should remove the obstacles of doing business by developing smooth infrastructure and logistics framework.

Interview extract provides evidence that continuous energy supply (electricity and gas) is probably the single biggest challenge for the textile factories in production level. As oil price has increased manyfold globally due to Russia and Ukraine war scenario, Bangladesh has been struggling to find ways for energy generation according to industry demand. Although some factories produce their own electricity using gas, gas supply has been saturated already. Government officials, RMG associations and factory insiders pointed out that due to lack of regular electricity supply, machines and workforce remains idle, wastage of working hour is a common scenario which in turn results in missed shipments, increased cost, and lead time. Experts already opined that making the energy infrastructure strong and sustainable has become the most important agenda for Bangladesh Government (McKinsey & Company, 2021). Bangladesh has placed 87 in the Energy Transition Index by World Economic Forum in 2020 showing poor performance. The industry is energy intensive, naturally any shortage of supply or increase of price of energies influence the RMG production and its cost (Farhana et al., 2022). Summarily it can be said that regular energy supply is a core logistics issue for apparel sector and any crisis in this regard results in affecting RMG exports (Raut et al., 2019). Alongside the energy issues, huge amount of water is required in the manufacturing process. Respondents are concerned that the scarcity of water will have detrimental effect on the production and cost very soon. Scholars already reported that factories are using water inefficiently without any monitoring, every year ground water level is declining by 2.5 meter (Haque et al., 2021).

Most of the respondents agreed that the internal communication and transport infrastructure for raw materials import and RMG export is seriously underdeveloped. Commuting via roads

around Dhaka, Ahulia, Gazipur, Narayanganj (RMG factories concentration areas) have become difficult, transporting finished goods from Dhaka to Chittagong is a challenge due to congestion, broken and under construction roads. Interview participants expressed that the system is already overstressed, current road and transport system is suitable for 30 billion USD worth of export, but Bangladesh's total export already surpassed 42 billion and aiming to reach 100 billion soon. Available literature and reports aligned with these findings as Bangladesh face myriads of challenges in relation to internal road transport and communication due to road congestion, bad conditions of roads, few inland transport options and smooth carrier services (McKinsey & Company, 2011; Raian et al., 2022). Transportation delay and communication irregularities due to road traffic and congestion, poor and inefficient infrastructure is a serious vulnerability of RMG industry of Bangladesh (Chowdhury & Quaddus, 2015).

Poor Port infrastructure and services has been reported by almost all the participants as one of the critical issues of RMG export for Bangladesh. The country is dependent on a single Sea port, service of which has always been questioned. Findings state that Chittagong port takes 10 days to release the imported raw materials, ports personnel involved in the process of clearing, forwarding, loading, and unloading are inefficient and corrupt and thus shipping cost gone higher. Literature provides evidence that over the period, volume of operation increased by many folds but manpower and logistics support system, documentation has not been upgraded, containers get struck in the port, jammed up lorry can be seen (Bala et al., 2019). According to Logistics Performance Index of World Bank, 2018, Bangladesh Customs clearance process scored 2.30 only against the top performer (Germany 4.09). Interview extracts pointed that Bangladesh needs to reach the mother vessel in Singapore or Colombo first by feeder vessel as there is no deep seaport infrastructure which increases cost by a large margin and the lead time by at least 10 days. Lack of coordination between two port authorities: Customs and Port makes the port service worse and 250-kilometre distance of Chittagong ports from Dhaka creates bottleneck in both ways of supply chain.

For implementing labour and environmental issues there are two authorities: DIFE and DoE. Most of the interview respondents opined that both agencies lack sufficient workforce, inspectors, and equipment. Officials of DIFE themselves confessed that they have resource constraint and personnel limitation. DoE local offices cannot properly monitor ETP operation and wastewater release due to shortage of capable inspectors, their technical equipment's are not compatible with field level operation. This skill gap accompanied by the corruption of monitoring authority affect the productivity negatively and increase the cost of production and

lead time (Bala et al., 2019). Corruption is another reality affecting the industry negatively, arranging all certificates and approval, trade licence, clearances, and export permits, RMG suppliers face corruption everywhere. Merchandizers and suppliers mentioned that around 30-35 certificates require in the process of RMG factory set up, production and export and in almost every stage the entrepreneurs need to pay bribe. DIFE inspectors take bribe in exchange of not inspecting the factories properly for labour rule violation, DoE officials and inspectors are also accused of taking money from the factories and ignoring proper ETP practices, environmental regulations. Police takes bribes from the owner to control and torture workers, the customs department is notoriously known for charging illegal money from the RMG exporters. Huq & Stevenson (2018) explicitly described that government officials and inspector take bribe for overlooking anomalies in the factories (Huq & Stevenson, 2018). Mismanagement and lack of coordination among RMG related public authorities is a structural and institutional weakness. There are Textile ministry and Department, other ministries, and department, EPB, DIFE, Environment ministry and DoE, water resources ministry and commission and relevant government agencies offering regulatory and administrative services. Top officials expressed their frustration that there are no clearly defined jurisdictions of these agencies.

Some industry experts specifically addressed that the banking and IT service framework in Bangladesh is slow and inefficient in handling export import transactions, and thus affecting international operation. In IT infrastructure and banking services area of World Banks logistics performance indicator, Bangladesh scored 2.39 against the top scorer Germany (4.37). Like the Indian Textile industry, Bangladesh is also suffering from old IT infrastructure (Gardas et al., 2018) and weak framework for advanced technological renovation. Another challenge of sustainable textile and RMG in Bangladesh is the evil nexus among business-media-civil society-politics which is not reported in any literature yet. The people own media houses also owns RMG factories and holds powerful political position. This syndication gives the factory owners enormous undue ‘power’ to manipulate established norms and practices where ‘legitimate’ concerns can be suppressed. As a result, bad incidents, workers exploitations and environmental pollution are mostly ignored by the media, intellectuals also don’t write anything about these issues. As a result, the factory owners get free license to operate their production houses wilfully as most of the factories does not keep proper documents, they do not publish environmental reports, some factories use fake documents to exploit workers.

Finally, this study found that factories which are not listed in the BGMEA and BKMEA, unregulated and engaged in sub-contracting do not have any accountability and transparency mechanism. Managing and regulating factories in a multi-tier (tier two and beyond) is an institutional and structural challenge for Bangladeshi RMG sector (Gong et al., 2018). Evidence indicates that big numbers of lead suppliers minimise their cost and expedite production to meet the shipping deadlines by subcontracting part of their operation from untraceable smaller factories. As these factories are out of any formal umbrella, social sustainability issues are easily ignored, environmental practices are out of questions. The inherent incapability of multitier management infrastructure in Bangladesh RMG supply chain makes it difficult to monitor and control and keep vigilance over the tier 2 and beyond. In their study Mejias et al (2019) found that detecting and identifying all the sub-suppliers and subcontracting unit is difficult and most of the brands and companies only focus on monitoring tier one (Mejías et al., 2019). Merchandizers said that they are unable to reach beyond cut to pack factories, the do not have resources and capability to go beyond.

5.2 Contemporary Sustainability Practices of Bangladeshi RMG

The Textile and RMG sector of Bangladesh has come a long way since the Rana Plaza disaster in terms of sustainability practices in all directions of TBL. Additionally, macroenvironmental initiatives in restructuring the industry, financial aid, covid fund from the Government, and support from the controlling bodies have been phenomenal as perceived by the different stakeholders. The stakeholders can influence the RMG sector from the perspective of firm level, industry and macro-infrastructural state level (Roy et al., 2020). After the incident of Rana Plaza, all the concerned stakeholders, Bangladesh Government, and state regulating agencies, factory owners, brands and their accord and alliance initiatives have taken massive initiatives to transform the RMG industry of Bangladesh towards positive change. As Roy et al (2020) argued that stakeholder's pressures and influence can direct the sustainability strategies and initiatives for the betterment of the sector, the following table shows the stakeholders own understanding of initiatives so far taken in regards of Bangladeshi textile and RMG sector. A successful sustainable supply chain framework requires stakeholders cooperation and their active engagement (Kannan, 2018), thus, the positive changes and achievement of Bangladeshi RMG the industry so far must be credited to the stakeholders proactive and reactive actions. Stakeholders' respective contribution to the initiatives and other issues are elaborated following sustainability dimension as follows (Table-20).

Contemporary Sustainability Practices and Intitiatives				
Stakeholders	Social	Environmental	Economic	Macro-Infra
Govt Officials (Ministries, Departments, EPB)	Cheaper and available workers, A well framed labor law, Health services and clinics in factories, Better Safety practices due to Accord-Alliance and Government Initiatives	Active Environmental law, Mobile court and financial punishement, Global top 7 green LEED factories, Informal Jhut (Fabric) recycle industry	Tax rebate for green factories (2%), TUF (Green Tech Upgradation Fund), Image Building and Branding Initiatives, Government Aid	Textile Engineering college and institute for Skilled manpower, Upgraded Syllabus , Textile Act, 2018 is in activation phase, Export Policy Support by EPB
Regulatory Agencies (DoE, DIFE)	A strong labor Law, Healthy Working environment, Resilient workforce, DIFE Regular inspection following checklist, NOHS Under Construction, Awareness campaign of labor rights	DoE Inspection and regular monitoring, EIA and IEE approval, Regular wastewater lab test, Waste minimization, Resource and energy Savings, Solar energy	Government support fund to factories especially during Covid, Better goodwill globally, Market Expansion Initiatives, EPB support for Product diversifications	Reciprocal Relationship between buyers-suppliers, Joint Taskforce (BIDA, DIFE, DoE and others) in operation, Strengthened DoE and DIFE after Rana Plaza
RMG Associations	Workers welfare initiatives, No child labor, No Force labor, OSH cell, Safety Cell, Women Welfare and family palnning initiatives, Training and Awareness programs, Labor Cell, Skill (SEIP) Project, Medical services	Highest LEED certified Factories (168), 550 in the pipeline, Solar Energy adoption, Most factories use ETPs (Biological), Environment court in function, Buyers Chemical Test before shipment	Productivity Improvement Cell, Collaboration with big Brands, Green Finance, BGMEA Innovation cell, Local Brands Initiation, Export promotion by EPB	Audit and Inspection mechanism by brands and association, Great entreprenaurship, Partnership With GRI, Sustainability Reporting Started, CAP initiated and retrofitting By Accord and Alliance,
Supplier/Factory Owner	Safety committee, Anti-harrassment committee, BNBC amendment following global standard, ASHRAE standard followed, Workers tenacity and resilience, Fair price shops, ‘Amader kotha’ helpline	Buyers Surveillance, Close loop and circular economy adoption, Informal Jhut (Fabric) Recycling Industry development, Energy efficient lights installed, Installation of water and waste efficient machines	Partnership with Big brands, 3D design initiatives, Cost effective smart technology adoption, Smart Production Planning, Government Support funds	Multilayer surveillance (Brands, Govt and Association), Backup plan to face Covid and war like situation, DIFE and DoE Surveillance, CIP and Government awards
Workers/Labor- Employees	WPC, Maternity benefits, Minimal child and force labor, Better fire and accident training and awareness, Provision of welfare officer for workers, Day care centre, Skill enhancement initiatives,	Waste minimization approach, Brands Audit, Use of Servo Motors, Energy Saving lights inside factory, Green Plantation, Solar panel installed, Use of day lights	Variety Clothes production, Localized accessories and trim supply, Smart Production Planning for efficiency	BGMEA and BKMEA initiatives, Environment and Labor Law framework, NGO and Workers welfare groups pressure

Brands Representattives(Merchandizers)	Investment in Safety management, No child and force labor in formal factories, Audit mechanism, International collaboration for safety and accidents prevention, Better hygiene and cleanliness	Higg index and Water metering system, Rain water harvesting, Factories use energy saving lights, Green Initiatives (Natural light and tree plantation), Recycle cotton are used, Organic Certification	3D design initiatives, Digital Communication with buyers, Product diversification initiatives, Foreign trade fair and new market search	Brands Audit mechanism, Brands and Suppliers sustainability Parnership, Regular monitoring by regulatory bodies, Four lane road
Third Party Auditors	Accord-Alliance Safety inspection and Retrofitting, Workers Participation Committee (For grievance), Workers consent for overtime, Adequate Fire drill and equipments and electrical measures	Biological ETPs, Export oriented Factories follow Higg Index, MRSL/ ZDHC guideline, Finished product chemical test, Certification Procedure, Energy efficient Servo Motors installed	Serving new markets, Strong Vertical Integration Initiatives, Local entrepreaurs, EPB support for global trade fair campaign , Better crisis management with Government help	Corrective Action Plan (CAP) by Accord and Alliance, Policy Support from Textile Ministry and Department, RMG Associations Proactive role, Retrofitting and restructuring of factories
NGO, Intellectuals and Media	Fair price shops by the Factories, BNBC is followed, Improved Safety and building stability after Rana Plaza, More Fire station	Waste reduction Initiatives, Energy efficient lightings, Day light use, Informal Jhut recycle indsutry, Buyers environmental code and chemical guidance	Government Support fund for RMG, Positive Branding Globally, Digitization to minimize corruption, Export promotion by EPB	Initiation of BIDA (Bangladesh Investment Development Authority), Textile act, 2018

Table 20: Stakeholders perception of Current sustainability Practices and Initiatives

In social side, findings suggested that many dramatic changes happened which were perceived positively by the respondents. The interview respondent said that once prevalent child labour and force labour has been found almost invisible which is evident in the BGMEA sustainability report 2020, currently there is mechanism for worker to participate and share their views via WPC, mechanism available for minimising sexual and other harassment issues, there is anti-harassment committee and Amader kotha helpline initiatives for workers to lodge any complaints. Factories initiated welfare officer to look after workers wellbeing, some big factories installed fair price and discounted shop to support the poor workers, some workplace programs aimed to support workers family education and welfare, there are special measures to support women welfare and empowerment. The findings of a recent study by Uddin et al (2023) shows that social compliances issues like working environment, child labour and workers' rights are properly addressed in the country due to brands and buyers pressure (Uddin et al., 2023).

Bangladesh government in association with BKMEA and BGMEA took a big skill initiative called SEIP project funded by ADB to improve overall skill level of workers in the industry. The industry actors, ministry of textile and concerned departments are aligning their resources to face the demand of 4IR and its tech revolution. Studies supported that Government has set up skill upgradation training institute and providing help towards sustainable manufacturing (Hoque et al., 2022).Worker's health and medical services are getting priority in the factory environment too. Most of the workers said that elementary health facilities, nurse and doctors, smaller clinics are available in most factories, the DIFE working on occupational health and safety side, NGOs, family planning department are working in the factories for maternal health and babies' welfare, welfare project for lactating mother is in effect. BGMEA sustainability report (2020) outlined details health initiatives taken so far including ESOH (Essentials of Occupational Safety and Health) program. Merchandisers, ex auditors of Accord-Alliance and controlling bodies ensured that internal hygiene and cleanliness has improved dramatically along with proper space management, factories have gone through inspection and retrofitting process after Rana Plaza and still domino effect has been effective in keeping the industry on track. Findings show that most factories follow BNBC code for structural stability, there are safety committees to trace and track accidents, workers are more aware and trained than ever before, fire hydrant, sprinkler linkage are supplied enough, electrical and fire equipment are checked regularly and there are fire stations within reach of each factory.

In environmental dimension too, Bangladeshi factories have advanced towards sustainability practices. Field data suggests that some of the established factories already installed biological ETP and running properly. Alongside, proper lab testing of the released chemicals is in action, almost all the factories use MRSL, MSDS and ZDHC in chemical usage and preparation. These practices are mostly influenced by buyer's code of conduct and their 'power' assertion which also provides the supplying firm 'legitimacy' of their business among stakeholders. Buyers' consortiums use third party auditors and their country representatives to monitor chemical practices and direct the factories about the hazardous chemicals, Bangladesh Government and suppliers' association together is aiming to initiating a uniform chemical management guideline along with current practices of penalties, administrative measures and enforcement (Sakamoto et al., 2019). Bangladeshi factories have achieved tremendous growth in achieving LEED certified Green Factory badge, almost 200 factories already achieved it from USGBC and 500 more in the pipeline. Around 60 of these factories are platinum certified while more than 100 are gold standard, out of the top 10 factories globally, 8 are from Bangladesh. This progress already reported by the scholars and academician as Bangladesh is leading the LEED charts (Hoque et al., 2022). Bangladesh government has also initiated green finance initiative and tax rebate for the factories invest in green tech, servo motors, natural lighting, and green space in their premises. DoE and Environment ministry awards environmentally friendly factories each year for their role in reducing carbon emission. Bangladeshi factories have adopted circular economy practices, they are using energy saving lights, energy efficient machines and motors, some factories installed machines which consumes less water. Practices of using solar energy in limited scale, saving heat and natural rainwater, recycling and reusing the materials until the life cycle ends have been in the action too. Coordinating with all the stakeholders and by facilitating above initiatives Bangladesh Government has planned to reduce carbon and Greenhouse gas by 5% by the year 2030 (BGMEA, 2020).

In the business and economic side, the RMG sector has not been advanced much in terms of profitability and capability building. But respondents have observed tremendous growth in developing backward linkage and accessories industry. Alongside, factory owners claim that Bangladesh is slowly moving towards high end diversified and value-added products adding more items in the RMG export product mix and factories have started to serve big brands targeting better CM. Suppliers expressed their interest in exploring new markets globally beyond EU and USA which is evident in literature (Mostafiz et al., 2022). Bangladesh has moved to 3D designing option, digital sampling and invested heavily on online communication

strategy during Covid pandemic, preparation for smart technology and automation is in the process (Mostafiz et al., 2022) which is evident from the factory insiders statement in the current study. There is strategic partnership with the international trade bodies, NGOs, and buyers' consortiums, local representatives of the buyers and merchandisers with the Bangladeshi suppliers. From the state level and industry level, globally positive branding and marketing initiatives have been taken. The most positive side of RMG business in Bangladesh has been the resilient and risk-taking entrepreneur's pool.

Beyond the established sustainability practices along the TBL line, macro level initiatives are also identified by the respondents in chapter four. Government agencies and RMG associations have 'legitimate' authority and 'power' over the supplying firm and their role play is evident from the data extract. Regulating bodies like DIFE and DoE plays a significant role in ensuring social and environmental practices having regular inspection, monitoring and legal measures while BIDA, EPB plays development and promoting role of the industries, there is a dedicated textile ministry and department for overall management and policy support for the industry. Central Government also passing laws for the environmental protection and labour rights and amending the safety laws. The factory owner's association BGMEA and BKMEA have monitoring tools, skill enhancement initiatives, welfare, and training programs, national and international collaborations.

5.3 Sustainability Solutions and Measures

The problems and challenges of textile and RMG sustainability identified by respondents as prominent stakeholders in the findings section and discussed critically with the help of existing literature in the first part of this chapter provides the avenues of solutions as well. Addressing those issues and taking adequate measures can ensure the overall positive sustainability outlook of the Bangladeshi textile and RMG sector. As stakeholders are diverse in nature and different stakeholders possess different nature of Power, their extend of legitimacy also varies and organizations response urgency has varied degree (Roy et al., 2020), the internal and external stakeholders offered their relative suggestions for solving challenges in each sustainability directions. According to Stakeholders Resource Based View (SRVB), all the stakeholders who possess all or any of the stakeholder's salience; power, legitimacy and urgency need to be dealt strategically and their respective resources needs to be aligned to achieved highest sustainability performance (Mani et al., 2020). Thus, all the solutions offered by the

stakeholders with their practical field level understanding can lead the industry to achieve integrated sustainability agenda as presented in the following (Table- 21).

Sustainability Solutions perceived by the Stakeholders				
Stakeholders	Social	Environmental	Economic	Macro-Infra
Govt Officials (Ministries, Departments, EPB)	Skill Enhancement programs, Safe factory internal arrangement, Increased Minimum salary framework, Govt initiatives for Skill training, DIFE and Labor ministry monitoring	Circular economy, Environmental Law Activation, A Chemical management Guideline, Regular lab test of waste water, Stronger DoE enforcement and fine, Advance green tech adoption	Market Diversification and expansion, Value added offering, Backward linkage industry development, Developing new product and new demand, Advance tech adoption and better productivity	Improved transport infrastructure, Improved Port Services, Coordination of public agencies, One stop service (OSS), Digitization to minimize corruption, Business simplification to attract FDI
Regulatory Agencies (DoE, DIFE)	Enabling and Activating DIFE, Ensure Freedom of association, Healthy and Happy workers for better productivity, Yearly Increment, Producing better management personel	Enabling and activating DoE, Online ETP Monitoring by IP camera and live waste water parameter, Follow Higg Index, Use of non hazardous chemical, EIA must be ensured, Circularity and recyling in practice	Premium price offering for sustainable practices, Reduce dependency on raw materials import, System efficiency and Kaizen approach, Lean manufacturing and Innovation	Strengthening Regulatory Framework and agencies, Mass awareness programs by the Government, Balance between business and environmental practices, Reduce Corruption in Customs and Ports
RMG Associations	Protect Human Rights, Ensure Safety and Health, Training and awarenss of workers and employees, Proper Labor Grivevance management, Review the salary structure, Adaptation with technology and automation	Circular Economy, Recycling and waste minimization, Strong framework for solid waste management, Reuse, Positive mindset of factory owners, Certification for organic and recycled products, Cloud based Monitoring	Fair Price offering, Diversified production, Value added and high end items , Branding sustainable practices for economic benefit, Strengthening backward linkage, Industry Image Building , New Market Search	Better BGMEA-BKMEA Monitoring, Sub-contracting Guidelines and control mechanism, Government Incentives for Sustainable practices, Partnership With ILO, UNICEF and such organizations, Efficient Road Transport
Supplier/Factory Owner/Top Management	Skill development initiatives, Better designer and creative people, Skill for higher salary initiatives, Improved professionalim from employee and workers, Quality Education of employees	Recycling the fabric waste Solar and renewable energy, Energy and water effiient machine, Proper Wastewater treatment, Waste minimization, Reduce carbon emission, Rain Water harvesting	Own Design Initiatives and Innovation, Premium price offer for organic products, Higher profit margin for Sustainbaility investment, High margin value added items, Floor price or ceiling price offerings	Assurance of Electricity and gas supply, One stop service for Government approval and licencing, A balanced coordiantion of agencies, Improved Road and port services, Minimised Corruption
Workers/Labor-Employees	Workers Safety net and welfare, Safety precautions, Skilled and Professional mid management, Diverse skill sets, Workers training	Environmental awareness, Proper chemical management, Formal Jhut management framework, Hazardous disposal vendor and	Quality assurance, Timely production, Bargain for Better price, Efficient Machines, Cost effective production plan, Reduce System loss	Improve road transport and internal communication, Continuous Electricity Supply, Stronger Rule play Of BGMEA and BKMEA,

	programs, Health insurance and accidental compensation	authority, Use of Energy bulb, Energy efficient machines	and optimization, Good production planning	Remove raw material dependence on import
Brands Representattives(Merchandizers)	Improved workers standard of Living, Brands Safety audit, Development of critical skill and expertise of workers, Workers adoption of modern technology, Post construction verification of factory building	Proper Monitoring of ETP ,Envrionmental awareness and training, Use of organic and recyled cotton, Waste minimization, Avoid hazardous chemicals, Ground water extraction policy, Green Plantation, Natural lightings	Product diversification and better quality production, Vertical Integration with backward linkage industry, Use of production planning software, Association with big brands, High end products, Promoting Sustainability as Selling point	Advance Technology adoption, Regular Compliance Inspection Mechanism, Buyers Strong Code of Conduct, Partnership between brands and supplier, Subcrontracting surveillance by brands
Third Party Auditors	Healthy and clean environment, Ensure Building stability, Fire and electrical safety precautions, Workers grievance mechanism, Maternity and baby care services, Educated and trained textile Engineers	Installing energy and water efficient machines, Maintaining Ground water extraction threshhold, Water Accounting, Rigorous organic and chemical certification, Maintain Higg Index, Proper Chemical Management	Setting a floor Price/ Price Negotiation Table, Premium price for Organic products, Quality products, Home grown global brand, Tech Upgradation and productivity improvement, Market diversification	Minimize corruption, Strong relationship with Brands and buyers, Ensure Gas and electricity supply, Strengthen internal road and communication systems, Textile engineering internship
NGO, Intellectuals and Media	Skilled workers, Better salary, Workers welfare initiatives, Human rights assurance, Profit sharing with workers, Health insurance inception, Healthy and happy workers	Managing safe discharge of Wastewater and chemicals, Central ETP, A central chemical management guideline, Use of Energy efficient motors	Shared responsibility of brands, Competitive and sustainable pricing, Sustainable brand image building, Reduce dependance on foreign cotton, Vertical integration	Ensure regular energy supply, Improve the ease of doing Business, Improve customs and port facilities, Find a Balance between Social and environmental cost and business Operation

Table 21: Sustainability Solutions and strategies offered by Stakeholders

5.3.1 Social Sustainability Solutions in the Context of Bangladeshi RMG

The field data of this research endeavour finds workers wellbeing, proper salary framework, ensuring health and safety, compensation and insurance, proper skill development and adequate education to be the solutions of the crisis on the table. Skill enhancement and training initiative can be the biggest step in saving the industry's future crisis and workers livelihood. If current industry skill level (less than 50%) persists, Bangladeshi apparel sector will face existential threat in the future. To face the challenge of fourth industrial revolution and technological advancement, there is no other alternative other than acquiring expertise and adapting to the new environment (Uddin et al., 2023). Interview extract proposes that enabling and equipping the mid-level management people with modern management techniques is necessary as most of them have once been entry level workers. Study provided evidence that business enterprises run by people, they are the most valuable resources for the organization and properly educated and qualified personnel can make big difference (Uddin et al., 2023). Many of the respondents expressed that for the RMG industry to flourish, factories and supplying firms should employ quality and talented graduates in top and middle management for which quality education must be ensured. As safety concerns remain a big threat for the industry still, experts suggest two main solutions for the RMG factories of Bangladesh. Firstly, continuous vigilance and monitoring of risk factors which can generate accident and fire, factory workers and employees are still reluctant and not aware enough. Second critical suggestions derived from the interview is to introduce the post construction verification of factory facilities as environmental department and building approval authority verify only before construction. Health, hygiene, and medical needs must be addressed as factories provide the workers with basic medicines only leaving them helpless in case of critical illness and smaller factories do not have any medical facilities at all. Moreover, there is no health insurance system in Bangladesh and there is no system in place for compensation for accident and physical damage to the workers or death, these two services must be ensured to avail highly productive workforce. In this regard, modern leadership techniques should be adopted where healthy, motivated, and happy workers could bring their best output. Physically and mentally unfit workers cannot give best of their effort and thus impact the productivity negatively. As nearly 80 % of the textile and RMG workers are women, special care and arrangements for them are prerequisite for growth of the industry. Industry actors believe that some positive actions can change the scenario in favour of more female management positions and their empowerment. Childcare centre, breast feeding corner, anti-harassment approaches can help female workers feel more comfortable. All the

respondents agreed that salary review and new minimum wage determination is the demand of time. A recent article argued that salary must be reviewed as soon as possible and buyers should take responsibility of fair return and fairs wages (Alghababsheh et al., 2023). To provide a framework for social sustainability issues the preconditions can be summarily narrated; there would be no child and force labour, there would be standard working hour practice with no discrimination, there must be a proper compensation system for accidents, workers can be freely express themselves and form association and workers health issues must be addressed along with the safety measures in the workplace (Winter & Lasch, 2016). Especially, to activate workers as 'legitimate' internal stakeholder group who can exert 'power' and demand 'urgent' attention, they need to be skilful and organized with their voice. In this regard, being legitimate and powerful stakeholders, government agencies must enforce legal measures to empower the workers and support their claim against the factories. In their study Bubicz et al (2021) argued that proper monitoring over all tiers with decent work environment for the workers, generating jobs and decent income can ensure social sustainability.

5.3.2 Environmental Sustainability Solutions

Solving the issues raised in the environmental sustainability challenge's part by the respondents provides the avenues of actions to take and implement. Managing chemical processes properly in the wet processing units with adequate ETP measures, setting up biological ETPs, keen monitoring and regular lab test by the regulatory bodies with modern digital devices are being reported as top priority from the first-hand data. Scholars suggested better monitoring from the government side, better control mechanism from the buyers and close tie with subcontracting units can ensure best ETP practices (Sakamoto et al., 2019). Third party auditors emphasised that a uniform chemical management guideline from the government side is a dire necessity for the industry. Restricting and avoiding toxic materials are suggested by scholars (Raian et al., 2022). Many of the interviewees asked for ground-water extraction and usage monitoring mechanism and policy followed by water accounting mechanism from the government side. Need for such unified water usage policy and optimal usage practices is evident (Shamsuzzaman et al., 2023). Findings warrant a structured system development for the fabric waste and solid waste management as currently there is no formal framework, designated area and no specified organization to incinerate and discard solid/ hazardous waste. Circular economy and recycling of resources, waste minimization issues are already established way out in the literature which are found evident from the findings. Eco friendly productions, circularity, waste reduction, and conservation of natural resources are already prescribed in

established literature (Islam et al., 2020) complementing the findings of current study. Surveillance and monitoring mechanism must be strengthened using digital technological devices, adequate auditing by third party must be in place, proper environmental certification like Higg index, OEKOTEX, Cotton certification should be implemented. Green practices like natural lighting, energy saving bulbs and motors, green space and plantation are found to be effective too. The study of Islam et al (2020) narrated that buyers and brands must use influences to employ circularity, recyclability, waste minimization, energy and water savings initiatives and environment friendly design with organic materials in the operation which complements interview data.

5.3.3 Business and Economic Solutions

Generating revenues and keeping the profitability of the business is in the centre of the economic sustainability outlook. Among broad themes of economic and business policy solutions found in the findings, modernization of production and manufacturing processes, diversifying export product basket with high end fashion items, and improving overall efficiency of the industry and labour skills are of top priority. Efficiency in terms of waste minimisation and lean manufacturing and time bound production planning must be emphasized. Technological inertia must be addressed and upgraded; tech adoption should be realized along with lesser dependence on import of cotton. Bangladeshi suppliers' main destination is Europe and USA where 80% RMG is exported (Hoque et al., 2022), expanding current market and adding new destinations can become significantly fruitful. Suppliers must diversify their market and decrease dependence on traditional market (Mostafiz et al., 2022). Stakeholders, NGOs, and garments association suggested for global positive branding of the industry and proper communication with brands, buyers and international organizations making them responsible and aware. Developing some 'indigenous' brands operating internationally is a suggestion given by some interviewee. In the face of global inflation, high production, and labor cost, to ensure fair price for the suppliers, buyers must be made responsible, and their opportunistic behaviour must be minimized. Floor pricing initiatives or unified pricing for similar product category, reducing the unhealthy price competition among the buyers, making the suppliers skilful in negotiation and bargain are the solutions available to implement as well. Existing knowledge support that better pricing and fair treatment of suppliers from the buyer's side have positive impact on the working conditions, worker's salary and labour welfare (Alghababsheh et al., 2023). Primary data indicates that there must be balance between social-environmental cost and the growth and economic development due to

the RMG sectors contribution. A wholistic study considering all environmental and social costs, presenting with numeric proposition can be a way out to determine the overall impact. With a futuristic outlook, all the stakeholders must come forward, coordinate each other to reach the target of 100 billion USD export target, where the environmental impact, chemical pollution and social sustainability risks must be considered. Capabilities and resources of all the stakeholders must be in coordination so that synergistic impact can be achieved.

5.3.4 Macroenvironmental/ Government (Infrastructure and Logistics) Solutions

RMG entrepreneurs have been trying relentlessly to expand the export portfolio and bring growth to the textile industry. Findings suggest that the industry requires government and state level intervention for smooth functioning and sustainable growth. Improving internal communication and transport logistics has been identified as top macroenvironmental priority in this study. Transportation of finished products from production point to the point of shipment must be made hassle free, Dhaka-Chittagong highway maintenance including clearing road blockage and roadside shops must be given emphasis, factory-to-factory transport, transport of raw materials should be made convenient too. Improved services including easier documentation process, corruption free port services and customs clearance, skilful and swift clearing and forwarding are the initiatives prescribed by data extract. Deep seaport is a dire necessity for the RMG industry of Bangladesh. Strengthening RMG centric government agencies; DIFE, DoE, BIDA, Textile and Jute ministry and department, other concerned ministries must be given importance. Coordination among these agencies and ministries is much needed alongside. Energy infrastructure is another area the study finds macro intervention is required from the state level. National electricity grid must continue enough electricity supply to meet the demand of textile factories to minimize non-productive idle hours and wastage of resources, a steady supply of gas to the factories who produces their own energy must be ensured too. Maintaining water extraction policy and water accounting must be in place as the country is having saturated groundwater supply already. One macro proposition suggests developing a legal framework to bring the subcontracting units under proper monitoring and surveillance involving relevant stakeholders ranging from government bodies, buyers and their representatives and lead suppliers. Initiatives should be taken to mainstream tier 2 and beyond smaller subunits and helping them thrive rather than punishing and blaming them. In their study Sakamoto et al (2019) focused that shutting down and punishing the small factories out of business should not be the target rather government and other stakeholders should provide help to make them responsible (Sakamoto et al., 2019). There is no institutional

set up or body to evaluate the overall environmental and social cost/ impact of the RMG industry of Bangladesh, and thus a macro study detailing the economic cost of the environmental impact on natural habitat and social sacrifice must be measured and compared against the economic value it creates.

5.4 Discussion of ISSCM model development with theoretical base

5.4.1 Sustainability Integration

Although the notion is accepted that all the sustainabity dimensions are interlinked and interconnected and sometimes interdependent too, an integrative aproach in the literature is rare (Köksal et al., 2017). In this context, current study offers a comprehensive understanding of TBL dimensions adding an additional macro dimention developing a true sustainability integration in the RMG and Textile sector of Bangladesh. First hand data indicates that economic and business sustainability drives other dimensions to flourish. Financial strenghth and capability can help factories and supply chain actors to invest for better social practices, better salary for the workers and greater environmental protections. Morever, macro-infrastructural development requires capital investment, so revenue earning and profitability is inevitable. One of the major issue of environmental sustainbaility is the capital investment in green technology adoption, ETP installtion and operation by which treating the waste water is done, going for ZDHC (Zero Discharge and biological ETP installation requires one time huge moneytary involvement. If suppliers and factory owners do not get fair price for their final products, they can not improve overall sustainbaility outlook. The current study found that among the buyers-supplier-workers relationship, brands have the edge and exercise strategic 'power' to control the price and leave sustainability responsibility mostly on the suppliers. Suppliers again exploit the workers and use their institutionl 'power' to keep their salary minimum. Sometimes the owner of green factories expect that their green initiatives would be appreciated by the brands and they would get better return. Respondents shared the idea that without better social sustainability the productivity of the operation decreases, they say that healthy and happy workers and employee can achieve greater production valume. Although environmental management requires huge cost, need longer payback period and sometimes does not directly offer any economic benefits, the green tech requires less chemical and water, less energy which in turn provides operational efficieny. On the other hand, stakeholders opined that positive social and environmental outlook gives the supplier competitive edge as the brands feel confident to give orders and can brand themselves 'sustainably sourced' in the

mind of ultimate consumers and thus attracting bigger consumer base. By the way the brands and suppliers and other supply chain members become economically benefitted. Sustainbaility practices provides competitive advantages over the rivals (Hollos et al., 2012). In the end all the TBL dimensions and macro-infrastructural issues are inter dependent and only integrative approach can attain complete sustainability in the given industry. Literature suggests that sustainability inherently denotes the integration of all the sustainability dimensions, and intersection of all the dimension can ensure environmental, social and economic goals of the firms (Carter & Rogers, 2008).

5.4.2 Model Development

Based on the first-hand data findings from the interview respondents, an Integrated Sustainable Supply Chain Management model of Bangladeshi RMG and textile industry has been developed. Following the TBL lens, industry sustainability challenges, contemporary practices, and possible solutions derived from the findings are conceptualized to attain a comprehensive model of sustainability management of the industry. Most of the findings are supported by the already established literature as narrated in the above sections in this chapter. Along with the established TBL model, a new dimension has emerged from the field level interview data which is incorporated in this study as macroenvironmental dimension. Although most of the sustainability literature revolves around social, environmental, and economic dimension, significant first-hand data in the current research endeavour warrants macroenvironmental (Infrastructure and logistics) dimension to be considered separately in evaluating sustainability challenges and offering pragmatic solutions. Findings provides the rationale that the infrastructural and logistics support plays an important role in offering a sustainable textile supply chain management environment. Challenges, current initiatives, and possible policy suggestion regarding the macro dimension is a unique contribution of this study which has never discussed before in this way. The model shows that for RMG and textile industry of Bangladesh to be truly sustainable, social, environmental, business-economic and macroenvironmental issues must be addressed properly according to stakeholders' compliance requirement (Freeman, 1984).

The current research found that subcontracting factories and factories in the distant tier are out of any control and surveillance mechanism which is massively ignored in the textile supply literature so far. The triple TBL sustainability practices and government regulations are mostly ignored in the smaller subunits of the tier two and beyond. Beyond tier two, stakeholders cannot reach, their influence does not work. Most of the subcontracting units are beyond the

surveillance of buyers, NGOs, Government bodies, supplier organizations, international watchdogs. The industry's internal strength and capability is also limited to monitor the tier 2 and beyond. Buyers' representatives and merchandizer explicitly expressed their inability that they mostly monitor the first-tier supplier and sometime nominate second tier to supply for first tier. Independent auditor and assessor of the sustainability practices confessed too that they focus only for the exporting lead supplier. Following the stakeholder's theory lens, it is hence proved that beyond second tier, reaching and influencing the operations of subcontracting units, maintaining sustainability practices like environmental precautions and workers welfare, safety and health issues by the stakeholders are barely existent. Extant literature in the field of sustainability of textile supply chain covers very little of this anomaly. Moreover, the current study provides the evidence that some of the stakeholders knowingly ignore the malpractices of tier two and beyond. Buyers and their local representative ignore the hidden practices so that they can maximize their profits and government bodies in the country to administer their duties overlooking the negative practices. The country focuses more on revenue and foreign currency earned rather strictly maintaining sustainability measures thus allowing the agencies to be much more flexible in implementing the environmental and labour laws. Following stakeholder's theory, it can be said that brands, government bodies, and associations have 'power' and legitimacy' (Mitchell et al., 1997) to influence factories and suppliers but their lack of adequate information, conflict of interest and unwillingness to go beyond limit leads to unsustainable firms' behaviour. Following the stakeholder's salience, government regulatory bodies, brands and RMG associations have the urgency for the factory managers to attend and listen to as they can directly force and act immediately to exert their power over the suppliers.

This incapability also unfolds gaps of Stakeholders resources industry lacks in line with the Stakeholders Resource Based View (SRBV) by Sodhi (2015) and can be result of stakeholders conscious influencing strategy as par Frooman (1999). SRBV considers stakeholders as resources for the firm which can give competitive edge over the competitors (Mani et al., 2020). Depending on the resources strategic stakeholders possess determines how much 'power' and influence they can exercise on the focal firm (Frooman, 1999). In the given context, internal and external stakeholders of Bangladeshi textile and RMG sector have their own resource incapability and inertia to act upon. Thus, still skill level of the industry has not been updated comparing with the global standards, workers salary, health and safety issues have not been addressed properly to improve the efficiency and capability, incapability regarding the environmental management, inadequacy of ETP and chemical practices and pollution control

makes capability of the industry stakeholder resources questionable. The industry faced challenges in managing dynamic resources regarding demand fluctuations and order cancellation in the face of Covid pandemic and war situation, finding new market destination, the industry has been unable to cope up with the price bargain assuring strong CM. In case of RMG and textile of Bangladesh, management capability of social sustainability issues, management of environmental and ecological balances, simultaneously keeping economic perspective have been found structurally weak. Analysis of stakeholders influence and their relative importance shows that buyers and owners bodies like BGMEA and BKMEA can influence the operation of suppliers practices (Huq & Stevenson, 2018). Same study said that having influences over the suppliers, buyers look for opportunism and ignore the violations where their interests are involved which is coherent with the current study's assumption. Following Frooman (1999)'s notion of buyers being the strategic stakeholder can influence and control the suppliers resource mobilization to a greater extent, they only focus on their profitability. RMG and textile sector is facing challenges which is evident from the findings that human resource pool of the industry is not yet ready to adopt automation and advance operation, modern advanced sustainable machineries yet to install for better efficiency and resource conservation, Bangladeshi RMG is not yet ready in adopting high margin/ high value items production and the industry has proved its vulnerability in the face of changing circumstances during Covid pandemic and war.

Although for sustainability management, stakeholders and their resource base are evidently insufficient, positive initiatives cannot be ignored. The model visualized the contemporary positive initiatives taken in all sustainability dimensions where all the stakeholders mobilized and synchronized their resources to attain sustainability goal. In the final stage of the model, possible solutions and remedies to the sustainability issues raised for the stakeholders, industry actors and practitioners are presented.

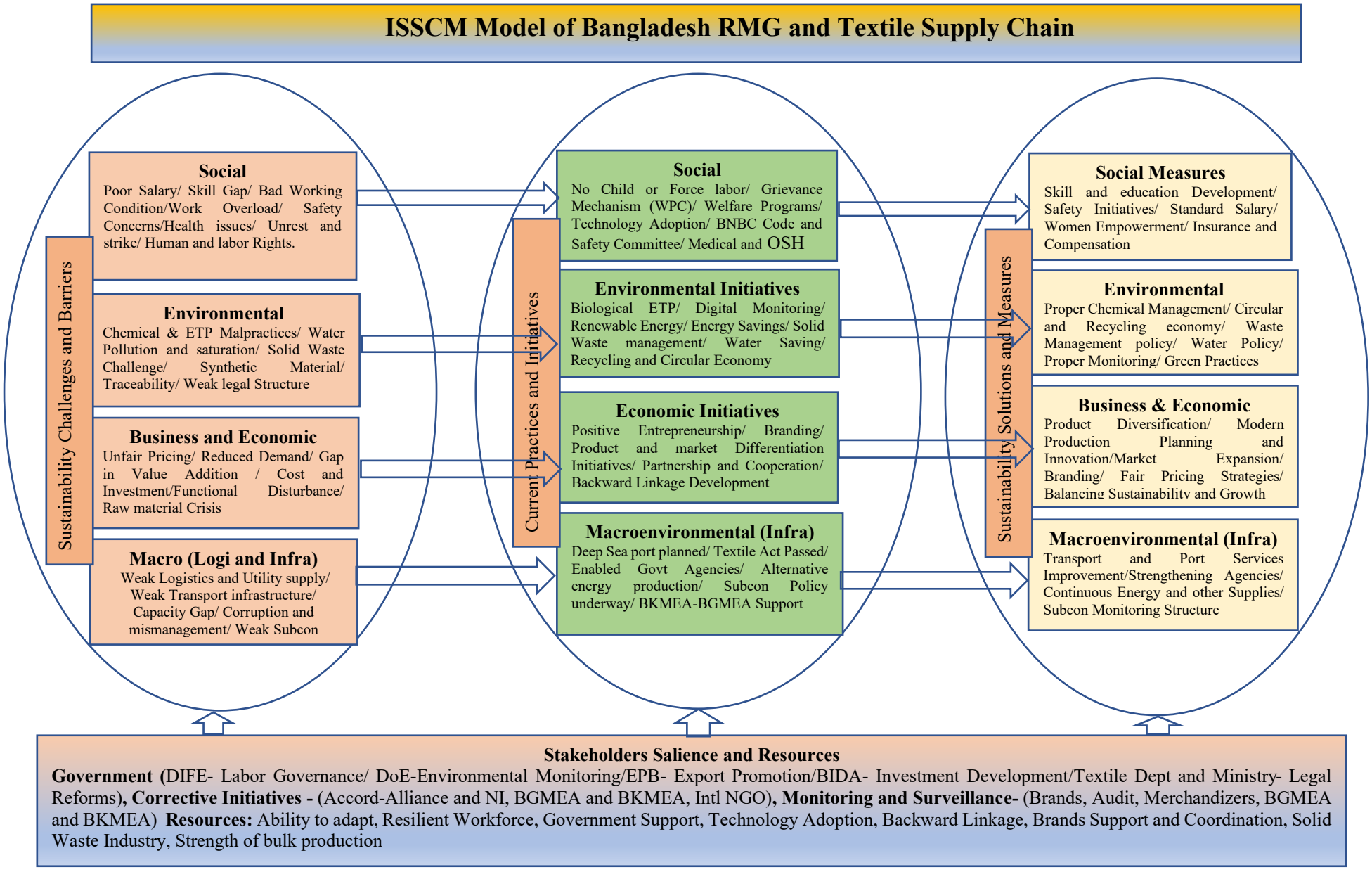

Figure 12: Integrated Sustainable Supply Chain Management Model

Chapter 6 Conclusion

This chapter provides a summary and overview of the whole research project starting to give a brief context and then moving towards answering the research questions and research objectives. After that the theoretical and practical contribution of the research are discussed followed by limitations of this research project and direction and suggestions for the future researchers in the field.

This research endeavour consists of six chapters where the first chapter offers the background and context of textile and RMG industry of Bangladesh along with the overall sustainability challenges and industry outlook. Chapter two deals with a detailed systematic literature review of SSCM literature of last 20 years to sum up the trend in the sector. TBL lens have been used to conceptualize the literary findings and finally selected the same along with stakeholders' theory as the theoretical foundations. Stakeholder identification and stakeholder's salience have been employed to theoretically ground the findings. Chapter three provides the details of research methods used in this research and offers the logic of using qualitative research design, selecting a semi structure interview protocol to collect the research data. Chapter four consists of three parts (Part A, Part B and Part C). Part A describes all the relevant challenges and issues RMG, and textile supply chain of Bangladesh are facing currently in ensuring sustainability practices as extracted from the interview transcripts, Part B illustrates the current sustainability practices and positive initiatives taken so far and Part C discusses the solutions and remedies to the existing sustainability challenges in the same industry set up. In this chapter all three parts of the findings are presented following the TBL lens and an additional Macro-environmental dimension. In the chapter five, the discussion of the findings and relevant literary argument and supportive evidence are provided in line with the TBL and macro-dimension lens and stakeholders theory and Stakeholders Resource Based View and finally an Integrated Sustainable Supply Chain Management (ISSCM) model is developed.

The current chapter (Chapter six) offers the conclusion and a comprehensive summary of the whole research project.

6.1 Addressing the Research Questions

RQ 1. *How to identify (What are the) the challenges and issues of sustainable practices of Textile and RMG industry of Bangladesh following TBL lens?*

Following Triple Bottom Line (TBL) lens of Elkington and stakeholders' theory, identifications and salience, this research endeavour tries to locate and understand all the possible sustainability challenges and barriers the Bangladeshi RMG, and textile supply chain are currently encountering. From the interview transcription challenges in Social, Environmental, Economic and Macro-environmental dimension are identified. In both social and environmental side, most common challenge is facing by the industry to ensure environmental and social compliance in distant tier subcontracting units. On social front, these unidentified, unregulated factories cannot ensure proper salary for the workers, their salary payment is irregular, safety and working environment is poor. On the environmental front they do not have any ETPs or chemical treatment plant, they release water directly to the river, release the solid waste and fabric waste to the open landfill. Major other social issues found by this research revolves around lack of skill among the workers and employees, especially industry skill level is understood to be below 50%. In the environmental side, water pollution by chemical discharge and destroying the water resources has been found the leading challenge. There is no common chemical management guideline from the government side and thus hazardous chemical use is still there. Solid waste management is still in the informal shape, there is no legal framework yet and releasing fabric and plastic waste to the open field is common scenario. In Bangladesh there is no ground water extraction policy and thus most of the factories use ground water without any restriction and this excessive water usage has made the ground water level deeper and saturated already. Bangladeshi garments factories and suppliers are facing serious problems in regards of CM/ Price of their finished products. Brands and retailers are in a better bargaining position and control the price from their end, suppliers' complaint about buyers' opportunistic behaviour while suppliers have ugly price competition and weaker negotiation capability. Overall decreased demand globally, inflation, saturated market and order decline have been major economic issues for the industry, especially after Covid and on-going war. In the macro-environmental front, disruption in regular electricity supply and rampant loadshedding is rated as the most critical issue, gas supply also has become saturated already. Internal road communication infrastructure and road to Chittagong port for transporting raw materials and finished good have been reported poor, broken, and unusable

due to loadshedding. The gateway to Bangladesh and main shipment hub Chittagong port is already stressed and overburdened, corruption, complex documentations, and capacity gap makes the port services a nightmare for the suppliers. Corruption in other licensing and approval bodies, regulating agencies and over all government monitoring also critical for the RMG business in the country.

RQ 2. *How to find the sustainable solutions to the challenges and barriers considering the contemporary industry practices?*

After the massive Rana Plaza Accident, Accord and Alliance took initiatives for rectifying the social and environmental practices along with the local suppliers and Bangladesh Government. During their auditing, almost all the factories of Bangladesh have been through retrofitting procedures and CAP (Corrective Action Plan). As all the stakeholders acted promptly, the safety and building stability issues have been improved dramatically in the Bangladeshi factories. Following the trend at present BNBC code is updated and internal fire risks have been mitigated. Now factories are accustomed to sprinkler system, enough firefighting equipment are available. Most of the export-oriented factories adopted fire door, proper exit and shelter space, fire drill and adequate training of employees to mitigate fire and electrical risks. BKMEA and BGMEA are more actively engaged in updating the sustainability practices in their member factories, they have initiated SEIP skill development project in association with ADB and Bangladesh Government. All the factories-initiated Workers Participation Committee and provision of welfare officer to mitigate grievance in workers level, there is Amader kotha initiatives for saving female workers from any form of abuse and sexual harassment. In the environmental compliance side, most of the factories follows brands code and chemical guidelines, RSL and MSDS, Higg index is respected, big factories are adopting biological ETPs, exercising lab test before shipment. Most of the factories are working to adopt circularity in their operation, deploying energy saving mechanisms like energy efficient Servo motors, natural lighting, and renewable energy transitions by solar panel. From Government side too, a strong environmental law is there, tax rebate and green financing available for sustainable factories along with awards and recognition. Due to comprehensive arrangement of all the concerned stakeholders, Bangladesh is leading the chart of having 178 LEED green factories certified by USGBC among which top 7 are from Bangladesh. In the economic dimension, EPB and suppliers combinedly trying to expand the traditional market and finding more diversified advance product categories. 3D design initiatives, smart production planning, along with risk taking entrepreneurship are driving the industry. From this discussion, it is

evident that the RMG and textile industry of Bangladesh has come a long way and aiming to achieve true sustainability.

To satisfy part of the research question two, this study offers avenues of sustainability solutions to the barriers and challenges already presented. One way of looking for the solutions is to solve the issues raised by the stakeholders and mitigate respective challenges. Most prominent specific solutions suggested by the respondents are briefly discussed following the four dimensions of sustainability. In the social aspects, the highest importance has been given to increase and enhance the skill set of the workers and the industry, quality education must be ensured, enough training arrangement must be there, diversified critical skill must be emphasised. Along with the skill development, proper wage framework for the workers and employees is found to be of paramount importance as they are struggling with their livelihood. Although safety and building stability initiatives have been taken, still safety awareness of the workers, adequate safety and fire training, post construction verification of the factory facilities must be brought into consideration. For better health of the workers, health insurance must be incorporated for each and very employees. On the Environmental front, factories must invest in deploying biological ETP as this is the modern tech of treating effluent and operation cost is significantly lower, proper regulating and monitoring ETP operation has to be ensured. A proper chemical management guideline, ground water extraction and usage policy and legal framework for solid (fabric) waste management are the solutions for a well-planned environmental management of the industry. Energy and resource saving initiatives, waste minimization, circular practices, more advance energy efficient machines, energy saving lights, using natural lights, stricter monitoring and proper certifications should be implemented.

For the business and economic sustainability, Bangladeshi RMG and textile sector should diversify its product line and export basket, especially higher margin fancy items must be added. Moreover, Bangladesh should look for reducing its dependence from current traditional EU and US market and look for new market destination. Along with product upgradation, ensuring fair and equitable price for the finished product, maintaining shared buyers' responsibility, and improving price bargain/ negotiation capability of buyers can improve the overall sustainability outlook in all dimensions. Lean manufacturing, system efficiency increase, cost minimization in the operation can also offer economic benefits.

In macro and infrastructural side, first and foremost intervention the government and macro stakeholders must do is to ensure continuous electricity and gas supply to the factories for

uninterrupted production, loadshedding in the industrial zone must be minimized. Second most crucial intervention is needed to upgrade the transport infrastructure, internal roads to carry raw materials and finished products to and from Dhaka to Chittagong port. The roads are already broken, over stressed, traffic jam is paramount, should be upgraded as par demand. Moreover, the Chittagong port facilities, corruption of customs and port authority must be cut down to a tolerance limit. Coordination and cooperation among the concerned government agencies, enabling the regulating bodies so that more sub-con units can be monitored, minimizing corruption among licencing and approval authorities must be addressed. Respondents suggest that for the overall sustainability program, Bangladesh government should conduct a wholistic study calculating all the social and environmental costs in numeric terms and compare with the economic contributions and then design the sustainability umbrella program.

RQ 3. *How to develop an integrated sustainable supply chain management (ISSCM) framework for RMG sector of Bangladesh?*

In answering the third and final research question, this study designed an integrated sustainability model of RMG and Textile supply chain of Bangladesh where all the sustainability challenges, contemporary initiatives and solutions to the identified problems are integrated. The model follows TBL lens (Social, Environmental and Economic) to identify sustainability barriers of Bangladeshi RMG supply chain and to offer respective solutions and added one extra dimension from the field data to it, macro- environmental issues to describe and elaborate the whole picture of the industry. The summary model encompasses all the stakeholders compact view and allows stakeholders theory to be incorporated along with the respective stakeholder's salience. As integrative sustainability approach in textile supply chain literature is rare, and an additional dimension added in this current model, this offers a unique broader bird's eye view of the sustainability perspective. As current literature suggests that most scholarly studies in respect of developing country fashion supply chain are centred on partial sustainability agenda, this model offers a complete guide to the practioners and industry actors for sustainability practices. Moreover, in theoretical front this model extends stakeholders theory and salience models horizon within TBL framework.

6.2 Theoretical Contributions:

6.2.1 TBL of Sustainability Integration in a Developing Country Context

After coining the concept of Triple bottom line of sustainability in 1994 by Elkington, numerous studies have been done following the framework in different industry perspective. In textile and fashion supply chain too, triple helix of sustainability has been in discussion for a while, but as mentioned in the literature and introduction part, most of the studies focused on a single dimension, some studies incorporated two dimensions too but integrated approach to understand impact of environmental, social, and economic in a developing country context are limited (Köksal et al., 2017). In SSCM framework of (Carter & Rogers, 2008), they proposed that TBL must be integrated for sustainable supply chain but still date integrative approach is scarce in academic arena. In the given context, sustainability challenges and solutions are presented from a bird's eye view where a wholistic model has been proposed in this current study. The study argues that attaining partial sustainability goal cannot solve the unsustainable practices thus an integrated strategy where environmental issues, social challenges and economic barriers must reconcile together and offer composite solutions. The study confirms the notion that there must be balance among all the sustainability directions for achieving true sustainability (Hollos et al., 2012). The study advances the understanding of TBL integration in offering evidence that sustainability directions (environmental, social, and economic) are interlinked and inter-dependant and thus no single dimension can be addressed independently. From the detail findings and discussion it is evident in this current research that each of the sustainability dimension in simultaneously separate from each other and again complementary and interlinked as described by (Köksal et al., 2017). Social and environmental dimensions require financial strength and investment capability, which is directly linked with the economic aspects, while social and environmental compliances always give the suppliers firms better brand image in the eyes of the buyers, buyers on the other hand can claim sustainably sourced tag and earn consumer confidence.

6.2.2 Proposing New Sustainability dimension for TBL

Triple Bottom Line (TBL) of sustainability has been a revolutionary framework in the sustainability discussion from its inception in 1994 and still ruling the literature. From the ideation of the concept, three directions have been distinctively identified by Elkington to conceptualize sustainability namely, social, environmental, and economic dimensions (Rovanto & Bask, 2020). Social dimensions centred on the workers life, safety and health

issues and community development while environmental direction encompasses water and river pollution and its control, poisoning the landmass, resource, energy and water consumption and saturation issues and resource saving, waste minimisation, reuses and recycling while the economic side revolves around the profitability and revenues generating elements which is denoted as People, Planet and Profit by Kleindonrfer at el (2005). But interestingly, in elaborating the issues and solution of sustainability in RMG supply chain of Bangladesh, a new dimension has emerged from the first-hand data in the current study, Macro-environmental and infrastructural dimension. Respondents expressed that for ensuring sustainability practices of the industry, macro-environmental management from the government and stakeholders' side is necessary. Bangladeshi RMG and textile factories are severely affected by energy crisis, regular power cut, gap of gas supply, textile, and raw material channelling on time. Macro-infrastructural issues such as: untenable road and transport infrastructure of internal communication, fragile Chittagong port facilities need immediate attention from the government. Moreover, rampant corruption of government licencing bodies, customs, port and regulating agencies, lack of coordination among ministries and public bodies concerning the industries need to be addressed from broader perspective. Although, there is governance literature available for fashion and textile industries, a fourth sustainability dimension describing macro-environmental outlook is a theoretical contribution in the research from the data findings.

6.2.3 Extending Stakeholders theory, Salience Model and SRBV understanding

This study incorporates the stakeholder's theory in the context of Bangladeshi RMG supply chain and broadens the understanding of stakeholder's literature in a developing country setting. Firstly, from the stakeholder's theory, a particular tenet, stakeholders' identification has been used to locate the relevant stakeholders of RMG and Textile industry supply chain of Bangladesh following the study of Tighe (2016) and Huq et al (2016). Prominent stakeholders such as: Government and its officials, regulating bodies, suppliers and factory owners, merchandisers and buyers' representatives, workers, and employees, RMG associations, third party auditors and NGOs and civil society members and their understanding and sustainability solutions have been explored in a developing country RMG industry setting which itself provides a unique theoretical proposition. Alongside, stakeholder's salience and attributes: Power, Legitimacy and Urgency as developed by (Mitchell et al., 1997) have been adopted to get in-depth knowledge of stakeholder's influence and strategic roleplay. Not only the essence of stakeholder's theory be generalized in a new setting here, but also new avenues of knowledge

discovered regarding the power imbalances and asymmetry among the stakeholders. From the top-level, foreign buyers and global retailers enjoys unanimous power over the suppliers and dictate suppliers' group by opportunistic pricing, regulations and opportunistic behaviour. On the other hand, suppliers and manufacturers always push the workers at an edge with poor salary and inhuman workload where in the absence of proper trade unions, workers cannot exercise any power leverage over factory owners. Availability of cheap labours and skill gap also give factories undue power. This lack of power and responsibility balance, illegitimate behaviour of different interest groups makes the business unsustainable in the long run which is a new insight for RMG supply chain. Against the backdrop of general understanding of positive impact of combined stakeholders resources, this study offers a differing position where SRBV produces a negative externality as stakeholders does not work harmoniously and their strengths are not mutually benefitting.

6.2.4 Multi-tier Supply Chain Management and Subcontracting Challenges

Although this research did not focus on theories relating to Multi-Tier Supply Chain scenario regarding Bangladeshi RMG and Textile industry, as a natural consequence, from brands to tier one, tier two and beyond, suppliers' operation has been covered. In a multi-tier setting, sub-suppliers and subcontracting units bypassing of sustainability practices is a serious risk (Jamalnia et al., 2023). Bangladesh is mainly a sourcing destination for the European and US brands, for which managing a long multi-tier supply chain from the brands outlet to suppliers' production units, backward factories and subcontracting smaller sub-units is a challenging task (Gong et al., 2018) and thus sustainable practices monitoring over the whole chain is almost impossible. This is a sign that the theoretical understanding of stakeholder's salience; power and legitimacy does not work properly in case of Bangladeshi RMG industry. Findings suggest that there are many smaller factories operating and subcontracting on behalf of the focal supplying firms in Bangladesh and most of these informal units are beyond monitoring and control of lead buyers, government agencies and RMG associations. These findings substantiate that influential and powerful stakeholders cannot exercise their legitimate stake to ensure sustainable practices. A lot of these factories and units are unidentified and untraced by the regulating bodies and brands auditors. Beyond tier two, social and environmental mal-practices and non-compliances are rampant and regular as reported in this research but the responsible parties and stakeholders are unable to reach to subcontracting level (Gold et al., 2020). These distant-tier unrecognised and unidentified production units do not have any legitimacy and legal approval thus they cannot take part in sustainable programs and reforms

too. This Multi-Tier Supply Chain failure in case of Bangladesh and other emerging sourcing destinations of RMG products are not well documented, well researched and represented in academic arena in clothing and fashion supply chain literature. This power asymmetry, lack of monitoring, control and lack of legitimacy of some of the stakeholders in attaining supply chain sustainability is new to the literature. This is where this research project has contributed and provided direction for the future researchers.

6.3 Practical Contributions

For the local suppliers: The study findings offer a comprehensive discussion of sustainability challenges consistently relevant to the factory level and thus the local suppliers can get a broader sustainability perspective. Moreover, the research presented the practical solutions and adequate remedies to fight the issues in an organized manner. Thus, the suppliers can develop greater environmental and social outlook, they would see the importance of a better salary and better working environment for more productive workers, the factory owners and suppliers must focus on the skill enhancement of the workers, especially critical skill development must be on their agenda. In the environmental front, the suppliers and factory management must initiate waste minimization, reuse and recycling, circularity in the operation. Adopting energy efficient machine, Biological ETP, solar energy, green practices, water saving and rainwater harvesting in the factory premises are sustainable environmental way out. For better economic results, suppliers must coordinate and cooperate with other fellow suppliers for better price negotiation, for better bargain of their sustainable initiatives. Summarily this research endeavour can help suppliers, exporters, and practitioners in designing better sustainability action plan.

For Government and regulatory agencies:

This research provides practical insights for the policy level government administrative bodies, ministries and regulating agencies relating to the RMG and textile sector. The ministry of labor must revise the minimum wages from 8200 Taka to a rational level as workers are struggling with their current living standard. The textile ministry should update the syllabus of the textile engineering colleges, institutes, and vocational institutes to provide skilled and efficient workers and employees to the industry. The labor law regulating DIFE must be embolden and strengthen with capacity and capability so that this organization can look after the workers' rights better and keep the factories ensure labor welfare. For the safety, concerned government

bodies like fire service and civil defence, building authority must work in coordination with the factories. The central government must ensure regular electricity and gas supply which is the biggest challenge assumed by the suppliers and factory owners. Communication infrastructure, roads to Chittagong port must be made compatible to the demand of RMG products smoother transport. The Chittagong port authority and customs services must be aligned with the production capacity and shipment volume of the RMG finished products. One of the major anomalies is that there is no common chemical management guideline from the government side of Bangladesh and there is no formal framework for solid waste disposal, so government and policy level actors must act on this. Government must formulate a water usage and ground water extraction policy for the industry.

For the Retailers and Brands: European and US fashion brands and retailers like Bangladesh as a sourcing destination for their products, the cheap labor and cheap production costs attract them to Bangladeshi Suppliers. One of the major suggestions found in this research is that the brands must consider the local suppliers as their partners and help them attain sustainable goals. Brands cannot grow alone; long term sustainability requires shared responsibility from the buyer's side too. Buyers' opportunistic behaviour can hamper the sustainability goal of the industry as price of the finished goods is the only way from which the suppliers generate revenues, earn profit, ensure fair wages for the workers, and invest in sustainable machinery and installation. Suppliers must ensure proper auditing the whole channel from the tier one focal suppliers to their subcontracting units, their third-party auditors must visit the backward linkage composite units.

For RMG Associations: BGMEA and BKMEA are two strong association of RMG manufacturers operating in Bangladesh, although they do not have direct regulatory power, they can exert their power and influence even more than the government regulatory bodies. The foreign buyers do not place orders if a factory is not a member of either organization. As a result, these organizations have responsibilities to ensure labor welfare, human and labor rights, environmental compliances in their member factories. Moreover, for skill enhancement and productivity improvement, regular training arrangement, skill programs, awareness session must be organized. They must do policy advocacy and help government to formulate sustainability friendly policies. This research findings can function as a guideline for these organization in better monitoring and managing member factories and contribute more proactively.

6.4 Research Limitations

Like all other research projects, this endeavour has its own limitations and drawbacks. First, this study is a qualitative project, and data has been collected via semi-structured interview protocol. Initially plan was to conduct the interview physically meeting the respondents in person so that more friendly, cordial discussion and emotionally intelligent response can be obtained. But due to Covid 19 travel restrictions and local safety precautions, the interview has been done using telephone and online calling platforms. Every attempt has been taken to make the respondents comfortable during the interview and bring out the best information from them, still in person interview could have been a better tool.

Second, the study follows a purely qualitative structure where interview participants have been limited in number, their in-depth understanding has been sought in this project. But if the project could have employed a mixed method and a survey could be added, it would bring more comprehensive and generalized outlook. Addition of a quantitative analysis would have strengthened the study findings but due to time and technical constraints, the study chooses to stick to qualitative analysis only.

Third, although data saturation has been reached by interviewing the respondents and interview procedure stopped at a point when there was no new data coming, a Focus Group Discussion (FGD) could improve the data quality. Due to Covid restrictions, the interview has been conducted using internet calling facility mainly and one to one conversation has been recorded, a group discussion would probably bring more interesting facts about the industry and instant views sharing could be possible.

Although the study used stakeholders' theory and salience model to explore industry's sustainability outlook following TBL framework, the focus has been to the problem identification and offering solution rather understanding stakeholders' relative importance based on their 'Power', 'Legitimacy' and 'Urgency' attributes. It's understandable from the data analysis that buyers and brands are the most powerful and influential stakeholders of the industry, but this study did not offer a comprehensive understanding of all the stakeholders comparative importance.

Last, although this research tried to understand the whole supply chain of fashion and RMG industry of Bangladesh, European and US brands and their ultimate consumers have not been interviewed. Brands Bangladeshi representative and merchandisers have been contacted but

European and US brands offices and outlets have been excluded. On the other hand, the distant tier, smaller composite units who gets their job done for the lead and focal suppliers, reaching them, and investigating them require a separate research endeavour and thus could not be added in the interview pool.

6.5 Future research Directions

This research project has contributed to the sustainability integration of RMG and textile industry in the context of a developing country setting by enhancing the interlink of TBL and expanding its horizon. Alongside, the study opens numerous new avenues for the future researchers in the field.

There are distant tier informal factories which are beyond surveillance of Government regulatory bodies and buyers auditing, it is already found in this research that these beyond tier two subcontracting units are the main source of sustainability inconsistencies in all direction, The current structure of Brands supervision, regulating agencies capability and RMG associations membership cannot reach these local unidentified smaller composite units. In this research these units' operations are presented in the eyes of established stakeholders, but direct contact with these factories from the field was not possible. Removing them from the broader literature cannot give the birds eye view of the industry. Thus, this researcher proposes that there must be studies directly visiting these factories and have their views, aims, future reflected in the research. Moreover, future research can propose a model to bring the sub-contracting industries under a formal structure. A surveillance, monitoring and supervision structure involving all the government agencies, BGMEA-BKMEA, Brands association can be offered with pragmatic solutions.

The data provides the evidence that Bangladeshi RMG sector is moving forward to develop its own accessories and trim industry filling the vacuum of backward linkage support but in this research this area could not be touched in detail, possible future researcher can get deeper insight into backward linkage industries prospects and problems. Looking into development of accessories and backward linkage industry and vertical integration can be a great future research field.

This research project is conducted entirely focusing the sustainability paradigm of Bangladeshi RMG and Textile industry and its supply chain, a comparative analysis with competing countries like Vietnam, China and India can be an interesting research setting. Aside from the

competition, these countries can learn and enrich their sustainability practices collaborating each other and thus comparative studies can offer new avenues of sustainability learning. Hence, it can safely be said that comparison of sustainability practices of these countries can be a great field for future researchers.

This study is aimed at exploring Bangladeshi RMG and textile supply chain from the perspective of local suppliers, whereas conducting a study from the viewpoint of buyers and international retailers can be an interesting angel. How buyers perceive the sustainability agenda and how they exert their authority over the suppliers' practices, how global sustainability standard is being maintained in this dyadic relationship can be the focus of future research in this specific field.

Finally, in this current research study the whole industry has been under the discussion and a broader perspective has been taken. For more detail and close understanding, similar sustainability integration study can be done focusing two or three case studies of suppliers. In developing case study design industry 4.0, tech revolution, and carbon taxation can be focused on the future research project.

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Appendix 1-Systematic Literature Review Matrix

Systematic Literature Review Matrix

Author/s (Year)	Sustainability Dimensions/ Theme	Title	Journal	ABS 2021	ABS 2018	Context	Theory Used	Purpose or Research Questions	Research Design & Methods	Key Words	Abstract/ Findings
(Li et al., 2021)	Environmental Performances	Textile supply chain waste management in China	Journal of Cleaner Production	2	2	Developing /Emerging Economies, China	Waste Management	396 textile supply chain factories in China were surveyed to evaluate their waste generation, waste management, and difficulties and challenges in waste management.	Survey, Questionnaire	Waste management, Textile supply chain, Recycling ,Waste streams, Disposal methods, Sustainability	Based on the observations, the predominant problems encountered in waste management included a lack of technical support, lack of support from the government and brands, and shortage of qualified recycling contractor. To resolve these issues, collaborations between the government, brands, and suppliers is imperative. In general, China exhibited more sufficient waste management compared to Cambodia, Vietnam, South Korea, and Myanmar. However, waste management in China and these other countries have great potential for improvement. The results presented herein can provide information for policymakers as well as on systemic waste management in the textile industry
(Khan et al., 2021)	Social Sustainability	Evaluating barriers and solutions for social sustainability adoption in multi-tier supply chains	International Journal of Production Research	3	3	Developing /Emerging Economies (Africa and Asia)	Multi-tier Sustainable Supply Chain Management/ Hesitant Fuzzy set Theory, Cumulative Prospect Theory	RQ1: What are the dominant barriers that hinder MT-SC from improving their social sustainability? RQ2: What are the most prominent MT-SC solutions to overcome these barriers and improve their social sustainability?	LR, Hesitant fuzzy sets; cumulative prospect theory; VIKOR	Multi-tier supply chain; social sustainability; hesitant fuzzy sets; cumulative prospect theory; VIKOR	The results indicate that solutions to social sustainability in MT-SC are sensitive to the supply chain sector. However, there is a general trend toward adopting emerging technologies and openness and transparency-based relationships with the external environment. Managers could use these results to redirect their strategies to promote social sustainability, particularly in low-tier suppliers in under-developed countries.
(Hossan Chowdhury & Quaddus, 2021)	Social, environmental, economic (Financial and Production)	Supply chain sustainability practices and governance for mitigating sustainability risk and improving market performance: A dynamic capability perspective	Journal of Cleaner Production	2	2	Developing country context, Bangladesh	Dynamic capability View (DCV), Supply chain Sustainability	1. To develop, test and validate a multidimensional supply chain sustainability measurement scale in an integrative manner in the context of apparel industry in a developing country. 2. To investigate the conditional direct and indirect effect of supply chain sustainability on performance through reducing sustainability risks at different levels of sustainability governance.	Both Qualitative and Quantitative, model and scale development	Supply chain sustainability Scale development Sustainability governance Sustainability risk Market performance Dynamic capability view	The findings suggest that SCS (Supply chain sustainability) is a multidimensional construct consisting of four dimensions: social, environmental, economic (financial) and economic (production). The measurement instrument of SCS also satisfactorily correlates to the “technical” and “evolutionary” criteria of DCV (Dynamic Capability View). The findings also affirm that the conditional indirect effect of SCS on market performance via reducing sustainability risk is significant at higher levels of sustainability governance. This study contributes significantly to the body of knowledge by developing and validating a multidimensional scale of supply chain sustainability (SCS) and investigating its impact on market performance through a mediated-moderated modelling approach.

(Fung et al., 2021)	Comprehensive (Human and Planet)	Sustainable product development processes in fashion: Supply chains structures and classifications	International Journal of Production Economics	3	3	Global/ LR	Review paper	This is probably the first paper aims to systematically reviews the whole fashion PDPs (Product Development Process) with a focal point on sustainability.	Systematic Revies and Content Analysis	Sustainable product development, Supply chain structures classifications, Product development processes Sustainable production	By examining the product development process in practice and in the literature, the paper identifies the essential steps in fashion PDPs, which include planning, product design, manufacturing, and product launching. It is further classified the product development process into three types, namely the traditional product development process (TPDP), new product development process (NPDP), and sustainable product development process (SPDP) and the key factors of achieving sustainable fashion based on the triple bottom line (TBL) framework regarding the PDP is analysed. A sustainable product development process (SPDP) matrix, which can guide the fashion supply chain members to operate in a sustainable manner during the SPDP is also prescribed.
(Fontana et al., 2021)	Sustainability Compliance	Nominated procurement and the indirect control of nominated sub-suppliers: Evidence from the Sri Lankan apparel supply chain	Journal of Business Research	3	3	Developing countries, Sri Lanka	Nominated Procurement	(1) How do buyers articulate nominated procurement in an emerging economy supply chain? (2) What are the consequences of nominated procurement on the supply chain?	Qualitative in-depth interview, Case Study approach	Sustainable Supply Chain Management, Sustainability compliance, Nominated procurement, Business networks, Emerging economies, Sandwiching	This article contributes to the advancement of the Sustainable Supply Chain Management literature by theorizing about nominated procurement, direct and indirect pressure, and pointing to the supply chain consequences beyond achievements in sustainability compliance.
(Bubicz et al., 2021)	Social Sustainability	Social sustainability management in the apparel supply chains	Journal of Cleaner Production	2	2	6 Global Companies	Systematic reviews followed by Content analysis of Sustainability reports	RQ1: What is the common structure of a global apparel supply chain considering all its key stakeholders? RQ2: How is social sustainability managed in the apparel sector considering the different stakeholders?	Systematic Revies and Content Analysis of Sustainability Reports	Sustainable supply chain, Social sustainability, Apparel supply chain, Social sustainability strategy	The findings showed that social sustainability is a part of strategic goals as policies and commitments, and several actions have been developed along the supply chain to promote human rights, labor conditions, social development, and product responsibility, with external stakeholders' collaboration. Finally, this article contributes to understanding how social sustainability should be managed in the apparel sector in a global supply chain context
(Brydges, 2021)	Environmental Focus, Circular Economy	Closing the loop on take, make, waste: Investigating circular economy practices in the Swedish fashion industry	Journal of Cleaner Production	2	2	Developed country, Sweden	Circular Economy	Three key questions drive this research. First, what is the CE, and how did it emerge as a potential solution to the challenges facing the global fashion industry? Second, how are Swedish fashion brands engaging with CE principles across supply chains? Third, to what extent are CE strategies supporting the transition to a more sustainable fashion industry?	Qualitative in-depth interview, Case Study approach	Circular economy, Fashion, Sweden, Sustainability	This article maps circular economy strategies across key stages: take, make, and waste. Crucially, for the fashion industry to move towards circularity, this paper argues that brands must integrate these strategies across supply chains, rather than limiting them to the waste stage. The analysis explores the gaps between circular economy principles and practice, identifying challenges inherent in fashion brand approaches. To the broader study of circular economies, this research offers two important takeaways. First, we must consider industrial specificity, because the application of CE principles will look different in each industry. For example, fashion has specific external barriers to CE practices, including style, aesthetics, and the role of consumers. Second, we must consider the local industrial context. Even as the CE will look different in different industries, so too will it reflect local factors, such as policies and regulations related to sustainability and/or the CE. Industrial dynamics particular to the local context will influence decisions.

(Silvestre et al., 2020)	TBL focus	Supply chain corruption practices circumventing sustainability standards: wolves in sheep's clothing	International Journal of Operations & Production Management	4	4	Mixed- 10 cases (From USA, Germany, Brazil, China, Nigeria, Canada, Libya and South Africa)	Institutional Theory, Adaptive Theory, Business Corruption, Social isomorphism for corruption	What are the factors that influence supply chain corruption practices to emerge as mechanisms to circumvent sustainability standards?	4 (Out of 10) In-depth Case Study, Secondary Data analysis using adaptive theory and the methods of constant Comparison	Sustainable supply chains, Sustainability standards, Supply chain corruption practices, Symbolic adoption, Social isomorphism for corruption, Institutional contexts	The paper suggests that although sustainability standards can improve supply chain sustainability performance, if they are adopted only symbolically and not substantively, unanticipated outcomes such as supply chain corruption may occur. The study proposes a typology of supply chain corruption practices, further explores the symbolic adoption of sustainability standards in supply chains and proposes the novel construct of "social isomorphism for corruption."
(Park, et al., 2020)	Environmental Sustainability/ Circular Economy	Toward a circular economy: Understanding consumers' moral stance on corporations' and individuals' responsibilities in creating a circular fashion economy	Business Strategy and the Environment	3	3	Developed Country USA	Moral Responsibility Theory of Corporate Sustainability	Research Question 1: Do consumers perceive that they, as well as fashion corporations, are morally responsible for creating CF? If so, what moral stance (i.e., perfect vs. imperfect moral responsibility) do they project toward the corporations and themselves, and how do these moral stances interplay? • Research Question 2: Do consumers perceive that fashion corporations are hypocritical, which happens when consumers see a mismatch between what the corporations say and do with respect to CF? • Research Question 3: Do these morally grounded traits (i.e., perceived corporate moral responsibility, consumer moral responsibility, and corporate hypocrisy) serve as critical factors affecting consumers' attitudes and behavioral intentions toward fashion corporations' CF efforts?	Survey, Questionnaire, Construct development, Hypotheses testing	Circular economy, circular fashion, environmental policy, fashion consumer, moral responsibility, Moral Responsibility Theory of Corporate Sustainability, stakeholder engagement, sustainable development	Findings indicate that the more consumers shape positive (vs. negative) attitude toward fashion companies' CF offerings, the more (vs. less) they show the intention to engage in the companies' CF endeavors. Noting on the moral factors that influence consumers' attitudes—from perceived corporate moral responsibility (+), consumer moral responsibility (+), and corporate hypocrisy (−)—business practitioners can design effective CF business strategies to encourage consumers to take part in their CF offerings. In this way, we believe that the fashion business can successfully co-create CF across its value chain and enhance its impact on sustainable development.
(Chong, et al., 2020)	Environmental Sustainability/ Circular Economy	How fashion can achieve sustainable development through a circular economy and stakeholder engagement: A systematic literature review	Corporate Social Responsibility and Environmental Management		1	Systematic Reviews, Global	Circular Fashion	* What are the key drivers affecting fashion stakeholders, with respect to both internal and external stakeholders, and their adoption of CF? * What are the key strategies suggested for fashion stakeholders, with respect to both internal and external stakeholders, in their pursuit of CF?	Systematic Reviews	Circular economy, Engagement, Environmental management, Fashion, Sustainability, Sustainable development, Stakeholder	The results yielded a conceptual framework offering an integrated understanding about how fashion businesses can institute true circularity by engaging external stakeholders in their CF-related endeavors.

(Gold et al., 2020)	Social Sustainability (Labor Standard)	Diffusion of labor standards through supplier–subcontractor networks: An agent-based model	Journal of Industrial Ecology	2	2	Developing country context, Bangladesh	Resource Dependence Theory, supplier nexus theory	How do key structural network characteristics affect the diffusion of labor standards from buyers throughout a supplier–subcontractor network?	Hypotheses development and testing, model testing	Agent-based modelling, network asymmetries, standard diffusion, subcontracting, supply net- works, sustainable supply chain management	The finding suggests that subcontracting increases horizontal complexity at each supply chain tier, and intermediaries such as sustainability nexus suppliers may crucially affect the adoption of labor standards within industries.
(Shen et al., 2020)	Environmental Sustainability/Green Technology	Green technology adoption in textiles and apparel supply chains with environmental taxes	International Journal of Production Research	3	3	Conceptual Paper/ Context not defined	Environmental taxation, Green technology adoption	RQ1: Would environmental taxes always encourage green technology adoption? RQ2: How does the spillover effect of investing in green technology affect supply chains? RQ3: Can consumers be benefited from green technology adoption in supply chains?	Analytical/ conceptual model development and analyzed	Supply chain; textiles and apparel; green technology adoption; environmental taxes; monopoly; duopoly	In a monopoly case where a two-echelon supply chain consists of one buyer and one manufacturer it is found that raising the environmental tax rate motivates the manufacturer to invest in green technologies. In duopoly case, it's found that if the buyer's market share is sufficiently small (large), the optimal greenness level for this buyer's product decreases (increases) in the environmental tax rate; whereas if the two products market shares are relatively equal, the optimal greenness levels for both products buyers increase in the environmental tax rate. The existence of the spillover effect reduces the cost and improves the product greenness. Consumer welfare can be improved if the efficiency of green technology adoption and the coefficient of greenness level on market demand are sufficiently high.
(Roy et al., 2020)	Comprehensive (Environment focus in main text)	Reactive and proactive pathways to sustainable apparel supply chains: Manufacturer's perspective on stakeholder salience and organizational learning toward responsible management	International Journal of Production Economics	3	3	Emerging Economy, India	Stakeholders Salience/ Management, Organizational Learning toward management (OLRM)	RQ 1. How stakeholder pressures and sustainability learning shape the reactive and proactive pathways of sustainability implementation by apparel manufacturers? RQ 2. What performance implications can be derived from apparel manufacturers' sustainability implementation to the performance of their apparel supply chains as a whole?	Survey, Questionnaire, Construct development	Sustainable supply chains, Stakeholder management, Apparel manufacturing, Fashion industry, Organizational learning toward responsible management (OLRM), Emerging economy	Findings suggest that stakeholder salience in pressuring apparel manufacturers to embrace SSCM practices generates reactive pathways to sustainability implementation at the firm-level. Results also show that firm-intrinsic efforts of organizational members aiming to learn about sustainability shape proactive pathways toward SSCM. This paper shows evidences that reactive pathways appear to be less effective than proactive ones. This paper contributes to the literature by detailing how different SSCM practices adopted by apparel manufacturing contribute to enhanced supply chain environmental and operational performances of contemporary apparel supply chains. It also enriches the firm-intrinsic view of stakeholder salience in SSCM by outlining the relevance of internal and external stakeholders in pressurizing manufacturing firms within the supply chain. Lastly, it strengthens the view of intra-firm learning toward sustainability in SSCM by drawing from the construct of 'responsible management learning' to propose an integrative notion of organizational learning toward responsible management (OLRM).
(Rovanto & Bask, 2020)	Circular Economy, Comprehensive	Systemic circular business model application at the company, supply chain and society levels—A view into circular economy	Business Strategy and the Environment	3	3	Developed country, Finland	Circular Business Model	RQ1. How do companies implement a CE on the company (micro) level? RQ2. How do companies drive CE implementation on the supply chain (meso) level? RQ3. How do companies assist	Qualitative Inductive Interview, In-depth Multiple case Study Approach	Circular business model, circular economy, natives and adopters, sustainable development, system shift	This study contributes to the conceptualization of a sustainable circular business model (CBM), the application of the circular economy (CE) by companies. The study utilized a three-level framework adapted from the CE literature with company (micro), supply chain (meso) and society (macro) levels. This multiple-case study in the textile industry included two types of

		native and adopter companies						systemic shift to a CE on the society (macro) level?			companies operating in the CE: companies founded on the sustainable principles of a CE (natives) and companies transitioning to a CE from the linear economy (adopters). The findings show that the adopters emphasized long-term economic sustainability on a company level and implemented CE elements to varying degrees on all three levels. The natives pursued business decisions from environmental and social sustainability standpoints, and the three levels were integral in their systemic approach to a CE. The study highlights two key claims: established operational structures and economic volition hindered adopters in their systemic CE implementation, and an integral part of the CBM for natives was a proactive approach towards the society level.
(Nath et al., 2020)	Comprehensive TBL /Sustainability malpractice/ decoupling	The hidden side of sub-supplier firms' sustainability – an empirical analysis	International Journal of Operations & Production Management	4	4	Developing country/ Specifically Bangladesh Garments Sector	Institutional theory/ Multi level supply chain/ Second-third tier sub suppliers	(1) How do sub-suppliers decouple the implementation of sustainability practices in supply chains? (2) What institutional logics permit these suppliers to decouple the SSM practices?	Exploratory, Qualitative research design/ Face to face Semi structured interview	Institutional theory, Sustainable supply management, Apparel industry, Consensual and concealment strategies, Developing country sub-suppliers	Findings – The findings suggest that owners and managers of sub-suppliers use two decoupling responses: (1) consensual strategy to compromise sustainability requirements (2) concealment strategy. In addition, this paper identifies multiple institutional types of conflicting logics: instrumental logic, legitimacy logic complexity and gaps in normative logic, which interplay amongst sub-suppliers whereby permit to decouple the implementation of supply management practices.
(Siddiqui, McPhail, & Rahman, 2020)	Labour Governance/ Social Sustainability	Private governance responsibilisation in global supply chains: the case of Rana Plaza	Accounting, Auditing & Accountability Journal	3	3	Bangladesh/Rana Plaza Disaster	Reinecke and Ansaris (2016) political responsibilisation framework, Stakeholders Theory/ Sustainability Accounting	How did private sector responsibilisation for the governance failures emerge and evolve post Rana Plaza?	Exploratory, Flexible Qualitative research design/ Face to face Semi structured interview/ Analysis done by using exploratory flexible pattern matching design with nested template analysis (Sinkovics et al., 2019)	Governance, Sustainability, Supply chain, Political, Certification, Social accounting	Findings – Our analysis suggests that the magnitude of the Rana Plaza collapse triggered several frameshifts in multinational corporations' approach towards labor governance in Bangladesh. Subsequently, a responsibility framework for the private sector was created, resulting in significant improvements in working conditions in the sector. However, the sustainability of the labor governance mechanisms was significantly affected by the state's ability to play the role of catalyst in the process, mainly due to the presence of a significant state-business nexus.

(Mani et al., 2020)	Social Sustainability	Supply chain social sustainability in small and medium manufacturing enterprises and firms' performance: Empirical evidence from an emerging Asian economy	International Journal of Production Economics	3	3	Emerging Asian Economy, India	Stakeholder's resource-based view (SRBV) (Sodhi, 2015) (Based on Stakeholders theory, Utility Theory and Resourced based view)	1. To explore the different supply chain social sustainability practices related to SME's 2. To investigate how SME's supply chain social sustainability practices in emerging markets might relate to supply chain performance.	Survey, Questionnaire, Construct development, covariance-based structural equation modelling (CBSEM)	Social sustainability, Small and medium enterprises (SMEs), Sustainable performance, Sustainable supply chain management, Sustainable development, BRICS	The results suggest a positive relationship between social sustainability practices and supply chain performance that is mediated by customer, supplier, and operational performance. Additionally, the role of firm size and investment in determining supplier performance (SP), operational performance (OP), and customer performance (CP), and supply chain performance (SCP) is established. The study presents an empirical model for supply chain social sustainability grounded in stakeholder's resource-based view for SME's in emerging economy setting. This study provides original evidence to SME's managers that tangible performance benefits can be realized by focusing on increasing supply chain social sustainability, supporting the case for social sustainability on economic as well as ethical grounds.
(Li et al., 2020)	Social/ CSR And Corporate sustainability	Analyzing the critical success factor of CSR for the Chinese textile industry	Journal of Cleaner Production	2	2	Developing country, China	Decision making trial and evaluation laboratory (DEMA- TEL), CSR/CSF- Critical success factor	This Case Study attempts to study the critical success factors of CSR in textile industries situated in one of the developing nations, China	Case Study approach using Multi Criteria Decision Making (MCDM) tools	CSR, Critical success factors, DEMATEL, China, Textile sectors	This study attempts to study the critical success factors of CSR in textile industries situated in one of the developing nations, China. This study collected the critical success factors from literature and validated with the field experts; then the same were evaluated with the assistance of Chinese textile case industrial managers. Decision-making trial and evaluation laboratory tool has been used to evaluate the influential critical success factors (The most influential factor is: Government Initiatives) of CSR to promote CSR through motivating those most influential success factors.
(Kumar et al., 2020)	Social Responsibility	Evaluating sustainable drivers for social responsibility in the context of ready-made garments supply chain	Journal of Cleaner Production	2	2	Developing Country, Bangladesh	Social Responsibility Drivers	1. What are the social responsibility (SR) drivers that can help to achieve sustainability in the context of the RMG industry? 2. How are the identified SR drivers assessed?	Delphi Study using Fuzzy AHP techniques	Delphi, Social responsibility, Ready-made garments, Supply chain, Fuzzy AHP	Findings: Analysis shows that finance is the key driver, composed of four important sub-sets; these are sustainable economic benefits, maximization of the net return on investment, business ethics and an enhanced reputation in the global market. Sensitivity analysis is also conducted to check the stability of the results.
(Jia et al., 2020)	Environmental-Circular Economy	The circular economy in the textile and apparel industry: A systematic literature review	Journal of Cleaner Production	2	2	Review Paper, Global	Circular Economy	The objective of this paper is to discover the present state of research concerning SSCM toward a CE in the T&A industry.	Systematic Literature Review approach	Circular economy, Closed-loop supply chain, Literature review Sustainable supply chain, Textile and apparel industry	Theme/Findings: Through a systematic literature review, this paper identifies four themes: drivers, barriers, practices, and indicators of sustainable performance when applying a circular economy in the textile and apparel industry. And establish a conceptual model based on these four themes, which illustrates the relationship between them.
(Handfield et al., 2020)	Supply chain risks	Assessing supply chain risk for apparel production in low-cost countries using newsfeed analysis	Supply Chain Management: An International Journal	3	3	Case analysis (USA- Buyer, Developing country suppliers)	Systems Theory, Supply chain risk theory	Q1. How can the different forms of factory risk be predicted for a five-year planning horizon in LCC (Low cost countries) apparel factories? Q2. What are the differences in predicted factory risks by region in apparel producing countries?	Case Study, A machine-based learning algorithm is developed, ACH (Analysis of competing Hypothesis) Method, Secondary	Sustainability, Industrial purchasing, Supplier relationships, Supply chain ethics, Supply chain disruptions, Supply risk, Supply base risk analysis, Machine learning, Supply chain risk, Buyer-seller relationships	This paper produced probability and impact scores for 23 distinct supply base risks across 10 countries in the apparel sector. The results suggest that the most significant long-term risks of supply disruption for apparel in LCC's are human resource regulatory risks, workplace issues, inflation costs, safety violations and social welfare violations. The results suggest that apparel brands seeking suppliers in the regions of Cambodia, India, Bangladesh, Brazil and Vietnam should be aware of the significant risks in these regions that may require mitigative action.

									Data (Published news and report)		
(Freudenreich & Schaltegger, 2020)	Sufficiency-oriented business offerings/Slow Fashion	Developing sufficiency-oriented offerings for clothing users: Business approaches to support consumption reduction	Journal of Cleaner Production	2	2	Conceptual Paper, global	Sufficiency Approach of Sustainability/ Slow fashion	To propose a framework for developing business offerings based on the sufficiency approach, which enable and encourage consumers to reduce clothing consumption.	Conceptual Framework development for Sufficiency Approach	Sufficiency, Sustainable production, Sustainable consumption, Clothing, Sustainability management, Slow fashion	Finding: This conceptual paper builds on a generic sufficiency management concept and incorporates ideas from the clothing-specific 'slow fashion' literature. It proposes a framework for sufficiency-oriented business offerings and investigates related management approaches for companies aiming to reduce social and environmental problems in the clothing sector through: Extended use, partial reuse, reuse.
(Cai & Choi, 2020)	TBL focus/SDG	A United Nations' Sustainable Development Goals perspective for sustainable textile and apparel supply chain management	Transportation Research Part E: Logistics and Transportation Review	3	3	Review Paper Global	Operations Management Theories	The objective of this research is to examine how to make the FSCM (Fashion supply chain management) well respond to the 17 SDGs by 2030 and make the fashion industry more sustainable and eco-efficient.	Systematic Literature Review Methodology	United Nations' Sustainable Development Goals, Supply chain management, Sustainability, Textile and apparel industry, Review	The current sustainable operations in TA (textile and apparel) industry is far away from realizing the goals of economic growth going hand-in-hand with the social and environmental sustainability. For instance, among the SDGs, the goals of "Responsible Consumption and Production", "Clean Water and Sanitation", and "Climate Action" receive a considerable amount of attention, while goals of "No Poverty", "Reduced Inequalities", "Life below Water" and "Life on Land" have the least attention. Balanced sustainable development actions from the stakeholders' perspective are proposed.
(Beyers & Heinrichs, 2020)	TBL focus	Global partnerships for a textile transformation? A systematic literature review on inter- and transnational collaborative governance of the textile and clothing industry	Journal of Cleaner Production	2	2	Global, Review paper	Not applicable	What are the prevailing research characteristics, discourses and modes of governance in academic literature on inter-organizational networks and governance partnerships in the textile and clothing industry? (From Conclusion)	Quantitative full-text bibliometric word analysis, followed by coding around the meta-framework	Not given	Finding: This analysis revealed four discourses referred to as Economic and Industrial Development, Ecology and Environment, Private Labor Governance and Workers' Rights, and Critical Ethnographies. Secondly, these four discourses were found to differ in their thematic sustainability challenges as well as in their variety of governance modes and partnerships. Research on economic sustainability tends to focus on modes of central and public-private governance; research on environmental challenges focus more on private governance of supply networks and research on social sustainability tends to focus on more participatory, interactive and self-governing modes between multiple actors.

(Antonini et al., 2020)	Social Sustainability/ Sustainability Reporting /Working. Conditions	Sub politics and sustainability reporting boundaries. The case of working conditions in global supply chains	Accounting, Auditing & Accountability Journal	3	3	Global + Bangladesh	Becks (1986, 2003) reflexive modernisation, the risk society thesis and sub politics	To explore the subpolitical role and main characteristics of a specific accounting technique, sustainability reporting boundaries. Its focus is on how the setting of sustainability reporting boundaries affects the definition and distribution of social risks along the supply chain, particularly the risks related to working condition and human rights.	Beck's theorisation of Sustainability reporting boundaries	Global supply chains, Inditex, Sustainability reporting boundaries, Subpolitics, Working conditions, Ready-made garment industry	The paper finds that the way social risks are framed along the supply chain renders them invisible and impersonal and that the framing of these risks becomes endless as they are contested by different groups of experts. Setting sustainability reporting boundaries has subpolitical properties in producing and framing those risks, whilst is simultaneously limited by the inherent politicisation of such an exercise. The questionable legitimacy of sustainability reporting boundaries calls for the construction not only of discursive justifications but also of new possibilities for political participation.
(Agyabeng-Mensah et al., 2020)	Environmental Sustainability/Green	Examining the influence of internal green supply chain practices, green human resource management and supply chain environmental cooperation on firm performance	Supply Chain Management: An International Journal	3	3	African context, Ghana	Stakeholder's resource-based view (SRBV) (Sodhi, 2015), Green Supply Chain Management, Green HRM	1. Do IGSCP, GHRM and SCEC directly influence FP? 2. Does IGSCP influence FP through GHRM and SCEC? 3. Does GHRM influence FP through SCEC? 4. How could IGSCP, GHRM and SCEC be implemented to influence FP?	Quantitative, Structured Questionnaire survey, PLS SEM Analysis	Collaboration, Sustainability, Environmental management, Surveys, Structural equation modelling	Findings – The results suggest that the adoption of only IGSCP (internal green supply chain practices) may negatively affect the market and financial performances of firms. However, the implementation of GHRM (green human resource management) and SCEC (Supply chain environmental cooperation) may catalyse IGSCP to improve FP (Firm Performance).
(Xu et al., 2019)	TBL focus/ Risk	Supply chain sustainability risk and assessment	Journal of Cleaner Production	2	2	Not specified	TBL, Sustainable supply chain risks	To develop an integrated framework to assess supply chain sustainability risk for a company or industry. The supply chain sustainability risk in this study comprises all three aspects of sustainability, including operational (economic) risk, social risk, and environmental risk.	Case study approach, Framework development, Risk assessment space and materiality analysis	Sustainable supply chain , Risk, Supply chain sustainability risk, Apparel , Automotive	This study develops a framework to assess the supply chain sustainability risk taking into account the triple bottom line. Two case studies representing two distinct types of supply chains are used to demonstrate the application of the developed framework. The apparel industry is used to represent the deep-structure supply chain, while the automotive industry is used to represent the broad-structure supply chain.
(Wang et al., 2019)	Consumer perception of Sustainability	Sustainable fashion index model and its implication	Journal of Business Research	3	3	Developing country, China and Korea	ACSI (American Customer Satisfaction Index)	Objectives of this study are: a) to define the dimensions of sustainability in fashion industry, b) to identify variables which can influence sustainable activities of fashion companies, c) to construct the measurements of sustainability of fashion companies, d) to test sustainable fashion index model, and e) to generate the implications for sustainable fashion industry based upon the results of this study.	Questionnaire-based survey, Quantitative analysis, Hypothesis testing	Fashion, Sustainability, Index Customer equity, Satisfaction	The results indicate that consumers evaluate product quality and form repurchase intentions according to whether they perceive that the product is sustainable, which then increases customer equity, brand equity, and relationship equity, an important competitive advantage for fashion companies and brands. Satisfaction greatly impacts repurchase decisions. Dissatisfied customers tend to withdraw from the brand. This study demonstrates this inverse relationship by showing that customers are more satisfied when they perceive sustainable performance. Thus, they will be less likely to complain and will form stronger relationship equity and brand equity.

(M.-L. Tseng et al., 2019)	SSCM/Social Media	Improving sustainable supply chain capabilities using social media in a decision-making model	Journal of Cleaner Production	2	2	Developing country, Taiwan	Resource based view, Sustainable supply chain capabilities	1. What are the decisive attributes of SSCCs? 2. What attributes should be improved to enhance the effect of social media on SSCCs?	Qualitative and quantitative, Fuzzy Synthetic Evaluation (FSE), Decision-making trial evaluation laboratory (DEMATEL)	Sustainable supply chain capabilities, Social media Fuzzy synthetic evaluation, Decision-making trial evaluation laboratory	The results present the integration of qualitative information and quantitative data for building a hierarchical structure with sustainable supply chain capabilities and indicate that social, dynamic and information capabilities are simultaneously strongly affected. The top seven criteria that most influence sustainable supply chain capabilities are outbound logistics flexibility, supply chain reconceptualization, information quality, coevolution, market-oriented perception, partner development and knowledge acquisition and absorptive capacity.
(M.-L. Tseng et al., 2019b)	Sustainability Governance/ Finance	Improving the benefits and costs on sustainable supply chain finance under uncertainty	International Journal of Production Economics	3	3	Developing country (Taiwan, china, Vietnam, Philippines)	Fuzzy Set theory, Prospect theory	1 What are the unique SSCF attributes in the hierarchical structure? 2 What attributes should be improved to enhance SSCF in the textile industry?	Fuzzy interpretive structural modelling (FISM),	Sustainable supply chain finance, Fuzzy interpretive structural modelling, Fuzzy TODIM, Triple bottom line	The results obtained show that sustainable supply chain finance improves firms' competitive advantages through multiple attributes, which imply that collaboration value innovation, strategic competitive advantage and financial attributes are the most important aspects for improving firm's performance. The results also indicate that to build a successful sustainable supply chain finance, firms should upgrade the synchronization of financial-related decisions, obtain price and cost information, focus on product and service quality, and ensure the dispersion of dependent and interdepartmental interactions.
(Sirilertsuwan et al., 2019)	TBL focus	Exploring current enablers and barriers for sustainable proximity manufacturing	Journal of Fashion Marketing and Management		1	Developed country, Europe/ Sweden	TBL, Sustainable Proximity manufacturing	RQ1. Why do clothing companies in high-cost countries choose proximity manufacturing over distant manufacturing and are these reasons based on TBL? RQ2. Why do clothing companies in high-cost countries do not choose proximity manufacturing and are these reasons based on TBL?	Qualitative/ exploratory/ Content analysis, within-case and cross-case analysis of data from semi-structured interviews of managers from 12 clothing companies	Sustainability, Reshoring, Supplier selection, Sustainable supply chain, Local sourcing, Manufacturing location decision	Findings – Within-case analysis showed enablers and barriers (factors) of proximity manufacturing within each company's characteristics under TBL. Cross-case analysis showed the most-mentioned enablers (high-quality suppliers, short lead-time and fast replenishment) and barriers (expensive production cost and lack of industrial set-up and seamstresses). The findings revealed both common and different factors from existing studies.
(Shumon et al., 2019)	Environmental Sustainability	How do suppliers address stringent environmental requirements from buyers? An exploratory study in the Bangladesh ready-made garment industry	International Journal of Physical Distribution & Logistics Management	2	2	Developing Country, Bangladesh	Transaction cost theory (Williamson, 1975), Theory of dynamic capability (Eisenhardt and Martin, 2000)	RQ1. How do supplier firms perceive stringent environmental requirements from buyers? RQ2. How do supplier firms translate these stringent requirements into environmental performance?	Qualitative study, Case study Approach (8 Case studies)	Stringent buyer environmental requirements, Green supply chain, Supplier environmental capability, Buyer–supplier relationship, Dynamic capability theory, Transaction cost economics	Findings: The Study explored the concept of "stringent environmental requirements" imposed by buyers on suppliers in the supply chain. Using the concept of transaction cost, the following factors contributing to stringency (as perceived by the supplier) were identified: uncertainty of changes in buyer environmental requirements; extent of newness and variety in the supplier's environmental requirement portfolio; complexity in implementing buyer environmental requirements; and extent of the use of buyer-specific frameworks to fulfil the buyer environmental requirements. Employing dynamic capability theory, this research also provided an understanding of the connections among perceived

											stringency, the supplier's environmental capability and the supplier's environmental performance. Moreover, this research provides evidence for the argument in the extant literature that buyer involvement and suppliers' green orientation may improve suppliers' development of environmental capability and reduce their perception of stringency
(Raut et al., 2019)	Sustainability Barriers	Ranking the barriers of sustainable textile and apparel supply chains	Benchmarking: An International Journal	1	1	Emerging Economy, India	Conceptual Paper/ ICM/MCDM	Objectives: To propose a new conceptual hierarchical model of significant challenges to the sustainable growth of the T&A industry in the Indian context	Conceptual paper using ISM (Interpretive structural modelling): multi-criteria decision making (MCDM) Model	Challenges, Emerging economies, Multi-criteria decision making (MCDM), MICMAC analysis, Interpretive structural modelling (ISM), Sustainability textile and apparel (T&A) industry	Findings: The results of the investigation revealed that lack of effective governmental policies (B8), poor infrastructure (B4), lack of effective level of integration (B6), low foreign investment (B13) and demonetization (B12) are the top most significant challenges among the 14 challenges identified.
(Nayak et al., 2019)	TBL focus	Recent sustainable trends in Vietnam's fashion supply chain	Journal of Cleaner Production	2	2	Developing countries, Emerging Economy, Vietnam	Contextual Analysis with review	RQ1: As one of the global leaders in fashion production and distribution, what is the current status of Vietnam's fashion industry? RQ2: With imminent changes in the fashion supply chain, what are the current sustainability trends in Vietnam relating to planet, people and profit?	Step by step industry analysis/ Trend analysis	Sustainable supply chain management, Fashion sustainability, Textiles and garment, Emerging economy, Third-party logistics, Vietnam	Findings: The findings showed that although Vietnam is among the top five exporting countries of textiles and garments globally, the concept of a sustainable supply chain is new to many of the Vietnamese supply chain players. Four out of five stakeholders claimed that they are attempting to achieve sustainability by reducing environmental pollution, taking care of the labor force, and pursuing future sustainable materials as well as renewable energy resources. In addition, one of the stakeholders, the retailers, regularly focus on ethical practices in their sustainable sourcing.
(Shobod D. Nath et al., 2019)	Sustainability Governance	The Invisible Side of Managing Sustainability in Global Supply Chains: Evidence from Multitier Apparel Suppliers	Journal of Business Logistics	3	2	Developing Country, Bangladesh	Institutional theory/In the context of Multi-tier supply chain	1. How do institutional pressures and mechanisms affect the implementation of SSM practices across Bangladeshi multi-tier apparel suppliers? 2. And what challenges do these suppliers face in the quest to become sustainable?	Exploratory, Qualitative research design/ Face to face Semi structured interview	Sustainability, global supply chains, institutional theory, governance mechanisms, multi-tier suppliers	The findings show that first-tier and second-tier suppliers experience more collective coercive pressures than mimetic and normative pressures toward sustainability implementation. However, only coercive pressure from second-tier suppliers influences third-tier suppliers' sustainability implementation. The identified key collective coercive pressures were stemming from the selection and assessment requirements of direct buyers, followed by third-party auditors, governments, and newly emerged collective buyers' consortia.

(Mejías et al., 2019)	Sustainability Governance	Traceability management systems and capacity building as new approaches for improving sustainability in the fashion multi-tier supply chain	International Journal of Production Economics	3	3	Global	Multi-tier supply chain	RQ1. How are leading fast fashion companies addressing the challenge of managing a truly multi-tier SC for sustainability? RQ2. What level of performance are these companies perceiving in terms of the commitment of suppliers with the main sustainable principles set out in the Code of Conduct (CoC) defined by companies? RQ3. What factors can contribute to achieve the best level of performance in managing a truly multi-tier SC for sustainability?	Content analysis methodology is applied to the last six sustainability reports (2011–2016) published by the four biggest fast fashion companies in the global market (Inditex, H&M, Fast Retailing and Gap) along with MCDM	AHP multi-criteria decision-making, Fast fashion industry, Multi-tier supply chain, Sustainability	Results show companies are mainly implementing traceability management systems, training and capacity building teams, and joint long-term planning programs to improve SC performance. However, performance assessment is no easy task due to the lack of transparency about the level of identification, compliance with CoC and relationships developed in the tier-1 position and beyond.
(Mair et al., 2019)	Carbon Emission / Living Wage/ Eco	Higher Wages for Sustainable Development? Employment and Carbon Effects of Paying a Living Wage in Global Apparel Supply Chains	Ecological Economics	3	3	BRIC (Brazil, Russia, India and China) Context within the Western European clothing supply chain	Input output modelling	To explore the potential for supply chain living wages to play such a role	Input-output framework extended with income and demand elasticities	Not Presented	Negligible effects found on carbon emissions but a substantial increase in BRIC employment under 3 scenarios of consumer behavior. Changes in Western European consumption lead to small decreases in global carbon emissions and BRIC employment. However, the increase in BRIC wages increases demand in BRIC. This increased demand increases production which largely cancels out the carbon savings and generates net increases in BRIC employment. We conclude by arguing that paying higher wages in global supply chains represents a good but not sufficient step toward achieving the Sustainable Development Goals.
(Hannibal & Kauppi, 2019)	Social Sustainability/ Assessment	Third party social sustainability assessment: Is it a multi-tier supply chain solution?	International Journal of Production Economics	3	3	Global, Third party assessors	Information processing theory (Gailbrath 1973) in a multitier setting	How does the third-party assessment of social sustainability act as a bridging mechanism in multi-tiered supply chains?	Exploratory, Qualitative research design, Semi-structured interview	Information processing theory, Indicators, Social sustainability, Uncertainty	Findings: The analysis of semi-structured interviews with assessors reveals differing approaches to assessment. The study shows how these approaches utilize differing numbers of supply chain tiers. Some, for example, focus only on the farmer or raw material supplier when assessing social sustainability, which raises questions about the credentials of actors further downstream. The communities and livelihoods of supply chain actors, often located in the global South, can be dependent on the new, niche and potentially more profitable markets made available to goods that can demonstrate their social sustainability credentials. Robust assessment is therefore integral in accessing these new markets. The study offers a comparison between different assessors that will be of interest to scholars and to supply chain actors considering engaging in social sustainability assessment.

(Garcia-Torres et al., 2019)	TBL focus/ Traceability	Traceability for sustainability – literature review and conceptual framework	Supply Chain Management: An International Journal	3	3	Global	Resource Based View (Valuable, rare, inimitable, and non-substitutable i.e. "VRIN resources"), Practice based view (PBV), TBL	RQ1. How is TfS (Traceability for sustainability) developed and implemented in global SCs? RQ2. How does TfS contribute to (S)SCM?	Integrative and systematic literature review/ Content analysis and abductive category-building	Sustainability, Tracking, Dynamic capabilities, Systematic literature review, Apparel industry, SCM framework	A conceptual framework emerges to describe TfS as an evolving cycle, comprising three dimensions: governance, collaboration and tracking and tracing. Resources and capabilities literature set the foundations for conceiving TfS as a distinctive meta-capability construct. Hence, besides being associated to increased performance, risk management and SC process transformation, TfS ultimately blurs boundaries and integrates non-traditional SC actors into the same ecosystem with important implications for sustainability and (S)SCM. This study refers to the industrial upgrading potential of global SCs to explain how leveraging enabling technologies for TfS may help to improve the triple-bottom-line (TBL) performance of the actors in the broad ecosystem while reducing the risks associated to those technologies. Thus, TfS can contribute to (S)SCM and to TBL sustainability within and beyond SC boundaries.
(Garcia et al., 2019)	Ecological Footprint/ Consumer awareness	The sustainability awareness of Brazilian consumers of cotton clothing	Journal of Cleaner Production	2	2	Developing economy, Brazil	Ecological Footprint	Objectives: To evaluate the Brazilian consumer's ecological footprint and the awareness of sustainability in the clothing production stages using data mining technique.	Structured Questionnaire, Data mining, cluster analysis	Textile supply chain, Cotton clothing, Sustainability indicators, Clothing production	The results indicated that women spent more on cotton clothes than men. Most of the respondents (62%) are not aware of the clothing production chain and its potential for pollution. Although the consumers are generally concerned with sustainability (66%), most interviewees are not aware of the manufacturing processes of the worn garments neither the impact the cotton manufacturing might cause to the environment. The studied Brazilian consumers show that, although they wear clothes made of cotton, they are not aware of how the production is. Men do not know and do not care about this fact, as can be observed by the decision tree. Another point was that consumers (65%) seek to buy generic products from sustainable companies, but they do not know if the clothing manufacturer is sustainable. It is also observed that the values spent on clothes do not seem to be related to the Ecological Footprint. The study concluded that the Ecological Footprint of the consumers increase as their expenditure are greater also in the lifestyle requirements.
(Fung et al., 2019)	TBL/Sustainable planning	Sustainable planning strategies in supply chain systems: proposal and applications with a real case study in fashion	Production Planning & Control	3	3	Global, Nike operation	Institutional theory, Resource-based theory and the decision-making theory	1. To determine how companies can identify the demand in sustainable fashion and make the right decision in resource allocation through-out the supply chain. 2. To develop sustainable planning strategy framework (SPSF) is for a sustainable fashion supply chain.	Planning strategy Framework, Case Study approach involving three stages, namely the preliminary stage, analysis stage and conclusion stage.	Sustainable supply chain management, operations management theories, triple bottom line, sustainable planning strategy, case study, fashion company	The study established a sustainable planning strategy framework via a case study with public data on the fashion giant brand Nike and explored the application of our proposed sustainable planning strategy framework. The finding suggests that the strategic planning of fashion companies on sustainability can improve the performance of the stakeholders throughout the whole sustainable fashion supply chain.

(Chowdhury et al., 2019)	TBL/ Dynamic capabilities	Dynamic capabilities for meeting stakeholders' sustainability requirements in supply chain	Journal of Cleaner Production	2	2	Developing Country, Bangladesh	Dynamic capability View (DCV)	1. To translate stakeholders' changing sustainability requirements into meaningful and practical strategies using dynamic capabilities view (DCV) DS (Decision support) framework. 2. To Know the effect of dynamic capabilities on sustainability, and investigates (i) the SCS requirements (economic, social and environmental) of the stakeholders and corresponding strategies to meet those requirements, (ii) prioritize the SCS requirements in (i) and (iii) determine the optimal mix of strategies considering the dynamic nature of stakeholders' sustainability requirements over time.	Mixed Approach- Qualitative Field study/ interview and quantitative fuzzy Quality Function Deployment (QFD) integrated optimization technique.	Supply chain sustainability, Decision support framework, Stakeholder requirements, Dynamic capability view	The findings show that concomitant with the changes in the stakeholders' priorities of the sustainability requirements, the organizational sustainability practices, strategies and capabilities also change over time. The SCS DS framework brings a richer conceptual understanding of the dynamic changes in stakeholder requirements and allow managers to choose and select optimal strategies and make astute decisions whilst balancing the economic, social and environmental viability simultaneously.
(Choi & Luo, 2019)	Blockchain	Data quality challenges for sustainable fashion supply chain operations in emerging markets: Roles of blockchain, government sponsors and environment taxes	Transportation Research Part E: Logistics and Transportation Review	3	3	Emerging Economy, Brazil, India and South Africa	Theoretical Modelling	What are the impacts brought by poor data quality on the sustainable business operations of fashion companies in the supply chain?	Theoretical Modelling	Fashion business operations, Supply chain centralization, Emerging markets, Sustainable operations, Social welfare	Poorer data quality level will lead to a drop of both social welfare and supply chain profit under the decentralized supply chain setting, blockchain can be used to address this issue. As blockchain's implementation requires both a fixed cost and a variable operations cost, we have found the necessary and sufficient condition under which blockchain is helpful to improve social welfare.
(Choi et al., 2019)	SSCM/ Engineering Focus	Sustainable Fashion Supply Chain Management: A System of Systems Analysis	IEEE Transactions on Engineering Management	3	3	Developed country, Sweden (H & M)	System of Systems (SoS) theory	1. Is fashion supply chain a well-qualified SoS under ABCDE Framework/ criteria? 2. Can the SoS theories be applied to explore sustainable fashion supply chain management? What are the SoS principles that can help attain sustainable fashion supply chain? 3. What are the theoretical values and managerial and managerial insights of SoS principles? 4. How can an implementable framework and action plan be developed to achieve sustainable fashion supply chains using SoS?	Framework development based on SoS theory	Sustainability, sustainable supply chain management, system of systems (SoS) theory	The study first investigates and indicate that the fashion supply chain is a well-qualified SoS. Then proposed the critical SoS principles for building a sustainable fashion supply chain. The study analytically revealed and investigated the values of these principles by deriving the "expected value of SoS principles" (EVSOS). In particular, highlight how the number of market observations as well as the fabric and product leftovers related loss and gain affect EVSOS has been done. Further a two-stage framework as well as an action matrix for achieving sustainable fashion supply chain management is built. Finally, a public data based real case study on Sweden giant fashion enterprise H&M is conducted to illustrate real world applications of the proposed framework.

(Akbar & Ahsan, 2019)	Social Sustainability	Workplace safety compliance implementation challenges in apparel supplier firms	Journal of Cleaner Production	2	2	Developing Country, Bangladesh	Resource Dependence Theory, Resource Based View, Neo Institutional Theory	1. What are the key challenges faced by apparel supplier firms in implementing workplace safety compliance? 2. What are the key underlying issues affecting the implementation of workplace safety compliance?	AHP (Analytical Hierarchy process) (A Multi-criteria Decision-Making model)	Safety compliance, Social sustainability, Bangladesh garment industry, Analytic hierarchy process, Apparel supply chain	Findings: The Study finds that the most significant challenges in implementing workplace safety compliance relate to 'cost and financial concerns' and 'factory capacity and capability' issues. The study determines that, to enable effective implementation of workplace safety compliance, apparel supplier firms must strategically manage their factory capacity, and require long-term commitment from international apparel buyers.
(Talay et al., 2018)	TBL focus/Buyer - Supplier power relation	How small suppliers deal with the buyer power in asymmetric relationships within the sustainable fashion supply chain	Journal of Business Research	3	3	Developing country, Turkey	Industrial Marketing and Purchasing Group's interaction model (IMP Group, 1982)	1. To identify the application of power within sustainable fashion supply chains. 2. To understand how fashion suppliers, deal with the retail buyers' power within the sustainable fashion supply chains. 3. To understand the implications of power application for sustainable fashion supply chains.	Qualitative study, Exploratory Case study Approach (6 Case, 12 interviews studies). NVivo 11 was used to analyses data.	Supplier, Retailer, Fashion, Power application, Sustainability	Findings: Power is applied by enforcing collaborations and extension of responsibilities of fashion suppliers. Small fashion suppliers deal with the application of power by providing process efficiency that supports the performance of economic, environmental and social sustainable goals of retail buyers within sustainable supply chains. This research contributes by linking the concept of power and sustainability within fashion supply chains. The paper concludes by evaluating the application of power by retail buyers and fashion suppliers' responses.
(Stevenson & Cole, 2018)	Social Sustainability /Slavery	Modern slavery in supply chains: a secondary data analysis of detection, remediation and disclosure	Supply Chain Management: An International Journal	3	3	Developed country, UK	Theory of modern slavery By Crane (2013)	RQ1. How are organizations approaching the disclosure of information about modern slavery in response to legislative demands? RQ2. What do their public statements report about how they are detecting and remediating modern slavery in their operations and supply chains?	Qualitative study, Exploratory analysis of Secondary data (Modern slavery statements produced by organizations in response to the 2015 UK Modern Slavery Act)	Sustainability, Clothing industry, Information transparency, Modern slavery, Supply chain information disclosure, Secondary data	Findings: Many firms use the same practices to detect and remediate modern slavery as for other social issues. But the hidden, criminal nature of modern slavery and the involvement of third-party labor agencies mean practices need to either be tailored or other more innovative approaches developed, including in collaboration with traditional and non-traditional actors. Although five broad types of disclosure are identified, there is substantial heterogeneity in the statements. It is posited however that firms will converge on a more homogenous set of responses over time.
(Soundararajan & Brammer, 2018)	Social Sustainability	Developing country sub-supplier responses to social sustainability requirements of intermediaries: Exploring the influence of framing on fairness perceptions and reciprocity	Journal of Operations Management	4*	4*	Developing country, India	Theory of Bounded Self Interest, Prospect theory	a) What micro- processes are involved in the response of sub-suppliers to the social sustainability requirements imposed by their intermediaries? b) What are the micro-level antecedents that condition the responses of sub- suppliers?	Exploratory approach to theory Development using Case Study (longitudinal multiple case study)	Social sustainability, Multi-tier supply chains, Developing country, Sub-suppliers, Intermediaries, Framing, Fairness, Reciprocity	The way in which intermediaries frame social sustainability requirements and their associated procedures influence both the way in which sub-suppliers perceive the procedural fairness of those requirements and the way in which they thus reciprocate. When intermediaries frame social sustainability requirements as 'opportunity' and engage in various procedures perceived to be procedurally fair by sub-suppliers, the latter reciprocate positively. Contrastingly, when intermediaries frame social sustainability requirements as 'insulation' and engage in various procedures perceived to be procedurally unfair by sub-suppliers, the latter reciprocate negatively. Under the production-dominant framing, sub-suppliers exhibit positive reciprocity only related to processing production orders. The analysis inductively generated propositions that emphasize the important role played by

											framing in shaping the perceptions of fairness held by sub-suppliers towards social sustainability requirements and the reciprocity of the latter's responses to them.
(Sirilertsuwan et al., 2018)	TBL focus	Proximity manufacturing for enhancing clothing supply chain sustainability	The International Journal of Logistics Management	1	1	Review Paper, global	TBL	RQ1. What are the most frequently mentioned benefits and factors of proximity manufacturing in the clothing industry under each dimension of TBL sustainability presented in existing literature? RQ2. How has proximity manufacturing in relation to the TBL dimensions of sustainability been studied (research methods and data sources, studied markets and production locations, and TBL dimensions included)? RQ2 will reveal trends and absences in existing studies.	Systematic Literature Review approach	Sustainability, Process management, Literature review, Europe, Asia, North America, Sourcing and supply, Supply chain innovation, Supplier management, Offshoring-reshoring	Findings – This paper shows the potential of proximity manufacturing to enhance TBL sustainability, the scope of proximity manufacturing, and the trend and absence of existing studies. The most frequently mentioned elements are time-to-market, job creation, product quality, quick response, and trade policies. Governments and clusters are also important players.
(Rafi-Ul-Shan et al., 2018)	Overall Focus	Relationship between sustainability and risk management in fashion supply chains	International Journal of Retail & Distribution Management	2	2	Review Paper, Global	Not specified	Objective: To investigate the relationship between two important issues in fashion supply chains: sustainability management and risk management.	Literature Review using CIMO (Context, Intervention, Mechanisms, Outcome) by Denyer and Tranfield (2009)	Fashion supply chains, sustainability management, risk management, Supply chain management, Sustainability risk	Substantial research gap found on combined sustainability-risk discussion and literature of fashion supply chain, thus proposed a framework for that with four research directions: Definition, organization and management, influence on performance, development of a conceptual framework.
(Pal & Gander, 2018)	Environmental Sustainability/ Close loop Impact	Modelling environmental value: An examination of sustainable business models within the fashion industry	Journal of Cleaner Production	2	2	Conceptual Paper, global	Sustainable Business Model (SBM)	1. To contribute to this literature by exploring the development of sustainable business models within the global fashion industry; the manufacture, distribution, sale and use of fashion clothing. 2. How SBMs can achieve the competitive advantages of scale and provide products that are in keeping with changing trends?	Conceptual Framework development	Sustainable business, models Fashion, Environmental value, Scalability, Customer value Firm value	This paper uses the sustainable logics of narrowing, slowing and closing the loop of resources used during the production, design, manufacture and distribution of fashion garments to analyses emerging business models that seek to reduce the environmental impact of the fashion system. Taking the business model conceptualization of an enterprise as a system designed to create value for the customer and capture value for the firm, we add a consideration of environmental value and derive propositions that test the possibility that emerging sustainable business models in fashion will replace the dominant, unsustainable model. The paper argues that

											lack of scalability, incompatibility with fashion customers value propositions plus obstacles to supply chain changes militate against the prospect of the currently designed sustainable business models becoming the standard model of the fashion industry.
(Moretto et al., 2018)	Environmental Sustainability and Social Sustainability/TBL	Designing a roadmap towards a sustainable supply chain: A focus on the fashion industry	Journal of Cleaner Production	2	2	Anonymous 18 companies	Theory Development approach	How can fashion companies design a sustainability road-map, consisting of sets of practices to be adopted along the supply chain in the long term?	Inductive Methodology, Qualitative Approach, Case Study Approach	Sustainability, Supply chain, Roadmap, Fashion, Luxury, CSR	Based on case studies of three tiers of three fashion SCs as an empirical basis, social and environmental sustainability practices were grouped into a five-step roadmap. The main result of the paper is a five-step roadmap, characterized in terms of practices and main goal.
(Mahmoudi & Rasti-Barzoki, 2018)	Green Supply chain Focus	Sustainable supply chains under government intervention with a real-world case study: An evolutionary game theoretic approach	Computers & Industrial Engineering	2	2	Developing country, India	Mathematical Modelling	(1) How can governments affect competition of supply chains by using taxes and subsidies as financial instruments, such that green purposes can be achieved? (2) Under government interventions, what are the evolutionary responses of the supply chain members and which strategy is used by the majority? (3) How do different government scenarios and policies influence the environmental effects of supply chain members' activities and competition? (4) What is the optimal price in each scenario and strategy?	Mathematical game theory	Pricing, Sustainable green supply chains, Government policy, Textile industry, Evolutionary game theory	Using two- population evolutionary game theory approach, the performance of supply chains members under different government scenarios is modelled. Finally, the proposed sustainable model is applied to the Indian textile industry. The results show that government policy clearly affects producers' activity, competitive markets and emissions. Imposed tariffs are the most effective government approach to minimizing environmental impacts
(Karaosman et al., 2018)	Comprehensive Sustainability issues	Behind the runway: Extending sustainability in luxury fashion supply chains	Journal of Business Research	3	3	Developing country, India	Resource based View, Natural RBV, Multi-Tier supply chain	RQ1: How is sustainability extended across multiple supply chain tiers in the Italian luxury fashion industry? RQ2: How do contextual factors of the luxury fashion sector influence sustainability in supply chain management?	Qualitative in-depth interview, Case Study approach	Sustainability, Supply chain management, Luxury fashion, Qualitative, Case study	Findings reveal that product-level practices focused on raw materials more than design initiatives, with operational benefits of cost reduction and market benefits of consumer value-add. Process-level practices in water and energy reduction were motivated by cost reduction benefits more than environmental concerns. At supply chain level, traceability projects and supplier audits were limited by a lack of end-to-end supply chain visibility, despite the criticality of raw materials and evidence of close and long-term trading relationships. Supply chain transparency and supplier engagement are critical areas for development.

(Kannan, 2018)	Comprehensive Sustainability issues/TBL	Role of multiple stakeholders and the critical success factor theory for the sustainable supplier selection process	International Journal of Production Economics	3	3	Developing country/ Emerging Economy, India	Stakeholders Theory, CSF (Critical Success factor) theory, TBL	1. How can the suppliers' sustainable compliance be measured in order to increase the efficiency of the company's supply chain based on the stakeholders' views? 2. What are the criteria required for measuring sustainability among the suppliers and which are the most important CSFs? 3. How are the interdependencies and the weights of the selected CSFs determined? 4. How are the suppliers evaluated and ultimately selected under both sustainability criteria and stakeholders' perspectives?	Deductive Case study protocols based Indian suppliers, Fuzzy Delphi, MCDM (Fuzzy Delphi, ISM-Interpretative Structural Modelling, ANP-Analytical network Process, COPRAS-G-Complex proportional assessment)	Stakeholder theory, Critical success factor, Triple bottom line, Sustainable supplier selection, Multi criteria decision making, Fuzzy Delphi, ISM, ANP, COPRAS-G	Based on the CSF theory and by considering the multi-stakeholders' view in a sustainability perspective, this work provides a decision support system for the sustainable supplier selection (SSS) problem in a real-world textile industry located in the emerging economy of India. Through a three-phase methodology, this study examines Indian suppliers by considering the sustainability views of various stakeholders, including employees, customers, researchers, shareholders, and a government environmental officer. The CSF priorities show that the first four influential CSFs are categorized as social concerns (i.e., maintaining long-term relationships and alliances, stakeholder empowerment, equity labor sources, and individual human rights). The fifth factor is an environmental issue (i.e., production of polluting agents). Among the five suppliers being evaluated in this work, Supplier 4 receives the top ranking. Specifically, the results show that the supplier rankings are highly influenced by CSF's social dimensions. Hence, to validate the influence of CSF's social dimensions in relation to the SSS process, a sensitivity analysis has been done by varying the respective weights. The study concludes with the relevant managerial implications and limitations.
(Huq & Stevenson, 2018)	Social Sustainability	Implementing Socially Sustainable Practices in Challenging Institutional Contexts: Building Theory from Seven Developing Country Supplier Cases	Journal of Business Ethics	3	3	Developing country context, Bangladesh	Institutional theory	How do institutional pressures affect the implementation of ethical practices in suppliers situated in challenging institutional contexts? More specifically, what explains the decoupling of formal socially sustainable practices from the day-to-day reality?	Case study approach (& Cases), Theory Building conceptual paper	Case study, Decoupling, Institutional theory, Social sustainability, Ethical practices	Cross-case analysis highlights the coercive, mimetic, and normative pressures on suppliers to implement socially sustainable practices. A key pressure identified that has not previously been highlighted in the literature is horizontal collaboration between buyers, which intensifies coercive pressure on suppliers and increases the consequences of non-compliance. The factors that contribute to decoupling are categorized into firm-, supply chain-, and environment- related factors. Further, six propositions are developed on how specific forms of institutional pressure can tackle particular decoupling factors to support implementation. The paper responds to recent calls for greater scrutiny of why and how firms decouple ethical practices and supports the development of the literature specifically on social sustainability, which lags behind that on environmental sustainability and has been largely focused on the Western buyer perspective. The findings have implications for the diffusion of ethical practices into supply chains, especially distant suppliers in very different and challenging institutional contexts.

(Fahimnia et al., 2018)	Environmental Sustainability/Green	Greening versus resilience: A supply chain design perspective	Transportation Research Part E: Logistics and Transportation Review	3	3	Developed country, Australia (ACO corporation as a case)	Environmental performance scoring approach and P-robustness approach	Is it possible for a SC to simultaneously sustain economic growth (minimize costs), minimize environmental impacts, and yet be robust to disruptions?	Simulation and experimentation modelling (Elastic p-robustness/ analytical optimization modelling)	Supply chain management, Green, Environmental sustainability, Robust Network design, Elastic p-robust approach	This paper investigates the extent to which supply chain greening and buttressing (building robustness) strategies are supportive or conflicting. A supply chain design model is introduced which uses an environmental performance scoring approach and a robustness measure to explore the relationship between greening and buttressing. Potential trade-offs to develop robustly green and greenly robust supply chains are evaluated. Data from a multinational apparel company is used. Results show both greening and buttressing can be costly, green supply chains are most sensitive to disruption, robust supply chains have strong long-term benefits, and buttressing a green supply chain is a good investment.
(Choi et al., 2018)	Comprehensive/ Close Loop	Used intimate apparel collection programs: A game-theoretic analytical study	Transportation Research Part E: Logistics and Transportation Review	3	3	Developed Economy, Hongkong, Japan	Game Theory, Used Intimate Apparel Collection (UIAC) program, Closed loop supply chain	Between the charity collector and the commercial collector: (a) Which one of them would exert a greater collection investment in the UIAC program? (b) Would the intimate apparel retailers offer a different voucher rebate value when working with different type of collector? In terms of social welfare: (a) Will the charity collector always attain the highest possible level of social sustainability in its operations? (b) When will the social welfare created by the charity collector be lower than the commercial collector? What are the impacts brought by retail competition on the UIAC program? What are the corresponding mediating factors?	Game theory Modelling	Supply chain management , Used intimate apparel collection program, Reverse logistics, socially responsible operations	Game-theoretic analysis reveals that the collector type and the level of retail competition affect the UIAC program significantly. In particular, we show that the benefit-cost ratio of the collector's investment plays a decisive role in determining whether an increased level of competition will improve the UIAC program's levels of social, environmental, and economic sustainability. We further find that an increased level of competition will lead to a higher consumer surplus if the respective consumer goodwill of donation is sufficiently small.
(Börjeson & Boström, 2018)	Environmental / Reflexive upstream responsibility	Towards Reflexive Responsibility in a Textile Supply Chain	Business Strategy and the Environment	3	3	Developed country, Sweden	Reflexive responsibility	The key objective of this paper is to demonstrate the crucial role that reflexive responsibility has in handling difficult situations and hence, the paper explores both theoretically and empirically what such responsibility entails and implies.	Case Study approach, semi-structured interview, Cross case analysis	Chemicals, textiles, CSR, reflexivity, responsibility, supply chain management	This paper explores the possibilities for responsible management of high-risk chemicals in textiles and focuses on a case study of a Swedish outdoor company. The concept of reflexive responsibility is used to understand and discuss potential possibilities and challenges. The paper describes the process and illuminates the complexity, balancing acts and avenues for upstream responsibility faced by a brand-owning company. It contributes to an understanding of how important steps towards responsibility can be taken.

(Benstead et al., 2018)	Social Sustainability	Horizontal collaboration in response to modern slavery legislation: An action research project	International Journal of Operations & Production Management	4	4	Developed country, UK	The relational theory (Relational Rent, relational capital, Governance)	How can horizontal collaboration, including the involvement of non-business actors, aid organizations to gain competitive advantage in terms of social sustainability performance, in response to modern slavery legislation?	Action research Approach (Collaborative approach with the practitioners in action), multiple qualitative data collection approach	Action research, Horizontal collaboration, Relational theory, Modern slavery	Findings – Successful horizontal collaboration is dependent on both relational capital and effective (formal and informal) governance mechanisms. In collaborating, firms have generated relational rents and reduced costs creating a socially sustainable competitive advantage, as suggested by the relational perspective. Yet, limits to horizontal collaboration also exist.
(Niu et al., 2017)	Sustainable procurement	Punishing or subsidizing? Regulation analysis of sustainable fashion procurement strategies	Transportation Research, Part E: Logistics and Transportation Review	3	3	Centered mainly Developing economy, China	Conceptual Analysis	1) Which procurement strategy is more profitable for the parties in a fashion supply chain? (2) Which procurement strategy is more "green" and sustainable for the society? (3) Is there any effective regulation that a local government can adopt to affect the retailer's procurement strategy and improve the sustainability?	Stylized Modelling	Sustainable operations, Procurement strategy, Fashion supply chain, Government regulations	The retailer's ordering quantity is larger under control than that under agency, i.e., the control strategy is less sustainable; however, the retailer obtains more profits under the control strategy and prefers it; The local government's punishing regulation cannot change the retailer's decision on procurement strategy, but it can effectively make the retailer order less from the manufacturer; The local government's subsidizing regulation can change the retailer's decision on procurement strategy if the subsidy is sufficiently large.
(Nassivera et al., 2017)	CSR And Corporate sustainability	Willingness to pay for organic cotton; Consumer responsiveness to a corporate social responsibility initiative	British Food Journal	1	1	Developed country, Italy	Consumer attitude/ perception/ Consumer behavior	Objective: To contribute to a better understanding of the Italian organic apparel consumer by using structural equation modelling to investigate the importance of consumers' attitudes and beliefs regarding CSR in the agricultural product-processing industries and their WTP for organic cotton (OG) clothing	Quantitative, Structured Questionnaire (Using Likert Scale), SEM Modelling, Consumer attitude towards CSR	Consumer behavior, Corporate social responsibility, Organic cotton, Organic production, LISREL	Findings – One of the direct implications of our study is that companies in the apparel industry should try to improve their social and environmental performance, and communicate their efforts to the public if they want to enlarge their presence in the organic cotton apparel market and elicit the desired consumer response of boosting their WTP a premium price.
(Macchion et al., 2017)	Environmental Sustainability and Social Sustainability	Strategic approaches to sustainability in fashion supply chain management	Production Planning & Control	3	3	Developed country, Italy	Contingency Theory	RQ1: What strategic approaches to sustainability characterize fashion SCM? RQ1.a: What sustainability practices of SCM belong to the different strategic approaches to sustainability? RQ1.b: What drivers/barriers and contextual factors influence the different strategic approaches to sustainability?	Exploratory, Qualitative approach with Multiple Case Study approach (10 Case)	Supply chain management, sustainability, fashion, environmental sustainability, social sustainability	This work provides updated academic and managerial knowledge on the sustainability issue in the fashion industry by revealing the existence of three specific strategic approaches to sustainability that are adopted by reactive, proactive, and value-seeker companies. This research highlights the necessity to approach the sustainability issue by adopting a supply chain perspective that considers both environmental and social sustainability efforts not only within companies' boundaries but also outside in collaboration with supply chain partners (From conclusion)

(Lim et al., 2017)	Comprehensive Sustainability issues	Knowledge management in sustainable supply chain management: Improving performance through an interpretive structural modelling approach	Journal of Cleaner Production	2	2	Developing countries, Vietnam	TBL, Knowledge Management	1. What are the interrelationships among the (KM) attributes? 2. What are the driving and dependence powers to improve the firms' performance through KM in SSCM? 3. What is the SSCM action plan for next frontier?	Qualitative study, Interpretative Structural Modelling (ISM)	Knowledge management, Sustainable supply chain management, Interpretive structural modelling	This study segregated the proposed attributes into 9 levels, namely knowledge management, cleaner production, recycling, waste treatment innovation, economy sustainability (include level 4 and 5), quality, collaboration and social. The research result indicated that learning organisation, information/ knowledge sharing, joint knowledge creation, information technology and knowledge storage are amongst the highest driving and dependence powers among the 21 criteria. These attributes are deemed to be most effective to enhance the performance of firms (From Abstract)
(Hashim et al., 2017)	Environmental Fosus	Application of multi-objective optimization based on genetic algorithm for sustainable strategic supplier selection under fuzzy environment	Journal of Industrial Engineering and Management	1	1	Developing country, Pakistan	Multi Objective optimization framework, fuzzy set theory with uncertainty.	1. To identify and understand the concept of environmental sustainability associated with the strategic supplier at industrial context in textile firms. 2. To evaluate the identified criterion to priority by determining and confirming of their relative importance in effective selection of (SSSS). 3. To interpret the fuzzy logic for dominance of one objective over the other for the formulation of multi-objective optimization based on genetic algorithm for sustainable strategic supplier selection with sensitivity analysis under fuzzy environment.	Quantitative study, multi-objective optimization model, expected value measure (EVM) and genetic algorithm with weighted sum approach, Mathematical case modelling	multi-objective programming, sustainable strategic supplier selection, expected value measure, genetic algorithm, textile sector	Findings: This study makes a certain contribution by introducing the Tetra 'S' concept in both the theoretical and practical research related to multi-objective optimization as well as in the study of sustainable strategic supplier selection (SSSS) under uncertain environment. Results suggest that decision makers tend to select strategic supplier first then enhance the sustainability.
(Franco, 2017)	Circular Economy	Circular economy at the micro level: A dynamic view of incumbents' struggles and challenges in the textile industry	Journal of Cleaner Production	2	2	Developed Economy, Europe (Switzerland, Germany, and Austria, Italy)	Circular economy, Crade to Crade (C2C) approach	1. Which factors hinder established firms' ability to go fully circular? and 2. How do these factors interact with each other in order to move firms and industries towards a circular production system? In other words, what prevents incumbents from radically transforming their linear production systems into circular ones even when they have the intention to do so, and what are the dynamics driving firms' successful transition from a linear economy (LE) to a CE?	Exploratory, Qualitative study, Multiple Case study Approach	Circular economy, Implementation, Supply chain collaboration, Sustainable production, Systemic change	The main contribution of this paper is the dynamic understanding of how certain collaborative supplier-buyer innovation factors (i.e., supply chain position, power balance, and a shared vision) coupled with complex aspects in product design, namely in basic materials, architecture, and functionality, combine to determine the output speed and quantity of circular products to be sold, taken back, and ultimately regenerated.

(Fornasiero et al., 2017)	Environmental Sustainability	Proposing an integrated LCA-SCM model to evaluate the sustainability of customization strategies	International Journal of Computer Integrated Manufacturing	2	2	Simulation study via computer	Life Cycle Assessment, Systems Theory	This work aims to fill the gap of applying quantitative models for environmental assessment in SC context overcoming the limits of the current models of linking the operational practices of the SC with sustainability indicators	Quantitative analysis, Life cycle Assessment (LCA), Specific Industrial Case analysis	Supply chain, customization, modular life-cycle assessment, simulation	The study suggests a modular LCA can assess the environmental impact of a supply chain (SC) with different configurations. Then, based on different supply chain management (SCM) strategies, simulation is run creating scenarios by introducing variation of performance drivers such lead time to the customer, quality in terms of scraps and level of sustainability of the suppliers to support comparison of different kind of customization. The preliminary results of the LCA-SCM model applied to the customization case in the fashion sector highlights as specific decisional areas under the control of supply managers (e.g. supplier selection and manufacturing defects) can significantly affect the environmental impact of the whole SC.
(Fischer & Pascucci, 2017)	Circular Economy	Institutional incentives in circular economy transition: The case of material use in the Dutch textile industry	Journal of Cleaner Production	2	2	Developed country, Netherlands	Circular Economy, Institutional Analysis	The aim of this paper is to gain an insight into how requirements for transitioning to CE creates new organizational forms in inter-firm collaborations and ultimately how they stimulate the emergence of new institutions enhancing sustainability and providing a key contribution to the literature on institutional analyses and sustainability by identifying and analyzing differences between two types of pathways towards CE, and by explaining how the organizational arrangements for these two pathways differ.	Inductive Approach, Qualitative and Explorative analysis, Multiple Case Study	Not presented	Using information and data from cases of inter-firm collaborations engaged in transition to circular material flows resulted in discovering a dichotomy between SQ and PAS pathways. Chain coordination, contracting, and financial mechanisms, have been identified as key elements for stimulating the emergence of new organizational elements of inter-firm collaborations and eventually new rules for managing circular economy material flows and metabolisms. Both SQ and PAS arrangements, while created by firms to manage collaborations and exchanges can have consequences at multiple institutional levels. Whereas SQ arrangements may have implications at the level of formal rules, for example in creating a new industry standard for regulating use of up-cycled fabrics, PAS arrangements may have wider implications, by for example reshaping ownership in service contracts and creating cascading supply chain activities. Both SQ and PAS arrangements aim at creating new rules for managing circular material flows, albeit through different pathways.
(Fallahpour et al., 2017)	Comprehensive Sustainability issues	A decision support model for sustainable supplier selection in sustainable supply chain management	Computers & Industrial Engineering	2	2	Developing country, Iran	Not specified, Supplier selection Criteria used	(i) Which set of criteria and sub-criteria is most important and applicable in the evaluation of suppliers' sustainability performance? (ii) How an integrated model can be developed to weigh and evaluate the sustainability performance of suppliers in the presence of uncertainty?	Questionnaire-based survey,	Sustainable supplier selection, Questionnaire-based survey, Importance and applicability, Fuzzy preference programming	This research has contributed specifically to sustainable supplier selection by: (i) Developing a comprehensive list of sustainability criteria and their corresponding sub-criteria and (ii) Proposing a hybrid hierarchical decision-making model to select the optimal supplier using FPP and FTOPSIS. The results show that economic aspect is still the most essential aspect, followed by environmental aspect and finally social aspect. The second contribution is the development of a new hybrid model by integrating fuzzy preference programming, as one of the newest and most accurate fuzzy modification of Analytical Hierarchy Process, with Fuzzy Technique for Order of Preference by Similarity to Ideal Solution

(Winter & Lasch, 2016)	Environmental Sustainability and Social Sustainability	Environmental and social criteria in supplier evaluation – Lessons from the fashion and apparel industry	Journal of Cleaner Production	2	2	Mixed, Europe, Asia, Global	Supplier Evaluation theory/ criteria, Discrepancy Theory	How are environmental and social criteria applied in supplier evaluation? The focus is on identifying applied environmental and social criteria as well as the way these criteria are applied in purchasing and supplier evaluation processes in practice.	Case Study approach (6 Cases), semi-structured interview, Cross case analysis	Supplier evaluation, Environmental criteria, social criteria, Case study Fashion and apparel industry	The results indicate that no child labor, working hours, no forced labor, no discrimination, employment compensation, freedom of association, and health and safety practices are commonly used as social criteria, whereas end-of-pipe control (wastewater treatment systems) and environmentally friendly materials are used as environ- mental criteria. New criteria, for example, housing conditions and home worker conditions, were identified as not having been suggested in the literature on supplier evaluation. Environmental and social criteria are applied in prequalification as well as verification of the compliance of the purchasing requirements in supplier controlling. However, these criteria are not important in the final selection of a supplier for an order as is often recommended in the literature. Consequently, sustainability criteria are indeed important for supplier evaluation but do not carry the same importance that many papers assign them.
(Wilhelm et al., 2016)	Environmental Sustainability and Social Sustainability	Implementing sustainability in multi-tier supply chains: Strategies and contingencies in managing sub-suppliers	International Journal of Production Economics	3	3	Mixed (Developed and Developing)	Multi-tier supply chain/ Sub Suppliers	Which strategies do buying firms choose to manage sub-suppliers' sustainability in different supply chains? Which contingencies determine the choice of a particular strategy?	Case Study Approach, Semi-Structured Interview, Theory Elaboration	Sustainability, Buying firm strategies, multi-tier supply chains, Case studies	Analyzing seven cases of global MSCs and found four different characteristic MSC types—open, closed, third party, and “don't bother”. We identified three main factors—supply chain complexity, the sustainability management capabilities of the first-tier supplier, and the type of sustainability in focus (i.e., environmental, or social sustainability)—that determine when and how buying firms actually extend their sustainability strategies to their sub-suppliers.
(O'Reilly & Kumar, 2016)	Closed loop/ Reverse Supply Chain	Closing the loop: An exploratory study of reverse ready-made garment supply chains in Delhi NCR	The International Journal of Logistics Management	1	1	Developing country, India	Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA)	The purpose of the study is twofold: to map current garment recycling activity in the Delhi National Capital Region (NCR) based on interviews with key stakeholders and to explore behavior at household level to inform future closed loop chain design.	Qualitative in-depth interview, Case Study approach	India, Closed-loop supply chain, Garment recycling, TPB model	Four constructs (attitudes, subjective norm, perceived control and sense of duty) are significant determinants of “intention to plan to recycle”. Having tested for various possible meditating effects, sense of duty was found to act as a precursor to attitude. In this model all other constructs were significant determinants of intention to recycle garments. Thus, the study highlights the role of “sense of duty” in attitude formation, a key determinant of intention to recycle garments. This highlights the importance of adherence to sustainable practices and the need for associated governance and regulation.

(Miemczyk et al., 2016)	Environmental Sustainability/ Close loop supply chain	Dynamic development and execution of closed-loop supply chains: a natural resource-based view	Supply Chain Management: An International Journal	3	3	Developed country, Italy, Netherlands, France	Natural Resource Based view (NRBV)-Dynamic Capabilities	1. How does the changing environment lead to new objectives for existing capabilities, e.g., pollution prevention, and drive new capability acquisition and development? 2. As collaboration is key to the acquisition and development of these capabilities, how do relationships need to be managed to achieve CLSC success? 3. How do these capabilities enable CLSC development through supply chain redesign, co-evolution and control?	Theory Elaboration by Case study, Qualitative Interview, Cross Case analysis,	Dynamic capabilities, Resource based view, Sustainable supply chains, Closed loop supply chains	Findings – The paper shows how strategic resources help companies in two sectors achieve successful CLSC designs. Strategic supply chain collaboration is an important success factor but also presents a number of challenges. The NRBV is used to explain the importance of new resources in technology, knowledge and relationships and stresses the role of DCs to constantly address changes in the business environment to renew these strategic resources.
(Macchion et al., 2016)	Environmental Sustainability	Improving innovation performance through environmental practices in the fashion industry: the moderating effect of internationalization and the influence of collaboration	Production Planning & Control	3	3	Developed country, Italy	Ecological modernization/ Internationalization	This paper addresses whether sustainability practices and collaboration would improve company's innovation performance; moreover, the paper aims at addressing whether (production and distribution) inter-nationalization would moderate this relationship?	Quantitative, Structured Questionnaire, Linear regression modelling and hypotheses testing	Supply chain management; environmental sustainability; collaboration; innovation management; internationalization	The results of the research clearly show the positive impact of these practices (the adoption of environmental sustainability practices, collaboration along the supply chain implies better innovation performance, in terms of differentiation from the competitors for higher quality, product or process, the internationalization on innovation performance)The paper also proves the existence of a moderating effect exerted by internationalization on the relationship between environmental sustainability and innovation performance.
(Li et al., 2016)	Green Supply chain Focus, Supplier Integration	Supplier integration, green sustainability programs, and financial performance of fashion enterprises under global financial crisis	Journal of Cleaner Production	2	2	Not specified (Global Context)	Green Supply Chain, Suppliers Integration	This study aims to empirically examine the financial performance of fashion enterprises with SI and GSP adoption in light of the financial tsunami in 2008. Specifically, this study considers the following relationships: (i) the impact of SI and GSP adoption on the financial performance of the fashion enterprises, (ii) the ability of SI and GSP adoption to alle- viate adversity owing to financial crisis, and (iii) the moderating effect brought by fashion content on the above relationships	Content analysis methodology is applied to the data collected from the fashion enterprises' websites, annual reports and public articles.	Supply chain management, Supplier integration, Green sustainability programs, Fashion enterprises, Financial performance, Empirical study	The findings reveal that (i) both SI and GSP adoption can significantly improve the financial performance of the fashion enterprises, (ii) both SI and GSP adoption help to mitigate the adverse effect of financial tsunami on the fashion enterprise's financial performance; and (iii) fashion content has a moderating effect for fashion enterprises which sell fashionable items (i.e., "fashionable group") to increase profits through a higher level of SI or executing GSP to act against financial tsunami.

(Khurana & Ricchetti, 2016)	Comprehensive Sustainability issues	Two decades of sustainable supply chain management in the fashion business, an appraisal	Journal of Fashion Marketing and Management: An International Journal	1	1	Review Paper, global	Reflection on action/Reflective Study	RQ1. What are the main changes in the industry approach to sustainability and what lessons stakeholders learnt in the two decades as a result of the trial-and-error process? RQ2. How NGOs campaigns influenced fashion brands strategies toward SSCM? RQ3. What role for transparency in SSCM recent developments in the industry sustainable strategy reveal?	Reflective Practice by Donald Schon	Fashion industry, Corporate social responsibility, Stakeholders, Supply chain management, Brands, Textile/clothing supply chains	Findings – The time span considered captures fashion brands sustainability awareness in its statu-nascendi (nascent state) revealing a trial and error process that led to progressive refinements of both means and ends. Change drivers identified are go beyond monitoring, adopt a comprehensive approach, look beyond first tier of suppliers, integrate sustainability to core business practices and bring transparency to the supply chain.
(Huq et al., 2016)	Social Sustainability	Social management capabilities of multinational buying firms and their emerging market suppliers: An exploratory study of the clothing industry	Journal of Operations Management	4*	4*	Developing Country, Bangladesh	Stakeholders Theory, Social sustainability in supply chains	This study explores two primary research questions: what social management capabilities (SMCs) are needed in multinational buyers and their emerging market suppliers; and how do external factors affect the development and evolution of buyer and supplier SMCs in emerging markets?	Multiple case analysis (With two time period comparisons), semi structure interview protocol (Yin 2009), NVivo for analysis	Social sustainability, Supply chain Capabilities, Clothing industry, Longitudinal case study, Stakeholder theory	Findings show that, in the absence of intense stakeholder pressure, buyers can lay the foundation for improved social performance by using their own auditors and collaborating with suppliers rather than using third-party auditors. However, in the face of acute attention from customers, NGOs and media, it is observed that consultative buyer-consortium audits emerged, and shared third-party audits offered other advantages such as increased transparency and improvements in worker education and training.
(Giannakis & Papadopoulos, 2016)	Sustainability related risks	Supply chain sustainability: A risk management approach	International Journal of Production Economics	3	3	Developed country, UK and France	Supply chain risk management (SCRM),	RQ1: What is the nature, the causes and effects of sustainability- related supply chain risks? RQ2: How can sustainability-related risks be managed?	Mixed Approach-Qualitative Field study, Two Case analysis (Interview, survey, literature review)/ The failure mode and effect analysis (FMEA)	Sustainability, Risk management, supply chain management	The findings show that endogenous environmental risks are perceived to be the most important across different industries and the interconnectedness between several sustainability-related risks is very high. This points to the need for integrated sustainability risk management approaches to facilitate the development of effective sustainable strategies. (From Conclusion) The findings of the empirical study show that the majority of the most significant sustainability-related risks relate to endogenous risks that result from companies' operations. These risks are generally controllable, or partially controllable if appropriate strategies are put in place. Major exogenous sustainability-related risks were also found to be correlated to endogenous risks, which leads to the conclusion that through a holistic and systematic risk management process sustainability-related risks could be contained.
(Da Giau et al., 2016)	Environmental Sustainability and Social Sustainability	Sustainability practices and web-based communication: An analysis of the Italian fashion industry	Journal of Fashion Marketing and Management: An International Journal	1	1	Developed country, Italy	CSR mentioned	RQ1. Which environmental and social sustainability drivers, barriers and practices are adopted by companies in the Italian fashion industry? RQ2. How those companies are communicating their sustainability commitment through their corporate websites?	Multiple case analysis (12 company case), Ad-hoc structured interview protocol, within and cross case analysis	Corporate social responsibility, Communication, Supply chain management	Findings – The findings showed that four different approaches in the field of sustainability practices and web-based communication are available within the Italian fashion industry (i.e. low commitment, high commitment, low disclosure, high marketing) by highlighting the alignment (i.e. fit or misfit) among these dimensions and by discussing the practices as well as the drivers/barriers of each approach.

(Beh et al., 2016)	Reverse Service Supply Chain	Second-life retailing: a reverse supply chain perspective	Supply Chain Management: An International Journal	3	3	Developing country, Malaysia	Resource based view (RBV), Ecological Modernization Theory, Reverse Service Supply Chain (RSSC)	To contribute to the emerging literature of the RSSC by identifying and examining business models designed to extend the life of apparel and fashion goods, reducing waste and democratizing consumption.	Case Studies analysis (Two Malay off price retailer) using the Business Model Canvas (Osterwalder and Pigneur, 2010), Qualitative Interview	Business model, Sustainability, Reverse logistics, Retailing, Sustainable supply chains	Findings – Using the Business Model Canvas, the authors demonstrate the essential characteristics of second-life retailers. Retailers in this study, unlike retailers in the developed world, combine traditional business models with off-price retailing. There is no clear demarcation between the forward and reverse supply chain used to manage first- and second-hand retailing. Practical implications – The paper demonstrates the potential of innovative business models in the reverse supply chain. It encourages managers to look beyond the "return to the point of origin" and seek imaginative alternatives. Such alternatives potentially could result in additional revenue, enhanced sustainability and democratisation of consumption meeting triple bottom line objectives.
(Aßländer et al., 2016)	Comprehensive	Suppliers as Stewards? Managing Social Standards in First- and Second-Tier Suppliers	Journal of Business Ethics	3	3	Developing country, Istanbul, Turkey	Agency Theory, Multi-tier Supply chain, Proposed Stewardship Theory	The purpose is twofold: 1. to find out whether the six characteristics differentiating agency and stewardship relationships allow a meaningful analysis of buyer–supplier relationships. 2. To determine how much the relationships observed have in common with the characteristics outlined by agency and stewardship theory and whether one of these theories has more explanatory power in this particular case.	Case Study Approach, Semi-Structured Interview, Theory Elaboration	Sustainable supply chain management, Textile industry, Agency theory, Stewardship theory, Auditing, Social and environmental standards	The study analyse how the agency and stewardship theories differ regarding their descriptions of autonomy, motivation, identification, authority, stakeholder orientation and short- versus long-term collaboration. The distinction between agency and stewardship relationships is empirically meaningful in the context of supplier–buyer relationships and adds a new aspect to our understanding of how to achieve more sustainable supply chains.
(Ashby, 2016)	Comprehensive Sustainability issues	From global to local: reshoring for sustainability	Operations Management Research	1	1	Developed country, UK	Social Network Theory, Offshoring, Reshoring, Nearshoring	RQ1. Why do firms decide to re-shore, and what are the challenges and benefits? RQ2. Does a local supply chain enable better supply management, and what impact does this have on sustainability performance?	Case Study Approach, Qualitative Semi-Structured Interview	Offshoring, Reshoring, Nearshoring, Sustainability, Social network theory, Supply management	The findings demonstrate the importance of socially complex, long-term relationships in managing a sustainable supply network. These relationships contribute to the resources that a firm can harness in its supply practices, and SNT extends this with its emphasis on the strength of ties with suppliers, and the trust, reciprocity and shared meanings it engenders. For the studied firm these advantages are derived through its localised supply chain, and collaborative supplier relationships, and its progressive reshoring of activities is integral to achieving its sustainability principles

(Lueg et al., 2015)	CSR And Corporate sustainability	The Role of Corporate Sustainability in a Low-Cost Business Model - A Case Study in the Scandinavian Fashion Industry	Business Strategy and the Environment	3	3	Developed country, (SCAC and NIKE)	CSR, Corporate Sustainability	In what way can corporate sustainability add value to a low- cost business model?	Case Study approach, semi-structured interview, Cross case analysis	Business model; corporate social responsibility; corporate sustainability; sustainable development; CSR policies; information disclosure; labor practices; public policy; environmental policy; risk management; shareholder value; stakeholder engagement; supply chain	Corporate sustainability minimizes the downside risk of the business model. It does so by (1) creating implicit contracts that reach beyond traditional 'shareholder value', (2) transferring risk to suppliers and (3) improving leadership by motivating management and employees, and by directing their attention to critical issues. As to public policy, it is concluded that regulators could introduce mandatory disclosure of suppliers to facilitate controls through stakeholders, or alternatively an industry-wide comply-or-explain code of conduct.
(Kozlowski et al., 2015)	Sustainability Reporting/ Corporate Sustainability	Corporate sustainability reporting in the apparel industry: An analysis of indicators disclosed	International Journal of Productivity and Performance Management	1	1	Global (14 Global Brands)	Sustainability Reporting, Corporate Sustainability	The purpose of this paper is to identify and analyze the sustainability indicators disclosed by apparel brands in their publicly available reporting RQ1. What sustainability indicators are currently being reported in the apparel industry?"	Content Analysis of Reports, Normative Business model development with cross case analysis, Qualitative and Quantitative	CSR reporting, Sustainability reporting, Global reporting initiative, Sustainability indicators, Sustainable apparel, Sustainable fashion	Findings – In total, 87 reported corporate sustainability indicators were identified. The study finds that there is a lack of consistency among them. The majority of the indicators dealt with performance in supply-chain sustainability while the least frequently reported indicators addressed business innovation and consumer engagement.
(Jakhar, 2015)	Comprehensive Sustainability issues	Performance evaluation and a flow allocation decision model for a sustainable supply chain of an apparel industry	Journal of Cleaner Production	2	2	Developing country, India	Game theory	To help decision makers, managers, and practitioners to achieve economic growth, societal development, and environmental protection by developing sustainable supply chain performance measures and proposes a partner selection and flow allocation decision-making model	Quantitative Survey, Questionnaire, SEM Modelling, Fuzzy AHP, multi-objective linear programming	Sustainable supply chain, Performance measures, Flow optimization, Structural equation modelling, Fuzzy analytic hierarchy process, Fuzzy multi-objective linear programming	The results of the structural equation modelling analysis indicate that the survey respondents considered sustainable production performance to be of prime importance, which thus indicates its significance in developing a sustainable supply chain for the apparel industry. To illustrate the use of the proposed model for partner selection and flow allocation decision making, real-time data from an apparel manufacturer are presented. Optimal results were obtained for two strategies sustainability and cost saving to show a cost benefit trade-off when developing a sustainable supply chain.
(Egels-Zandén & Lindholm, 2015)	Social Sustainability	Do codes of conduct improve worker rights in supply chains? A study of Fair Wear Foundation	Journal of Cleaner Production	2	2	Developed Economy, European context by Fair wear foundation	Not specified	Do codes of conduct improve working conditions (in the form of outcome standards and/or process rights) at the point of production?	Multiple factory audits, content analysis	Code of conduct, Garment, Private regulation, Supply chain, Value chain, Worker rights	Findings lend support to the widespread argument that codes have uneven impact. It is proved that even rigorous multi-stakeholder factory audits seldom are able to identify process rights violations (such as those affecting freedom of association and discrimination), and that auditing is thus is more fundamentally flawed than assumed in previous research.
(Egels-Zandén et al., 2015)	Supply chain transparency/ Sustainability minor focus	Trade-offs in supply chain transparency: the case of Nudie Jeans Co	Journal of Cleaner Production	2	2	Developed country, Sweden	Supply chain transparency	How a company, in practice, attempts to work with supply chain transparency and how to explain the transparency outcomes of such attempts?	Case Study Approach, Qualitative Semi-	Supply chain, Supply networks, Supplier relationships, Sustainability, Trade-offs Transparency	Three underlying trade-offs, i.e., threat vs. collaboration, standardization vs. differentiation, and means vs. ends, shape a firm's transparency outcomes. The study questions whether more supply chain transparency is always desirable and argue that

									Structured Interview		managers must choose between a compliance or cooperation approach to supply chain transparency.
(Egels-Zandén & Hansson, 2015)	Supply chain transparency/ Sustainability minor focus	Supply Chain Transparency as a Consumer or Corporate Tool: The Case of Nudie Jeans Co	Journal of Consumer Policy	2	2	Developed country, Sweden	Supply chain transparency	RQ 1. How do consumers in practice leverage increased supply chain transparency to pressure the disclosing firm RQ 2. How does increased supply chain transparency in practice influence consumers' willingness to buy products?	Case Study Approach, Qualitative Semi-Structured Interview	Consumer willingness to buy, Garment, Political consumerism, Supply chain, Sustainability, Textiles, Traceability, Transparency	The authors demonstrate that consumers do not leverage transparency, but that transparency improves consumer willingness to buy. In doing this, the authors contribute to the literature in two important ways. First, the authors provide one of the first, if not the first, studies of whether consumers in practice leverage increased supply chain transparency, challenging the previous research claim that supply chain transparency is a useful consumer tool. Second, the authors move beyond studies of purchasing intentions and willingness to buy in experimental settings and confirm that supply chain transparency is a useful corporate tool in practice.
(Bhaduri & Ha-Brookshire, 2015)	Comprehensive-Gender biased opinion	Gender differences in information processing and transparency: cases of apparel brands' social responsibility claims	Journal of Product & Brand Management	1	1	Developed country, USA	Schema-congruity theory, Information processing Theory	To help apparel brands successfully communicate their SR (Social Responsibility) efforts, the study aimed to understand the differences and similarities in how males and females evaluate SR claims from apparel brands.	Online survey experiment, PROCESS (Regression based hypothesis testing tool),	Gender, Sustainability, Fashion marketing, Supply chain management, Information processing, Brand schema, Fair labor, Information transparency, Made in USA, Sustainable marketing	Findings – Males were more likely than females to rely on their existing schemas for judgment in case of Made in USA but not Fair Labor claims. The presence of information transparency in claims reduced participants' reliance on their schemas.
(Turker & Altuntas, 2014)	Comprehensive Sustainability issues/ Sustainability Reporting	Sustainable supply chain management in the fast fashion industry: An analysis of corporate reports	European Management Journal	2	2	Developed Economy, European context	SSCM Theoretical Framework	This study attempts to conceptually map their current SSCM approaches using a theoretical model to reveal their overall approaches to sustainability.	Content analysis of the sustainability reports, Global Reporting initiatives (GRI), Theoretical framework derived from Seuring and Müller (2008)	Sustainability, Supply chain management, Fast fashion industry, Sustainability reports	The results of the study reveal that these companies focus significantly on supplier compliance with their code of conduct, employing further monitoring and auditing activities to prevent production problems in developing countries, improve overall supply chain performance and set sustainability criteria for their suppliers.
(S. C. Tseng & Hung, 2014)	Carbon emission/ Environmental Issues	A strategic decision-making model considering the social costs of carbon dioxide emissions for sustainable supply chain management	Journal of Environmental Management	3	3	Global Context	CBA (Cost-benefit analysis),	In this study, the authors propose a model considering both the operational costs and social costs of CO2 emissions in SCM. The objective of this study is to provide a useful model for decision- makers of SCM for planning a sustainable supply chain	Mathematical Modelling	Carbon dioxide emissions, Social costs, Sustainable supply chain management	The results showed that the higher the social cost rate of carbon dioxide emissions, the lower the amount of the emission of carbon dioxide. The results also suggested that a legislation that forces the enterprises to bear the social costs of carbon dioxide emissions resulting from their economic activities is an effective approach to reducing carbon dioxide emissions.

(Yongjian Li et al., 2014)	Sustainability Governance	Governance of sustainable supply chains in the fast fashion industry	European Management Journal	2	2	Global, Single case analysis, H&M	Sustainability theory, CSR, SCG (Supply Chain governance)	How many competitive sustainable attributes of the fast fashion product can be identified based on the sustainable development theory? Which are the motivations for adopting sustainability governance in the fast fashion supply chain? Which are the factors of affecting the sustainability governance decision-making? What are the mechanisms of sustainability governance of the fast fashion supply chain? In practice, how do the sustainability governance mechanisms work in the fast fashion supply chain?	Case Study approach (H & M), SSCG Framework	Fast fashion Sustainability Corporate social responsibility Supply chain governance	Competitive sustainable attributes related to fast fashion products -TCQSERP, i.e., time (T), cost (C), quality (Q), service (S), environment (E), resource (R), and people (P). The study demonstrates the seven SSCG influence factors, i.e., the characteristics of consumer demand, the regulatory capacity of governments, the capacity of disclosure by NGOs, the density of a supply chain, the complexity of transactions, the centrality of the focal company, and the capabilities of suppliers. The findings suggest that the core influence and centrality of a corporation should be strengthened from the perspective of internal governance, and stakeholders should collaborate to achieve sustainability governance throughout the entire fast fashion supply chain from the perspective of external governance.
(Joa et al., 2014)	Water usage/ performance/ Environment	Introduction of a feasible performance indicator for corporate water accounting – a case study on the cotton textile chain	Journal of Cleaner Production	2	2	Developing Country, Turkey and Bangladesh	Quantitative RCWI model	This paper presents a low-effort approach for corporate water accounting that overcomes those shortcomings. The concept of Regionalized Cumulative Water Intensity (RCWI) works with real data rather than generic values and thus allows a realistic analysis of corporate water use (Joa and Hottenroth, 2012)	Regionalized Cumulative Water Intensity (RCWI), Case study, LCA (Life cycle Assessment), WFA (Water Footprint Assessment)	RCWI, Corporate water accounting, Water efficiency, Supply chain management, Cotton textile chain	The results of this case study show that the concept is suitable for assessing and comparing the water performance of different suppliers and supplier combinations whereby not only environmental and economic but also social aspects can be considered. Moreover, the indirect responsibility that a company bears for the water use of its suppliers is reflected in its own water performance results. Through purchasing less, more or other pre-products as well as through deliberate supplier selection a company has a non-negligible influence on this.
(Diabat et al., 2014)	Comprehensive Sustainability issues	Analysis of enablers for implementation of sustainable supply chain management – A textile case	Journal of Cleaner Production	2	2	Developing country, India	SSCM, TSCM	This paper addresses the gap in the identification of dominant enablers to implement SSCM through a two-phase research approach. Phase 1 is an initial survey to identify the enablers for SSCM, and Phase 2 is the identification of the leading enabler by ISM approach.	Interpretive Structural Modelling (ISM)	Sustainable Supply Chain Management, Enabler analysis, Interpretive Structural Modelling	Results reveal that five enablers dominate an industry's practices, and those five enablers include Adoption of safety standards, Adoption of green practices, Community economic welfare, Health and safety issues, and Employment stability. The result of this study shows that safety perspective enablers provide additional motivation when compared to the other enablers for SSCM adoption.
(Boström, 2014)	Sustainability minor focus	Between Monitoring and Trust: Commitment to Extended Upstream Responsibility	Journal of Business Ethics	3	3	Developed country, Sweden	CSR, Theory of Trust (Mo¨llering (2006), Extended responsibility	By focusing on trust, monitoring, and a commitment to extended responsibility, the article aims to contribute to any approach with a theoretical interest in the feasibility of extended upstream responsibility among procuring organizations of various types.	Intensive and comparative case study approach, Qualitative Semi Structured Interview	Responsibility, Trust, Auditing, Sustainability, Supply chain, Interorganizational	The aim is to demonstrate, both theoretically and empirically, the limits and possibilities of monitoring and trust for developing extended upstream responsibility. The article demonstrates the problems with, on one hand, simple ritualistic monitoring and, on the other, simple trust, and explores potentially constructive pathways to extended upstream responsibility at the intersection of monitoring and trust. In connection with the findings, the article argues that theories on responsible and sustainable supply chain management must also take the enormous variety of organizations into account: not only large, private,

											transnational companies, which the literature has until now been preoccupied with.
(Huq et al., 2014)	Social Sustainability	Social sustainability in developing country suppliers: An Exploratory Study in the Ready-Made Garments Industry of Bangladesh	International Journal of Operations & Production Management	4	4	Developing Country, Bangladesh	TCE (Transaction Cost Economies)- Grover and Malhotra (2003),	RQ1. Why are developing country suppliers adopting socially sustainable practices? RQ2. How is the achievement of social sustainability impeded? RQ3. How can the implementation of social sustainability be facilitated?	Qualitative, Exploratory multiple Case Study approach (4 Bd Suppliers, 2 UK retailers), Semi Structured Interview	Bangladesh, Social sustainability, Developing country suppliers, Exploratory case study, Readymade garments industry, Transaction cost economics	Findings – One factor motivating implementation is labour retention – a skilled labour shortage means employees will migrate to other factories if suppliers do not improve certain social standards. Barriers to implementation include a misalignment between the requirements of western codes of conduct and the cultural and socio-economic context in Bangladesh. Enablers include a shift from auditing and monitoring to more open dialogue and trust between buyers and suppliers. The paper also reveals evidence of mock compliance, e.g. suppliers keeping two sets of timesheets, and of the complexities of social sustainability.
(Bevilacqua et al., 2014)	Environmental Sustainability	Environmental analysis of a cotton yarn supply chain	Journal of Cleaner Production	2	2	Developing and Developed country (Egypt, China, India and the USA)	LCA (Life Cycle Assessment) Approach	a) What are the critical points of the supply chain from the environmental point of view; b) What important activities can be carried out by focal company and suppliers for reducing the environmental impact.	Descriptive Case Study, five stage process.	Life Cycle Assessment (LCA), Cotton yarn, Sustainable supply chain	This study compares the environmental impacts related to the production of cotton yarn from cultivation to washing and drying, when cotton is supplied by four companies located in four different countries (Egypt, China, India and the USA). Interesting results have been obtained from cultivation scenarios where the productivity influences the value of the environmental impact associated to each country. The highest greenhouse effect is produced by the Indian company, with 0.89 kg of CO2 equivalent (per 1 kg of cotton).
(Jaegler & Burlat, 2013)	Environmental Sustainability	What is the impact of sustainable development on the re-localisation of manufacturing enterprises?	Production Planning & Control	3	3	Not specified Simulation study	Relocalization theme	To address issues, this paper studies how localisation of suppliers influences both industrial and environmental performance within a supply chain	Simulation modelling of Supply chain	Simulation; carbon emissions; supply chain; relocalisation	This simulation tool has been tested in the case of a supply chain in an MTS environment with two types of products and with four locations choices (local, regional, continental and global). The results provide general guidelines to support the supply chain design in view of reducing CO2 equivalent emissions due to storage and transportation.
(Fulton & Lee, 2013)	Environmental Sustainability and Social Sustainability	Assessing sustainable initiatives of apparel retailers on the internet	Journal of Fashion Marketing and Management	1	1	Mostly USA, online	Not specified	The purpose of this study is to identify retailers selling sustainable apparel goods on the internet and examine their sustainable initiatives in the supply chain based on the United Nation's Global Reporting Initiative (GRI), one of the most widely used sustainability reporting guidelines.	Content analysis of the retailer's websites following Global Reporting initiatives (GRI), Theoretical framework derived from	Apparel, E-commerce, Supply chain, Sustainability, Internet, Retailers	Findings – Findings of this study support the GRI as a useful framework to assess sustainability in online apparel retailers. The most addressed aspects of the GRI that were addressed by companies in this study were the environmental and social aspects. Few sustainable apparel retailers on the internet made initiatives in all three areas of sustainability addressed in the GRI

									Seuring and Müller (2008)		
(Dangelico et al., 2013)	Environmental Sustainability	Developing Sustainable New Products in the Textile and Upholstered Furniture Industries: Role of External Integrative Capabilities	Journal of Product Innovation Management	4	4	Developed country, Italy	New Product Development, Resource Based View,	To investigate the role of capabilities useful for companies to integrate knowledge and competencies from outside of the firm on green product development in terms of both manufacturing process and product design 2. To understand whether green product development opens new product, market, and technology opportunities, as well as leads to better financial performance of NPD programs.	Survey, Structured Questionnaire, regression analysis, CFA	not given	Results show that (1) companies engage in developing external integrative capabilities through the creation of collaborative networks with actors along the supply chain, the acquisition of technical know-how, and the creation of external knowledge links with actors outside the supply chain; (2) external knowledge links play a key role in the integration of environmental sustainability issues into the manufacturing process, whereas capabilities such as the acquisition of technical know-how and the creation of collaborative networks prove to be more important for integrating environmental issues into product design; and (3) the integration of environmental sustainability issues into NPD programs in terms of product design leads to the creation of new opportunities for firms, such as opening new markets, technologies, and product arenas.
(Choi, 2013)	Environmental Fosus/ Carbon Taxation	Optimal apparel supplier selection with forecast updates under carbon emission taxation scheme	Computers & Operations Research	3	3	Not specified	Not specified	In the presence of carbon emission tax and considering multiple (N) suppliers with different lead times and wholesale price offers, how should a fashion retail buyer make an optimal choice on selecting supplier? (2) How would the carbon emission tax affect the optimal choice of supplier?	Analytical modelling, develop the optimal solution algorithm by multi-stage stochastic dynamic programming	Optimal supplier selection, Carbon emission tax, Dynamic programming	We propose a two-phase optimal supplier selection scheme in which phase one filters the inferior suppliers and phase two helps to select the best supplier among the set of non-inferior suppliers by multi-stage stochastic dynamic programming. The impacts brought by different formats of carbon emission tax are explored. Finally, we examine an extended model in which there is a local supplier who offers a buyback contract and accepts product returns. Insights from the analysis are discussed.
(Wiengarten et al., 2012)	Environmental Sustainability	Supply chain environmental investments in dynamic industries: Comparing investment and performance differences with static industries	International Journal of Production Economics	3	3	Mixed, Europe, Asia, Global	Not specified	1. Does the level of investment in supply chain environmental practices vary between companies situated in dynamic and static industries? 2. Do operational performance gains from investments in supply chain environmental practices vary between companies situated in dynamic and static industries?	Structured Questionnaire, Survey	Environmental issues, Supply chain management, Industry clock speed, Sustainability	Results indicate that plants competing in dynamic industries such as apparel do on average invest less in supply chain environmental practices compared to plants in static industries. In addition, these environmental investments do not significantly improve operational performance in dynamic industries in terms of cost, quality, delivery and flexibility. However, in static industries environmental investments do significantly improve a plant's operational performance in terms of cost, quality and flexibility.

(Shaw et al., 2012)	Environmental Fosus	Supplier selection using fuzzy AHP and fuzzy multi-objective linear programming for developing low carbon supply chain	Expert Systems with Applications	1	3	Model effectiveness checked based on a case of Developing country, India	Fuzzy Set theory	This study presents an integrated approach for selecting the appropriate supplier in the supply chain, addressing the carbon emission issue, using fuzzy-AHP and fuzzy multi-objective linear programming. Fuzzy AHP (FAHP) is applied first for analyzing the weights of the multiple factors.	Fuzzy-AHP and fuzzy multi-objective linear programming, A case analysis	Supplier selection, Fuzzy multi-objective linear programming, Fuzzy AHP , Carbon emission, Greenhouse gas, Textile supply chain	Fuzzy AHP (FAHP) is applied first for analysing the weights of the multiple factors and the considered factors are cost, quality rejection percentage, late delivery percentage, greenhouse gas emission and demand. These weights of the multiple factors are used in fuzzy multi-objective linear programming for supplier selection and quota allocation. An illustration with a data set from a realistic situation is presented to demonstrate the effectiveness of the proposed model. The proposed approach can handle realistic situation when there is information vagueness related to inputs.
(Shaw et al., 2012a)	Environmental Sustainability	Modeling a low-carbon garment supply chain	Production Planning & Control	3	3	Developing country, India	Carbon footprint	This article optimizes multi-period supply chain network by explicitly considering the carbon emissions and using multi-objective goal programming (GP) and optimized the total cost, total carbon emission, total embodied carbon footprint of the raw material and the trade credit in the model	Multi Objective Goal programming,	Low-carbon supply chain, carbon emission, goal programming, supply chain network design	The result suggests that managers should capture the direct as well as the indirect emission which helps in arriving at appropriate strategy for a sustainable supply chain. The effectiveness of the proposed model is demonstrated through a case of a garment supply chain. This model also supports in deciding appropriate goal for carbon emission, supply chain costs, etc.
(Pui-Yan Ho et al., 2012)	Environmental Sustainability	A Five-R analysis for sustainable fashion supply chain management in Hong Kong: a case analysis	Journal of Fashion Marketing and Management	1	1	Developing country, Hongkong Fashion industry	Five R framework	To explain why fashion companies would “go green” and to evaluate business models and sustainable supply chains by applying the Five-R framework, the study further evaluates the initiation, implementation and institutionalization journey of a local fashion company and generate important insights and findings.	Exploratory, Qualitative study, Semi-structured interview, Case study, Five-R framework (contains five critical processes- “recycle, reuse, reduce, re-design and re-imagine” (Etsy and Winston, 2009)	Hong Kong, Fashion industry, Textile industry, Supply chain management, Five-R analysis, Green supply chain, Sustainable, Case analysis	Findings – From the studies, data and literature gathered and analyzed hitherto, it is evident that fashion companies can seize competitive advantage through strategic management of environmental challenges. In their greening initiatives, fashion companies should strongly consider the product development process and extend stewardship across the multiple life cycles of products. The Five-R framework, together with its future extensions, can offer an opportunity to clearly display what has been achieved by the company at present and also succinctly demonstrate what area the company is lacking in or where there is room for further beneficial development.
(Momberg et al., 2012)	Environmental Sustainability/ Consumer Awareness	The role of environmental knowledge in young female consumers' evaluation and selection of apparel in South Africa	International Journal of Consumer Studies	2	2	Developing country, South Africa	Consumer Behavior	The focus of this study is to explore and describing young female consumers’ existing levels of environmental knowledge and whether such knowledge is reflected in their evaluation and selection of apparel products.	Qualitative Approach, Non-Probability Purposive Sampling, Essay Writing task, FGD	Environmental knowledge, sustainability, eco-friendly apparel, consumer behavior.	The results highlight that the product attributes important to the participants when evaluating and selecting apparel such as price, aesthetics, and functionality of the garment, but environmental attributes such as organic cotton, locally produced, reduced waste techniques and not using harmful chemicals did not feature high under the attributes participants considered. They prioritized price, aesthetics and fit above other attributes (including environmental attributes). Environmental knowledge was not consciously considered in their general apparel

											decision making, even though participants indicated that they do care about the environment.
(Illge & Preuss, 2012)	Sustainability footprint	Strategies for Sustainable Cotton: Comparing Niche with Mainstream Markets	Corporate Social Responsibility and Environmental Management	1	1	Developed country, Sweden (H&M) and Germany (Hessnatur)	Not specified	Strategic Analysis of Two different case (H&M and Hessnatur)	Case Study, Cross case analysis,	Organic cotton, sustainability, textile industry, textile supply chains, H&M, Hessnatur, sustainability strategy	The study aims to stimulate critical thinking regarding the multiple ways in which corporate strategies affect the sustainability footprint of both the company and the wider society in which the company is embedded.
(Chan et al., 2012)	Environmental Sustainability/Eco fashion	The consumption side of sustainable fashion supply chain	Journal of Fashion Marketing and Management	1	1	Developing countries, Hongkong	The consumer decision-making process (CDMP) theory, the conventional economic theory,	To examine the relationships between product- and store-related attributes of eco-fashion and fashion consumers' eco-fashion consumption decisions; and if such relationships are subject to the price premium level of eco-fashion. (Purpose)	Consumer Survey, Confirmatory Factor Analysis (CFA), Regression Analysis for Hypothesis Testing	Hong Kong, Consumer behaviour, Ethics, Fashion, Eco-fashion, Sustainable consumption, Product-related attributes, Store-related attributes, Price premium, Eco-fashion consumption decision, Sustainable development, Fashion supply chain	Findings – The findings showed that only store-related attributes of eco-fashion positively influence consumers' eco-fashion consumption decision, yet, such relationship can be weakened by the price premium level of eco-fashion.
(Cervellon et al., 2012)	Environmental Sustainability/Green	Knowledge sharing among green fashion communities online	Journal of Fashion Marketing and Management	1	1	Developed country, USA (Online Forum)	Not specified	RQ1. With the diffusion of knowledge in green fashion communities, does the focus of the community discussions shift from green/environmental concerns to fashion/trendiness? Does the concern for supply chain issues switch from sustainability to fashion? RQ2. Does the content dimension of knowledge structures change with time? Is the information shared on the sustainable supply chain more objective over time? RQ3. Do knowledge-sharing motives change as the community matures? How can these underlying motivations affect the exchange of knowledge on the sustainable supply chain?	Content analysis of Online forum Discussion, Netnographic Approach	Fashion industry, Supply chain management, Consumer behavior, Internet, Communities, Green, Sustainable, Ethical, Luxury, Online communities	Findings – Results show a switch in knowledge content between the two periods, from a focus on sustainability to a focus on fashion. Also, there is an evolution in the nature of knowledge content, being initially subjective and becoming more objective and showing expertise during the last period studied. As the communities gain maturity, members are interested in sharing precise knowledge on a variety of aspects linked to the sustainable supply chain, including fabric, materials, manufacturing processes, transportation, distribution, and recycling or re-use of fashion items.

(Caniato et al., 2012)	Environmental Sustainability	Environmental sustainability in fashion supply chains: Exploratory case-based research	International Journal of Production Economics	3	3	Developed country, USA and Italy (5 cases together)	GSCM (Green SCM), Environmental Sustainability	RQ1: Which are the drivers pushing ‘‘Green International Brands’’ and ‘‘Small Alternative Firms’’ towards the adoption of environmental sustainability practices? RQ2: Which practices are used by ‘‘Green International Brands’’ and ‘‘Small Alternative Firms’’ to improve environ- mental sustainability? RQ3: Which practices are measured by ‘‘Green International Brands’’ and ‘‘Small Alternative Firms’’ to assess environmental sustainability?	Exploratory multiple case study approach by Yin (2003), Semi structured Interview, Cross case analysis,	Environmental sustainability, Supply chain management, Fashion industry , Case studies	This paper presents the results of exploratory case-based research aimed at identifying three factors: the drivers that push companies to adopt ‘‘green’’ practices, the different practices that can be used to improve environmental sustainability, and the environmental KPIs measured by fashion companies. Results include a comparison of two approaches pursued by established international companies with green-positioned brands with the efforts of small firms that have adopted alternative supply chain models.
(Baskaran et al., 2012)	Comprehensive Sustainability issues	Indian textile suppliers' sustainability evaluation using the grey approach	International Journal of Production Economics	3	3	Developing country, India	Not specified	Using a sample of sixty-three suppliers and six sustainability criteria such as discrimination, abuse of human rights, child labor, long working hours, unfair competition, and pollution, the study aims to have categorized the suppliers into three categories: ‘good performer’, moderate performer’, and ‘performance not up to expectation’.	Interview, Grey Approach	Grey approach, India, Supplier evaluation, Sustainability, Textile industry	Examining a sample of sixty-three suppliers and six sustainability criteria (i.e., discrimination, abuse of human right, child labor, long working hours, unfair competition, and pollution), we categorize suppliers into the three categories of ‘good performer’, moderate performer’, and ‘performance not up to expectation’. Since all the criteria are potentially subjective, we have employed the grey approach for analysis. The results indicate that the criterion of long working hours is a critical one for both categories of suppliers; in the case of garment manufacturers, we found that pollution and unfair competition were the most important criteria. In addition, employing child labor was found to be a critical criterion in the case of ancillary suppliers.
(De Brito et al., 2008)	Comprehensive Sustainability issues	Towards a sustainable fashion retail supply chain in Europe: Organization and performance	International Journal of Production Economics	3	3	Developed Economy, European context	Stakeholders Theory	The paper discusses how the sustainability movement is impacting the fashion retail supply chain organization and its performance.	Semi structured interview,	Sustainable development; Supply chain management; Stakeholders’ views; Organization and performance; Fashion supply chain	The paper carried out a study with stakeholders of the fashion industry and report their views and elaborate on the challenges and conflicts of the different dimensions of sustainability, and discuss how to leverage both the internal and external organizations in the European supply chain.

Appendix-2: Articles category according to TBL

	TBL Focus of thematic papers			
SN	Author/s (Year)	Environmental	Social	Comprehensive (No specific Focus)
1	(X. Li et al., 2021)	√		
2	(Khan et al., 2021)		√- Barriers and solutions	
3	(Hossan Chowdhury & Quaddus, 2021)			√
4	(Fung et al., 2021)			√- Sustainable Product development
5	(Fontana et al., 2021)			√- Compliance
6	(Bubicz et al., 2021)		√	
7	(Brydges, 2021)	√- CE		
8	(Silvestre et al., 2020)			√
9	(Ki, Park, et al., 2020)	√- CE		
10	(Ki, Chong, et al., 2020)	√- CE		
11	(Gold et al., 2020)		√- Labor Standard	
12	(Shen et al., 2020)	√- Green Technology in Supply chain		
13	(Roy et al., 2020)	√		√
14	(Rovanto & Bask, 2020)	√- CE		√
15	(Nath et al., 2020)			√
16	(Siddiqui et al., 2020)		√- Labor Governance	
17	(Mani et al., 2020)		√	
18	(Y. Li et al., 2020)		√- CSR	
19	(Kumar et al., 2020)		√	
20	(Jia et al., 2020)	√- CE		

21	(Handfield et al., 2020)			√- Supply chain Risks
22	(Freudenreich & Schaltegger, 2020)	√	√	√- Slow/ Sufficiency Fashion
23	(Cai & Choi, 2020)			√- TBL/SDG
24	(Beyers & Heinrichs, 2020)			√- TBL
25	(Antonini et al., 2020)		√- Reporting working conditions	
26	(Agyabeng-Mensah et al., 2020)	√- Green Supply Chain		
27	(Xu et al., 2019)			√- TBL
28	(Wang et al., 2019)			√- Sustainability perception
29	(M.-L. Tseng et al., 2019)			√
30	(M.-L. Tseng et al., 2019b)			√- Sustainability Finance
31	(Sirilertsuwan et al., 2019)			√- TBL
32	(Shumon et al., 2019)	√		
33	(Raut et al., 2019)			√- Sustainability Barriers
34	(Nayak et al., 2019)			√- TBL
35	(Shobod D. Nath et al., 2019)			√- Sustainability Governance
36	(Mejías et al., 2019)			√- Sustainability Traceability
37	(Mair et al., 2019)	√- Living wage/ carbon emission effects		
38	(Hannibal & Kauppi, 2019)		√	√*- Sustainability Assessment
39	(Garcia-Torres et al., 2019)			√- TBL focus/ Traceability

40	(Garcia et al., 2019)	√- Ecological footprint awareness		
41	(Fung et al., 2019)			√-TBL/ Sustainable planning
42	(Chowdhury et al., 2019)			√-TBL
43	(Choi & Luo, 2019)			√- Blockchain
44	(Choi et al., 2019)			√- Systems of Systems (Supply chain Engineering)
45	(Akbar & Ahsan, 2019)		√- Workplace Safety	
46	(Talay et al., 2018)			√-TBL
47	(Stevenson & Cole, 2018)		√- Modern Slavery	
48	(Soundararajan & Brammer, 2018)		√	
49	(Sirilertsuwan et al., 2018)			√-TBL (Proximity Manufacturing)
50	(Rafi-Ul-Shan et al., 2018)			√- Sustainability and risk Management
51	(Pal & Gander, 2018)	√- Close loop Impact		
52	(Moretto et al., 2018)	√	√	√
53	(Mahmoudi & Rasti-Barzoki, 2018)	√- Green supply chain/ Government intervention		
54	(Karaosman et al., 2018)			√
55	(Kannan, 2018)			√
56	(Huq & Stevenson, 2018)		√	
57	(Fahimnia et al., 2018)	√- Sustainable Green Supply Chain		
58	(Choi et al., 2018)			√- Close loop operation

59	(Börjeson & Boström, 2018)	√- Upstream Reflexive responsibility		
60	(Benstead et al., 2018)		√- Modern Slavery	
61	(Niu et al., 2017)			√- Procurement
62	(Nassivera et al., 2017)	√- Organic Cotton/ Consumer awareness	√- CSR	√
63	(Macchion et al., 2017)	√	√	√
64	(Lim et al., 2017)			√
65	(Hashim et al., 2017)	√- Sustainable Strategic /Green Supplier Selection		
66	(Franco, 2017)	√- CE		
67	(Fornasiero et al., 2017)	√- LCA /Life Cycle Assessment		
68	(Fischer & Pascucci, 2017)	√- CE		
69	(Fallahpour et al., 2017)			√- Sustainable Supplier Selection
70	(Winter & Lasch, 2016)	√	√	√
71	(Wilhelm et al., 2016)	√	√	√
72	(O'Reilly & Kumar, 2016)	√- Close loop/ Reverse Supply Chain		
73	(Miemczyk et al., 2016)	√- Close loop Supply Chain		
74	(Macchion et al., 2016)	√		
75	(Li et al., 2016)	√- Green Supply Chain		√- Supplier Integration
76	(Khurana & Ricchetti, 2016)			√
77	(Huq et al., 2016)		√	
78	(Giannakis & Papadopoulos, 2016)			√- Sustainability Risks

79	(Da Giau et al., 2016)	√	√	√
80	(Beh et al., 2016)	√		√- Reverse supply Chain
81	(Aßländer et al., 2016)			√
82	(Ashby, 2016)			√
83	(Lueg et al., 2015)		√- CSR	√*
84	(Kozlowski et al., 2015)			√- Sustainability Reporting
85	(Jakhar, 2015)			√
86	(Egels-Zandén & Lindholm, 2015)		√- Code of Conducts	
87	(Egels-Zandén et al., 2015)			√- Supply chain Transparency
88	(Egels-Zandén & Hansson, 2015)			√- Supply chain Transparency/ Consumer survey
89	(Bhaduri & Ha-Brookshire, 2015)			√-Gender Based opinion of Sustainability
90	(Turker & Altuntas, 2014)			√- Sustainability Reporting
91	(S. C. Tseng & Hung, 2014)	√- Carbon Emission		
92	(Yongjian Li et al., 2014)			√- Sustainability Governance
93	(Joa et al., 2014)	√- Water Accounting		√
94	(Diabat et al., 2014)			√
95	(Boström, 2014)	√		√- Upstream Responsibility
96	(Huq et al., 2014)		√	
97	(Bevilacqua et al., 2014)	√- LCA		
98	(Jaegler & Burlat, 2013)	√- Carbon Emissions/ Relocalization		

99	(Fulton & Lee, 2013)	√	√	√- Global Reporting Initiatives (GRI)
100	(Dangelico et al., 2013)	√- Green Product/ New Product Development		
101	(Choi, 2013)	√- Carbon Taxation/ Supplier Selection		
102	(Wiengarten et al., 2012)	√- Eco Investments		
103	(Shaw et al., 2012)	√- Carbon Emission		
104	(Shaw et al., 2012a)	√- Low Carbon Emission		
105	(Pui-Yan Ho et al., 2012)	√- 5R (Recycle…)/ Strategic Management		
106	(Momberg et al., 2012)	√- Consumer Awareness		
107	(Illge & Preuss, 2012)	√- Organic Cotton		√-Sustainability Footprint
108	(Chan et al., 2012)	√- Eco Fashion Consumption/ Consumer Awareness		
109	(Cervellon et al., 2012)	√- Consumer Awareness/ Green Fashion		
110	(Caniato et al., 2012)	√- Green Supply Chain		
111	(Baskaran et al., 2012)			√
112	(De Brito et al., 2008)			√
		Environmental -49	Social-27	Comprehensive- 54

Appendix-3 Cover Letter for Interview

Supply Chain Sustainability Integration and Resilience: The Case of Ready-Made Garment (RMG) Industry of Bangladesh

Research background

Supply chain management has been one of the most important agenda of business operation since time immemorial but in modern times the complexity of the operations management multiplied by the inclusion of sustainability agenda. RMG and apparel supply chain is probably the most diverse and complex in nature and thus managing sustainability in textile supply chain is a challenging endeavour. Bangladesh, on the other hand is the second biggest supplier of textile finished products after China to the developed world and to the major Global retailers like H&M, Inditex, Primark etc. Being a major supplier of apparel goods, the sustainability, disruptions/volatility issues of the industry and the predominant vulnerability have not been addressed properly. Killing around 1100 people in the biggest RMG disaster in Bangladesh in 2014 called Rana Plaza Tragedy made the whole world to notice the massive unsustainable practices and vulnerability of the Country's RMG industry. Although the country's economy has been largely dependent on the Garments sector from the time of Independence, all the sustainability dimensions and resilience capacity have been ignored. Along with the much-talked social sustainability issues, the country's environment especially the waterbody, rivers and seas shores, landfills also suffered greatly by the untenable practices. Garments wastages, water filled with chemical components, during dying, spinning and other productions processes are being released to the nature without proper affluent treatment. Thus, exploring the Sustainability dimensions and resilience issues in the apparel sector of Bangladesh is of great importance for the country and for the industry simultaneously. With the given context, the current researcher aimed to explore the sustainability context of RMG industry and propose a framework in Bangladesh by answering following research questions:

- *RQ1: How to identify (What are the) the challenges and issues of sustainable practices of Textile and RMG industry of the country following TBL lens?*
- *RQ2: How to find the sustainable solutions of the challenges and barriers considering the existing industry practices?*

- *RQ3: How to develop an integrated sustainable supply chain management (ISSCM) framework for RMG sector of Bangladesh?*

Format and time scale of the Interview

Face to face/online/ telephone one to one in-depth interview lasting about 1 hour with key individuals involved in **Apparel/ RMG Supply Chain and sustainability initiatives in Bangladesh**.

PhD Researcher and interviewer
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Mr. Saiful Islam is a PhD researcher specializing in sustainable supply chain management (SSCM) of textile and apparel sector (With a special focus in a developing country setting, Bangladesh) at Southampton Business School, University of Southampton. He is a career bureaucrat and permanent member of Bangladesh civil service (Administration Cadre). His research has been sponsored by Bangladesh Government with an aim to deliver policy suggestions and feedback for his country's RMG sector. Earlier he has a MSc Development Project degree from highly esteemed The University of Manchester and BBA and MBA majoring in Marketing from Rajshahi University, Bangladesh.

Deliverable

I would like to produce a sustainability framework integrating all the dimensions for RMG industry of Bangladesh and propose strategic recommendations and suggestions for the same. The interviews taken using this protocol will be directed to the fulfilment of a doctoral thesis preparation by conducting a qualitative research project and the information collected will not be used otherwise.

Some Sample interview questions:

- What do you understand by the sustainable practices in the Textile supply chain as a

whole?

- How can the suppliers adopt sustainable practices which will cover triple bottom line (TBL) of sustainability?
- How do you perceive the sustainability practices of RMG in BD? What initiatives should be taken?
- How the stakeholders (buyers-merchandisers- suppliers and others) can be engaged in an integrative sustainable supply chain design following?
- How all the sustainability dimensions can be integrated into a single framework?

Appendix-4 Draft Interview protocol

Generic Sustainability questions

1. Do you have any idea what does Sustainability means?
2. What do understand by sustainability? How RMG production and distribution can be sustainable?
3. What are the dimensions of sustainability? Which is the most critical for Bangladesh RMG sector?
4. Can sustainability practices be used to make Apparel industry more resilient?
5. What are the issues to be considered for the RMG sector of Bangladesh for becoming a sustainable industry?
6. Do you think Bangladesh being a developing and poor nation taking the burden of unsustainability from developed world?

Questions relating to Resilience Capacity of RMG:

1. What are the factors that disturbs the smooth operation of RMG production and delivery in Bangladesh?
2. What are changes being incorporated after Rana Plaza incident to address volatility of the industry?
3. Do you think your organization has the capability to recover swiftly from any unusual circumstances (accident, fire, natural disaster etc.)?
4. What preparations do you or your organizations have to face any accidental irregularities? How quick your factory can respond and become normal after an incident?

Interview protocol for Govt Officials Concerned to RMG Sector

1. To what extent do you think the RMG sector of BD is sustainable? How the RMG industry implement sustainability practices?
2. What role the government is playing as a regulatory body to ensure sustainability practices in RMG sector?
3. Do you think there is proper legal framework to keep the factories/suppliers responsible for water body pollution/ release of waste to the river/ lake/ ponds/ sea?
4. How is the authority ensuring the labour welfare and their rights?
5. After rana plaza tragedy, what regulatory changes been adopted to ensure safety of the working facilities in the Textile sector?
6. What additional measures need to be taken to make RMG industries safe and secure for women? How to minimise wage discrimination based on gender? How to prevent women from sexual harassment and abuse in working place?

Interview protocol for RMG Association

1. Do you think that RMG sector/Industry of Bangladesh is a sustainable business in the long run? Alongside the economic efficiency, are you satisfied with the industries environmental and social sustainability practices?
2. Since independence, RMG sector has come a long way, do you think the sector has been evolved as a matured sustainable business over the time?
3. What initiatives have been taken so far by your organization to ensure TBL of Sustainability?
4. What are the sustainability criteria you as an organization have put into place to become a member of the Association?
5. Do you have any awareness campaign and training programs for the member about sustainable issues?
6. As more than 80 percent garments workers are female, do you have any special program to look after their wellbeing? Do they face any discrimination?
7. Do you think that sustainable operation in apparel sector can enhance the efficiency and effectiveness of the industry as a whole?

Interview protocol for RMG Factory owner

1. What do you understand by sustainable operation? Do you think your factory meets

sustainability practices criteria?

2. What is your opinion about Triple Bottom line of Sustainability?

Environmental:

1. Do you have affluent treatment plant in your factory?
2 How can you reduce environmental pollution by reducing wastage and treating effectively? Does your factory release waste element to land mass and water body?
3 Do you follow the sustainability instructions from your retailer, international body, and your government?

Social:

1. Your factory premise built following building code? Is the facility safe and secure?
2. Are you aware of the great Rana Plaza tragedy? What initiatives have you taken in your factory to avoid such disasters?
3. What do you think about overall working conditions in your factory? Hygienic and healthy?
4. Do you and your management treat workers fairly? What's your opinion about their human and labour rights?
5. Is there any force labor or labor exploitation/ slave labor in your factory?

Economic:

1. Do you think sustainability initiatives can increase efficiency and effectiveness and thus economic benefits?
2. How can you balance TBL for profitability?
3. Can sustainable production still be productive?

Interview protocol for Sub-supplier to the Finished product supplier

1. Are you aware of the sustainability concerns of RMG industry? Do you think your operations and production follow the standard?
2. Do you follow any code of conducts from the lead supplier or the final buyer?
3. Do sustainable practices affect your revenues? Do you pressure from supplier or buyer to become sustainable? Or you voluntarily want to be become sustainable?

Interview protocol for RMG Workers- Female and Male (Labour Union/Leader?)

1. How do you describe your workplace in regards of safety and hygiene?
2. How do you feel about the minimum wages/ salary regarding your labour?
3. What is your opinion about the behavioural environment in your factory? Exploited?

Forced to work?

4. Is there any scope for abuse? Misbehave?
5. (For female) Is there any incident of sexual harassment?
6. (For female) What is your opinion of Gender discrimination in terms of wages?
7. Is working hours and workload manageable for you? Not physically over burden?

Buyer/Purchasing managers/ Agent/ Middlemen/ Merchandiser

1. Do you think consumers held you responsible for the unsustainable behaviour of the suppliers?
2. How do you control and manage your suppliers?
3. What are the best decision tools you use to select your suppliers?
4. How do you manage sustainability operations in a complex multi-tier supply chain scenario?
5. Do you use any control mechanisms, code of conducts, third party certifications?
6. Do you use your buyer power/ coercive force, or you work in cooperation/ partnership?
7. Do you think sustainability practices allow the supply chain to be more resilient and efficient?
8. Is there any relationship between green practices and operational efficiency and effectiveness?
9. Do you think sustainability plays any role in buyer-supplier negotiation?
10. Do you think cultural differences play any role in retailer-supplier complex relationship?

Environmentalist group/NGO/Media/ Human Rights worker

Environmental:

1. What is your opinion about the RMG factory polluting the Environment in Bangladesh?
2. How can excessive ground water use in RMG Factories can affect Environment?
3. What measures should be taken to minimise releasing wastewater and other liquid pollutants to the water body (River, lake, Drain, Ponds and ultimately to the sea) of Bangladesh?
4. What role do you play in Building Awareness, Collecting Evidence and helping the Regulatory Body to shape the policies?

Social:

1. Are you aware of the Rana Plaza Tragedy? What have changed after that to address

such occurrence again?

2. What's your understanding of the safety and security measures in the Garments Industry of Bangladesh? Do the factories maintain proper work hygiene?
3. How can you contribute to ensure labor rights, human rights, and welfare of the labor force? Is there any pay discrimination based on gender?
4. Can you pressurize the retailer-buyer-supplier nexus to be more socially sustainable?

Overall

1. Do you think that due to the pressures from media and civil societies, RMG sector face less profitability?
2. How do you think the RMG sector can achieve operational excellence and performance aligning with sustainability practices?

Department of Environment/ Inspector of Mills and factories:

1. What are anomalies normally found in the Garments factory and in the supply chain which require legal actions?
2. How do you implement environment laws in RMG industry?
3. Do you face political or group pressure?
4. Do you think that there are enough legal provisions to safeguard the environment of Bangladesh from RMG wastage and pollution or new laws, or amendment required?
5. Do you have specific suggestions for improving the sustainability practices of RMG factories?

Covid/War Related:

1. Do you think, Covid have negatively influence the RMG Business?
2. Do you have any suggestion for the RMG business to face such situation in future? What steps can be taken to face crisis like this?
3. Were you personally affected by the Pandemic as a RMG (Workers/employee/factory owner/ merchandizer/ buyer)?
4. Ho do you and your company survived it?
5. Do you think current Russia-Ukraine war is affecting the business?