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SPECIAL ISSUE
DOI: https://doi.org/10.57240/DUJMJUNE03
Page No: 35-49, ISSN: 2221-2523

Challenges of Establishing a Circular Economy: A Case Study of Readymade Garments Sector in Bangladesh

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Abstract
Recycle, reuse, remanufacturing, and repair are some of the key concepts in a green or sustainable environment. These concepts are available under the theme of circular economy (CE). The socio-economic development of any country largely depends on the CE. Thus, the study attempted to discover the current implementation challenges by the Readymade Garments (RMG) firms in Bangladesh. Five large composite RMG companies were investigated to determine theirefforts and the challenges faced in establishing CE. This study conducted an FGD and KIIs to validate the findings. Lack of knowledge, technology, management support, CE establishment cost, monitoring, and fragile natural resource management systems are some of the significant challenges were identified by the study. Awareness, stakeholder participation, and conscious efforts should be incorporated along with the legislature modification and proper implementation of the compliance monitoring need to ensured in order to reap the benefit of the circular economy.
Keywords: *Circulareconomy, sustainable environment, RMG, recycle, reuse.*

Introduction

The tradeoff between growth and sustainability creates immense pressure for the entities in a society. The paradoxof development pivots in academic literature have becomeone of the significant issues in the 21st century for a sustainable economy. The crux of development must consider the sustainability evident for prolonged prosperity of the economy and hence the nature.A plethora of studies conducted on sustainability was propounding methods to circumvent the phenomenological disruption of the nature towards a more green and resilient environment (Ahi & Searcy, 2013; Bhandari, Singh, & Garg, 2019; Corral, 2003; Esfahbodi, Zhang, & Watson, 2016; Mani & Gunasekaran, 2018). Circular Economy (CE) is one of the initiatives to bring sustainability in the production and services at the micro and macro levels of economy (Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Jonkhoff, 2015; Koh, Gunasekaran, Morris, Obayi, & Ebrahim, 2017; Stahel, 2016). For having such twofold implications, CE has becomea popular concept for academicians, businesses, and policymakers that brings CE transitions and initiates into practice. However, the CE transition is perplexedand mingled with many challenges (Widmer T. , 2016; Kirchherr, et al., 2018). It requires CE innovation, systematic and paradigm shift of CE mindset, financial and physical abilities to implement CE transition, and so on (Patwa, et al., 2021).

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Despite the challenges andbarriers to CE transition, earlier studies show plenty of illustrations of successful CE transition in several industries in the developed and even developing countries (Islam, 2018; Islam, Sarker, & Taghizadeh-Hesary, 2021). The underlying reasons for such CE transitions, multiple

studiesidentified some significantCE drivers such as, first, a successful transition to CE may reduce greenhouse gas emissions up to 70%, second, help to increase the workforce by 4%, and third, eliminate the wastes that are the end product of the low-carbon economy(Stahel, 2016). Besides, a positive relationship is also identified between CE and sustainable business growth that leads the entrepreneurs to lean on CE initiatives (Busu & Trica, 2019; Chen, Chen, Liu, Nguyen, & Hasan, 2020; Hysa, Kruja, Rehman, & Laurenti, 2020).Furthermore, CE promotes worker empowerment, social inclusion, and the nurturing of lifestyles by formulating resilient human-centric design practices and policies throughmaintenaning, repairing, reusing, recycling, and remanufacturing (Geissdoerfer, Savaget, Bocken, & Hultink, 2017).

As a developing country, Bangladesh shows a positive and praiseworthy application of CE in many industrial sectors, especially in the RMG sector (Ishty & Tasneem, 2021). The credentials of such a CE transition in theRMG in Bangladesh are assumed for the exponential increase of the demand for green products, a consensus of ecological atmosphere among the world inhabitants, and a profitable perspective of CE transition in the balance sheet.Thus, this paper urges to find out the current practices and challenges of CE transition in a developing country such as Bangladesh in the RMG sector.The prime objective of the study is to identifying the challenges of the CE transition of the RMG industry in Bangladesh. This study also refers to the supplementary objectives to search for the main objective. Such as, first, investigating the current practices of CE in the RMG industries in Bangladesh; second, exploring the obstacles and challenges of CE transition and practices in the RMG industries of Bangladesh; and third, illustrating a case study of successful CE transition removing the CE barriers and challenges.

The Concept of Circular Economy

It is becoming increasingly popular among academia and industrialists to transform the linear economy into a circular economy as it has a rational appeal for operationalizing the much-disputed idea of sustainable development, which has been debated for decades (Kirchherr, et al., 2018; Murray, Skene, & Haynes, 2017). Besides, the notion has gained significant discussions in recent years in both political and corporate discoursesbecause of its ability to make a more sustainable and resilient future(Friant, Vermeulen, & Salomone, 2020). Due to its sustainable and resilient appeal, a vast number of academia and researchers are trying to specify the concept of circular economy in a more operational perspective (Widmer T. , 2016; Stahel, 2016; Temesgen, Storsletten, & Jakobsen, 2019). According to Stahel (2016), CE can covert the products at the end stage of its life span into the resources for others while minimizing wastes and ending the loops of industrial ecosystems. Further, Stahel (2016) hasadded that CE has the potential to alter the inherent logic that underpins traditional economies, as it replaces production with sufficiency—reusing what one can, recycling if reusing is not possible, repairing what is broken, and reproducing what is not feasible for repairing. Similarly, Widmer (2016) viewed CE as one of

the best ways to eradicate the dependency on today's virgin material streams of finite resources—'take-make-dispose.'Therefore, recent literature argued that a smooth transition towards CE practices can resolve the interconnected social, economic, and environmental problems within themainstream economics paradigm (Temesgen, Storsletten, & Jakobsen, 2019).

The Practices of CE in Different Industries

The circular economy has become more than just a buzzword. By 2030, the world population is predicted to surpass 9 billion. The demand is getting bigger than the supply. It is expected that the global resource consumption demand to reach double by 2050(Geng, Sarkis, & Bleischwitz, 2019; UNEP, 2017). As a result, the future is dependent on how people consume sustainably. Credits go to creativity and innovation; almost every industry attempts to remanufacture and recycle in an innovative way. It is, on the other hand, not so simple to turn the industry into one that is more environmentally friendly overnight. Although they face several obstacles and problem's, various industries such as construction and automobile, leather and plastics, foods, electrical and electronic manufacturing are attempting to initiate circularity practices (Adams, Osmani, Thorpe, & Thornback, 2017; Moktadir, Rahman, Rahman, & Ali, 2018; Agrawal, Wankhede, Kumar, & Luthra, 2018; Ormazabal, Prieto-Sandoval, & Puga-Leal, 2018; Rizos, Behrens, Kafyeke, Hirschnitz-Garbers, & Ioannou, 2015). The CE practices of some industries are depicted in the following table.

Table-01: CE Applications in Different Industries

Industries	Findings from Literature
Construction	The construction industry faces several challenges while practicing CE principles. For instance, the absence of industry-wide awareness, the lack of design of circularity infrastructure, and inadequate guidance & incentives to design buildings for reuse (Adams, Osmani, Thorpe, & Thornback, 2017).
SME	In a very competitive marketplace, the circular economy was unlikely to help the SME industry increase its profitability and long-term sustainability. Therefore, further investments and the acquisition of cutting-edge technologies to kick-start circularity are rare occurrences in the SMEs. Additionally, insufficient resources, short-term vision, and the high upfront costs of green investment indicate circularity as their least priority in the SME industry (Ormazabal, Prieto-Sandoval, & Puga-Leal, 2018; Rizos, Behrens, Kafyeke, Hirschnitz-Garbers, & Ioannou, 2015)
Leather	The leather sector is regarded as one of the most significant drivers to economic prosperity, despite being a major source of environmental degradation. The CE has been implemented in several countries to improve the negative image of the leather industry.The commitment of top management, customers awareness, and government backing might all play an important part in transforming the industry towards circularity while simultaneously addressing its negative aspects (Moktadir, Rahman, Rahman, & Ali, 2018; Moktadir, Kumar, Ali, & Paul, 2020).

Automobile	It takes a significant amount of water, energy, and resources to construct the vehicles, which results in a rise in carbon emissions. Deforestation and eutrophication of water, acidification of the air, landfills, and incineration would be prevented by using CE practices. However, several factors, including a lack of capability to deliver standard-quality remanufactured vehicles, the need to maintain the products' traditional design, and a lack of consumer awareness about refurbished products, are cited as significant roadblocks to the successful adoption of circular economy practices in the Indian automobile sector (Agrawal, Wankhede, Kumar, & Luthra, 2018).

CE Practices in the RMG Industry of Bangladesh

During the last 25 years, the ready-made garments (RMG) sector of Bangladesh has seen a significant growth rate in terms of foreign exchange revenues, employment generation, and gross domestic product (GDP).Consequently, the country has become the second-largest exporter of RMG products globally, followed by China over the last three decades (Farhana, Syduzzaman, & Munir, 2015). The RMG is the most stable pillar of the economy of Bangladesh, accounting for around 85.4 percent of the total export earnings in the fiscal year of 2019-2020, compared in 1976, the contribution was a minuscule amount of 0.001% (BB, 2020; Hasan, Mia, Rahman, Ullah, & Ullah, 2016). There is a significant upward trend found in the RMG export growth of Bangladesh from 1985 to 2018, with an 8.76% growth rate in 2018 only (Hussain & Uddin, 2021). Further, the RMG contributes to the percentage share of the country's GDP. In FY 2017-18, the amount was 11.2%. It is worth noting that foreign exchange earnings and employment generation through the RMG sector's expansion are accelerating every year (Haider, 2007). Resulting,the RMG sector has become the country's only multi-billion-dollar manufacturing and export industry which contributes notably to the other sectors—banking and insurance, shipping, and engineering directly and indirectly (Hussain & Uddin, 2021). However, a buzzword of implementing CE principles in the global RMG industry is found.A new CE Action Plan in 2020 was adopted by the European Commission, which focused on some specific industries that make the greatest use of the resources and have high circulation potential. Textiles and clothing are some of these sectors(European Commission, 2019). Realizing CE's prospect and aspect in the RMG sector, the Bangladesh Garment Manufacturers and Exporters Association (BGMEA)is already aware of circularity practices and announced to comply with CE practices in RMG in the upcoming days (Ishty & Tasneem, 2021).Despite awareness of the think tank of the RMG sector of Bangladesh, this sector is confronting several challenges while incorporating the CE principles, for instance, lack of advanced technology, lack of skilled manpower, and indifference of customers (Jahan, 2017; Saha, Dey, & Papagiannaki, 2021). However, some mixed opinions have been found among the researchers to eradicate these challenges and accelerate the transition of the RMG sector of Bangladesh towards CE initiatives.Astudy reveals that it is much more complicated for the companies to confront the challenges without a comprehensive approach incorporating cooperation from the incentives of the host government, industry-wide support, and the prevailing awareness of the end-users. In addition, the study recommends that the textile and clothing industry successfully implement the CE through collaborative efforts, sustainable knowledge sharing within the supply chain, and help the marketization of therecycling products (Saha, Dey, & Papagiannaki, 2021).

Challenges of CE Practices in the RMG Sector

The CE is extensive and interconnected with business systems and subsystems that interact with one another internally and externally. To have a circular business model, it is not enough to merely tweak some aspects of business operations; rather, it is necessary to completely overhaul the entire business model(Widmer, 2016). To restructure the CE business model, a number of typical roadblocks have been identified, like structural, operational, financial, technological, attitudinal, and human resources barriers (Ritzén & Sandström, 2017). But surprisingly, the study of Kirchherr et al., (2018) refutes the existence of intrinsic technological impediments to the circular economy. Rather they argue some cultural challenges, particularly during readiness to complete transition of CE, including the absence of consumer awareness and interest along with fluctuating culture from the parlance of policymakers and businesses. These can also be classified as market barriers, which, in turn, are exacerbated by the absence of synergistic government policy measures to support the smooth transition to a circular economy(Kirchherr, et al., 2018).

However, a study of the Bangladesh RMG industry demonstrates that waste management is an integrated process in which different types of RMG wastes are collected, processed, and recycled. Companies and inhabitants control the waste management process completely, while certain wastes have monetary value if properly recycled and repaired. Despite the potential of waste management, some significant challenges are found in the RMG waste reduction and recycling process, like lack of modern & advanced technology and awareness among the related stakeholders (Jahan, 2017). Similarly, a study revealed found that management indifference, lack of financial, technological & human resources capability along with customer indifference are the biggest pitfalls in the path of practicing waste management and CE implementation in developing countries like Bangladesh, India, and Vietnam (Saha, Dey, & Papagiannaki, 2021).

Methodology

The study takes an exploratory multiple case study approach. As a qualitative investigation, this study intended to develop a structure of the case to collect primary data from the respondents. This study considered five (Nije & Asimiran, 2014)composite RMG firms considering all the categories such as weaving, knitting, dying, etc. The criteria for selecting these five composite RMG firms are the organization's size, export orientation, and compliance performance. The case was prepared with the following structure:

a. Background of the organization
b. Initiatives taken by the company
c. Assessment of costs & benefits
d. CE Establishment challenges
e. Essential support environment

To collect multifaced data and cross-validation of the primary data, one FGD was conducted in this study. The FGD was conducted on 2nd April 2021. A two-hour-long session was conducted with a

semi-structured checklist. A total of twelve (12) participants attended the FGD. The stakeholders from different steps of RMG have participated in the FGD. The stakeholder's professional background covers entrepreneurs, association leaders, RMG employees, compliance auditors, researchers and academicians, and buyers and traders. Most of the participants in the FGD have more than 15 years of experience.

Further, ten (10)in-depth interviews were also conducted for this study. The entrepreneurs, association leaders, industrial journalists, bankers, RMG employees, researchers and academicians, and buyers and traders were interviewed with a semi-structured interview protocol.

The major findings were further explained through data transcribing, categorizing, and developing patterns for the content analysis (Hsieh & Shannon, 2005) and narratives-counter narratives format.

Findings and Analysis

Five reputed RMG enterprises are the subject matter for the case study in this paper. All the enterprises are composite and considered large organizations according to the industrial policy 2016 (MoF, 2018). On average, they have more than 5,000 employees working in different facilities with more than $168 million turnovers. Among them, three enterprises are involved globally in producing premium denim, woven garments, knitwear for men, women, and children, which is 100% export-oriented and diligently compliant to the society and environment. These enterprises are entirely compliant and set a benchmark for CE practices in Bangladesh. One of the enterprises has already declared 100% green and claimed first in this category in Bangladesh. In this case study, taking such enterprises to reveal CE practices and CE challenges in RMG in Bangladesh is undoubtedly valuable.

Initiatives Taken by the Selected Firms

The RMG industry has taken various initiatives in Bangladesh to establish CE. Despite recognizing the CE's prime drivers of CE's multifold benefits, coping with the international standard and market demand is the most vital role player of such CE transition in the RMG sector in Bangladesh. For instance, water recycling in RMGs, especially in dying firms, is an international agenda, has become so widespread and the first operative action of CE(Gerba & Rose, 2003). With the government mandate of water harvesting, water recycling and water consumption reduction have also become a cost-cutting issue in production and operation. One of the top ten RMG firms in Bangladesh achieved its target of water consumption. They reduced water consumption by about 40%in 2017 and set a target to use 40-50 liters of water from 100 liters per Kg production in dying firms. Of course, this is not an easy task for setting such a target. It will require innovation, alternative production design and plan, a mindset of the entrepreneurs and workforce and technological support, etc. One vivid practice of water consumption reduction has also been found in a reputed RMG, where they use spoons in the cafeteria instead of hand at launch, which saves 20.56% water consumption. This exemplary illustration has been spotted by several organizations in Bangladesh and starts imitating to save water consumption. Besides

the policy and strategy to save water consumption, water harvesting has also become one of the iconic CE practices found among the industries in Bangladesh. Generally, firms in Bangladesh started rainwater harvesting depending on their capacity and cost. On average, the rainwater harvesting capacity ranges from 500 cubic meters to 3500 cubic meters. The figure has also been justified in FGD, where one of the prominent organizations ensures that they have 2200 cubic rainwater harvesting capacity.

The scheme of saving water consumption is poised among the RMGs in Bangladesh because of available technology and its functionality. Renewable energy has also got its momentum due to the available technology in the RMG sector in Bangladesh. One reputed RMG has already devised a two-year energy efficiency program called 3E since 2017 with a world-renowned brand and Nordic Chamber of Commerce and Industry in Bangladesh, and able to reduce 25% of energy consumption in the last four years. Moreover, to reduce carbon emissions, one respondent in FGD said they set a target is to reduce 60% carbon dioxide emissions by involving their supply chain partners by 2030. The scenario of such CE transition is thus so overwhelming compared with the developed countries because the CE transition is concomitant with several challenges and factors such as cost, capacity, lack of knowledge, and absence of a CE environment.

Effectuation does matter in the successful CE transition in Bangladesh. With all the limited resources and capacity, entrepreneurs in the RMG industry use recycling materials in the production process. The environmentally hazardous material poly was recycled in almost every RMG in Bangladesh. One such argument addresses that the company recycled 97 tons of poly per year and is projected to convert 50% of polestar products into recycled products by 2025. To this end, 35% has already been achieved, which cannot be possible with the invention of the Linear low-density polyethylene (LLDPE).

Moreover, entrepreneurs use eco-friendly cotton from BCI (Better Cotton Initiative), making readymade products more ecological and environmentally friendly. One delicate moment of small-scale CE transition was found by involving the partners in the supply chain in the CE transition process. One of the top ten multinational RMG in Bangladesh involves customers collecting used clothes by keeping a donation box in every outlet. Till 2020, they have donated 21 million used cloths in 75 countries, including 29 million used clothes in Africa. In an attempt to CE transition, it has also been found in the RMG industry to reuse the packaging. Many firms have targeted this area as a cost-cutting strategy that organically converted in the CE initiative.

Table-02: Summary of CE Initiatives Taken by the Sampling Firms

CE initiatives of the selected firms	CE application		
	Reduce	**Reuse**	**Recycle**
Water harvesting		ü	
Process redesign for less water consumption:			
• Production redesign	ü		
• Redesigning habits of employees	ü		
• Sustainable washing facility	ü	ü	ü
Energy efficiency program	ü		
Lower carbon emissions program	ü		
Recycling polybags			ü
Using eco-friendly raw materials	ü		
Involvement of supply chain actors		ü	
Effluent treatment plant	ü		

Source: Field study and FGD conducted by the authors

Major Implementation Challenges

Cost leadership and differentiation are strategic paradigms that can be devised through implementing CE practices. CE meets the demand of ISO 9000, the CLS (Core Labor Standard), Accord, thus CE gains popularity in RMG in Bangladesh. Most of the RMG firms have acknowledged, initiated, or to some extent, calibrated the role of CE in the economy and environment (Saha, Dey, & Papagiannaki, 2021). However, the CE transition and development require continuous iteration with a long-term view (Kemp, Loorbach, & Rotmans, 2007). RMG industries in Bangladesh may lack envisioning the long-term CE focus due to some key barriers and challenges. The continuous iteration of CE practices with the long-term focus stuck into the ground for lack of vision. As a result, many cases were found where firms have made only one-time CE initiatives. Thus, the result of one isolated CE initiative does not bring the best of CE to the stakeholders of RMG industries in Bangladesh. Besides, one of the significant CE implementation challenges found in FGD and KII is the lack of CE-supportive infrastructure. There is no consensus about the CE practices even in a particular industrial zone, i.e., BSCIC, EPZ, etc. There is no central ETP found in those industrial areas, whereas the common drainage system fails to prevent water logging in the rainy season (Jahan, 2017).

Cost is another significant barrier to implement the CE initiative. A unanimity found in the discussion that the cost involved in the CE technology is roughly 2.5 to 3 times higher than the traditional setup. Initial investment (fixed cost) is costly, such as installing new machines

or building an ETP plant for better CE orientation. The enterprises need to wait for a long time to get a break-even for such CE expenditures. The CE initiative is higher for fixed cost-oriented and requires continuous maintenance of the plant to ensure better functioning. Such maintenance costs are also so high that most companies failed to comply with the given standard (Masi, Kumar, Garza-Reyes, & Godsell, 2018; Garcés-Ayerbe, Rivera-Torres, Suárez-Peral, & Leyva-De La Hiz, 2019; Campbell-Johnston, ten Cate, Elfering-Petrovic, & Gupta, 2019).

However, the exponential demand for green products is escalating faster than ever (Brécard, Hlaimi, Lucas, Perraudeau, & Salladarré, 2009). It is a real challenge for the manufacturer to cope with the new demand. Enterprises lack innovation and invention, and there have their limitations. Globally the supply of supporting sustainable and CE-friendly material is not abundant, whereas high competition for such materials prevails with dynamic changes in the pattern and design (Chen & Lin, 2021). Except for the top ten organizations in RMG in Bangladesh, the rest were never foresighted and participated in such a competition. And the experts assumed this to be the topmost issue that the RMG industry failed to establish a CE network in Bangladesh.

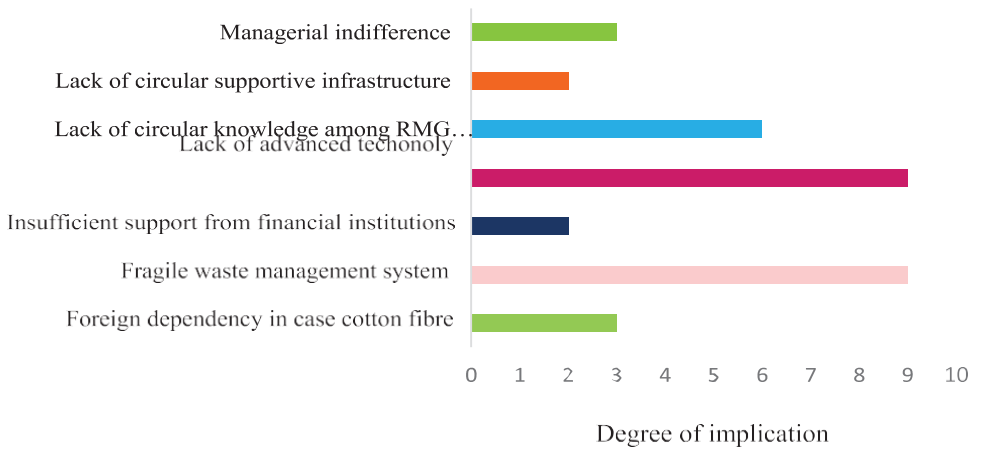

Figure-01: Major Implementation Challenges

Source: Field study and FGD conducted by authors

This study identified that owners-employees of RMG in Bangladesh havethe intention to bring CE initiatives, though. There is a severe gap in technology transfer and knowledge sharing in such CE transition in RMG industries in Bangladesh. There is no bilateral agreement between academia and practitioners, no government initiative for capacity building for CE transition, and no private/public incentives for CE innovation and implementation. Hence, CE culture is entirely absent, and there is no pressure from the inhabitants, local pressure groups, trade unions(Das, Sheikh, Islam, & Siddik, 2021; Jahan, 2017). However, CE innovativeness and a positive and supportive CE culture is prerequisite for CE transition and a sustainable and resilient environment (Kirchherr, et al., 2018; Ritzén & Sandström, 2017). Yet, some large RMG have demonstrated exceptional CE initiatives in Bangladesh; those are reasoned for foreign buyer

pressure and their immense financial and infrastructure capabilities (MoF, 2018).Other firms are far behind in implementing CE initiatives, especially SMEs. However, some innovative entrepreneurs have implemented CE initiatives, which become futile and can not significantly impact the environment, society, and the organization. Moreover, they are left alone with their CE innovativeness. Such overturned cultural dimension undermined the CE innovativeness, one of the most significant implementation challenges found in this study.

Suggestions for Overcoming Challenges

Realizing the tremendous importance of CE practices in RMG in Bangladesh, RMG enterprises are taking many initiatives despite the barriers and challenges in CE implementation. Different strategies are confronted with the CE challenges differently by the RMG enterprises according to their financial capabilities and scope. Of course, the initiatives are not static, idiosyncratic. It requires a faster innovation cycle, market demand for CE products, regulatory changes, flexible CE mechanisms, etc.,that cannot be identical for every RMGs, especially a developing country resembling Bangladesh(Hopkinson, Zils, Hawkins, & Roper, 2018). However, some important suggestions are identified in this study, expecting a holistic impact on the RMG industry in Bangladesh.

To improve the present status of CE practices in the RMG industry in Bangladesh, a central waste management system and ETP can be beneficial. There must be an industrial zone categorizing according to the industry type, such as knitting, knitwear, dying, etc., and establishing a central waste management policy incorporating all the stakeholders in operation. Government support for CE practices and initiatives can be a better approach to counter challenges. There are many infrastructural issues, policy matters, and it requires philanthropic activities. None other than government can take these steps in making these feasible.

Additionally, the enterprises, with the help of the government and NGOs, can search for global practices. Government and NGOs can take an active role in making seminars, a workshop about CE global practices, offering researchers to research CE and open a platform to share such knowledge to the practitioner. Moreover, the government and industry associations may play a role in creating awareness about the CE and the green concept in RMGs because CE awareness is sought as a significant determinant in developing CE practices in the RMGs in Bangladesh.

Conclusion and Future Scope of the Research

Even though the concept of CE seems new to Bangladesh, it is practiced in many different forms by different sectors in Bangladesh. The present study reveals that the selected RMG firms have already taken some CE initiatives such as water harvesting, energy-efficient plants, establishing ETP, recycling polybags, using eco-friendly and biodegradable raw materials, etc. Most RMG firms emphasize CE activities concerning reducing the detrimental though there is still a lack in reuse and recycle CE activities. However, the CE awareness and initiatives are growing in the RMG sector in Bangladesh. As the RMG sector of Bangladesh is surrounded by many active stakeholders, which plays a vital role in establishing CE in this sector. Lack of knowledge and importance regarding CE should be one of the agendas to motivate practitioners. The CE is not a cost issue rather it should be viewed as an investment. It should not be considered only as

compliance but also as a conscious effort to sustain the business.

This study provides us a contextual reference in future to conduct a study on the other industries such as leather and leather goods manufacturing, electronics, agro-food, construction, etc. Further this study will serve to make a future study on CE in SMEs in the RMG sector. Moreover, the technology and innovation in reducing the consumption of natural resources can be another domain of future study.

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