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Exploring the Green Initiatives of LEED-certified Readymade Garments Factories Journey on Sustainable Development in Bangladesh

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Abstract: *This study examines the green initiatives within Leadership in Energy and Environmental Design (LEED) certified Readymade Garment (RMG) factories in Bangladesh, exploring the connection between these initiatives and sustainable development. Despite the critical role of the RMG sector in the economy of Bangladesh, there is a paucity of research on green practices. Thus, the objectives of this study were to catalog the green initiatives undertaken by these factories, identify the key drivers of such initiatives, and assess their contribution to sustainable development. This study applied case study methods, taking 10 LEED-certified RMG factories with triangulation by a focused group discussion and key informant interviews. Findings reveal that LEED-certified factories have invested in eco-friendly construction, energy conservation through solar power and natural lighting, advanced effluent treatment, sustainable transportation, innovative waste-to-energy solutions, plastic recovery, and afforestation initiatives. These strategies exemplify a strong commitment to environmental protection while delivering notable socio-economic advantages, thus fostering comprehensive sustainable development within the industry. The study highlights the critical role of green initiatives, offers actionable insights, and provides a basis for future studies for RMG and other sectors in Bangladesh.*

Keywords: Green Initiatives, LEED-certification, RMG industry, Sustainable Development.

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1. Introduction

Over the past few decades, the importance of sustainable development has gained substantial momentum among academicians and industrial practitioners due to the increasing awareness of environmental, economic, and societal challenges all over the world. There is extant literature testimony to the growing concern for sustainable development globally, especially for developing countries, for varied reasons, i.e., holistic

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development, resource management, climate vulnerability, global commitments, etc. (Le Blanc, 2015; Roy et al., 2023; Tukker et al., 2016). With its significant contribution to the Gross Domestic Product (GDP) and corresponding environmental and societal implications, the RMG sector has become a focal point of study in Bangladesh. In financial terms, the RMG sector, being largely export-driven, has been a linchpin for the economy of Bangladesh, accounting for an average of 82.01% of exports (Hossain, 2019; Mia & Akter, 2019). However, the RMG industries are responsible for the devastating effects on nature and society, i.e., water pollution, air pollution, unhealthy and unhygienic health conditions, the safety of labor, etc. (Islam & Jabber, 2022; Kabir et al., 2023). This is why research on green and sustainable practices in the RMG sector is eminent to ensure long-term viability and competitiveness and to address and mitigate its environmental and socioeconomic impacts.

Green and sustainable practices mean manufacturing products that do not harm the environment (Yacob, Wong, & Khor, 2019). A green initiative is any action or policy that seeks to promote environmental sustainability, mitigate environmental damage, or address environmental issues such as climate change, pollution, deforestation, or biodiversity loss (Rasoolimanesh et al., 2023). There are plenty of green initiatives instances found in the literature, such as energy-efficient tools and techniques, application of renewable energy, use of sustainable transportation, waste reduction and recycling, natural resources conservation, green building, and constructions (Cheng, Yu, & Zhang, 2023; Kushwaha & Sharma, 2015; Singjai, Winata, & Kummer, 2018;). RMG factories operate in a vivid pattern of green practices due to their variant capabilities, available resources, and existing legal and social pressure; there is a need for uniformity in green practices to maintain environmental sustainability across the globe (Baah, Jin, & Tang, 2020).

Therefore, in recent times, international buyers have been demanding sustainable practices and seeking many certifications such as ISO, LEED, Fair Trade Certificate, EKO-TEX Standard 100, Global Organic Textile Standard (GOTS), Business Social Compliance Initiative (BSCI), Worldwide Responsible Accredited Production (WRAP) (Pushkar, 2020; Sanil & Ramakrishnan, 2015). Among those, the Leadership in Energy and Environmental Design (LEED) certification, developed by the U.S. Green Building Council (USGBC), is an idea where the concept of green buildings is amalgamated and encouraged, especially for developing countries such as Bangladesh, where sustainability has a multifold impact on growth and prosperity. Moreover, the incident of RANA PLAZA and TAZRIN garments ostensibly influenced the RMG in Bangladesh to adhere to compliance and sustainable practices (Siddiqi, 2015). Currently, among more than 4,000 garment factories, only 135 LEED-certified green garment factories have been operating in Bangladesh since the first

was in 2015, according to the Bangladesh Garment Manufacturers and Exporters Association (BGMEA) (Kiron, 2021). The rate of LEED certification and, hence, the green initiatives is slow and not sustainable in the textile and RMG industries in Bangladesh (Akter et al., 2019). However, the current rate of LEED certification is the most significant beacon that may enlighten the climate of sustainable practices in the RMG industries in Bangladesh. Therefore, this study finds the immense importance of conducting research on the LEED-certified RMG factories to determine the green initiatives toward sustainable development.

Despite a substantial number of studies related to green initiatives found in the research cohort, the green initiatives in Bangladesh, especially on the LEED-certified RMG factories remain under-explored (Sarkar, 2020). Earlier studies conducted on the green industries in Bangladesh exhibited limitations in terms of generalizability, primarily stemming from their exclusion or less attention to the LEED-certified factories (Akter et al., 2019; Sarkar, 2020; Siddiqi, 2015). Moreover, previous studies on LEED-certified factories in Bangladesh focused particularly on green buildings and construction and excluded green initiatives (Amiri, Ottelin, & Sorvari, 2019; Kiron, 2021). It is important to consider green initiatives more robustly because green initiatives are not confined only to the buildings and construction of LEED-certified factories. Moreover, it is presumed that LEED-certified RMG factories, as they opt for, have a higher chance to adopt exemplary instances of green initiatives. This study thus seeks to address this gap by providing a more comprehensive analysis of the green practices within the specific context of LEED-certified factories, contributing to a more holistic understanding of sustainable initiatives in the industrial landscape of Bangladesh.

Based on the research gap, this study formulated the research question (RQ): *what are the key driving forces for adopting green initiatives by the LEED-certified RMG factories in Bangladesh?* Thus, this study aims, first, to explore the green initiatives taken by selected garment factories in Bangladesh that have received LEED certification and, second, to identify the key driving forces that have contributed to adopting green initiatives and practices for promoting sustainable development in the RMG industries in Bangladesh. Multifold contributions are expected from this study. First, it aims to create awareness of green initiatives among academicians and industry leaders, especially for the LEED certification and its benefits to sustainable development. Second, by identifying the driving forces, this study can help policymakers formulate and implement policies for green initiatives to achieve SDGs, especially those 3, 6, 7, 8, 9, 11, and 12. This study is structured into five sections: introduction, literature review, methodology, analysis and findings, and conclusion. In the introduction, the foundation, research gap, RQ, and research objective

have been stated. The literature review section discusses sustainable development and green initiatives, culminating in a theoretical framework at the end. The methodology outlines qualitative data collection methods and processes. Analysis and findings are presented using qualitative data analysis (QDA), and in the last section, addressing limitations and suggesting future directions for the study.

2. Literature review

2.1 Sustainable development, green initiatives, and institutional theory

Sustainable development reckons to a framework where the production, distribution, and consumption of goods and services strengthen individual welfare without passing significant environmental harm. Murshed et al. (2021) emphasized that the sustainable development index evaluates various indicators encompassing environmental care, social well-being, technological advancement, economic growth, and performance management to gauge sustainability, particularly in corporate production processes. Echoing this, Raj (2020) argued for a comprehensive green approach that is conscious of environmental impacts, emphasizing pollution control, recycling, energy conservation, product innovation, and environmental management. Sustainable development encompasses three key elements: economic growth, social inclusion, and environmental protection (Rasoolimanesh et al., 2023). These interconnected pillars ensure present and future generations meet their needs without depleting natural resources or harming ecological balance. Economic elements foster economic growth and increased living standards, ensuring development strategies are effective, efficient, and equitably distributed (Jabber & Khanam, 2020; Mohanty et al., 2023). The crux of the social component of sustainable development is the promotion of social cohesion and inclusive practices (Davidson, 2010). It emphasizes the importance of reducing inequalities, ensuring human rights, and fostering opportunities for all, regardless of age, gender, ethnicity, or socioeconomic background (Islam & Jabber, 2018). The environment element focuses on conserving the natural environment and the resources it provides. Essential components include minimizing waste, reducing carbon footprints, conserving biodiversity, and ensuring the capacity to support life is not compromised (Latif et al., 2023).

Extensive literature reveals a dynamic interplay between the motivations, challenges, and future opportunities of green initiatives across national and industrial boundaries. However, innovation in business models, technological advancements, and supportive policy frameworks suggest a promising future for green initiatives (Stern, 2008). The motivation behind green initiatives is multifaceted, encompassing environmental, economic, and social dimensions. Environmental concerns, particularly climate change, have spurred substantial literature emphasizing the urgent need for sustainable practices. A seminal work by Stern

(2008) first discusses how green initiatives can mitigate the risks of climate change, providing a compelling economic argument for early action. Later, Baloglu et al. (2020), Garza-Reyes (2015) highlighted how organizations engage in green initiatives to build reputational capital and align with stakeholder expectations. Many driving forces are also found in many studies, such as reducing operating costs, complying with environmental regulations, improving company image, enhancing employee satisfaction and loyalty, increasing market attractiveness, diminishing environmental impact, tax incentives, demand from customers, reacting to competitors' moves and strategies (Baloglu et al., 2020; Das & Rana, 2022; Garza-Reyes, 2015).

Despite the benefits the factories can have by implementing green initiatives, it comes with multifold challenges and barriers (Baloglu et al., 2020). Sarker et al., (2020) argued that a corporation earns less profit after introducing and implementing rules referring to green management practices. Supporting this notion, Ahmed (2021) argued that investment in the green management sector sometimes would not generate revenue instantly. However, there is a consensus that innovation will play a pivotal role in overcoming barriers to sustainability. The transition to a circular economy, which emphasizes the reuse and recycling of materials, is a significant trend that can drive future green initiatives (Islam, Jabber, & Sakib, 2023; Singjai, Winata, & Kummer, 2018). Integrating digital technologies, such as IoT and AI, in green practices is also a game-changer (Baloglu et al., 2020). Zhang, Nuruzzaman, & Su (2021) emphasized that employee engagement was pivotal in the sustainable growth of the RMG sector. Green sourcing, green delivery, green logistics, and green production are crucial aspects of the green initiatives needed by Industrial Corporations to obtain sustainability (Katekar, Deshmukh, & Elsheikh, 2020).

This study adopts Institutional Theory (INT) as it explains the factors such as schemes, rules, norms, and routines that an organization has created, diffused, adopted, and adapted to explain the institutional adoption of green initiatives of the LEED-certified RMG factories (Peters, 2022). Moreover, INT is a widely used theory to explain the changes in societal values, adoption of technology and technological improvements, and influence of legislation toward "green" and "sustainable" activities (Hussain, Khan, & Saber, 2023). INT explains the institutional characteristics for adopting, diffusing, and creating such norms, rules, and schemes that lay the foundation for organizations to establish external relationships (Peters, 2022). Institutional characteristics mainly pivot to three actions. First, coercive action explains mandatory compliance with regulations and legislation, known as mandatory environmental regulations (MERs), though mandatory compliance negatively affects green initiatives (Li, Tang, & Zhang, 2020). Subsequently second and third are normative (socially accepted) and mimetic actions (culturally valuable) that are also labeled

as voluntary environmental programs (VEPs) (Li, Tang, & Zhang, 2020). MERs and VEPs are the learnings for the organization stemming from various sources, such as government, customers, suppliers, community, organizational philosophy, industry standards, motivations of top-level management, and environmental regulations (Gomes et al., 2024; Hussain, Khan, & Saber, 2023).

To prove the relationship between the MERs and VEPs towards sustainable development, a plethora of studies have taken the INT framework. Schaltegger, Loorbach, & Hörisch (2023) emphasized the institutional systematic change in the business model to contribute to sustainable markets. Institutional change acts as a leverage point for transitioning to sustainable development (Wan Rosely & Voulvoulis, 2023). Kushwaha & Sharma (2015) hypothesized and proved that green initiatives as an institutional change have a positive relation towards sustainable development. Based on the previous literature, the parameters used in this study are based on the INT catalyst such as green building, energy-saving approaches, optimized water use, appointing a green consultant, and paperless procedures toward sustainable development (Cheng, Yu, & Zhang, 2023; Katekar, Deshmukh, & Elsheikh, 2020; Kushwaha & Sharma, 2015; Prastyo, Sumi, & Kusumawardani, 2020; Putri, 2021).

3. Methodology

Since this study is investigating green initiatives in the RMG factories in Bangladesh, the LEED-certified RMG factories can portray an in-depth understanding. Therefore, this study adopts a qualitative case study approach to determine the prevailing green initiatives and their driving forces. The application of the qualitative methods is effective for exploring the factors suggested by recent studies (Jabber, Sakib, & Rahman, 2023). Given that the experiences of the LEED-certified RMG factories are socially constructed and subject to many interpretations, an interpretivism philosophy is deemed most fitting for this research, as suggested by Curry (2023). Furthermore, an inductive reasoning approach is chosen to cohort the research nomology. This approach entails drawing generalizations or identifying patterns based on the specific experiences of the LEED-certified factories. By virtue of its design, the case study method aligns appropriately with inductive reasoning. It offers the opportunity for an in-depth immersion into particular instances, making them conducive to drawing broader insights from detailed, context-rich data. Multistage sampling technique, initially, a stratified sampling technique was used to identify the strata, later data were collected from the strata those are conveniently accessible. Data triangulation involves one Focus Group Discussion (FGD) and ten Key informant interviews (KIIs). Finally, content analysis and thematic analysis are conducted by QDA Miner Lite (a software for analyzing qualitative data) after successfully transcribing data from FGD and KIIs.

3.1 Sampling frame and sampling unit

The population of the study is LEED-certified RMG factories in Bangladesh. According to BGMEA, 135 LEED green RMG factories are currently operating in Bangladesh (Kiron, 2021). Among these RMG factories, 35 are rated as platinum, 84 as gold, and 10 silver. This study aims to conduct a case study on 10 LEED-certified factories in Bangladesh. To select the sample for case studies, this study used Eisenhardt (1989) recommendations for the number of case studies, which suggests a range of four to ten case studies for similar studies (Eisenhardt, 1989). The sample selection approach for this case study is also supported by Baraldi et al., (2016), who found that most studies conducted through the case studies took less than four cases, while only 25% of all published articles used between four to ten case studies (Runfola et al, 2016). Therefore, this study chose to incorporate ten case studies to address the stated objectives of the study thoroughly. Moreover, stratified sampling technique is applied to plot the sample. As LEED certification has three prevailing categories: platinum, silver, and gold, the sampling structure was proportionate according to these strata (see- table 1).

Table 1 Sample of Case Study

Certification category	Population	Sample for case studies	ID
Platinum	35	2*	CSP1 and CSP2**
Silver	10	1*	CSS1**
Gold	84	7*	CSG1-CSG7**
Total	135	10*	-

* Proportionate according to the certification category

** CSP1= 1st Case Study of Platinum Certified Factory, CSP2= 2nd Case Study of Platinum Certified Factory, CSS1= 1st Case Study of Silver Certified Factory, CSG1= 1st Case Study of Gold Certified Factory, CSG= 2nd Case Study of Gold Certified Factory, CSG3= 3rd Case Study of Gold Certified Factory, CSG4= 4th Case Study of Gold Certified Factory, CSG5= 5th Case Study of Gold Certified Factory, CSG6= 6th Case Study of Gold Certified Factory, CSG7= 7th Case Study of Gold Certified Factory.

3.2 Triangulation

This study also used triangulation to cross-verify the data collected from the case study by one FGD, ten KIIs to enhance the validity of the findings. One FGD with 10 participants was conducted on Zoom with two managers, two assistant managers, one HR manager, one

academician, two journalists, one banker, and one environmentalist. In addition, this study is carried out with 10 KIIs, such as two entrepreneurs, one manager, one assistant manager, one owner of a buying house, two academicians, two journalists, one banker, and one environmentalist, by using various media to accommodate the participants. A semi-structured protocol is maintained to conduct both FGD and KIIs, which entails four sections, i.e., i) data collector details, ii) Organizational details, iii) respondents' details, and iv) green initiatives-related questions. The questionnaire (annexure 1) has 9 items developed from the previous studies (Amiri, Ottelin, & Sorvari, 2019; Hasan et al., 2019; Kumar et al., 2019; Singjai, Winata, & Kummer, 2018)

3.3 Structure of the case study

Based on the data collected on the case studies, complemented by triangulation through FGD, and KIIs, the following structure is constructed to synthesize the data according to the research objectives. First, the profile of the ten selected organizations is depicted, with an emphasis on their respective LEED journey; second, the major green initiatives taken by the chosen LEED-certified RMG factories are identified and discussed; and third, the driving forces of green initiatives and investments are outlined.

3.4 Data analysis

This research follows the decision analysis perspective, which contains five elements: options, criteria, analysis, recommendations, and actions. The basic criteria investigated in the case studies are sustainable site, water efficiency, energy and atmosphere, material and resources, indoor environment quality, innovation, and regional priority credits. Therefore, this research has opted for qualitative data analysis. Qualitative, content, and thematic code analysis has been conducted through QDA Miner Lite software. QDA Miner Lite was used to run several qualitative data analysis procedures, including FGD and KIIs transcription, thematic analysis, data coding, cluster analysis, and word frequency analysis (Richards, 1999). For thematic coding, "green building," "energy-saving approaches," "optimized water use," "appointing a green consultant," and "paperless procedures" are used by the QDA Miner Lite in this study. Moreover, this study used content analysis suggested by many studies (Jabber, Sakib, & Rahman, 2023). It followed steps like data transcription, categorizing, and isolating meaningful patterns and processes. Qualitative data were analyzed following several phases: first, the recorded KIIs and FGDs were transcribed into a textual form, then different themes were identified using QDA Miner lite from the textual data and validated by the previous literature (Cristoni & Tonelli, 2018).

3.5 Ethical considerations

All participants are informed about the purpose of the study and willing to give information to uplift the concept of sustainability in the RMG industry in Bangladesh. However, the

personal information of the respondents is kept confidential, and the findings of the report are written in an aggregated manner.

4. Analysis and Findings

4.1 Profile of the organizations

Following Industrial Policy, 2016 and the LEED certification index, reputed large composite RMG factories have been selected for the case study to draw generalizations on the green initiatives in Bangladesh. On average, these factories employ over 5,000 workers across multiple plants. Each entity has a high annual turnover, surpassing nearly $150 million. Their production portfolio encompasses knit garments, textiles, wet processing, & garments accessories, sweaters, shirts, and woven bottoms for men, women, and children. Their production is 100% export-oriented, predominantly for the European market. The selected companies acquired particular categorical certifications in the LEED grading system between 2015 and 2019. Among them, seven have been awarded Gold LEED certification, two have achieved Platinum LEED certification, and one acquired the Silver certification.

Table 2 Profile of the Organization Selected for the Case Study

SL	LEED certification category	Year of establishment	Year of LEED certification	Number of employees	Plant location	Products
1	Platinum	2002	2018	4000	Narayanganj	Woven products
2	Platinum	2005	2018	2300	Gazipur	Woven products
3	Silver	2011	2020	5500	Hemayatpur	Sweater
4	Gold	2017	2018	3000	Narayanganj	Garments accessories
5	Gold	2015	2018	1200	Gazipur	Sweater
6	Gold	2018	2019	6500	Narayanganj	Knit garments
7	Gold	2017	2019	6000	Dhamrai	Woven products
8	Gold	2018	2019	2080	Zirabo	Women's tops and bottom
9	Gold	2018	2019	1300	Savar	Jacquard Knitting
10	Gold	1994	2015, 2021	24000	Gazipur, Naryanganj	Knit garments

4.2 Green initiatives

The selected LEED-certified RMG factories in Bangladesh have undertaken a wide range of green initiatives. As they have taken LEED certifications that pertain to building and construction, it is imperative that their primary green initiatives naturally revolve around eco-friendly construction and infrastructures. The buildings are certified by the Decree on Fire and Building Safety in Bangladesh (the Accord). However, no restrictive measure exists to build eco-friendly infrastructures; the building codes are designed to meet global criteria to secure LEED certificates and other international verifications (Bowers & Lee, 2023). The most familiar green initiatives in green construction and building are using heat-resistant glasses and providing workers with amenities to support a green environment.

> "Using heat-resistant glass in windows, a common feature, is capable of reflecting up to 70% of heat emanating from the sunlight" (CSS1[3]). "We designed our factory premises in such a way where workers can breathe properly. We have shower rooms, changing rooms, male-female separate restrooms, dining facilities, and training rooms" (CSP2[4]).

Green initiatives in energy consumption are prominent in LEED-certified RMG factories due to their cost-effectiveness and eco-friendly nature (Gazheli, Ven den, & Bergh, 2018). Most RMGs have solar and generator-run (gas and diesel) in-house electricity production units and the supply from the national grid.

> "Solar energy is exceptionally economical, costing around 0.027- 0.036 USD to produce a kilowatt-hour, while diesel-run or gas-operated generators cost 0.23-0.27 USD per kilowatt-hour" (CSG1[5]). "We source 6-15% of our energy needs from solar power" (CSP2[6]).

Additionally, many LEED-certified RMG factories harness natural daylight to minimize energy usage. Utilizing green building materials maximizes sunlight penetration and decreases the energy demands of air conditioners and fans (Gazheli, Ven den, & Bergh, 2018).

[3] 1st Case Study of Silver Certified Factory
[4] 2nd Case Study of Platinum Certified Factory
[5] 1st Case Study of Gold Certified Factory
[6] 2nd Case Study of Platinum Certified Factory

> "We use energy-efficient LED lights instead of old CFL lights saves 85% of energy" (CSG5[7]). "Our factory saves $90,000 - $130,000 by only using a 16-ton capacity husk boiler over a gas variant" (CSG4[8]).

Literature suggests that energy-saving approaches, reducing carbon footprints, green constructions, planting trees, conserving water, ERP, and using renewable energy directly link with the environment pillar for a resilient and better future (Cheng, Yu, & Zhang, 2023; Latif et al., 2023).

Table 3 Cost-benefit Analysis of Green Initiatives

Green initiatives	Unit cost / Installation cost	Expected benefit	Expected tenure
Solar system[9]	220,000 USD (approx.)	70,000 USD (approx.) per year	Five years (approx.)
LED lights[10]	6 to 8 watts of electricity	Save 7 to 9 watts of electricity (.20 to .50 USD per month approx.)	50,000 hours
Rainwater harvesting[11]	6.81 USD per sq. (approx.)	Save 1,666 liters of groundwater per sq. rainwater harvesting	10 years (approx.)

Source: From Focus Group Discussion

LEED-certified factories have implemented state-of-the-art Effluent Treatment Plants (ETPs). These ETPs ensure global-standard water disposal while optimizing water usage (Islam & Jabber, 2022). In addition to ETPs, the RMG sector has also initiated water recycling plants that purify used water for reuse.

> "We have state-of-the-art four ETPs and sensor-based taps in the toilet" (CSG2[12]). "We recycle water to support aquaculture and gardening within the factory grounds" (CSG7[13]).

[7] 5th Case Study of Gold Certified Factory
[8] 4th Case Study of Gold Certified Factory
[9] Validated Khan et al. (2021) and The Kaler Kontho (2023)
[10] Validated Khan et al. (2021) and Islam, Usman, & Jamil (2022)
[11] Validated Karim et al. (2021)
[12] 2nd Case Study of Gold Certified Factory
[13] 7th Case Study of Gold Certified Factory

Table 4 Green Initiatives Taken by the Selected LEED-certified Factories

Sl	LEED certification	GB	WA	SE	DLS	WMT	PP	ETP	STP	ET	RH	CRP	PRP	GC	TP
1	Silver	✓		✓	✓			✓							
2	Gold	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓
3	Platinum	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	

Source: FGD and KII

GB-Green building, WA- Workforce amenities, SE- Solar energy, DLS- Daylight saving approach, WMT- Water management technology, PP-Paperless procedure, ETP- Effluent Treatment Plants, STP- Sewerage Treatment Plants, ET-Eco-friendly transportation, RH- Rainwater harvesting, CRP- Caustic Recovery Plants, PRP- Plastic recovery plant, GC- Green consultant, TP-Tree plantation.

> "We have installed low-liquor-ratio based machines in our dyeing unit which save 3-liter/kg water usage. We have innovated a new chemical process by introducing waterless enzymes producing nanobubbles" (CSP1[14]). "Our factory has introduced PRP that has a high recovery rate of 95% to 98%" (CSG3[15]).

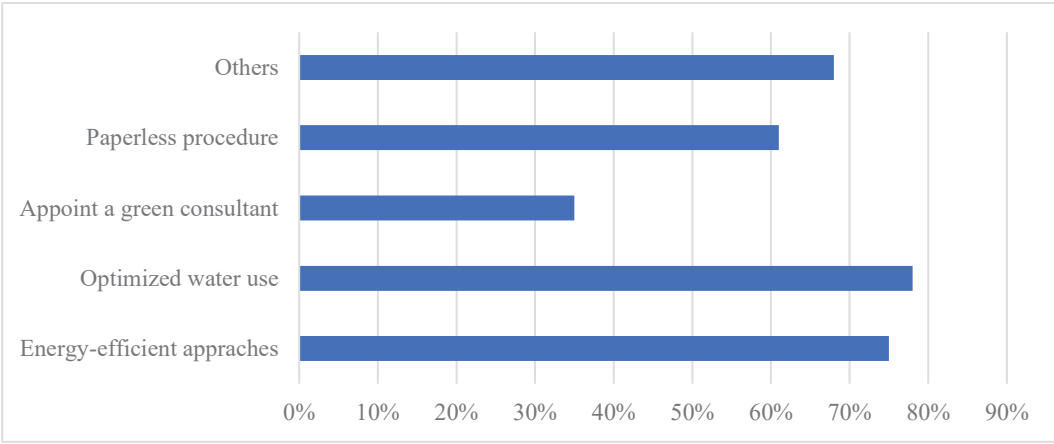

Figure 2 Validation of the Case Study Responses through FGD and KIIs

Many green initiatives are found in FGDs, KIIs, and case studies on LEED-certified factories, highlighting the innovative steps taken by independent factories that are idiosyncratic but highly commendable. One such valiant approach is the promotion of eco-

[14] 1st Case Study of Platinum Certified Factory
[15] 3rd Case Study of Gold Certified Factory

friendly transportation. Many organizations now encourage workers to opt for bicycles instead of motorized vehicles, significantly reducing carbon emissions.

> "We have installed electric car charging points in our factory premises, which encourage employees to use electric and hybrid vehicles" (CSP1[16]).

One of the respondents in KII said, "*many factories appoint green consultants to streamline their environmental initiatives better."* Lastly, some organizations have made a direct contribution to the environment that emphasizes the importance of biodiversity.

> "We have planted 2,500 trees to make a better, cleaner, and natural atmosphere in our factory premises" (CSG6[17]).

4.3 Driving forces toward green initiatives

From the data obtained from the case studies, FGD and KII, it is evident that there are multifaceted driving forces behind the green initiatives of RMG sectors; the green vision of top management is one of them. In most cases, the top management generates the idea of green initiatives to conserve nature and the environment. Earlier studies also supported the fact that top management support is pivotal in the case of green initiatives (Baloglu, Raab, & Malek, 2020). Respondents in the FGD mentioned that top management is very interested in taking green initiatives, has adopted a sustainable department/unit in the factories, and has participated in many sustainable programs. The only barrier to top management adopting these green initiatives arises when significant capital investment is required. Investment-centric green initiatives pose a major challenge for developing and developed countries, as highlighted by Iaquinto in 2014.

Rather than investment-centric green initiatives, adopting green initiatives is cost-effective in the long run and is the second driving force toward green initiatives found in the KII. The cost-effective operations driven by renewable energy led to financial savings, reinforcing the in-house work environment and safeguarding workers, thus enhancing productivity and promoting intentions for investing in green initiatives. Sustainable practices align with brand enhancement, long-term financial gains, global competitiveness, and fulfilling CSR initiatives. In the global industrial trajectory, sustainable RMG factories will dominate the market in the next 3-5 years, with non-compliant RMGs facing desuetude (Bowers & Lee, 2023).

[16] 1st Case Study of Platinum Certified Factory
[17] 6th Case Study of Gold Certified Factory

Transitioning from the traditional concept to the green paradigm is perplexing, however crucial. Such instances were found in the discussion in the FGD, stating that obtaining the LEED certificate was part of their long-term vision and ongoing efforts but mounted a substantial workload on the top-level management and associate divisions. However, the key driving forces for such a green shift encompass top management's commitment, community involvement, and compliance requirements from both local and international standards, i,e., GOTS (Global Organic Textile Standards), OCS (Organic Content Standard), ZDHC (Zero Discharge of Hazardous Chemicals) (Mohanty et al., 2023). The same has been echoed by the head of the compliance department of one of the sample RMG factories to assign reasons for green initiatives: *"to achieve the Sustainable Development Goal, to increase their goodwill and to ensure the safety of the surrounding environment"* (CSG4[18]). The transition toward greener was not only to attract foreign buyers but to place a distinct reputation in the market, which is now a fundamental strategic point in the global competitive marketplace, as remarked by a participant in the FGD. He also corroborates that the moral and social obligation also acts as a driving force for top management and the community to reduce environmental pollution for future generations and ensure the well-being of the community and their workforce.

A critical outcome regarding driving forces for the green initiative is the perception of a direct link between green initiatives and better product quality, operational efficiency, and global competitiveness. Such perception led the top management of LEED-certified factories to invest more in sustainability projects and green initiatives. The top-level management of one of the selected organizations opined, *"Due to the changing worldwide situation and the changing trend of utility, garment factories should focus on survival and continuing production; for example, our factory will use 100% processed water through PVA gel-based biological ETP, which is currently under the planning phase"* (CSP2[19]). Earlier studies also stated the same motivations for RMG to shift more to green: global platform positioning, customer engagement, environmental friendliness, sustainability assurance, CSR influence, and talent attraction (Baloglu, Raab, & Malek, 2020). However, tragic events like "RANA PLAZA" and "TAZREEN GARMENTS" have also prompted companies towards green practices, emphasizing the importance of a safe and sustainable work environment to avoid negative social repercussions, a stimulant towards green initiatives.

[18] 4th Case Study of Gold Certified Factory
[19] 2nd Case Study of Platinum Certified Factory

5. Conclusion

This study has explored the green initiatives taken by the LEED-certified factories in Bangladesh which may exemplify instances of sustainable development. Among the variety of green initiatives, the most common are eco-friendly constructions, application of renewable energy, taking energy-efficient strategies. Advanced effluent treatment plants and strategies for water management have also been adopted in some factories. Moreover, innovative waste-to-energy solutions and plastic recovery plants are not only mitigating waste but also show a greater contribution to society. The driving forces behind such green initiatives are the commitment of top-level management, long-run cost-saving philosophy, community involvement, and compliance requirements from both local and international, ensuring better product quality, towards operational efficiency, and strengthening global competitiveness.

This study significantly contributes to the field of sustainable development, especially to the RMG sectors in Bangladesh. First, this study identifies the green practices for the sustainable development journey of the RMG sector in Bangladesh. Second, in contrast to previous studies on green initiatives in Bangladesh, this study takes a distinctive approach by exploring the driving forces behind green practices in LEED-certified factories. Existing literature has often overlooked this crucial aspect. Third, the study also correlates the socio-economic gains, including enhanced marketability to international buyers and better working conditions, aligning with the United Nations Sustainable Development Goals (SDGs), especially 3, 6, 7, 8, 9, 11, and 12. Fourth, by providing empirical evidence of the positive impacts on both micro (factory level) and macro (national economy and environment) scales, the study offers valuable insights for policymakers, industry stakeholders, and the global sustainable development discourse. Fifth, under the key objectives of sustainable development and climate change outlined in the 8th 5-year plan of Bangladesh (2020-2025), this study addresses many issues, i.e., institutional capacity and water resource management, climate change mitigation, and green growth strategy which would serve as the basis for transforming a modern, efficient, and competitive economy. Finally, the findings of the study set a precedent for other industrial sectors in developing nations to integrate environment-friendly practices for sustainability.

One significant limitation of this study is the potential lack of representativeness, as the study focuses solely on LEED-certified factories, which may not reflect the broader industrial context of Bangladesh and may lack the generalizability of its findings to other sectors. This study expects a future study that would take more samples and stakeholders from various sectors in Bangladesh, including leather, light engineering, agriculture, small and medium enterprises (SME), plastic, and electronic sectors. Additionally, the study may

encounter in measuring the long-term impacts of green initiatives due to its cross-sectional nature, and the rapid advancement of green technologies and practices could make the findings redundant in the future.

Future research directions should consider longitudinal studies to track the sustainability journey of LEED-certified factories over time, providing an evident picture of the long-term effects of green initiatives. Expanding the scope to compare LEED-certified factories with non-certified counterparts could also offer deeper insights into the tangible benefits of such certifications.

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Annexure

Title: Exploring the Green Initiatives of LEED-certified Readymade Garments Factories Journey on Sustainable Development in Bangladesh

A. Case data collector's details:

i. Name:

ii. Contact number:

B. Organization details:

i. Name:

ii. Address:

iii. Year of establishment:

iv. Products:

v. Number of employees:

vi. Plant locations:

vii. LEED-certified unit/plant:

viii. Year of LEED certification:

ix. Category of LEED certification (please ✓ mark on the certification type):

☐ Platinum ☐ Silver ☐ Gold

C. Interviewee details:

i. Name:

ii. Position:

iii. Years of Experiences:

iv. Gender:

v. Contact information (Mobile and email addresses):

D. Descriptive questions:

1. Mention the green initiatives, including in the area of the value chain (such as production, distribution, etc.)

2. What motivated you to adopt green initiatives (Such as local compliance, buyers' pressure, brand reputations, employee satisfaction, entrepreneurs/top management preferences, financial profit potential, etc.)?

3. What are the challenges in implementing green initiatives (Top management support, financial constraints, lack of knowledge, Government support, lack of cooperation from employees, etc.)?

4. How would you overcome such challenges? (past, present, and future)

5. What are your recommendations for making an environment-friendly production environment/ compliance-friendly brand in Bangladesh?

6. When did your organization get the LEED certification/accreditation? Explain the journey of LEED certification (initiatives, implementation challenges, and way forward).

7. How have you benefitted from the LEED certification? How much change did you see in the revenue/order cycle/social/name and fame/environmental protection, if any? Did you ever make any cost-benefit analysis of this LEED certification?

8. What are the driving forces or the reasons for the industries to adopt this LEED certification and other green initiatives, especially for the RMG sector in Bangladesh?

9. What is the next goal for your company to accomplish for a sustainable environment vis-à-vis your future green plan?