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RENEWABLE ENERGY AND BANGLADESH RMG INDUSTRY

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Renewable Energy and Bangladesh RMG Industry: An Exploration on the Rooftop Solar Adoption of RMG Factories in the Digital Platform of Mapped in Bangladesh

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Abstract

In response to the knowledge gap on solar adoption in RMG factories in Bangladesh, this study pursues the research question to what extent RMG factories in Bangladesh have adopted renewable energy. The study demonstrates the solar panel adoption of RMG based on the factory data of Dhaka district of the Mapped in Bangladesh (MiB), which is a digital platform to showcase information of export oriented RMG factories in all over Bangladesh in order to enable transparency and accountability in Bangladesh RMG sector. The quantitative analysis of the study identifies several features of solar adoption among RMG factories that include large factories are ahead of other types of RMG factories (micro, small and medium) in terms of using solar panels and factories located in stand alone building tend to have greater solar adoption than RMG factories located in shared building. Moreover, it has been found in the study that woven factories have more solar adoption than other type of factories. Understanding the solar adoption of RMG industry through this study can aid the policy makers and stakeholders to rethink the renewable energy related interventions at policy level as well as at the firm level of Bangladesh RMG industry. Furthermore, such study can provide future research directions on issues related to renewable energy and Bangladesh RMG industry.

Introduction

Ready Made Garments (RMG) industry has been considered as energy intensive industry (Khan et al. 2022). Here, renewable energy plays a crucial role for sustainable climate solutions of this industry (Bhuiyan et al. 2021). Global fashion industry's stakeholders have developed a climate action charter under the auspices of UNFCCC to work for sustainability and towards the target net-zero emissions by 2050 (Fashion for Climate 2023). Bangladesh Garments Manufacturers and Exporters Association (BGMEA), as an apex trade body of export-oriented apparel

manufacturers of Bangladesh, has already joined the Fashion Industry Charter for Climate Action. Moreover, BGMEA has its own sustainability vision 2030 with the target to reduce energy consumption and use of renewable energy in Bangladesh RMG industry (Star Business Report, 2023). At present, Bangladesh has the highest green factories in the world with the certificate of Leadership in Energy and Environmental Design (LEED) (Mirdha 2023).

Despite of such achievements, commitments, targets and initiatives; there exist a knowledge gap on to what extent RMG factories in Bangladesh have adopted renewable energy. This study aims to bridge the gap by shedding light on the RMG industry's adoption of solar panels. Majority of the factories in the industry use captive power plants to generate electricity but there has been a shift towards renewable solutions due to current fuel price hike while demand for solar rooftops in the industry is growing because of the compliance criteria to capture more market share (Light Castle Analytical Wing 2023). Thus, the objective of this study is to explore the dynamics of solar adoption of the RMG factories in Bangladesh.

Literature review

Bangladesh has experienced a significant increase to ensure the availability of green and affordable energy throughout the country to achieve seventh sustainable development goal (SDG) of the United Nations over the past decade (Abdulrazak et al., 2021).

The energy-based efforts, the majority of which are solar-based, have also been highlighted by recent press coverage, stakeholder events, study findings, and policy actions. Natural gas is the primary energy source of Bangladesh which is running short. The Infrastructure Development Company Limited (IDCOL) states that rooftop solar plants on industrial units have the potential to generate approximately 5,000 megawatts of solar power (Billah, 2022).

IDCOL disclosed its plans to raise US$ 250 million for the garment industry's energy efficiency of the country during a dissemination and stakeholder consultation workshop. Of this amount, $150 million will be sought from the Green Climate Fund (GCF), with the remaining $100 million being co-financed by financial institutions, including banks (IDCOL plans to mobilize $250m, 2019).

Thus, the energy interventions in the RMG sector of Bangladesh already involve non-state actors like banks and funding initiatives like GCF, as well as government actors like IDCOL and SREDA. Numerous RMG businesses have already partnered with the project, such as the International Finance Corporation's (IFC's) Partnership for Cleaner Textiles (PACT) and other donor and buyer-assisted initiatives (Selim 2018). PACT was established in 2013 and has the following partners: the Bangladesh Garment Manufacturers and Exporters Association (BGMEA), textile manufacturers, 13 top buyers, the Embassy of the Kingdom of the Netherlands, the non-profit Solidaridad, and two technology suppliers (Selim, 2018). Selim

(2018) found that by implementing a variety of management strategies motivated by a desire to outperform their rivals, PACT partners and LEED high achievers were able to create win-win situations.

The RMG sector in Bangladesh currently has 242 LEED (Leadership in Energy and Environmental Design) certified factories. As of 2024 the sector has 206 LEED-certified green factories (Bangladesh: Green Building Information Gateway n.d.). Although having a large number of LEED certifications is something to be proud of, these factories make up a very small portion of all RMG factories (Light Castle Analytics Wing, 2019).

The "Renewable Energy Policy of Bangladesh 2008" is being revised and as a part of this effort, meetings have been scheduled to gather input from stakeholders and Development Technical Consultants Pvt. Ltd (DTCL) has been appointed as a consultant by the SREDA, the focal point under the Power Division of the government of Bangladesh. Experts have reiterated the importance of the existing Net Metering Policy in advancing rooftop solar power based on the "Opex Model" (Experts favor ‘target-oriented roadmap’, 2022). In order to create a framework for distributed RE (Renewable Energy) integration into the national grid, the government released net metering guidelines in July 2018 (Likhon, 2022). In order to create a framework for distributed RE (Renewable Energy) integration into the national grid, the government released net metering guidelines in July 2018 (Likhon, 2022). SREDA has urged RMG units to embrace solar power because it has been anticipated that industrial owners would be encouraged to sell excess or unconsumed electricity to the grid and would modify their monthly bills (Bangladesh's SREDA urges RMG units, 2021). The government has already given SREDA instructions to create a rooftop solar policy for RMG to facilitate green energy generation (Govt to formulate rooftop solar policy, 2020).

There have already been some studies related to energy issues in Bangladesh RMG along with some global literature. According to global literature, textile and RMG industries, are wasting great quantities of nonrenewable resources like natural gas and other fossil fuels to generate energy (Hanna 2008) while it has been expected that technological innovation or transformation will help organizations achieve business objectives in energy-efficient ways and thereby work toward environmentally friendly manufacturing (Singh et al., 2019). In Bangladesh, a previous study of Reza and Islam (2018) on knitwear garments factories found that most factories have taken a lot of initiatives towards energy efficiency, with initiatives such as shifting to energy saving lamps, to energy saving motors for sewing machineries, installing economizers, and making condensate return in boilers, while constructing exhaust gas boilers. However, the study acknowledged that vulnerability exists because lack of energy audits by factories and insufficient capacity building of workers through equipment maintenance or energy (efficiency, upgradation, process safety, and technical knowhow) related trainings (Reza and Islam, 2018). Another challenge remains for energy dimension in Bangladesh RMG which is increasing production costs due to increasing price of energy and materials (Asif, 2017).

Renewable energy is defined as energy that is collected from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat (Sheokand and Jaswal, 2016). Because of global warming, world is emphasized more on renewable energy (Bristi et al., 2018). Moreover, energy efficient process in the fashion in a sustainable, ethical ground are being pursued by fashion consumers which is why all the brands are very much conscious for the same in the western world (Asif, 2017). A recent study of Shajahan et al (2023) finds that a transition is ongoing for Bangladesh RMG industry in terms of energy efficiency machines and rooftop solar-based renewable energy. However, it can be observed from this literature review that energy efficiency has received more focus on preceding studies while literature gap persists particularly for solar energy, which is the major form of renewable energy in Bangladesh RMG.

Methodology

In this study, the solar panel adoption of RMG factories will be demonstrated based on the data of Dhaka district of the Mapped in Bangladesh (MiB) Project which is being implemented by the Centre for Entrepreneurship Development of BRAC University. The project has developed an open digital platform (mappedinbangladesh.org) which mapped 3723 factories till March 2022 based on its countrywide census (MiB maps 3, 723 RMG factories, 2022). In 2023, the project collected solar adoption data of RMG factories along with other factory data points.

Presentation of the data

According to the recently conducted factory census in Dhaka district (Dhaka cluster), MiB finds several features of solar adoption among RMG factories. For example, large factories are ahead of other types of RMG factories (micro, small and medium) in terms of using solar panels and factories located in stand alone building tend to have greater solar adoption than RMG factories located in shared building. Moreover, it has been found that woven factories have more solar adoption than other type of factories.

Table 1: Solar Usage Based on Factory Type

Type		Woven		Knit		Sweater		Mixed		**Total**	
Solar Use		No.	%	No.	%	No.	%	No.	%	No.	%
	Yes	160	29.04	81	21.89	40	19.61	45	27.61	326	25.31
	No	391	70.96	289	78.11	164	80.39	118	72.39	962	74.69
	Total	551	100	370	100	204	100	163	100	1288	100

Table 1 illustrates solar usage, categorized into factory types: woven, knit, sweater, and mixed. Mixed factories have been defined as factories having combinations of factory types, such as knit & woven, knit & sweater, woven & sweater, and knit, woven & sweater. It can be seen here that the woven factories are higher in number in the case of installed solar panels (160 out of 551) in comparison to the sweater factories that have the least amount (40 out of 164) of factories with solar panels. The mixed factories are second in solar usage (45 out of 118) and the knit factories are the next with 21.89 percent of them with solar panels.

Table 2: Solar Use Based on Factory Size (in terms of Workers)

	Factory size (in terms of workers)	Micro		Small		Medium		Large		**Total**	
Solar Use		No.	%	No.	%	No.	%	No.	%	No.	%
	Yes	2	2.56	23	6.65	158	25.86	143	56.52	326	25.31
	No	76	97.44	323	93.35	453	74.14	110	43.48	962	74.69
	Total	78	100	346	100	611	100	253	100	1288	100

Table 1 demonstrates the usage of solar energy classified into micro, small, medium, and large based on the number of workers in the factory. This classification has been taken from Bangladesh Industrial Policy 2022. Factories can be classified into four types based on the number of workers employed in the respective factories. The factories are divided into large, medium, small, and micro. Large factories are those factories that have more than 1000 workers working full. Medium factories have been categorized as having workers ranging from over 120 to 1000. Factories with workers ranging from 26 to 120 are considered small factories and factories with 1 to 25 workers are considered micro factories (Bangladesh Industrial Policy 2022).

The factories that have been categorized as large are the highest in number in the case of solar use, which is 56.52 percent. Micro factories have the lowest number of factories regarding solar usage, which is 2.56 percent. Small factories have 6.65 percent of their factories using solar panels. Medium factories are higher than the micro and small factories standing at 25.86 percent of the factories using solar panels.

Table 3: Solar Use Based on Premise Type

	Premise Type	Stand-alone Building		Shared Building		**Total**	
Solar Use		No.	%	No.	%	No.	%
	Yes	249	33.33	77	14.23	326	25.31
	No	498	66.67	464	85.77	962	74.69
	Total	747	100	541	100	1288	100

Table 3 represents solar use in the factory, which is sectioned into stand-alone buildings and shared buildings based on occupied premise type. The comparatively smaller operation set up their factories in shared buildings and face difficulties in finding sufficient spaces to install solar panels. This issue is reflected in the data provided in Table 2. 14.23 percent of the factories that operate in a shared building have their solar panels installed, as opposed to 33.33 percent of the factories with their solar panels operating in a stand-alone building.

The findings that above table represented have alignment with previous while at the same offer new insights that can have contribution to the knowledge gap on renewable energy usage in Bangladesh RMG industry. From the findings, it is clear that the RMG factories possesses different features if solar adoption is presented in terms of different classification of RMG factories in Bangladesh. The previous study of Reza and Islam (2018) has already shed light on sustainability indicators of knitwear factories where energy was the least vulnerable indicator. This study shows that when it comes solar energy, the adoption can be different in terms of woven, knit, sweater and mixed factories. Thus, previous studies can be and should be initiated to examine the energy dimensions dissecting and delineating the context of different types of RMG factories unless capturing holistic scenario would not be possible. This will also be applicable to the situation where small, medium and micro RMG factories have lagged behind from large factories in terms of solar adoption. Similar trend has also been observed in other countries. In Sri Lanka, larger apparel manufacturers have already adopted energy-efficient technologies, small-and medium-sized enterprises (SMEs) encounter various obstacles such as financial constraints, lack of knowledge, technology, and motivation (Pathirana and Yarime, 2018). Solar adoption of factories in terms of standalone and shared building can be considered as unique findings of this study. To complement the features of factories' solar adoption, further data points from Mapped in Bangladesh such as certifications, buyers and products of the factory, can be added in this study to examine to what extent solar adoption varies in terms of those data points.

Conclusion

Renewable energy has received attention on several policies and guidelines of Bangladesh include Mujib Climate Prosperity plan, National Adaptation Plan, Nationally Determined Contributions (NDC), Net Metering Guidelines, and Renewable Energy Policy of Bangladesh. Additionally, different initiatives andinterventions related to renewable energy have been taken by RMG sector stakeholders such as buyers, trade bodies, development partners, NGOs and others.

However, there lies some limitations in the study. While the study stresses on solar adoption of whole Bangladesh RMG industry, it still relies on the data of Mapped in Bangladesh in only

Dhaka district. The second phase of the Mapped in Bangladesh project (2022-2025) is now being progressed with data collection of other factory clusters such as Gazipur, Narayanganj and Chattogram. Addition of factories' solar adoption data from these cluster in this study will make the study more rigorous. The study can also include other data points of Mapped in Bangladesh such as certifications, buyers and products to explore to what extent solar adoption changes in terms of these data points. At present, the main consideration of the study is only limited to whether RMG factories are using solar panel or not. Such consideration can further be extended by identifying the situations which influence the RMG factories in Bangladesh to adopt solar panel.

Therefore, understanding the solar adoption of RMG industry through this study can aid the policy makers and stakeholders to rethink the renewable energy related interventions at policy level as well as at the firm level of Bangladesh RMG industry. Furthermore, such study can provide future research directions on issues related to renewable energy and Bangladesh RMG industry.

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