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ECONOMIC IMPACT, CHALLENGES, AND RECOMMENDATIONS OF READY-MADE GARMENT (RMG) INDUSTRY IN BANGLADESH

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ABSTRACT

Background: The Ready-Made Garment (RMG) industry is a vital contributor to Bangladesh's economy, generating 8.29% export revenue, and employment of over 5 million workers. This sector plays a significant role in poverty reduction and gender empowerment. However, challenges such as unsafe working conditions, low wages, environmental issues, and inadequate technological innovation persist.
Purpose: The study aims not only to explore the RMG sector's impact on Bangladesh's economy but also to highlight the challenges and recommendations for sustaining this sector's global competitiveness.
Design/Method/Approach: A mixed-method approach was used, integrating a systematic literature review (SLR) with the PRISMA model and a comparative analysis to obtain actionable insights.
Findings/Result: The RMG sector has made achievements like workers' pay scale and green factory initiatives, but several significant gaps such as workers' training, export diversification, and technology adoption. Additionally, major global concerns such as environmental sustainability, excessive water consumption, and discharge of chemicals need to be addressed.
Conclusion: The contribution of this sector to Bangladesh's economy is remarkable but must address challenges in the RMG sector. Strategic actions are necessary to ensure long-term competitiveness and growth.
Originality/value (State of the art): This review paper consolidated the RMG sector's contribution, challenges, and future directions. It also highlighted actionable recommendations for export diversification and how to address the challenges.

Keywords: Gross Domestic Product (GDP), Ready-Made Garment (RMG), Green Factory, environmental sustainability, technological innovation

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INTRODUCTION

Bangladesh's Ready-Made Garment (RMG) industry has a vibrant and significant contribution to the economy, employment, and export earnings. As per the statistics of the World Trade Organization (WTO), 50% of apparel exports from Bangladesh are in the international trade market (Rahman et al. 2019). During the COVID-19 pandemic year 2020, export growth in this sector decreased compared to the previous six fiscal years when the revenue dropped by 18.45%, the exports decreased by $3 billion against the target of $10 billion (Gazi et al. 2024). Shajahan et al. (2021) highlighted in their research report the female and male worker ratio in the RMG sector in Bangladesh which is 42:58. Bangladesh first started the garments industry business in the 1970s with seven factories only. The number of factories was 384 in 1984-1985 and the employees were 120,000; whereas the number of factories became 759 in the year 1989-1990 and the employees were 340,000 (Mia & Akter, 2019). Furthermore, the total RMG sector export was $116.2 million in 1984-1985 and the export became $624.16 million in 1989-190; where export increased rapidly and this became $4,349.51 million in the year 1999-2000 and $1.25 billion in the year 2010, and this export amount became $3.62 billion in the year 2023-2024 (BGMEA, 2024). The RMG sector not only bolsters the growth of Bangladesh's economy but has also accelerated foreign investments in this industry and other industries as well (Rahman, 2023, Gomes & Daud, 2020).

Though the low-level labor wages have increased by 50% over the last five years, still the salary is poor compared to the country's living standard (Uz-Zaman & Khan, 2021). Environmental issues have also become major concerns due to the consumption of high volumes of water and the discharging of waste (Chowdhury, 2023). Several international brands and organizations have been urging with Bangladesh Government and RMG stakeholders to take the initiative to adopt sustainable practices and mitigate the environmental issues (Saha et al. 2021).

Bangladesh's economic growth is largely driven by the RMG industry, but changing global needs, labor issues, and environmental concerns threaten the industry's long-term viability. Developing well-informed policies and strategic reforms requires an understanding of the sector's economic contributions and deficiencies. For policymakers, business executives, and foreign stakeholders looking to improve Bangladesh's garment industry's competitiveness and resilience in the global market, this research is essential.

Even though it is a major force behind economic expansion, Bangladesh's RMG sector faces significant sustainability issues. Its long-term survival is threatened by an over-reliance on conventional export markets, inadequate labor training, labor rights, safety, and wages, poor technological innovation, and rising global sustainability norms. Bangladesh might lose its competitive edge in the global clothing market if these problems are not resolved.

The total export of RMG products including knitwear, woven garments, specialist garments, home textiles and accessories, and high-value apparel is over 84% of the total RMG exports (Berg et al. 2021; Ferdousi, 2024). Product diversification is also significant for RMG sectors to move forward with low-cost products and capture high-value segments. Technical textiles, eco-friendly garments, and apparel products can help Bangladesh to capture the premium market in the world. Research also indicates that investing in innovative design and sustainable practices may help the RMG sector to keep its leading global position (Gu et al. 2021; Razzaque & Rahman, 2019). On the other hand, market diversification is required to enhance RMG products in different geographical locations such as the Middle East, Latin America, and Africa to keep its leading position in international markets (Raihan, 2020).

Bangladesh's RMG sector has created millions of job options for the local workers, which is the largest individual employers' sector in the country. However, this industry also faces the challenges of workers' productivity due to a lack of trained workers. Kasem et al. (2021) highlighted the statistics about the training program of the RMG workers. Only 32% of workers received limited-scale training before joining their service and the remaining 68% received training after joining the service (Moazzem et al. 2021; Akhter, 2023). Though there is a lack of productivity, 58% of female workers make a vital contribution to the national economy. The researchers Rahman & Chowdhury, (2020) published a report where they said that one direct job has opened directly and indirectly few other job opportunities in other industries.

Labor law and working environments have become prominent after the Rana Plaza disaster in 2013 and the Tazreen Fashion Industry fire case in 2012 (Barua et al. 2021; Habib et al. 2022). Though the low-level labor wages have increased by 50% over the last five years, still the salary is poor compared to the country's living standard (Uz-Zaman & Khan, 2021). Overall, 70% of the female workers are predominated by the male management cadre which is a violation of gender equality and becomes a barrier to creating the leadership of the female workers (Chowdhury, 2020). These trajectory situations notify the regulators and RMG industry stakeholders to reform the working environment.

Another notable challenge in the RMG sector is labor costs. After increasing the wages of the workers, Bangladesh's RMG products become less competitive compared to other low-wage countries such as China, Cambodia, and Vietnam (Mian, 2020).

In the 21st century, the Fourth Industrial Revolution (4IR) maximized production and South Africa put 4IR into their national economic strategy (Sutherland, 2020). Introducing 4IR will be alarming in the Bangladesh apparel industry. By introducing 4IR, Artificial Intelligence (AI), and the Internet of Things (IoT); the international apparel industry stakeholders have demonstrated to enhance productivity, reduce manufacturing costs, and improve the quality of products, which can create a negative impact on the Bangladesh economy if the stakeholders do not incorporate in technology on a timely manner (Jahan et al. 2022; Ahammed et al. 2024). However, cyber risk and cyber threat have become another serious concern in the apparel industry all over the world.

While the RMG industry has made a significant contribution to the country's economy, several challenges are threatening where sustainable environment concern is noticeable. This sector consumes more energy sources such as water, fossil fuel, and chemicals which leads to degrading environmental pollution. Shamsudduha et al. (2022) mentioned in their article that 75 to 90 cubic kilometers of water are used by this sector, which creates a scarcity of drinking water. On the other hand, industry waste, especially from textiles and discharge chemicals, pollutes the river and seawater, which is ultimately a big issue for the sustainability of underwater lives (Farhana et al. 2022; Anik et al. 2024).

Lack of Export Diversification

- The RMG industry is heavily reliant on low-cost clothing and conventional export markets (such as the USA and EU).
- Limited research has been done on Bangladesh's potential to penetrate high-end clothing markets and specialized sectors.

Inadequate Workforce Development

- Pre-job training is only provided to 32% of RMG employees, which has an impact on productivity.
- Few research has been done on organized vocational training programs for workers who want to improve.

Labour Rights, Safety, and Wages

- 70% of female workers work in unsafe conditions, but many studies concentrate on economic contributions rather than social sustainability.
- Research is required on the efficacy of policies for worker protection and wage increases.

Insufficient Technological Innovation

- The majority of RMG factories in Bangladesh still use manual production methods.
- Few studies examine the sector's adoption of automation, AI, and IoT.

Environmental Sustainability Challenges

- The industry generates chemical waste and uses a lot of energy and water.
- Few studies examine the adoption of green initiatives and policy enforcement beyond green factory certifications.

The main objective of this study is to evaluate the RMG sector's contribution to Bangladesh's national economy and challenges to pinpoint any gaps and offer accountable recommendations for maintaining its expansion and competitiveness.

METHODS

The purpose of this research article is to investigate the economic effects of the RMG sector in Bangladesh, with a particular emphasis on how it affects the nation's job situation, social development, and economics. Although the economic benefits of the RMG sector have been well studied in the literature, less attention has been paid to how technical innovation, environmental sustainability, and workforce development might promote product and market variety. By examining the difficulties, the industry faces and offering practical suggestions to guarantee a sustainable workplace and improve its standing in international markets, this study aims to close this gap. This study intends to add to the current conversation on the sustainability and competitiveness of the RMG sector by tackling these understudied topics.

A mixed method approach such as a Systematic Literature Review (SLA) with the PRISMA Model and Comparative Analysis has been used to collect information.

Systematic Literature Review (SLA) with PRISMA Model

A review protocol that referred to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Page et al. 2021) has been used which is shown in Figure 1. The selection of this PRISMA model is based on the predefined eligibility criteria which aligned with the objectives of this review highlighted in the introduction section. Then we developed a strategy for searching the databases and related items from several databases. Next, to select the relevant articles, the identification, screening, and eligibility selection process has been followed. As part of this, the identification process has been discussed in detail in step 1 where the literature search was conducted for several databases. The articles' screening process has also been placed in this section in step 2, the duplication removing criteria and articles extraction process have been discussed. Finally, the authors verified the eligibility of the articles in step 3 and selected them for final review.

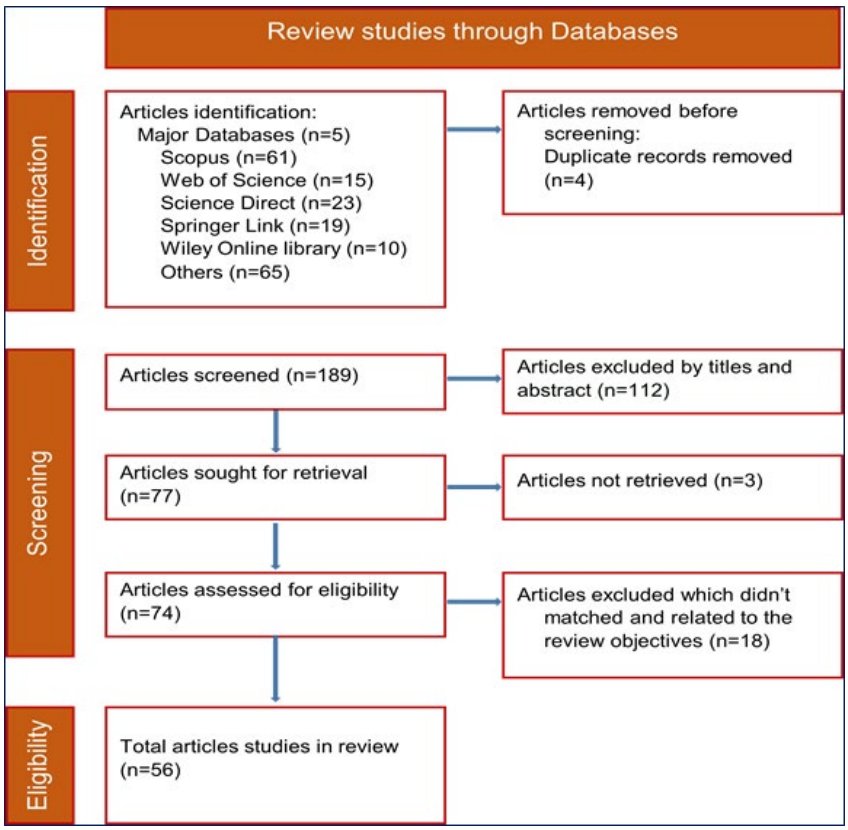

Figure 1. PRISMA 2020 workflow for systematic literature review

Searching Strategy

The PRISMA, a systematic review method has been followed to gather data from secondary related sources to the present economic status of the apparel sector in Bangladesh, the challenges in the RMG sector in Bangladesh, and researchers' previous recommendations. Several databases such as Textile Exchange, Google Scholar, Scopus-indexed journals, peer-reviewed journals, web of Science, reputed publications, research journals, thesis papers, trade articles, and the Internet have been used to collect the information. To optimize the search method, the Google search engine and ResearchGate were used to collect information. Search strings such as "RMG industry in Bangladesh", "economic impact", "employment workforce", "sustainability", "impact of technology", "advantages of 4IR", and "safety and wages of worker" have been used to filter the relevant data. The articles considered from 2019 to 2024 to collect the last five years' updated information which were published in peer-reviewed journals, and reporting focused on the Bangladesh garments industry. Updated information helped to improve the quality of this research paper, especially for technical innovation and advancement with the latest 4IR technology and environmental sustainability which will help the researchers.

Identification: Step 1

The information that was not related to the scope of this paper was considered almost equivalent to this review paper, and publications that did not match this review paper's criteria have been excluded. Initially, 193 papers were selected and downloaded by using the above keywords. The literature search has been seasoned through 5 major databases such as Scopus (n=61), ScienceDirect (n=23), Web of Science (n=15), Springer Link (n=19), and Willy Online Library (n=10), and along with other sources (n=65). A total of 193 articles have been considered in Step 1.

Screening: Step 2

After removing the 4 duplicate research papers, 189 papers were selected, and this screening process was conducted based on the articles' titles and abstracts. Through this process, 112 articles were excluded, they did not align with the research objectives. The remaining 77 articles were sought to retrieve with full text, where 3 articles could not be retrieved. Thereafter, 74 articles were accessed for eligibility criteria.

Eligibility: Step 3

After properly assessing 74 articles, 18 articles were excluded from the final list which did not directly match the review criteria of this review paper. Eventually, 56 articles were included in the final review stage.

Comparative Analysis

Comparative analysis is used in this paper to compare Bangladesh's RMG industry to that of other top garment exporting nations, namely China, Vietnam, and India. These nations were chosen because of their substantial worldwide market share, varied production methods, and sophisticated technical adoption in the clothing industry. By analyzing important economic, social, and technological variables, this method assists in determining Bangladesh's advantages, disadvantages, and potential areas for development.

Five key categories are the subject of the comparison: (1) export diversification; (2) workforce development; (3) labor wages and workplace safety (4) adoption of technological innovation (5) sustainability and green manufacturing; The report identifies policy gaps, best practices, and possible tactics for raising Bangladesh's competitiveness in the global garment market through this benchmarking.

RESULTS

The results section incorporates the findings on export and economic diversifications, workforce development and social impact, labor rights, safety and wages, technological innovation, and sustainability in the RMG sector in Bangladesh, highlighting the achievements against the challenges, addressing the gaps, and recommendations for sustainable growth.

Export Diversification and Economic Growth

The RMG industry is the main contributor to the national economy of Bangladesh, this is the maximum foreign remittance earners sector in the country (Sikder, 2019). This sector has remained the backbone of the country, where the contribution is 10 - 12% to GDP and generated $36.15 billion in the year 2023-2024 (Chowdhury et al. 2024; BGMEA, 2024). From the 1990s to till date, the RMG sector has maintained the top position in exporting their product which is 81.29%

whereas another sector contributes only 16% of exports in the country (Export Performance (BGMEA, 2024). The total export and their contribution are shown in Figure 2. However, the research gaps have shown that the RMG sector still can increase exports globally to focus on the niche market of their high-value garments.

Enhancing Employment and Poverty Reduction

The total number of employees in the RMG sector in Bangladesh is 5.02 million where 55.57% of workers are female, which helps to reduce the poverty level in the country and empowers gender inequality (Staff Correspondent, 2025). This significant portion of women workers reduces unemployment in society and contributes to the economy. Where in the rural part of the country, employment opportunities become very low, the RMG sector has had a positive impact on creating job facilities for female workers, leading to maintaining their household expenses and improving living standards. Though the production efficiency of these workers has become low due to a lack of adequate pre-job training is 32%, productive efficiency can be maximized by facilitating the proper trainer to them (Van Oort, 2023).

Improvement of Labour Rights, Safety, and Wages

A significant improvement has been visualized to enhance the safety issues in the RMG sector in Bangladesh such as the Accord on Fire and Building Safety and Alliance for Bangladesh Workers has led to an improvement in the working environment. As per the report by Moazzem (2023), the progress rate of correction for Remediation Sustainability Effort (RSE) was 91.32%, the survey covered a total number of 1828 RMG factories, where 500 factories have complied with 100% and an additional 1300 factories complied with 91%. These statistics strongly support the significant improvement of the RMG sector in Bangladesh. On the other hand, 50% of wages have already been increased in the RMG industry considering the living standard of the workers, where the options are available for the workers for overtime working facilities with extra salary based on an hourly basis (Uz-Zaman & Khan, 2021).

Technological Transformation

In the 21st century, technological transformation is a fundamental requirement to ensure the efficiency of productivity, innovation, quick production, and sustainability. To automate and maximize the production process, AI, IoT, and 4IR can make a significant contribution. This technological innovation not only increases the production of garments but will also help to align with the goal of sustainability. With the adoption of modern technology and automated processes, it is expected that workers will face employment or less growth in employment generation (Mannan & Sultana, 2021). Textile Focus (2022) reported that 4IR can change the traditional operational methods by introducing automation, AI, 3D printing, robotics, and intelligent manufacturing, as a result, Bangladesh has made significant exports of ready-made garments. However, the researchers Islam & Rafique (2024) published their research paper, by implementing the Wazuh management system in the apparel industry to mitigate the cyber threat.

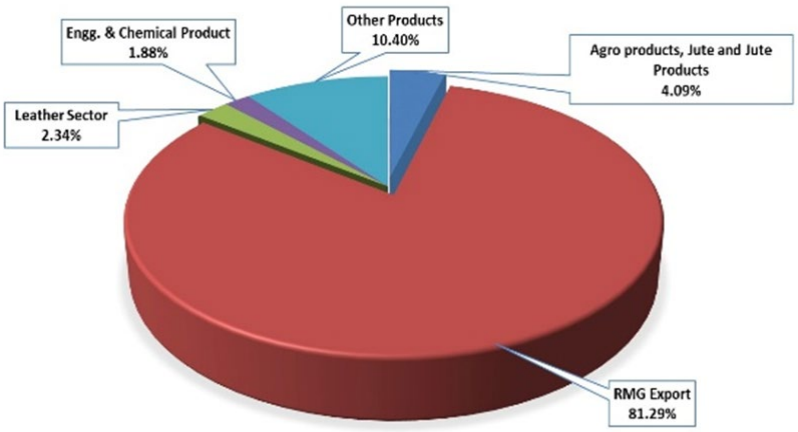

Figure 2. Export Position of Bangladesh

Improvement of Sustainability

While the environmental degradation issue is a significant concern, Bangladesh's RMG sector's stakeholders and government are reluctant to address this issue. RMG factories discharge waste and chemicals into the rivers, and excessive uses of water in these factories need to be addressed by protecting the environment and ensuring compatibility with international buyers. However, the RMG sector is responsible for the emission of greenhouse gases is 15.4% and the textile sector accounts for 12.4%, while the ABA group in Bangladesh committed to investing at least 25% more to establish green factories, which will help to reduce the greenhouse gas emission and fulfill the Paris Agreement (Anwar, 2024). Additionally, Bangladesh's RMG sector has already received 204 'green' factories certification from the United States Green Building Council (USGBC) in the year 2023 where 74 factories are platinum rated, 116 gold rated, and the remaining are other rated where 500 factories were waiting to achieve these certifications (UNB, 2023). The green factory can cut down uses of energy by 40% and 30% of water consumption, where carbon dioxide emission can be less compared to traditional factories (Mannan & Sultana, 2021).

Comparative Analysis

The Comparative Analysis compares Bangladesh's RMG sector against significant garment-exporting countries, such as Vietnam, India, and China, to identify strengths, shortcomings, and areas for improvement. The analysis focuses on export diversification, workforce training, sustainability initiatives, technological adoption, and labor rights. Findings indicate that Vietnam has successfully diversified into high-value apparel, India invests heavily in skill development, and China leads in automation and sustainability efforts. In contrast, Bangladesh is slowly embracing Industry 4.0, lacks organized workforce training, and is still largely dependent on traditional export markets. To preserve competitiveness, Bangladesh must engage in digital transformation, expand into niche markets, increase skill development programs, and improve environmental compliance. These observations offer practical methods for enhancing the industry's standing internationally. The comparative analysis in Table 1.

Table 1. Comparative Analysis

Key points	Bangladesh	Vietnam	India	China
Export Diversification	84% of clothing in bulk	High-end clothing and athletic apparel (Dao et al. 2021)	Textiles and ethnic clothing (Roy et al. 2024)	Automation and smart fabrics (Dong et al. 2021)
Workforce Development	Pre-job training availed 32%	Vietnam's government-sponsored skill development and increased productivity by 20% (Huy et al. 2021)	Institutes of specialized RMG (Chowdhury, 2023)	workforce powered by AI (Yuan, 2024)
Labour Rights, Safety, and Wages	70% of employees are working in hazardous conditions	Labor laws and higher wages are ensured by regulators (Thi & Ninh, 2021)	Policies for the well-being of employees (Kashyap, 2025)	Efficient monitoring and higher pay (Lollo & Rourke, 2020)
Technological Innovation and Transformation	Limited usage of IoT and digital innovation.	Most of the RMG industry is controlled digitally (Salman et al. 2024)	Blockchain and AI are incorporated partially into the supply chain system (Chawla et al. 2023)	Fully digital and automated system in the RMG sector (Altenburg et al. 2020)
Sustainability and Green Factories	A total of 204 green factories	Solar and eco-friendly dyeing facilities (Pham & Bechtold, 2023)	Circular economic practices (Modak, 2021)	Carbon reduction goals and sustainable textiles (Xu et al. 2023)

Summary of Results

Table 2 provides a summary of the main concerns, related findings, and strategic recommendations to highlight the most important findings and offer an organized method for resolving the difficulties in Bangladesh's RMG industry. This synopsis identifies important topics that need attention, including labor rights, technological adoption, environmental sustainability, workforce development, and export diversification.

Verifying Recommendation

To confirm that the recommendations properly address the problems pointed out in this research through a scientific method, which considers the following:

1. Data-driven Justification

- Data that has been taken from industry reports, peer-reviewed sources, and comparative studies should be used to support recommendations.
- For instance, research showing that only 32% of RMG employees receive pre-job training, which contributes to low productivity, supports the recommendation to expand training programs for these employees (Kasem et al. 2021).

2. Comparative Evaluation

- By comparing Bangladesh's RMG industry to China, Vietnam, and India to identify best practices, validity is increased.
- For instance, Vietnam's government-sponsored skill-development initiatives increased productivity by 20% (Huy et al. 2021); Bangladesh can follow their lead.

3. Logical Framework Establishment

- Employ a methodical strategy in which every suggestion is in line with a particular issue and anticipated result.
- As an illustration, implementing Industry 4.0 (AI, IoT, robotics, and intelligence manufacturing) boosts productivity and raises competitiveness internationally (Textile Focus, 2022).

4. Alignment of Policy and Regulation

- Verify that the greenhouse gas emissions comply with the Paris Agreement for sustainability guidelines, the ILO's worldwide labor standards, and Bangladesh's National Industrial Policy.
- As an illustration, mandatory green manufacturing certification is required to lower greenhouse gas emissions and comply with the Paris Agreement, the ABA Group in Bangladesh has pledged to increase its investment by at least 25% to grow green factory activities (Anwar, 2024).

Table 2. Summary of findings and recommendations

Challenges	Findings	Recommendations
Export Diversification and Economic Growth	84% exports inexpensive clothing with a small presence in specialized markets.	Expand product diversification; enter new markets (Middle East, Africa).
Enhancing Employment and Poverty Reduction	32% of workers receive pre-job training.	Put in place programs for vocational training; industry and academia should work together.
Improvement of Labour Rights, Safety, and Wages	70% of women are employed in hazardous jobs with low pay.	Enforce labor rights compliance, and increase wages based on inflation.
Technological Transformation	Digital and 4IR adoption is slow and 80% of SMEs lack automation.	Support technological advancements financially and give employees training in digital manufacturing.
Improvement of Sustainability	Weak regulations and high-water consumption (1,500 B liters/year).	Promote green factories and enforce sustainability rules.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

A vital component of Bangladesh's economic growth, the RMG sector has made a substantial contribution to employment, GDP expansion, and international commerce. Nonetheless, the industry faces several issues that need immediate attention. Lack of export diversification, inadequate labor training and workforce development, labor rights, safety, and wages, slow uptake of contemporary technological innovation, and environmental sustainability issues are some of the main challenges. Resolving these problems is essential for sustained competitiveness and growth of the RMG industry in Bangladesh.

Recommendations

The following tactical measures are advised to guarantee long-term progress:

- Improving Export Diversification: Enter high-end clothing markets and form commercial alliances with new international markets.
- Workforce Development: To upskill employees and increase production, put in place organized training programs and industry-academia partnerships.
- Labor Rights, safety, and Wages: Implement equitable wage structures in line with global norms, enhance workplace safety, and bolster compliance monitoring.
- Technological Advancement: Help SMEs integrate Industry 4.0 technology by offering them training and financial support.
- Environmental Sustainability: By implementing financial incentives, technological advancements, and regulatory rules, green manufacturing projects can be strengthened.

Bangladesh may improve its standing in the global RMG industry and guarantee economic sustainability while adhering to international labor and environmental standards by putting these suggestions into practice.

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