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Sumi, Razia Sultana

School of Business and Entrepreneurship, Independent University, Bangladesh (IUB)

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Adoption of AI-Driven Personalization in the RMG Sector of Bangladesh: A Study on Industry Readiness and Its Impact

Razia Sultana Sumi[1], Sadia Binta Salauddin[2]
[1,2]Department of Marketing, Jagannath University, Dhaka, Bangladesh
[1]*raziasultana@mkt.jnu.ac.bd,* [2]*bintasadia2000@gmail.com*
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Abstract: **This study examines the implementation of AI-driven personalization in Bangladesh's Ready-Made Garment (RMG) sector, focusing on the industry's readiness. It explores how personalization could enhance operational efficiency, reduce costs, and improve competitiveness, fostering sustainable economic development. Using a qualitative approach, the research includes semi-structured interviews with 15 RMG professionals from four RMG establishments across various levels of the value chain, such as factory managers, HR officers, and IT leaders. Thematic analysis shows that AI readiness in the RMG sector is limited and still in its early stages, but it has significant potential for future transformation. The industry shows early signs of readiness but lacks strategic frameworks for successful integration. This research adds to the limited studies on digital transformation in developing economies and offers practical advice for industry leaders and policymakers. It highlights key factors for adopting AI-driven personalization and identifies essential elements for successful AI implementation.**
Keywords: **Artificial Intelligence, RMG sector, AI-personalization**

I.INTRODUCTION

Artificial Intelligence (AI) is profoundly transforming industries worldwide due to its ability to automate processes, make data-driven decisions, and create personalized customer experiences by utilizing advanced computing to replicate human intelligence. This encompasses various domains, including machine learning, natural language processing, and expert systems. AI has already made significant changes in numerous sectors by allowing machines to perform tasks that typically require human intellect. In the textile and apparel sector, AI enables hyper-personalization, granting brands the ability to deliver extremely customized experiences to their customer [1]. Numerous global brands, especially in regions like China, the USA, and parts of Europe, are already employing AI to innovate the Ready-Made Garment (RMG) industry through strategies like mass customization and predictive analytics. AI-driven personalization emerges as a particularly promising advancement in this field, utilizing machine learning and behavioral data to tailor experiences, services, and products to individual preferences [2].

The RMG sector plays a vital role in the national economy, providing employment for millions and making significant contributions to export revenues [3]. Traditionally, this industry, which represents around 84% of the nation's total exports, has depended on labor-intensive practices with minimal integration of modern technologies. While certain industries, such as healthcare, e-commerce, and finance, have begun to embrace this technological shift, the adoption of AI within the ready-made garment (RMG) sector, particularly in developing countries like Bangladesh, remains considerably behind [4]. Though some manufacturing segments have started using AI for quality control, the overall integration is still quite limited [5] Issues such as insufficient infrastructure, skill gaps, and financial constraints are hindering the sector from fully embracing AI technologies [5]. Consequently, it is increasingly vital to investigate innovative solutions like AI-driven personalization to improve business efficiency, address sustainability concerns, and stay competitive in the global market. The apparel sector has experienced considerable changes as a result of evolving consumer preferences and advancements in technology. In the realm of customer service, AI-driven chatbots and virtual assistants are improving response times and customer interactions, thereby boosting overall satisfaction [6]. The application of AI-driven personalization in the RMG sector could lead to significant improvements in efficiency, product quality, and customer satisfaction.

By leveraging AI, manufacturers can enhance their ability to forecast market trends, reduce waste, and offer tailored products, thus improving their competitiveness on a global scale. In Bangladesh, the industry's readiness to adopt AI significantly relies on digital infrastructure, an efficient workforce, and a supportive policy and regulatory framework. Current gaps in technical expertise, data infrastructure, and organizational awareness pose considerable challenges for the RMG sector regarding the integration of AI [7]. This study intends to evaluate the preparedness of organizations within Bangladesh's RMG sector to implement AI while also exploring their present capabilities and challenges. The Technology-Organization-Environment (TOE) framework [8] is employed to analyze how different factors affect AI personalization adoption in the RMG sector. The primary goal of this study is to analyze the current readiness of the Ready-Made Garment (RMG) industry in Bangladesh for adopting AI-driven personalization technologies and to evaluate possible effects of this implementation on operational efficiency, customer engagement, and competitive edge. This study seeks to pinpoint the main factors and challenges that affect the industry's readiness, assess the current state of technological capability, and investigate the strategic consequences of incorporating AI personalization into the RMG value chain. Therefore, this study will contribute to the current body of knowledge by exploring the role of AI personalization in Bangladesh's Ready-Made Garment (RMG) sector, which is the country's primary industry but

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has been under-researched academically. It provides an analysis of how prepared the industry is for implementing AI, identifies existing gaps and possibilities, and assesses the potential effects of AI-driven personalization on operational efficiency, customer engagement, and global competitiveness. The research offers actionable recommendations for industry leaders, policymakers, and stakeholders aiming to enhance Bangladesh's standing in the global apparel value chain through digital transformation.

II. LITERATURE REVIEW

Artificial Intelligence (AI) describes the ability of machines or computer systems to perform tasks that usually necessitate human intelligence. The textile manufacturing sector is experiencing a notable transformation due to AI advancements. The readiness of the ready-made garment (RMG) industry for textile applications refers to how prepared the sector is to embrace and implement AI technologies, particularly in areas such as personalized production, consumer insights, and supply chain optimization. According to the TOE framework [8], the adoption of technology is shaped by three contexts: technological, organizational, and environmental. The technological context encompasses both the internal and external technologies relevant to the company. It includes a company's existing technological tools and practices, along with the external technologies accessible to it. This component examines the user-friendliness and compatibility to ensure the practical advantages of the new technology. The organizational context pertains to the internal environment in which technology is utilized, encompassing aspects like the firm's size, scope, and management structure. This component addresses the structure and culture of the organization that promotes and facilitates the utilization of new technology. The environmental context refers to the external conditions under which the firm operates, specifically its competitors, interactions with the government, and its industry as a whole. Finally, the environmental component assesses the external, social, and technological support available for AI applications [9,10]. Research suggests that the adoption of technology differs across both industries and nations [11]. A study reveals that AI-enabled smart factories can enhance supply chain visibility, optimize inventory management, and reduce production lead times [12]. Leading textile-producing countries such as China, Vietnam, and Turkey have begun to implement AI to improve efficiency, reduce waste, and enhance transparency in their supply chains. China, a significant competitor to Bangladesh, has illustrated a strategic approach by adopting cutting-edge technologies, focusing on sustainability, and actively collaborating with suppliers, setting a standard for harmonizing environmental accountability with operational efficiency [13]. Meanwhile, Bangladesh, which derives over 80% of its export revenue from apparel, stands as one of the top exporters in the global garment sector (Export Promotion Bureau, 2021). Faruque Hassan, the president of the Bangladesh Garment Manufacturers and Exporters Association (BGMEA), has been a strong proponent of integrating AI to promote growth within the garment industry [14]. However, Bangladesh remains in the early stages of utilizing AI, encountering substantial hurdles such as a lack of technical skills, high implementation costs, and resistance to change, along with deep-rooted practices and fears regarding job security [15]. Even though the apparel industry in Bangladesh is less explored by researchers, there has been particularly limited investigation into the readiness for technology adoption issues within this sector. Embracing modern and eco-friendly technologies can boost competitiveness, enhance productivity, minimize mistakes, and maximize resource efficiency.

III. METHODOLOGY

The study adopts an exploratory research design. Its main goal is to collect in-depth qualitative data about the adoption process and the impact of AI-driven personalization, utilizing the TOE framework. The primary method for data collection was semi-structured interviews, which struck a balance between formal questioning and the chance to explore issues raised by the participants. This approach is particularly suitable for investigating new and complex topics since set frameworks may limit the depth of insights. Participants were selected through purposive sampling. The research utilized a two-phase sampling strategy [16,17]. Initially, apparel manufacturing factories focused on exports were identified. Subsequently, factories were selected that varied in aspects such as size, ownership structure, the background of respondents, their experience, and the range of business activities. The study involved 15 professionals from four ready-made garment (RMG) companies located in the Narayanganj district of Bangladesh, including two large companies and two medium-sized firms. The inclusion of both large and medium enterprises allows for a comparative analysis of AI adoption across different organizational sizes, thereby improving the understanding of the sector's readiness and challenges.

Participants represented varied roles, including General Manager, Deputy General Manager, IT Head, Production Manager, and Compliance Officer. Each organization provided 3 to 4 participants, ensuring that strategic, operational, and technical viewpoints were well-represented. The research data was collected through semi-structured interviews, which were conducted in person at the participants' workplaces, while phone interviews were used when face-to-face meetings were not feasible. All interviews were conducted in Bangla and were digitally recorded. The audio recordings were then translated and transcribed from Bangla to English. Consent was obtained from participants for recording the interviews to ensure accurate transcription and analysis. Each interview lasted around 15-20 minutes and was guided by open-ended questions. The semi-structured format allowed for a balance between focused inquiries and the flexibility to explore

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important themes, including the current use of AI in the RMG sector, levels of awareness, challenges encountered, and overall readiness for AI incorporation. The data analysis utilized thematic analysis by categorizing responses within the TOE framework. The recordings were transcribed verbatim, with the transcripts reviewed several times to identify recurring themes, patterns, and insights relevant to the research objectives. Manual coding of the data was performed to highlight key themes. This analysis focused on organizing the data according to principal research themes related to organizational readiness, barriers to AI adoption, and the perceived impact of AI on business functions within the RMG sector. This approach enabled the extraction of detailed insights that directly align with the research objectives.

IV. RESULTS

The Ready-Made Garment (RMG) sector in Bangladesh, although the second-largest exporter in the world, has fallen behind in adopting technological advancements. While artificial intelligence (AI) offers significant opportunities to optimize production processes, improve quality control, and streamline supply chain management, various obstacles still hinder its adoption in the industry. A recent study examining the textile sector in Bangladesh highlights critical challenges such as insufficient technological infrastructure, high costs of implementation, and a lack of skilled professionals who are knowledgeable in AI and data analytics [18]. The identified themes have been structured according to the TOE framework, as shown in Figure-1. The findings were analyzed based on the technological context, organizational context, and environmental context.

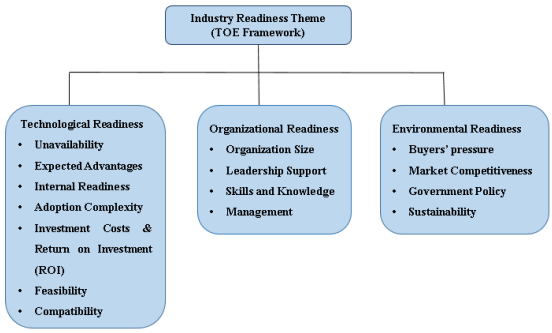


Figure 1: Industry Readiness theme framework
Author's Work

Technological Readiness:

Regarding the technological context, adoption decision mainly depends on the expertise of technology usage, perceived usefulness of technology, internal expertise, feasibility, compatibility and investment cost analysis. The findings and statements of the interviewees related with technological readiness are presented in Table 1.

Technological Theme	Key Findings	Quote Evidence	Factory Types
Unavailability of Resources	Most factories—both large and medium—have adopted basic digital tools (e.g., CAD, ERP, barcode tracking), but lack access to AI-specific technologies. AI tools are either unknown, or they expect that AI has been embedded within foreign machinery without explicit understanding. It can be inferred that AI technology is not yet widely accessible or recognized in Bangladesh.	*"We use pattern-making software and advanced cutting machines, but… we haven't implemented anything concerned to that concept."* — GM, Medium Enterprise *"AI tools are not directly marketed to us in Bangladesh … they come embedded in advanced foreign machines."* — DGM, Large Factory	Both large and medium enterprises, but medium enterprises are less exposed to foreign technology.
Expected Advantages	There are strong perceived benefits of AI personalization. Participants strongly believe in AI's future potential, especially in reducing errors, increasing efficiency, and optimizing forecasting.	*"If AI could be adopted to detect fabric defects quickly… it would save us hours…"* — IT Head, Knitwear Company *"AI could provide us with accurate predictions … we currently use a dashboard for this."* — Supply Chain Manager	All factory scales recognize the advantages, but larger factories are better positioned to implement them once barriers are removed.
Internal Readiness	Lack of technical expertise, training, and awareness among both workers and management. Responsibility lies with top management. Management is not fully informed, and technical staff are unequipped to handle AI systems.	"Our IT head is only equipped to handle emails and HR software—how can he manage an AI system?" DGM, Large Enterprise *"We currently have no skilled workers…	but large factories are more vocal about management-level barriers, while medium factories suffer from resource and talent shortage.

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		let's grow the market first." - PM, Medium Enterprise	
Adoption Complexity	AI is perceived as overly complex and disruptive. Even factories that are technologically literate hesitate due to training and workflow overhaul concerns.	*"How can we learn to integrate it? It's not as simple as just installing a new sewing machine."* —-GM, Large Company *"Our lower-level workers may lose their jobs if AI takes over some tasks."* - HR, Medium Company	medium factories fearing job loss and confusion, and large factories struggling with implementation strategy.
Investment Cost & Return on Investment	High costs and unclear ROI make AI investment risky. Factories want external support (buyers/government) before taking such an initiative.	*"An AI system is too expensive and risky without a guaranteed ROI."* — Production Head, Medium Company *"We can't invest millions just to experiment... if the government or BGMEA were to offer grants, we would consider it."* — DGM, Large C	medium enterprises find it financially impossible
Feasibility	Due to the low labor cost and manual efficiency, AI seems unnecessary. Adoption depends on proving feasibility through either ROI or policy support.	We don't see the need for AI since we can operate efficiently with manual systems." – DGM	Medium enterprise hesitant without strong financial justification.
Compatibility	Factories fear AI won't align with existing processes or infrastructure. Resistance stems from fear of disruption and long-standing manual workflows.	*"It needs to fit with our production line, not require us to start from scratch."* — PM, Medium Factory *"We have been working the same way for 15 years; AI means changing everything, and that scares people."*	Medium enterprises face greater fear of disruption, though large factories are also hesitant due to complex legacy systems

Table-1: Factory type, qualitative interviews and key findings according to technological theme (author's work)

Organizational Readiness

Organizational preparedness denotes a company's ability to adjust to new technologies and their corresponding solutions [9, 19]. The organizational context pertains to examining the implications of AI personalization within the framework of the organization. In the table-2, the statements of the interviewees and findings regarding organizational context are shown.

Organizational Theme	Key Findings	Quote Evidence	Scale Based Factory
Organization Size	Larger RMG factories are structurally more capable of exploring AI technologies due to their financial muscle, advanced infrastructure, and access to skilled IT personnel. On the other hand, medium enterprise faces limitations in budget, manpower, and digital systems, making AI adoption appear impractical or financially risky.	"As we are a part of a big group or company, we cannot experiment with AI to take that chance." — *Respondent from a large factory*	Larger factories are better equipped; not all are agile in decision-making. Medium large enterprise, though more flexible, often lack the required resources, contributing to a widening digital divide in AI adoption readiness.

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Leadership Support	Leadership vision is critical but often missing in the RMG sector. Most owners prioritize short-term production and order fulfillment, viewing AI as an unnecessary or futuristic luxury. The absence of a clear digital roadmap impairs strategic planning and discourages investment in AI.	"Our owners are more focused on fulfilling orders and short-term production than on experimenting with AI. However, if buyers demand AI integration, then they might consider it." — *HR Manager from a medium-sized factory* "*To adopt this kind of advanced tool, factory owners or managing directors must be tech-savvy. Only then will progress occur; otherwise, it's just talk with no action*." — *Participant from a large factory*	Medium-sized factories lack leadership push unless driven by buyer pressure. Even large factories struggle with leadership that lacks technological awareness or risk appetite, stalling progress in AI implementation.
Skills and Knowledge	There is a critical skills gap in both technical and managerial levels. IT departments primarily manage routine software (like ERP) but lack expertise in AI, machine learning, or data science. Moreover, no structured training or institutional collaborations exist to upskill employees.	"There is no training program for daily operations, let alone AI-driven training programs." — *HR Officer from a medium company*	This shows that training infrastructure is nearly absent, especially in medium-scale factories, where the readiness to up skill is low. This hinders not just AI adoption, but also operational efficiency through any advanced technology.
Management Policy	Management attitudes are largely risk-averse and skeptical. Many managers worry about job displacement or AI disrupting traditional processes. As a result, they prefer proven ROI before adoption, which delays experimentation and transformation.	"I do not want to bring AI into my factory. What happens to the people who have worked here for the last 15 years? It is a hazardous topic." — *HR Manager at a large factory*	Large factories fear social backlash (e.g., job loss due to automation), while medium factories emphasize financial ROI.

Table-2: Factory scale, qualitative interviews and key findings according to organizational theme (author's work)

Environmental Readiness

The readiness of the environment to assess and comprehend the application of AI personalization involves evaluating industry pressures and governmental regulations [20]. The quotation of the respondents, key findings and factory types are figured in the table-3.

Theme	Key Findings	Quotes Evidence	Factory Types
Buyer Pressure	Buyer Pressure is a critical enabler for AI adoption in the RMG sector of Bangladesh. If international buyers explicitly demand digital transparency, ethics production and operational efficiency through automation or AI systems, industry professionals are far more likely to prioritize such adoption.	*"If international buyers' asked us to use AI in our production and if they think adopting AI in RMG production will ensure overall cost efficiency, then we will may think about this."- Merchandiser Large Factories.*	Large Factories
Market Competitiveness	As the global apparel industry becomes increasingly competitive, especially with countries like Vietnam and India making rapid technological progress, Bangladeshi manufacturers are under pressure to enhance speed, reduce costs, and improve operational flexibility The demand for shorter lead times and leaner operations in the international	*"Earlier, it took us 15 hours to finish a batch using conventional methods. With newer systems, including semi-automated setups, we can complete it in just 8 hours. We are not using AI yet, but our processes are becoming leaner and faster."* — *Sustainability Head, Large Company*	Large Company

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	market is pushing Bangladeshi RMG factories to modernize. While most factories have not yet implemented full-scale AI systems, the shift toward semi-automation indicates a growing awareness of the need for technological upgrades.		
Government Policy	Although national policies promote digitalization and sustainability, they lack specific focus on AI integration in the RMG sector. This policy vacuum delays widespread AI adoption.	*We get support for green building certification and energy audits, but there are no clear guidelines or financial assistance for adopting AI in our operations.*	Large and Medium both
Sustainability	Sustainability is widely prioritized, particularly by large export-focused factories, but the tools used are conventional, not AI-based. There's high potential for AI to advance this.	*"To reduce fabric waste, we've switched to cotton-polyester blends and implemented a solar energy program. Our ETP concept uses a biological system as part of a global sustainability partnership."* These are impactful efforts, yet they depend on traditional technologies.	Large, Medium and small companies

Table-2: Factory type, qualitative interviews and key findings according to environmental theme (author's work)

VI. DISCUSSION

Technological Readiness Assessment

The research suggests that primary technological elements influencing AI adoption in the Ready-Made Garment (RMG) sector in Bangladesh include the lack of available resources, anticipated benefits, internal readiness, complexity of adoption, investment expenses, as well as return on investment (ROI), feasibility, and compatibility. Among these seven elements, unavailability, internal readiness, investment expenses, and return on investment are directly tied to AI adoption in the RMG sector. While factories in Bangladesh have started to use digital tools like CAD software and ERP systems, there are limited AI-specific applications that concentrate on personalization aspects, such as product manufacturing, forecasting, intelligent inventory distribution, and efficiency in the supply chain. At present, Bangladesh is still in an early phase regarding the implementation of AI-driven personalization.

Many professionals in the RMG field are not aware of these tools and lack knowledge about how to apply AI in their manufacturing processes. Currently, the AI functionalities in operation are mostly automated rather than personalized. China has shown a considerable level of technical preparedness in adopting advanced technologies by incorporating AI, Big Data, IoT, and Blockchain. These technologies facilitate improved forecasting, real-time tracking, and supply chain efficiency, which enable swift responses to disruptions in the supply chain. Automation and robotics enhance operational efficiency and help mitigate labor shortages. AI-driven visual inspection systems have been established by Chinese companies like Dongguan Yunji Zhihui Technology Co., Ltd., which automate garment measurements and defect identification. These systems can swiftly and accurately measure dimensions, leading to significant reductions in labor costs and enhanced inspection precision [21,22]. In a similar vein, Zhijing Technology has integrated AI-enabled visual recognition into weaving machines, permitting real-time detection of flaws during the weaving process. This advancement has reduced the sampling timeline from several days to as little as 24 hours while improving product consistency [23]. AI is also reshaping the design process within the RMG sector. Designers are able to create 3D clothing prototypes using platforms such as "Style3D" by selecting and adjusting components from an online database. This method enhances responsiveness to market trends by streamlining the design cycle from weeks to under 30 minutes [24]. In places like Xinjiang, AI and 5G technologies are being employed to monitor and optimize energy usage in textile mills. AI systems track machine performance, predict maintenance requirements, and regulate energy consumption, which improves product quality and minimizes operating costs. Despite the prevalent unfamiliarity with AI in Bangladesh's RMG sector, there is an overall positive perception of its potential, with participants recognizing the anticipated benefits of future AI adoption.

One illustration of AI simplifying the clothing manufacturing process is Feiliu Tech's "SewSmart" system, which not only tracks activities in real-time but also manages an overhead conveyor system that directs clothing components to the designated workstations. Significant challenges continue to exist as the primary obstacles for AI integration in the RMG industry in Bangladesh, including a shortage of skilled labor, inadequate strategic planning, and insufficient financial support. Employees frequently lack

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training in data analytics and machine learning, which are crucial skills needed for implementing and overseeing personalized production. The lack of organizational alignment and development of internal capacity suggests that the RMG sector is not yet equipped for widespread integration of AI. Financial constraints and infrastructural limitations also act as major hindrances to AI adoption. In summary, these findings indicate that while the RMG sector may acknowledge the overarching value of AI, it is currently ill-prepared for the specific demands and strategic alignment necessary for the adoption of AI-driven personalization. The industry remains in its infancy concerning digital automation and is far from being ready for AI without significant external assistance and internal changes.

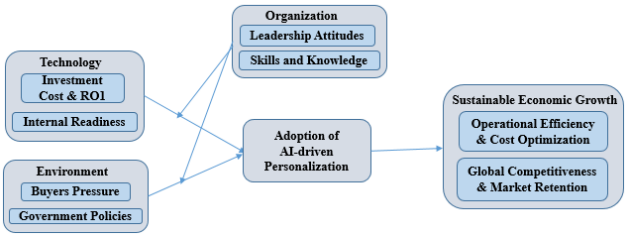


Figure 2: Framework of AI adoption

Organizational Readiness Assessment

The findings of the study show that several organizational factors play a significant role in the adoption of AI within Bangladesh's Ready-Made Garments (RMG) industry. Key factors include the size of the organization, support from leadership, skill levels, and management policies. Collectively, these factors contribute to a fragmented and ill-prepared atmosphere for the implementation of AI technologies. Many participants expressed that the attitudes of leadership and management towards decision-making are a significant obstacle to adopting AI. Existing leadership often lacks a forward-thinking mindset and has difficulty focusing on long-term objectives. Effective leadership is vital for creating a strategic vision for AI-enhanced personalization in the RMG sector. In Bangladesh, there are considerable skill gaps, along with limited training opportunities in Big Data and AI. In contrast, China has invested heavily in upskilling programs to prepare its workforce with the expertise necessary to leverage new technologies, reflecting a robust commitment to organizational transformation [22]. Such investments align human resources with advanced tools to enable efficient operations.

China has introduced the "Made in China 2025" initiative as a strategic approach to enhance manufacturing capabilities through the integration of automation, robotics, and intelligent systems. This initiative underscores the synergy between government initiatives and industry efforts. The execution of Made in China 2025 illustrates how a unified organizational vision and national policies can collectively foster technological advancement [25]. Nonetheless, there is also a lack of innovation and adaptability within the management frameworks of RMG companies. Organizations must develop data-driven structures that allow them to respond effectively to evolving market demands. To maintain competitiveness, companies should actively engage in collaboration and knowledge-sharing. The current situation of Bangladesh's RMG sector suggests that while there is some awareness of AI's possibilities, the organizational infrastructure is inadequate for proper AI implementation. There needs to be a strong commitment to proactive leadership, investment in training initiatives, and comprehensive changes in management approaches; otherwise, the RMG sector in Bangladesh will continue to fall behind in competitiveness on the global stage.

Environmental Readiness Assessment

The readiness of the Ready-Made Garment (RMG) industry in Bangladesh for AI adoption is significantly shaped by external influences, such as buyer expectations, competitive market pressures, sustainability demands, and government initiatives. Among these factors, pressure from buyers emerges as a primary driver. Buyers are increasingly demanding traceability, transparency, and sophisticated technological solutions, moving beyond simple concerns of cost and quality. Although buyers show enthusiasm for the adoption of AI, the majority of factories in Bangladesh are still operating under semi-automated conditions instead of fully embracing AI technologies. Conversely, more developed nations like China and Vietnam have already integrated AI into their garment production processes, while Bangladesh is still grappling with substantial developmental obstacles. This gap underscores the urgent need for AI integration to enhance market competitiveness. Significant barriers are present in the form of deficiencies in governmental policies, resulting in a lack of clear guidelines or incentives for implementing AI. For example, China offers considerable government subsidies, encouragement, and initiatives to foster innovation. In contrast, Bangladesh is in the nascent stages of policy support, with limited financial and legal incentives available for enterprises. The garment sector in China effectively meets global demands for sustainability, customization, and rapid delivery, maintaining its competitive advantage through continuous technological advancements and digitization. Meanwhile, Bangladesh has difficulty keeping up with technological progress and ensuring efficiency in its digital transformation. In terms of sustainability, many initiatives remain isolated from AI, despite their innovative aspects. Initiatives like Effluent Treatment Plants (ETPs) and solar energy projects operate with fundamental automation rather than employing advanced AI technologies. In comparison, China leverages big data analytics, the Internet of Things (IoT), and AI to anticipate demand by analyzing large datasets. This methodology enables more precise evaluations of customer preferences and market requirements, assisting in inventory management, maintaining optimal stock levels, and minimizing waste [26]. The research indicates that the Bangladeshi Ready-Made Garment (RMG) sector is in a transitional phase concerning the adoption of Artificial Intelligence (AI).

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Although there is increasing external pressure, especially from foreign buyers, to implement smarter and more transparent systems, internal capabilities remain limited. Future AI integration is being indirectly driven by buyer-related objectives focused on sustainability and compliance enhancement. Nevertheless, the actual execution of AI technology is obstructed by organizational issues such as a shortage of skilled personnel, inadequate infrastructure, and deficiencies in government policies. This suggests that the RMG sector is at a foundational level for AI adoption, yet not fully equipped for complete integration. However, the favorable attitudes of key stakeholders, ongoing sustainability initiatives, and growing collaboration with buyers create a hopeful climate for AI adoption, provided there is sufficient backing through policies, training, and investment. The structure for adopting AI within the Bangladesh RMG sector is illustrated in Figure-2.

Impact Analysis

Impact on RMG's Business Performance and growth:

It is anticipated that the adoption of AI in business will grow swiftly in the coming years. Studies suggest that by 2025, the global AI market is projected to reach $190.61 billion, underscoring the essential role of AI in driving innovation and business growth [27]. Various functions and processes strongly advocate for the use of AI in Bangladesh's apparel and RMG sector. Table 1 illustrates the applications of AI within the Ready-Made-Garment (RMG) industry. It is widely recognized that the RMG industry in Bangladesh serves as the primary and most significant source of the country's export earnings. The integration of Artificial Intelligence (AI) technology can assist the Bangladeshi RMG sector in achieving its objectives of heightened efficiency and technological advancement. We are proud to have secured our status as the world's second-largest apparel producer. This industry has played a vital role in our nation's economic progress and has been immensely beneficial to us [28]. Technological advancements and innovations such as blockchain, IoT, Big Data, and Artificial Intelligence (AI) are expected to further propel the development of this sector [29, 30]. Although the growth of Bangladesh's RMG sector has contributed to economic advancement, it has also introduced new challenges concerning management, operational efficiency, and worker safety. To address these concerns, the Smart Worker Tracking and Monitoring System (SWTMS) was developed. This system employs advanced AI and computer vision technologies to enhance worker safety and streamline processes [30].

V. Conclusions

This study focused on examining the adoption and effects of AI-driven personalization in Bangladesh's Ready-Made Garments (RMG) industry, emphasizing the sector's preparedness and the perceived impacts of such measures. Insights gathered from industry experts indicated that the incorporation of AI in Bangladesh's RMG sector is still in its infancy, with exploratory implementation significantly hindered by various challenges, including inadequate technological infrastructure, a lack of skilled workforce, expensive implementation costs, and reluctance to embrace change. However, the results suggested that firms collaborating with foreign clients or involved in export-driven markets exhibit a heightened interest in AI-driven approaches. Conversely, numerous local companies predominantly rely on manual processes and are doubtful about digital transformation, as it does not guarantee a return on investment. The majority of firms' lack of essential preparedness indicates that AI personalization is not yet entirely suitable for widespread implementation within the sector. To address these existing deficiencies and help Bangladesh maintain its status as a leader in garment production, it is vital to bolster government assistance, digital training initiatives, grassroots educational efforts, and broader industry awareness. The application area and benefits of AI tools in business sector are compiled in the table-4. The small sample size and qualitative nature of this research limited its ability to capture the complete range of viewpoints within the RMG industry. Future studies should utilize larger and more varied data sets, and the inclusion of quantitative methods could help validate findings on a broader scale. Furthermore, subsequent research could explore AI adoption in comparable industries for comparative insights and to identify best practices relevant to the RMG sector. In conclusion, while AI-driven personalization presents exciting possibilities, its successful integration into Bangladesh's RMG sector will necessitate long-term strategic planning, investment in workforce development, and collaborative policy initiatives. The path toward digital transformation must commence at the foundational level, ensuring that businesses recognize the advantages of AI and are prepared to implement it effectively.

AI Tool/ Technology	Application Area	Benefits
Demand forecasting AI tools	Production and inventory management	Avoid overproduction, reduce waste, and align with just-in-time manufacturing principles
Resource optimization AI	Sustainable manufacturing (fabric layout, energy, water usage)	Minimize waste, reduce environmental impact, and appeal to eco-conscious buyers
Consumer behavior analysis	Product design and marketing	Identify trends, tailor products to market demands, and boost customer satisfaction.
AI-driven sensors	Factory safety monitoring	Detect hazards, ensure swift preventive actions
Wearable AI devices	Worker health and performance monitoring	Improve workplace safety, increase productivity, and protect workers

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AI-powered real-time monitoring systems	Factory operations and equipment maintenance.	Predict equipment failures, reduce downtime, and ensure uninterrupted production.
AI-driven robotics	Fabric-cutting, stitching, and packaging.	Reduce labor time and cost, minimize human error, and improve product quality.
Image recognition systems	Quality inspection (stitching, color, patterns)	Detect flaws precisely, ensure only high-quality products reach buyers, and protect brand reputation.
AI-powered analytics	Supply chain management and inventory forecasting	Predict disruptions, recommend alternative suppliers, and manage inventory efficiently

Table 4: Potential areas of AI application in the RMG sector, Source: The Daily Star, Compiled by authors

REFERENCES

[1] R. Heymen, "Fashion brands use AI & Big Data for hyper-personalization," *TexSPACE Today*, Feb. 11, 2025. [Online]. Available: https://www.texspacetoday.com

[2] M. Soori, B. Arezoo, and R. Dastres, "Artificial intelligence, machine learning, and deep learning in advanced robotics: A review," *Cognit. Robot.*, vol. 3, pp. 54–70, 2023.

[3] Mia and Akter, "Ready-made garments sector of Bangladesh: Its growth, contribution and challenges," [Online]. Available: https://www.researchgate.net/publication/336851265

[4] M. S. Sarker, F. S. Khan, and S. L. Roon, "The impact of artificial intelligence (AI) on business operations in Bangladesh," *Int. J. Innov. Sci. Res. Technol.*, pp. 36–41, 2024. [Online]. Available: https://doi.org/10.38124/ijisrt/ijisrt24sep140

[5] Aparna, "Bangladesh's garment industry embraces AI, raising concerns of job loss," *EasternEye*, Nov. 14, 2024. [Online]. Available: https://www.easterneye.biz

[6] L. M. Davila-Zamora, "Artificial intelligence adoption in emerging economies: Challenges, opportunities, and strategies for Peru's business transformation," 2024.

[7] M. A. Khan and M. T. Islam, "Artificial intelligence adoption in emerging economies: Opportunities and barriers in Bangladesh's industrial sectors," *J. Technol. Innov. Dev.*, vol. 12, no. 1, pp. 45–60, 2023. [Online]. Available: https://doi.org/10.1234/jtid.2023.0012

[8] L. Tornatzky and M. Fleischer, *The Process of Technology Innovation*. Lexington, MA, USA: Lexington Books, 1990.

[9] A. Ahmi, S. Z. Saidin, and A. Abdullah, "IT adoption by internal auditors in public sector: A conceptual study," *Procedia Soc. Behav. Sci.*, vol. 164, pp. 591–599, 2014. [Online]. Available: https://doi.org/10.1016/j.sbspro.2014.11.151

[10] E. G. Siew, K. Rosli, and P. H. Yeow, "Organizational and environmental influences in the adoption of computer-assisted audit tools and techniques (CAATTs) by audit firms in Malaysia," *Int. J. Accounting Inf. Syst.*, vol. 36, p. 100445, 2020. [Online]. Available: https://doi.org/10.1016/j.accinf.2019.100445

[11] N. Kumar and N. S. Siddharthan, "Technology, firm size and export behaviour in developing countries: The case of Indian enterprises," *J. Dev. Stud.*, vol. 31, no. 2, pp. 289–309, 1994. [Online]. Available: https://doi.org/10.1080/00220389408422362

[12] Y. Rashid, A. Rashid, M. A. Warraich, S. S. Sabir, and A. Waseem, "Case study method: A step-by-step guide for business researchers," *Int. J. Qual. Methods*, vol. 18, 2019. [Online]. Available: https://doi.org/10.1177/1609406919862424

[13] K. M. A. Islam, M. B. Amin, M. F. Bari, *et al.*, "Advancing sustainability: A comprehensive review of green technology innovations and their environmental impact," *J. Infrastruct. Policy Dev.*, vol. 8, no. 15, p. 9481, 2024. [Online]. Available: https://doi.org/10.24294/jipd9481

[14] Bangladesh Textile Today Desk, "BGMEA president emphasizes using AI to boost garment industry growth," *Bangladesh Textile Today*, Dec. 26, 2023. [Online]. Available: https://www.textiletoday.com.bd

[15] M. M. Rahman and S. Akter, "Role of career counseling in shaping career choices of university students in Bangladesh," *J. Educ. Pract.*, vol. 10, no. 5, pp. 50–59, 2019.

[16] K. M. Eisenhardt, "Building theory from case study research," *Acad. Manage. Rev.*, vol. 14, no. 4, pp. 532–550, 1989.

[17] J. Seawright and J. Gerring, "Case selection techniques in case study research: A menu of qualitative and quantitative options," *Political Res. Quart.*, vol. 61, no. 2, pp. 294–308, 2008.

[18] S. Salman, S. Hasanat, R. Rahman, and M. Moon, "Analyzing the key barriers to adopting Industry 4.0 in Bangladesh's ready-made garment industry: An emerging economy example," *Int. J. Ind. Eng. Oper. Manage.*, vol. 6, no. 3, pp. 232–255, 2024.

[19] S. Chatterjee, P. N. Rana, K. Mikalef, and A. Sharma, "Assessing organizational users' intentions and behavior to AI-integrated CRM systems: A meta-UTAUT approach," *Inf. Syst. Front.*, 2021. [Online]. Available: https://doi.org/10.1007/s10796-021-10181-1

[20] S. Huang, B. Wang, X. Li, P. Zheng, D. Mourtzis, and L. Wang, "Industry 5.0 and society 5.0—Comparison, complementation and co-evolution," *J. Manuf. Syst.*, vol. 64, pp. 424–428, 2022. [Online]. Available: https://doi.org/10.1016/j.jmsy.2022.07.010

[21] M. M. Hasan, M. Kasedullah, M. B. B. Ripon, and M. M. H. Khan, "AI-driven quality control in manufacturing and construction: Enhancing precision and reducing human error," *Appl. IT Eng.*, vol. 3, no. 1, pp. 1–10, 2025.

[22] M. Rafid, R. Avi, T. B. Mostafa, and R. Wasi, "Harnessing Big Data and AI for supply chain resilience in the garments industry: A comparative analysis of Bangladesh and China," in *Proc. 7th IEOM Bangladesh Int. Conf. Ind. Eng. Oper. Manage.*, Dec. 2024. [Online]. Available: https://doi.org/10.46254/BA07.20240228

[23] Holly, "China's manufacturing sector revs up with AI-empowered innovation," *GD Today*. [Online]. Available: https://www.newsgd.com/node_1299786306/90a04083ab.shtml

[24] P. Daily, "Digital technologies open up new prospects for textile industry in China's eastern city," *News Daily*, Jul. 7, 2023. [Online]. Available: https://www.prnewswire.com

[25] Global Times, "China unveils 5-year plan for robotics, smart manufacturing amid global race," *Global Times*, Dec. 2021. [Online]. Available: https://www.globaltimes.cn/page/202112/1243614.shtml

[26] O. Çaylı and Z. Oralhan, "Artificial intelligence-driven inventory management: Optimizing stock levels and reducing costs through advanced machine learning techniques," *Eur. J. Res. Dev.*, vol. 4, no. 4, pp. 427–439, 2024.

ISBN 978-984-35-5270-9 *https://icebtm.iub.edu.bd*

[27] J. S. Calle García, A. S. Sotaminga Andi, G. N. Garay Arias, and R. R. Villavicencio Tuares, "Inteligencia artificial y su contribución a la innovación en las empresas," *Ciencia y Desarrollo*, vol. 27, no. 2, p. 245, 2024. [Online]. Available: https://doi.org/10.21503/cyd.v27i2.2618

[28] H. Saha, "Artificial intelligence in the ready-made garments industry of Bangladesh: Practices and challenges," *Int. J. Fundam. Multidiscip. Res.*, vol. 6, no. 5, 2024. [Online]. Available: http://www.ijfmr.com

[29] T. Rahuman, J. Singh, and A. N. Roes, "Exploring the importance of big data for exporters in Bangladesh's ready-made garments sector," *Electron. J. Bus. Manage.*, vol. 7, 2022.

[30] A. M. Ansary and U. Barua, "Workplace safety compliance of RMG industry in Bangladesh: Structural assessment of RMG factory buildings," *Int. J. Disaster Risk Reduct.*, vol. 14, pp. 424–437, 2015. [Online]. Available: https://doi.org/10.1016/j.ijdrr.2015.09.008

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