Adoption Barriers to Supply Chain Digitalization: A study on Ready-Made Garment Sector of Bangladesh

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Abstract

This study systematically examines the challenges towards the adoption of digitalization in the Ready-made Garment industry of Bangladesh. Though Ready-Made Garment (RMG) has been a major contributor to the economy of Bangladesh and digitalization in this industry was supposed to ensure significant efficiency & effectiveness, the sector is facing numerous challenges such as Servicing errors, Training challenges for the typical employees, Time barrier for global communication, Reluctance to new technology etc. which are threatening for this industry in the long run. The researchers have employed qualitative research methods, utilizing focus group discussions (FGD) with 8 groups consisting of a group of highly experienced supply chain managers & executives across multiple factories who have experienced the supply chain practices transition from tradition to digitalization. Data was analyzed using thematic analysis with the aid of Atlas.ti software. The study explored key themes such as Error, Training barriers, Time constraints etc. Findings from this study have been triangulated with the secondary data from existing literature to validate the insights. The qualitative nature of the study and small sample size limit generalizability. Additionally, the sizes of the firm & the intensity of the adoption of the digitalization require further exploration. Future research could focus on cross-sectional studies and the integration of other macro-environmental factors to address the real challenges of this sector adopting

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digitalization. The study shares unique findings for the managers and policymakers of RMG industry by identifying significant infrastructural, psychological, and social challenges faced by the users. Support from the govt, Infrastructural investment, Adequate training programs should be taken as initiatives suggested by the experts.

Keywords: Digitalization, Adoption, Challenges, Supply Chain, Strategies, RMG Industry.

1. Introduction

The Ready-Made Garment (RMG) is one of the underpinning sectors of Bangladesh's economy, which has significant contribution in earning nation's GDP and export revenues and creating employment for the ever-growing population of the country. Being the second-largest Ready-Made-Garment exporter globally, the industry is responsible for approximately 84% of the country's total export earnings in 2022 which is around $42.61 billion (Statista, 2026). Besides the sector is the largest source of employment of more than 4 million people, majority of which are women. By creating employment for such vast majority, the sector is playing a pivotal role in alleviating poverty and empowering women (ILO, 2020). Furthermore, as a key player in the global apparel chains the RMG sector has been instrumental in industrialization, driving investments in infrastructure (WTO, 2019).

Technology is progressing rapidly and given the context, digitalization has become a key driver in transforming supply chain operations worldwide (Akter et al., 2020). The Ready-Made Garment sector is the global leader in the apparel manufacturing and adoption of the digital systems on this industry present a unique opportunity to improve efficiency and enhance supply chain resilience by streamlining the operations (Swazan et al., 2022). To meet international standards and to enhance supply chain management, digital tools like Enterprise Resource Planning (ERP) systems, automation, and data analytics are adopted by many manufacturers to improve operational efficiency, and meet international quality standards (BGMEA, 2026).

However, besides posing potential benefits, the RMG sector is burdened with numerous barriers towards digital adoption, calling for further exploration into the impact and challenges of digitalization within its supply chain (Akter et al., 2020).

Moreover, the transition is not without challenges. Inadequate infrastructure, digital skills gap, and high initial investment costs include the major challenges in this transition (World Bank, 2023). Despite this, digitalization is considered extremely crucial for increasing productivity and ensuring sustainability in the global market (WTO, 2019). In FY 2023 the RMG sector has made a significant contribution in the GDP of Bangladesh which is around 10.35 percent of the total GDP (Hasan et al., 2025).

Despite the contribution made, the sector's traditional supply chain management processes are still inefficient and often lack the resilience and agility to meet the diversified and updated demands of global apparel markets (Rahman et al., 2025). The increasing globalization combined with Industry 4.0 technologies presents an ample opportunity to digitally transform the RMG supply chain, enhancing its efficiency, transparency, and resilience (Mim et al., 2024). In other industries digitalized supply chain has found to improve operational performance by reducing lead times, enhancing visibility, and improving decision-making (Bag et al., 2023).

However, the RMG sector in Bangladesh has demonstrated slow learning curve to fully embrace these technological advancements despite these global trends (Tushar, 2021). Though providing substantial solutions the adoption in RMG sector is still uneven, primarily due to infrastructural limitations, high costs, and resistance to change. As a result, despite possessing uncountable potential and efficiency, the adoption of digital technologies has raised concerns about their efficiency and acceptance. Understanding the barriers to digitalization in the RMG sector is vital to determine how these digitalized supply chains can be successfully implemented to improve efficiency while confronting potential challenges.

This study examines the efficiency of digitalization in the supply chain of the RMG sector, with a specific focus on finding the barriers against successful implementation. A comprehensive understanding of these barriers will provide actionable insights for the supply chain managers, industry stakeholders, policymakers, government and regulatory bodies. Moreover, the study aims to find out the strategic implications of the digitalization which eventually will help to identify strategies to overcome these barriers and will ensure more efficient, transparent, and sustainable supply chain practices in the RMG sector. Though there has been an increasing body of research on digitalization in the global supply chain management only few studies are available examining the unique challenges

faced by the RMG companies of Bangladesh. Existing literatures are found to overlook the practical strategies needed to overcome the barriers towards digital adoption in the RMG sector (Rahman et al., 2025).

This study goals to fill this gap by examining the current challenges in operational efficiency of digitalization in the RMG sector and identifying strategies to maximize the outcomes of digital transformation. The overall goal of this research is to investigate the challenges towards digitalization in improving the effectiveness of supply chain operations in Bangladesh's RMG sector. The primary objectives are:

1. To Identify challenges to digitalization adoption in the RMG supply chain towards operational efficiency.
2. To Explore strategies for leveraging digitalization to enhance supply chain resilience in the RMG sector.

Further it seeks to explore the following research questions:

RQ 1. What are the major challenges towards digitalization adoption in the RMG supply chain?

RQ 2. What strategies can RMG companies implement to overcome these barriers and maximize the benefits of digitalization?

The rest of the paper represents a comprehensive literature review on digitalization and adoption barriers in RMG contexts which strengthens the theoretical foundation. Then the methodology section describes the research design, sampling detail, data collection procedures, and data analysis techniques. The subsequent sections include the discussion of the findings followed by recommendations, limitations, and directions for future research integrating the challenges and resolution strategies towards supply chain digitalization in the RMG sector of Bangladesh.

2. Literature Review

Digitalization in supply chain management refers to the process of transforming traditional manual supply chain tasks into automated data driven applications with the use of advanced digital technologies, for example Artificial Intelligence (AI), the Internet of Things (IoT), blockchain, and cloud computing—to optimize supply chain functions. These digital tools are implemented to improve visibility,

coordination, automation, and real-time decision-making across all users engaged in the total supply chain (Büyüközkan & Göçer, 2018). Digitalization also enables predictive maintenance, demand forecasting, inventory optimization, and end-to-end traceability, all which bolster enhanced operational efficiency (Wamba et al., 2017).

Digital transformation has become a pivotal enabler in increasing supply chain resilience and agility in the events of global crises such as COVID-19, Ukraine-Russia war (World Economic Forum, 2021). While developed nations already have swiftly integrated such technologies with their existing supply chain framework, many developing economies, including Bangladesh, still face infrastructural, financial, and capability-related constraints that impede the full-scale adoption of digital supply chain models. With the employment of more than four million workers and 80% contribution to the country's total GDP, the ready-made garments sector has emerged as the biggest export industry (BGMEA, 2026). This robust export-oriented sector's supply chain is comparatively involved in traditional manual operation. Traditional practices such as manual record-keeping and lack of coordination between stakeholders results in supply chain inefficiencies such as deli delay and limited traceability (Hasan et al., 2022). To keep up with global standards and expectations for transparency and speed, the implementation of digital tools in the RMG supply chain such as ERP systems, RFID tagging, and cloud-based logistics platforms is becoming increasingly important (Husain et al., 2026). However, integration remains challenging due to barriers discussed below.

First, lack of adequate digital infrastructure is one of the primary barriers to digitalization in the RMG sector. Many suppliers lack the necessary IT infrastructure, up-to-date machinery, reliable internet connectivity, and digital platforms to support end-to-end automation (United Nations ESCAP, 2021). Small and medium-sized enterprises (SMEs) are especially vulnerable due to their limited access to capital and outdated equipment (Clohessy et al., 2017). Additionally, onboarding digital systems require significant investment in technology, training, and integration. However, most RMG businesses operate on tight profit margins and lack long-term financing options for technological upgrades (Hosain, 2025). The feasibility of such investment and the uncertainty of return from such investment deters owners from allocating resources to digital transformation (Kumar et al., 2020).

Furthermore, Digital illiteracy among the RMG workforce poses another critical challenge. Workers, especially assigned to the factory floor, often have lowest exposure to digital tools, leaving them ill-equipped to adopt new systems (Rahman et al., 2025). Additionally, training opportunities are low and existing management may resist adoption due to the fear of disrupting established workflows or incurring short-term losses (Dwivedi et al., 2021).

One of the repeated issues in the RMG sector is the resistance of the organization to change. The less involvement of the employees in decision-making and fear of job losses because of automation increases towards resistance (Botha et al., 2020). For maximizing the success of digital transformation, it requires efficient management strategies and strong leadership support which is absent in most of the firms (Moeuf et al., 2018). Cybersecurity has become an important concern as the organizations are undertaking cloud-based platforms and digital monitoring systems. Majority of the garment factories lack proper data protection policies, which make them vulnerable to cyber threats (GlobalData, 2024). Digital integration is discouraged because of the concern about privacy of the supplier information and employee data (Panetto et al., 2019).

While there is a growing body of research on digitalization in global supply chain management, few studies specifically examine the unique challenges and opportunities faced by the RMG sector. Existing research often overlooks the practical strategies needed to overcome barriers to digital adoption in this context (Khan et al., 2024). This study seeks to fill this gap by evaluating the current challenges of digitalization in the RMG supply chain & operational efficiency and identifying strategies to facilitate digital transformation.

3. Theoretical Framework

The study has adopted Technology–Organization–Environment (TOE) framework, Institutional Theory, and the Resource-Based View (RBV) to investigate the barriers to the adoption of digitalization in the supply chain of Bangladesh's Ready-Made Garment (RMG) sector. Proposed by Tornatzky and Fleischer (1990), TOE is an important framework for recognizing the benefits of technology, organization and environment which contributes to the adoption of digitalization and complexities of the systems, market pressures etc. According to Zhu et al. (2006) TOE framework is significantly relevant to understand how digital adoption

in RMG supply chains is facilitated or hindered by the interaction of the contextual factors.

Though TOE explains how the contextual factors surround adoption, it hardly explains why many of the RMG firms adopt digitalization despite conservative internal preparation. Here comes Institutional Theory developed by DiMaggio and Powell (1983), which explains that organizations are more influenced by social and cultural norms, rather than efficiency.

The theory addresses the gap and explains how the coercive pressures from the regulatory bodies and buyers around the world, normative expectations from the industry alignments, mimetic pressures from the peer firms stimulate the RMG firms to adopt digital technologies.

Finally, Resource-Based View (Barney 1991), helps to explain how the diversities among the firms regarding digital infrastructure, skilled human capital and managerial excellence determine the extensity of the digitalization and operational efficiency in the organization. The integration of these three theories explains that digitalization in the supply chain of RMG is challenged by external pressures of the institution, conditions of the contextual adoption and resource constraints resulting in the gap between expected and actual benefits of the digital transformation.

4. Methodology

To examine the barriers towards the adoption of the digitalization in the Ready-Made-Garment sector's supply chain of Bangladesh we have undertaken qualitative exploratory research design. As the barriers of the RMG sector is contextual and subject to perception qualitative study is the effective method to capture various perspectives of different stakeholders. Focus Group Discussions (FGDs) have been instrumented as primary data collection method where the researchers endured that the participants express their diversified experiences in an interactive setting. To select participants for the focus group discussions the study has adopted purposive sampling and selected the participants who are the direct users and beneficiaries of the digitalization system. As noted by Michael Q. Patton (2002), purposive sampling is widely used in qualitative and mixed-methods research to identify cases that provide deep understanding rather than broad generalizability. We have conducted eight FGD's, each consisting of 8-10

participants. All the groups are segmented purposefully for role-specific insights are to be endured. Additionally, the participants and the representatives from the relevant regulatory bodies are selected in such a manner that key stakeholders got selected and their experience could be integrated to understand the transition of the supply chain from analog to digital. To capture diversified professionals the study has used industry associations like Bangladesh Garment Manufacturers and Exporters Association, Bangladesh Knitwear Manufacturers & Exporters Association, LinkedIn and other professional forums.

FGD's are conducted via online platforms like Zoom, Microsoft Teams, Google Meet etc. emphasizing the preferences of the participants. Approximately 60-90 minutes each session lasted. The FGD's were conducted with the help of a semi-structured discussion guide around the following key thematic areas:

- Awareness and understanding of supply chain digitalization.
- Challenges faced by the users in the adoption.
- Suggestions for overcoming barriers.

The data was analyzed using thematic analysis with the aid of Atlas.ti software. Data analysis has gone through Transcription, Initial Coding, Refining Codes, Theme Development and Interpretation stages. The themes are developed according to the existing literature focusing on the challenges of the digital adoption and recommendation for managing the barriers in the RMG sector.

4.1 Ethical Considerations and Informed Consent

The study has maintained all ethical codes of conduct required for qualitative research. Before starting the interview, the objectives of the interview were clarified to the participants. Besides, consent was ensured from all the participants prior to their participation. No personal information and identity was collected to ensure confidentiality and all responses were anonymized during transcription and analysis. As the RMG sector is commercially sensitive the identities of the organization were protected carefully. The study has ensured no risk to the participants and excluded the vulnerable populations.

4.2 Data Transcription Procedures

As the FGDs were conducted online all the interviews were audio recorded with the permission of the participants. The recordings were then transcribed verbatim so that accuracy and completeness of the data is ensured. Where appropriate all the

non-verbal expressions like pauses, emphasis was carefully noted. Before coding all the transcripts were cross-checked against the original recordings and inconsistencies were adjusted when necessary. To ensure privacy and careful handling all the records are stored in highest secured manner which are accessed only by the authors of the study.

4.3 Coding and Thematic Analysis Process

Following the established guidelines of the qualitative research the study has used a systematic thematic analysis approach. The researchers have employed Atlas ti software to generate the codes and to facilitate transparency and consistency in the management of data. Major themes and subthemes related to the digitalization barriers and recommendations were identified and grouped into higher-order categories. Emerging themes were continuously compared rigorously with the existing literature to ensure analytical rigor and theoretical relevance.

4.4 Coding Reliability and Data Saturation

The coding was generated independently by more than one author to ensure analytical credibility. Authors then compared the independent coding outcomes and discussed the dissimilarities to reach the consensus. Original transcripts were used to resolve any discrepancies so that interpretive alignment is ensured and individual bias is removed. When no unique and substantial new themes or insights were deriving from the successive FGDs the study considered the saturation of the data which indicates sufficient depth and coverage of the research. Besides this the diversity among the participants across the industry and their diversified roles further supported the saturation of the data by integrating perspectives from different institutional and functional levels within the RMG supply chain.

5. Data Analysis & Discussion

This section represents the findings of the data through thematic analysis collected via Focus Group Interviews. The study aims to explore the fundamental challenges behind the digitalization experienced by the users, and management and strategic solutions recommended by them. Four major themes and their corresponding sub-themes have emerged through a rigorous coding process. To highlight the practical realities and innovative strategies the narratives of the participant are presented as descriptive quotations. To ensure comprehensive multi-level challenges of the digitalization process in the supply chain of the RMG sector, the FGDs were

carefully designed with diverse demographic composition. To capture the diversified experiences and perceptions in different layers participants were chosen from multiple job roles including technical, operational, managerial and procurement positions. Besides identifying the differences in the generations in adoption and resistance to the digital tools, the study has incorporated individuals with various lengths of experience (from 3 to over 20 years).

Contextual diversity and reflection of the realities of different production settings and operational scales are ensured through the inclusion of both export-oriented and subcontracting factories across major RMG hubs (Dhaka, Narayanganj, and Chittagong, Gazipur). Furthermore, to assess how digital literacy and technical training influences user's ability to adopt the digital tools, different educational backgrounders (from secondary school to post-graduate) are included.

The following pie chart shows the distribution of participants among the eight Focus Group Discussion (FGD) groups. Around 30% of the total participants belong to the production and compliance roles which indicates the operational and regulatory engagement in the digitalization barriers. Critical challenges of the digitalization and related strategies are revealed from the thematic analysis.

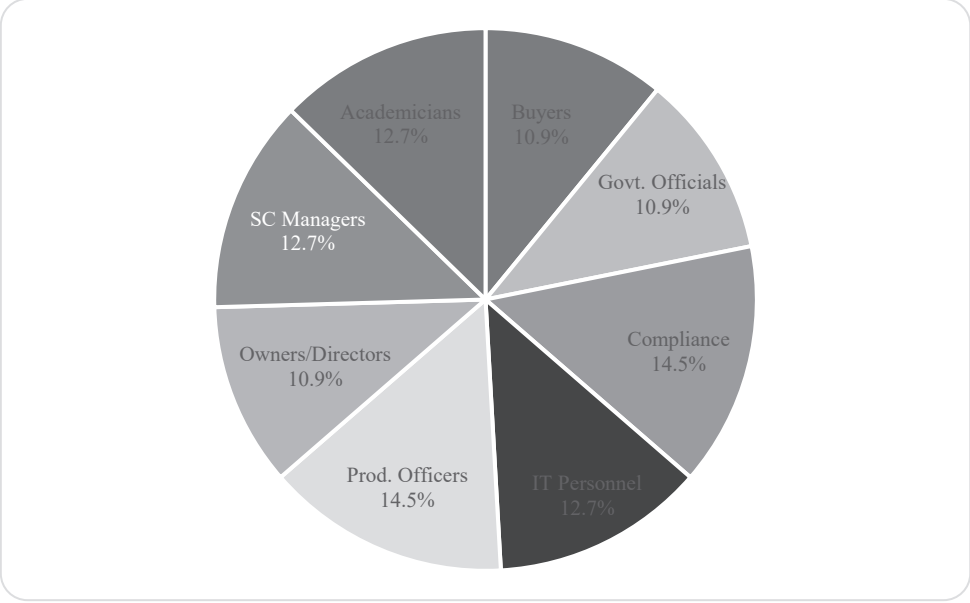


Figure 1: Distribution of the categories of the participants

5.1 Theme One: Challenges Faced by Users

The participants have expressed that there lie substantial resistance and operational hurdles in the transition of digital systems. The fundamental challenges faced by the user are:

a. Complex Interfaces

The employees, especially those who are oriented with the traditional manual system, ERP systems and IOT dashboards, are perceived to be extremely technical, which led them to the frustration and lengthy adoption periods for many of the users.

> *"Most of us are not from an IT background and you have to be familiar with the system to use this properly. The layout seems to be very complicated and difficult to use."*

b. Language and Familiarity Barriers

Most of the digital systems and software are imported and non-localized, having no multilingual options which poses challenges for the employees to get familiarized with the tools and to operate. A substantial number of respondents have expressed that due to the unfamiliarity with the systems even the basic tasks need extended support prolonging the time.

> *"Almost all the instructions are written in technical language which are not as similar as operating the smart phone. It seems like only the engineers can sort them out not the factory staff."*

c. Initial Errors and Resistance

During the implementation phase the users have faced frequent errors due to the lack of clear operational guidelines. The problem has led to the resistance with most of the users to prefer the traditional process to avoid the complexity of the new tools.

> *"In the first few days there were frequent blunders- missing data, wrong entries etc. Most of the senior and aged staff were hesitant saying this is not their job, we can't do this no matter if we must leave the job!"*

d. Adoption Delays

The participants have revealed that the users have shown a slow learning curve which was responsible for the delay of the operationalization of the digital systems especially in the peak production periods when quick adjustments were crucial.

> *"The company wants us to learn the new systems along with the management of the regular targets. There is no dedicated time for learning that's why either we have fallen behind or we couldn't learn properly."*

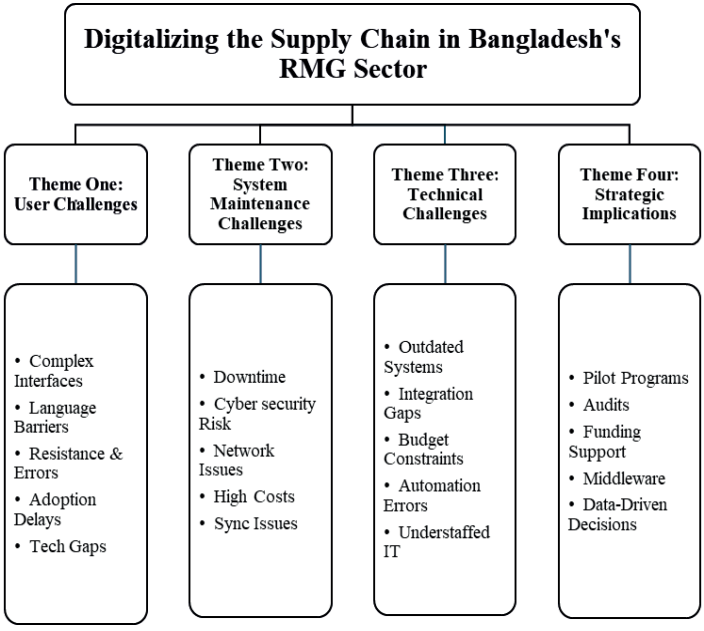


Figure 2: Thematic representation of the barriers and solutions of digitalization in the RMG sector. Themes are developed from the data analysis by Atlas ti.

e. Technological Implementation Gaps

Most of the firms have no structured plans for introducing the digital tools which results in uneven adoption rates and gap in the system effectiveness.

> *"In many times we need the features in the system it doesn't offer. Company has implemented new system but there was no follow up whether our daily agendas fit into this new structure or not. We then adjusted manually."*

5.2 Theme Two: System Maintenance Challenges

In the cornerstone of the supply chain of RMG, system maintenance is found to be one of the most significant. This theme reveals the structural and technical limitations of the digital systems which frequently interrupt the operational efficiency and reduce confidence among the users. The key subthemes that emerged are:

a. Frequent Downtime

Machines and technical systems need monthly update which often takes prolonged time and causes temporary suspension in operations from hours to days. Participants expressed how the downtime in the system disrupts the schedules of different agendas and reduces the agility of supply chain.

> *"It happens frequently that the server gets down suddenly. Just when we are becoming familiar with the system it crashes and we can't help returning to the manual logs to continue the task."*

b. Cybersecurity Risks

In digital world cyber security has become one of the major concerns. In many organizations, the security measures are weak, making the systems vulnerable to the data hacking. Users have shared their concerns about the threat of hacking sensitive personal and operational data which ultimately compromises competitive advantage.

> *"We've hardly had any training on the secured management of data. The users have no personalized user's login, it feels risky especially when external parties are involved."*

c. Network and Power Issues

With the current energy and fuel crisis, frequent power outages have become a common phenomenon with limited internet bandwidth. Most of the RMG factories are in the sub-urban and rural areas and their dependency on the local system and infrastructure increases these challenges.

> *"In Narayanganj, power cuts occur frequently. For the fuel issues, there is limited back up of the generators most of the time. We must wait for hours to restart the work or have to stop working for that day."*

d. High Maintenance Costs

To maintain the cloud storage systems the factories have expressed the measure as one of the financial burdens for the organization especially for the small and mid-sized companies focusing on very tight budgets.

> *"When it's time to update the system, most of the time company gives the excuse of the budget and skips the process. We can't help continuing with the outdated version. So, why not our productivity will be decreased?"*

e. Synchronization Issues

To integrate the digital tools used in production, logistics and inventory management the various challenges occur creating in-efficiencies in real-time decision-making.

> *"The update from the production side doesn't always show up on the other sides and we had to double-check always which wastes our time mostly."*

5.3 Theme Three: Technical Challenges

Theme three has highlighted the technical challenges faced by the users of the digitalization process in the RMG sector. The theme has revealed significant sub-themes reflecting the internal limitations, infrastructural complexities, poor budgets and integration and under-resourced IT teams.

a. Outdated Systems

Most of the factories operate with hardware and software which are brought in very significant past times and are now incompatible with the modern ERP systems. These systems require either extensive upgrades or immediate replacement.

> *"The computers and windows we are using are at least ten-years old and the latest software are not functioning on these systems."*

b. Integration Gaps

There is limited visibility across the supply chain and both the production and logistics systems often failed to integrate seamlessly.

> *"The warehouse team has one system to operate, and the order processing has another. So, we must update the system manually. It would be easier for us if all the systems were related to one login, one interface. But now the whole system is scattered."*

c. Budget Constraints

The small and mid-sized manufacturers struggle with the high cost of installing the new systems, training the staff and maintaining the updated systems. The department and the staff convey the quotas on regular basis, but the budget goes to the machinery only.

> *"Every time when we ask for the system upgradation, they either reject saying 'not urgent', next year' or delay the process."*

d. Frequent Errors in Automation

The participants have mentioned that the inaccuracies occurred in automated calculations frequently. To fix the problem, manual intervention is applied which undermines confidence in digital tools.

> *"Automation messed up with the sequence frequently especially at the time of materials arrival."*

e. Understaffed IT Departments

In the RMG factories there is a significant lack of skilled IT professionals. To fix minor technical issues it takes extensive periods which delays further operations.

> *"The company want us to fix errors by ourselves because the IT team is too small to handle all the requirements of the whole factory. Most of the time we're stuck if the only IT technician is on leave."*

5.4 Theme Four: Strategic Implications

We have asked for the clear expectations from the beneficiaries regarding the fruitful implementation of the digitalization. Theme four highlights the strategic implications for ensuring strategic management and sustainability. The below-mentioned subthemes reflect the recommendations from the real users based on the grounded realities.

a. Pilot Programs

The users have recommended small-scale pilot programs strongly before installing the new systems company-wide. In this phased approach they want the technical teams to fix glitches and help the users to adapt to the new system gradually.

> *"The company should test the software in one or two units first then upon the feedback should fix the issues by rolling it out step-by-step."*

b. Periodic Audits

By conducting the periodic audits, the regular performance and the usage of digital systems can be better expressed by the participants. Not just the technical performance but rather the user compliance should be emphasized by these audits to replace the manual override unnecessarily.

> *"After the installation, the audit team should check whether we can use it or not. It can point out where the process is going wrong and where the users are still avoiding the system."*

c. Middleware Solutions

The users have suggested using middleware solutions to connect the scattered systems from a practical standpoint. From their direct experiences of transferring data manually between incompatible platforms the suggestion of middleware solutions has derived.

> *"Doing double entry on two different platforms, middleware is better solutions."*

d. Data-Driven Decision Making

A transition toward data-informed operational and planning decisions is suggested by the mid-level managers and workers. To reduce the guesswork and other inefficiencies they have expressed a desire to use system-generated data more actively.

> *"The managers should check the daily reports and real-time status to avoid delays."*

e. Funding Support

As financial and budget issues have become one of the major concerns for the companies the participants have expressed that the fruit of digitalization cannot be fully consumed without financial support hence asking for the company-level budget allocation, government, donor's involvement to support hardware and software installation and maintenance and user training.

> *"The government or buyers should help fund this because we are doing this to meet their demands too."*

The discussed suggestions highlight the future of digitalization among the users through their strong sense of ownership and insights. Their experiences reflect and emphasize that digitalization must be collaborative and supported by both the internal and external stakeholders. The users of the digital tools are not the passive stakeholders but active contributors who can guide the organization towards more realistic and grounded digital strategies in the supply chain of the RMG.

5.5 Implications

With the help of Atlas ti, the authors have created word cloud to align the broader concepts of digitalization in supply chain with the themes extracted. The following figure RMG Concepts Cloud reflects the concurring words like "System", "challenge," "staffing," and "training" which depicts the interconnected the relationship between human nature, technology and operational challenges of digitalization.

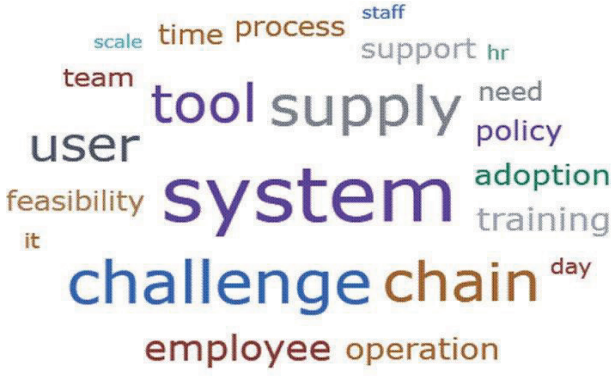
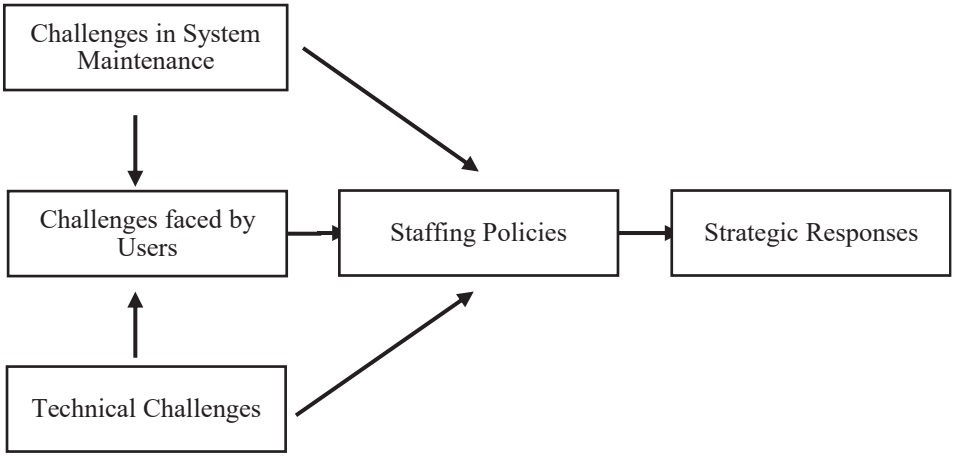


Figure 3: RMG Concept Cloud. (Source: Atlas ti)

Following figure reflects the final analysis and overall findings of the study. The interconnection between system maintenance, user challenges, technical challenges, staffing policies and strategic responses is summarized in this diagram. It reveals how working on the reliability of the system and resistance of the user can enhance the staffing policies to drive digital transformation successfully across the supply chain. In each stage, the system maintenance challenges and the technical challenges are associated with the challenges faced by the users which eventually influence the staffing policies of the organization leading to the requirement of strategic responses to be made in the RMG industry.

The diagram represents the conceptual representation of the interconnected relationships between User, System & Technical challenges. The map also demonstrates how these multiple challenges influence the staffing policies and decision making of the organization. The findings of this study have strong alignment with the proposed theories in the theoretical framework. Significant gap in the infrastructure, shortages in skill, financial constraints and weak policy from the TOE framework align with limited technological readiness, organization's resistance and inefficient environmental enablers. If see through the lens of RBV strategic resources like digital infrastructure, financial capacity, skilled human capital is needed to transform the digitalization process into a source of sustainable competitive advantage. At the same time, coercive pressures from

Figure 4: Final Analysis. (Source: Atlas ti)



international buyers demanding compliance and traceability, normative resistance between workers and managers for manual systems, and institutional voids caused by inadequate government support and fragmented policies support institutional theory strongly. The integration of these insights suggests that though digitalization in the RMG sector of Bangladesh provides efficiency and market competitiveness it needs to be upgraded technologically at the firm level.

Besides, strong institutional alignment at the sectoral and policy level needs to be ensured for capacity-building in the RMG supply chain.

6. Discussion of the Findings

The study shares unique findings providing significant insights into the barriers and implications of digitalization in the RMG supply chain of Bangladesh with positioning these findings within the broader body of existing literature. The study reveals that technological and organizational barriers significantly hinder the adoption of digital supply chain practices which are consistent with prior studies. Like the arguments presented by Michael Q. Patton (2002) and John W. Creswell (2018) regarding context-specific inquiry, this study confirms that these barriers are not uniform but deeply rooted in local industrial realities. Keeping consistency with the existing literature, high implementation costs, lack of skilled workforce, and resistance to change issues remain significant challenges. Still, this study compliments the literature by adding that the challenges are more acute in developing countries' contexts. Unlike many studies conducted in developed economies, this research reveals that efficiency in the RMG sector of Bangladesh is often constrained by infrastructural limitations and limited digital readiness.

Furthermore, the study contributes to the literature by identifying the lack of practical, context-driven strategies as critical gap. While earlier studies emphasized the importance of digital transformation, they often overlook how firms in resource-constrained environments can realistically overcome adoption barriers. The present findings suggest that capacity building, and strong collaboration among industry stakeholders are essential strategies for successful digital transformation. From a Bangladesh-specific perspective, the findings reflect unique socio-economic and institutional challenges. These findings align with emerging research on developing economies, emphasizing digital transformation is not merely a technological shift but also an organizational transition. Overall, this study bridges the gap between global digital supply chain

literature and the specific realities of Bangladesh's RMG sector. It underscores the need for more context-sensitive research and highlights that while digitalization offers significant efficiency benefits, its successful adoption depends on addressing localized barriers through targeted and practical strategies.

7. Limitations and future scope of the study

The study acknowledges several limitations which can be considered as important avenues for the future research. Firstly, the research design (qualitative) and the sampling technique (purposive) limit the generalizability of the findings across broader perspective. However, future studies can employ large-scale quantitative or mixed-method approach to validate the findings and address this limitation. Then the study focused on selected digital tools which creates the responsibility for the future researchers to capture a wider range of digital technologies to compare the intensity of the adoption across firm sizes. Additionally, time and budget constraint is another limitation of this study. To examine the barriers in broader scale longitudinal design with research funds can be undertaken to reach conclusive findings. Finally, considering the volatility of the technological change the future research can incorporate real-time data and various macro-environmental factors to understand the dynamic nature of the digital transformation in supply chain.

8. Contributions of the study

For practice with relevance the study provides several important contributions. The empirical contribution of this study is to provide qualitative insights highlighting the day-to-day challenges faced by the supply chain managers and users during the transition from traditional to digitalized practices. By integrating the Technology–Organization–Environment (TOE) framework, Institutional Theory, and the Resource-Based View (RBV) together to highlight the gap between digital adoption and operational efficiency in a developing-country, this study contributes theoretically. The findings provide actionable insights for the supply chain managers and policymakers by identifying critical barriers which under shadow the outcomes of the digitalization. To ensure tangible efficiency from the digital technologies the study emphasizes targeted training programs, phased implementation strategies and contributes to the reduction of the operational disruptions. Finally, this study shades light on the practical guidance for designing

more context-sensitive digital transformation strategies within global supply chains.

9. Conclusion

The Ready-Made Garment sector is one of the economic cornerstones of Bangladesh. Despite the widespread adoption initiatives in this sector, digitalization has not consistently contributed to the expected gains in efficiency and effectiveness. This study examines the barriers towards digitalization through qualitative lens from experienced supply chain managers and executives. It has been found in the analysis that the supply chain of RMG is constrained by a range of infrastructural inadequacies, skill-gaps, resistance to change etc. Besides servicing errors, insufficient training for operational users and reluctance to adopt new technologies are identified as persistent issues which undermine the performance of digital systems. These challenges are not isolated, rather interdependent further demonstrated by the study. Many organizations lack required measurement to adopt digital tools effectively while institutional pressures from the global buyers and regulatory bodies force the firms to adopt the digital systems. As a result, gap between the expected benefits of digitalization and its actual outcomes arises, limiting the organization's capacity. The integrated application of the Technology–Organization–Environment (TOE) framework, Institutional Theory, and the Resource-Based View (RBV) further explains how pressures from the external stakeholders, organizational constraints, and resource limitations combinedly influence digitalization outcomes in the RMG supply chain. Overall, the study concludes that without adequate infrastructure, continuous training and coordinated support from the institution the benefits of the digitalization in Bangladesh's RMG sector cannot be extracted fully. To address the challenges the policymakers can take a strategic and integrated approach towards digital adoption combining the investment in human resources and supportive government policies with industry-level initiatives. These adjustments are critical for ensuring meaningful transformation of digital systems to improve supply chain performance, resilience, and long-term competitiveness in the global apparel market.

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Appendix

Table 1: Information of the FGD Groups

FGD Group	Participants	Rationale
FGD 1	Supply Chain Managers	Central decision-makers in digital tool adoption and logistics coordination
FGD 2	Factory Owners & Directors	Key influencers of investment decisions and long-term strategic priorities
FGD 3	Mid-level Production & Inventory Officers	Operational view on challenges of system integration and process bottlenecks
FGD 4	IT Personnel & Digital Transformation Officers	Technical perspectives on implementation, integration, and cybersecurity
FGD 5	Compliance & Sustainability Officers	Insights into how digital tools affect traceability and global buyer audits

FGD 6	Government & Regulatory Officials (BGMEA, BEZA)	Policy-level understanding of incentives, guidelines, and digital readiness
FGD 7	International Buyers & Representatives	Buyer-side expectations, compliance demand, and digital traceability
FGD 8	RMG Sector Consultants	Broader insights, critical reflections, and trend analysis

Table:2 Demographics of the FGD Groups

FGD Group	Designation	Age	Experience (Years)	Educational Background	No. of Participants
FGD 1	Supply Chain Managers	35–45	8–15	BBA/MBA in Supply Chain or Operations	7
FGD 2	Factory Owners/Directors	40–55	15–25	BBA/Engineering/Family Business	6
FGD 3	Mid-level Production & Inventory Officers	30–40	5–12	Diploma/Bachelor in Textile Engineering	8
FGD 4	IT Personnel/Digital Officers	28–38	3–10	BSc/MSc in CSE or ICT	7
FGD 5	Compliance & Sustainability Officers	30–45	6–15	BBA/Master of Compliance, Environmental Science.	8
FGD 6	Government/Regulatory Officials (BGMEA, BEPZA)	40–55	10–25	Master of public Administration/ Economics	6
FGD 7	International Buyers/Representatives	35–50	10–20	Master of International Business/ Trade	6
FGD 8	Consultants/Academicians	35–55	10–30	PhD/MBA in SCM, Business, or Policy	7