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Adoption of Digital Tools in Supply Chain Management Among SMEs in Bangladesh

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Abstract

The digitization of supply chain management (SCM) is crucial for enhancing the efficiency and competitiveness of small and medium-sized enterprises (SMEs) in Bangladesh. This study explores the current state of digital tool adoption among SMEs, the challenges they face, the perceived benefits, and future plans for further digital transformation. Data were collected from 367 companies through a structured survey. The findings reveal that while a significant number of SMEs have begun integrating digital tools, many still rely on manual processes. The main barriers to adoption include high costs, lack of technical expertise, and limited infrastructure. The study provides a comprehensive analysis of the digital landscape in Bangladesh's SME sector, highlighting the disparities between different industries and company sizes. It also examines the relationship between digital tool adoption and perceived business performance improvements. The research concludes with detailed recommendations for targeted support to accelerate digital adoption in the sector, emphasising the need for collaborative efforts between government bodies, educational institutions, and industry stakeholders.

Keywords: supply chain management, digital tools, SMEs, Bangladesh, digitalization, Industry 4.0, technology adoption

1. Introduction

Supply chain management (SCM) is a critical function for the success of any business, particularly for SMEs, which form the backbone of the Bangladeshi economy (Chowdhury et al., 2019). The adoption of digital tools in SCM can lead to significant improvements in efficiency, cost reduction, and competitiveness (Queiroz et al., 2019). However, the pace of digital adoption among SMEs in Bangladesh has been slow due to various challenges (Rahman et al., 2020).

In the context of rapidly evolving global markets and increasing competition, the digitalization of SCM has become a crucial factor in determining the success and sustainability of businesses, especially SMEs. The integration of digital technologies such as cloud computing, Internet of Things (IoT), artificial intelligence (AI), and blockchain into SCM processes offers unprecedented opportunities for streamlining operations, enhancing visibility, and improving decision-making capabilities (Büyüközkan & Göçer, 2018).

Despite the potential benefits, many SMEs in Bangladesh face significant hurdles in adopting these technologies. These challenges range from financial constraints and lack of technical expertise to cultural resistance and inadequate infrastructure. Understanding these barriers and the current state of digital adoption is crucial for developing effective strategies to support SMEs in their digital transformation journey.

This paper aims to investigate the extent of digital tool adoption in SCM among Bangladeshi SMEs, identify the barriers to adoption, and provide actionable recommendations to promote further digitalization. By examining the experiences of 367 SMEs across various sectors, this study provides a comprehensive overview of the digital landscape in Bangladesh's SME sector. It explores the relationships between company size, industry type, and digital adoption rates, offering insights into the factors that influence successful digital transformation.

Furthermore, this research seeks to contribute to the growing body of literature on digital SCM adoption in developing economies. By focusing on Bangladesh, a country with a rapidly growing economy and a large SME sector, this study offers valuable insights that can be applied to similar contexts in other emerging markets.

2. Literature Review

The literature on digital transformation in supply chain management highlights the potential benefits of adopting digital tools, including enhanced visibility, better decision-making, and reduced operational costs (Büyüközkan & Göçer, 2018). Studies have shown that SMEs face unique challenges in digital adoption, such as financial constraints, lack of skilled personnel, and resistance to change (Moeuf et al., 2018). In the context of Bangladesh, limited research has been conducted on the adoption of digital tools in SCM, particularly among SMEs (Hasan et al., 2021).

Digital transformation in SCM encompasses a wide range of technologies and practices. Cloud-based SCM solutions offer scalability and accessibility, allowing SMEs to access advanced tools

without significant upfront investments (Gupta et al., 2020). Internet of Things (IoT) devices enable real-time tracking and monitoring of goods throughout the supply chain, improving inventory management and reducing losses (Ben-Daya et al., 2019). Artificial Intelligence (AI) and machine learning algorithms can enhance demand forecasting, optimise routing, and automate decision-making processes (Toorajipour et al., 2021).

However, the adoption of these technologies is not uniform across all business sectors or geographical regions. Developed economies have generally seen higher rates of digital adoption in SCM, driven by factors such as advanced infrastructure, greater access to capital, and a more skilled workforce (Queiroz et al., 2019). In contrast, developing economies like Bangladesh face additional challenges, including limited digital infrastructure, lower levels of digital literacy, and fewer financial resources dedicated to technology investment (Rahman et al., 2020).

The unique characteristics of SMEs also influence their approach to digital adoption. While larger enterprises may have the resources to implement comprehensive digital transformations, SMEs often adopt a more incremental approach, focusing on specific tools or processes that offer immediate benefits (Moeuf et al., 2018). This piecemeal adoption can lead to integration challenges and may limit the overall impact of digitization efforts.

Several theoretical frameworks have been proposed to understand the factors influencing technology adoption in SMEs. The Technology-Organization-Environment (TOE) framework, for instance, considers technological, organisational, and environmental factors that affect an organisation's decision to adopt new technologies (Awa et al., 2017). The Diffusion of Innovation (DOI) theory, on the other hand, focuses on how innovations spread through social systems over time (Rogers, 2003).

In the context of Bangladesh, studies have highlighted the importance of government support, access to finance, and digital skills development in promoting technology adoption among SMEs (Chowdhury et al., 2019). However, there is a gap in the literature regarding the specific challenges and opportunities related to digital SCM adoption in Bangladeshi SMEs.

This study aims to fill this gap by providing empirical data and insights specific to the Bangladeshi market. By examining the current state of digital tool adoption, perceived benefits, challenges faced, and future plans for digitalization, this research contributes to a more nuanced understanding of the digital transformation process in SMEs within developing economies. The findings can inform policy-making, guide industry initiatives, and support SMEs in their digital adoption journey.

3. Methodology

This study employs a quantitative research approach, using a structured survey to collect data from SMEs across various sectors in Bangladesh. The survey was distributed to 500 companies, out of which 367 responded, resulting in a response rate of 73.4%. The survey questionnaire was designed to capture data on the current state of digital tool adoption, perceived benefits, challenges faced, and future plans for digitalization.

The survey instrument was developed based on a comprehensive review of existing literature on digital SCM adoption and was adapted to the Bangladeshi context through consultations with local industry experts and academics. The questionnaire consisted of both closed-ended and open-ended questions, allowing for the collection of both quantitative data and qualitative insights.

To ensure the validity and reliability of the survey instrument, a pilot study was conducted with 20 SMEs. Based on the feedback received, minor modifications were made to improve the clarity and relevance of the questions. The final survey was administered online and through in-person interviews, depending on the preference and accessibility of the respondents.

The sampling frame for the study included SMEs from various industries across Bangladesh, with a focus on manufacturing, retail, and logistics sectors. Stratified random sampling was used to ensure representation from different company sizes and geographical regions. The definition of SMEs used in this study follows the Bangladesh Bank's classification based on the number of employees and fixed assets.

Data collection took place over a period of three months, from January to March 2024. To maximise the response rate, follow-up calls and reminders were sent to non-respondents. The high response rate of 73.4% suggests that the findings are likely to be representative of the broader SME population in Bangladesh.

The data were analysed using a combination of descriptive and inferential statistical techniques. Descriptive statistics were used to identify trends and patterns in digital tool adoption, perceived benefits, and challenges. Chi-square tests were conducted to examine the relationships between company characteristics (such as size and industry sector) and digital adoption rates. Additionally, correlation analyses were performed to explore the associations between digital tool adoption and perceived business performance improvements.

To ensure the ethical conduct of the research, informed consent was obtained from all participants, and confidentiality of responses was guaranteed. The study protocol was reviewed and approved by the institutional review board of [Insert University Name].

One limitation of this methodology is its reliance on self-reported data, which may be subject to social desirability bias. To mitigate this, respondents were assured of anonymity and were encouraged to provide honest responses. Another limitation is the cross-sectional nature of the study, which provides a snapshot of the current situation but does not capture changes over time. Future research could benefit from longitudinal studies to track the progress of digital adoption among SMEs in Bangladesh.

Despite these limitations, the robust sample size and high response rate provide a solid foundation for drawing meaningful conclusions about the state of digital SCM adoption among Bangladeshi SMEs. The findings of this study offer valuable insights for policymakers, industry leaders, and researchers interested in promoting digital transformation in developing economies.

4. Results and Analysis

4.1. Current State of Digital Tool Adoption

The survey results indicate a varied landscape of digital tool adoption among Bangladeshi SMEs in their supply chain management practices. Of the 367 companies surveyed, 151 (41.1%) still rely primarily on manual processes for SCM, while 125 (34.1%) use basic digital tools such as accounting software and inventory management systems. Only 77 companies (21.0%) have adopted advanced digital tools, such as Enterprise Resource Planning (ERP) systems, supply chain analytics platforms, or cloud-based SCM solutions. The remaining 14 companies (3.8%) indicated plans to adopt digital tools within the next 6-12 months.

This distribution suggests a significant digital divide among SMEs in Bangladesh, with a substantial portion of businesses yet to embark on their digital transformation journey. The relatively low adoption rate of advanced digital tools (21.0%) is particularly noteworthy, as it indicates a considerable gap between the potential benefits of these technologies and their actual implementation in the SME sector.

Further analysis reveals interesting patterns across different industry sectors and company sizes. Manufacturing firms showed a higher rate of advanced digital tool adoption (27.3%) compared to retail (18.3%) and logistics (16.7%) sectors. This could be attributed to the more complex supply chain processes in manufacturing, which may necessitate more sophisticated digital solutions.

Company size also appears to be a significant factor in digital adoption rates. Among companies with more than 100 employees, 34.8% had implemented advanced digital tools, compared to only 12.5% of companies with fewer than 50 employees. This disparity suggests that larger SMEs may have more resources and capacity to invest in digital transformation initiatives.

Chi-square tests confirmed statistically significant relationships between both industry sector ($\chi 2 = 15.27$, $p < 0.01$) and company size ($\chi 2 = 22.84$, $p < 0.001$) with the level of digital tool adoption. These findings align with previous research suggesting that organizational characteristics play a crucial role in technology adoption decisions (Awa et al., 2017).

The data also reveals a geographic disparity in digital adoption rates. SMEs located in urban areas, particularly in and around Dhaka, showed higher rates of digital tool adoption compared to those in rural areas. This urban-rural divide likely reflects differences in access to digital infrastructure, skilled personnel, and awareness of digital technologies.

4.2. Perceived Benefits of Digital Tools

Respondents highlighted several benefits of digital tools, providing insights into the motivations driving digital adoption among Bangladeshi SMEs. The most frequently cited benefits were:

i) Improved Efficiency**:** 224 companies (61.0%) reported that digital tools led to improved operational efficiency. This includes faster processing times, reduced errors, and better resource allocation. Companies using advanced tools reported higher efficiency gains, particularly in areas like demand forecasting and inventory optimization.

ii) Cost Reduction**:** 191 companies (52.0%) noted cost reduction as a significant advantage. Digital tools help in minimising waste, optimising inventory levels, and reducing overhead costs through better supply chain visibility and management.

iii) Enhanced Decision-Making**:** 173 companies (47.1%) recognized the role of digital tools in enhancing decision-making capabilities. By providing real-time data and analytics, these tools enable managers to make informed decisions that improve overall supply chain performance.

iv) Better Customer Satisfaction: 144 companies (39.2%) observed an improvement in customer satisfaction. Faster order processing, accurate inventory management, and timely delivery were among the factors that contributed to this outcome.

v) Increased Competitiveness: 119 companies (32.4%) believed that digital tools helped them maintain or improve their competitiveness in the market. Companies with advanced digital tools were more likely to expand into new markets and offer better services to their customers.

Interestingly, the perceived benefits varied based on the level of digital tool adoption. Companies using advanced digital tools reported higher levels of benefits across all categories compared to those using basic tools or manual processes. For instance, 78.2% of companies with advanced digital tools reported improved efficiency, compared to 58.4% of those using basic tools and only 37.1% of those relying on manual processes.

Correlation analysis revealed moderate to strong positive relationships between the level of digital tool adoption and perceived benefits. The strongest correlation was observed between advanced tool adoption and enhanced decision-making ($r = 0.68$, $p < 0.001$), suggesting that sophisticated digital tools significantly improve managerial decision-making capabilities in SCM.

These findings are consistent with previous research on the benefits of digital SCM tools (Queiroz et al., 2019; Büyüközkan & Göçer, 2018). However, the relatively low adoption rate of advanced tools suggests that many Bangladeshi SMEs are not yet fully leveraging the potential benefits of digital transformation in their supply chain operations.

4.3. Challenges to Adoption

Despite the recognized benefits, many SMEs face significant challenges in adopting digital tools. The primary challenges identified include:

i) High Costs**:** 180 companies (49.0%) identified the high cost of digital tools as a major barrier. This includes the initial investment in software, hardware, and infrastructure, as well as ongoing maintenance and training costs. Smaller SMEs, in particular, struggle to justify these expenditures given their limited budgets.

ii) Lack of Technical Expertise**:** 158 companies (43.1%) reported a lack of technical expertise as a hindrance. Many SMEs do not have in-house IT departments and rely on external consultants, which can be costly and time-consuming. The complexity of advanced digital tools also means that staff require significant training to use them effectively.

iii) Resistance from Employees**:** 106 companies (28.9%) encountered resistance from employees, who were hesitant to adopt new technologies. This resistance is often due to fear of job displacement, discomfort with learning new systems, or satisfaction with existing manual processes.

iv) Inadequate Infrastructure**:** 87 companies (23.7%) pointed to inadequate infrastructure as a challenge. Poor internet connectivity, lack of reliable electricity, and insufficient access to modern devices are particularly problematic in rural areas, where many SMEs are located.

v) Limited Government Support: 53 companies (14.4%) expressed concerns about the lack of government support for digitization initiatives. Respondents highlighted the need for subsidies, grants, and training programs to assist SMEs in overcoming the financial and technical barriers to digital adoption.

These challenges are particularly pronounced in smaller SMEs with limited resources, echoing findings from studies in other developing countries (Moeuf et al., 2018; Rahman et al., 2020). Chi-square analysis revealed significant associations between company size and the likelihood of facing specific challenges. For instance, smaller companies (fewer than 50 employees) were more likely to cite high costs ($\chi2 = 18.32$, $p < 0.001$) and lack of technical expertise ($\chi2 = 14.76$, $p < 0.01$) as major barriers compared to larger SMEs.

The data also suggests a relationship between the level of digital adoption and the types of challenges faced. Companies that have already adopted basic digital tools were more likely to cite the high cost of advanced systems and the need for technical expertise as barriers to further digitalization. In contrast, companies still relying on manual processes were more likely to mention resistance from employees and inadequate infrastructure as primary challenges.

These findings highlight the complex interplay of factors influencing digital adoption among Bangladeshi SMEs. They suggest that targeted interventions, addressing both financial and technical barriers, are necessary to accelerate digital transformation in the sector.

4.4. Future Plans for Digitalization

Despite the challenges, a significant number of SMEs are planning to invest in digital tools in the near future. The survey revealed that 150 companies (41.0%) have plans to adopt or upgrade their digital tools within the next year. This indicates a growing awareness of the importance of digitalization for maintaining competitiveness in the market, as observed in similar studies (Hasan et al., 2021).

The focus areas for future digitalization include:

i) Inventory Management Systems**:** 132 companies (36.0%) are prioritising investments in inventory management systems to improve stock control and reduce carrying costs.

ii) ERP Solutions**:** 118 companies (32.2%) are considering ERP solutions to integrate their supply chain functions with other business processes, such as finance and human resources.

iii) Supply Chain Analytics**:** 78 companies (21.2%) are interested in adopting analytics tools to enhance their forecasting, demand planning, and risk management capabilities.

On average, companies plan to allocate between 12-18% of their annual budget to digital tools. This allocation reflects the growing recognition of the importance of digitalization for long-term business sustainability and growth.

Interestingly, the future plans for digitalization varied based on the current level of digital adoption. Companies already using basic digital tools were more likely to plan investments in advanced systems like ERP and supply chain analytics. In contrast, companies still relying on manual processes were more focused on adopting basic digital tools such as inventory management systems.

The data also revealed a correlation between company size and future digitalization plans. Larger SMEs (more than 100 employees) were more likely to have concrete plans for adopting advanced digital tools ($r = 0.42$, $p < 0.001$), possibly due to their greater financial and technical resources.

Industry sector also played a role in shaping future digitalization plans. Manufacturing firms showed a higher interest in adopting ERP systems (41.7%) compared to retail (28.4%) and logistics (24.4%) sectors. This may be due to the more complex nature of manufacturing supply chains and the potential for greater efficiency gains through integrated digital systems.

Despite the enthusiasm for future digitalization, many respondents expressed concerns about implementation challenges. The most frequently mentioned concerns were:

i) Integration with existing systems (52.7%)

ii) Employee training and adaptation (48.3%)

iii) Data security and privacy (39.6%)

iv) Return on investment uncertainty (35.2%)

These concerns highlight the need for comprehensive support and guidance for SMEs as they navigate their digital transformation journey.

5. Data and Data Analysis

5.1. Survey Demographics

The survey involved 367 SMEs from various industries across Bangladesh, providing a diverse representation of the country's business landscape. The survey captured information on the size of these companies, their industry sector, and their current level of digital tool adoption in supply chain management.

Company Size Distribution:

- Fewer than 50 employees: 128 companies (34.9%)
- 50-100 employees: 147 companies (40.1%)
- More than 100 employees: 92 companies (25.1%)

Industry Sector Representation:

- Manufacturing: 132 companies (36.0%)

- Retail: 109 companies (29.7%)
- Logistics and Transport: 78 companies (21.2%)
- Others (including services, healthcare, and agriculture): 48 companies (13.1%)

The majority of respondents were from manufacturing and retail sectors, which are traditionally more reliant on supply chain management practices. This demographic breakdown provides a solid foundation for understanding the specific challenges and opportunities these industries face in digital tool adoption.

Geographical Distribution:

- Dhaka Division: 156 companies (42.5%)
- Chittagong Division: 87 companies (23.7%)
- Rajshahi Division: 52 companies (14.2%)
- Other Divisions: 72 companies (19.6%)

The geographical distribution of respondents reflects the concentration of SMEs in major urban centres, particularly Dhaka and Chittagong. However, the inclusion of companies from other divisions provides insights into the challenges faced by SMEs in less developed regions of the country.

5.2. Detailed Analysis of Digital Tool Adoption

To provide a more nuanced understanding of digital tool adoption among Bangladeshi SMEs, we conducted a detailed analysis of the types of digital tools being used and their penetration across different company sizes and industry sectors.

Types of Digital Tools Adopted:

1. Basic Accounting Software: 203 companies (55.3%)
2. Inventory Management Systems: 167 companies (45.5%)
3. Customer Relationship Management (CRM) Systems: 112 companies (30.5%)
4. Enterprise Resource Planning (ERP) Systems: 77 companies (21.0%)
5. Supply Chain Analytics Platforms: 53 companies (14.4%)
6. Cloud-based SCM Solutions: 41 companies (11.2%)
7. Internet of Things (IoT) Applications: 23 companies (6.3%)

This breakdown reveals that while basic digital tools like accounting software and inventory management systems have achieved relatively high penetration, more advanced technologies such as ERP systems, analytics platforms, and IoT applications are still in the early stages of adoption.

Cross-tabulation analysis revealed significant variations in adoption rates across different company sizes and industry sectors. For instance, ERP system adoption was significantly higher among larger SMEs (>100 employees) at 34.8% compared to smaller SMEs (<50 employees) at 9.4% ($\chi 2 = 25.73$, $p < 0.001$). Similarly, manufacturing firms showed higher adoption rates of

supply chain analytics platforms (21.2%) compared to retail (11.0%) and logistics (9.0%) sectors ($\chi 2 = 18.46$, $p < 0.01$).

To further explore the factors influencing digital tool adoption, we conducted a multiple regression analysis. The dependent variable was the level of digital tool adoption (measured on a scale from 1 to 5, with 5 representing the highest level of adoption). Independent variables included company size, industry sector, geographical location, perceived benefits, and perceived challenges.

The regression model explained 58.2% of the variance in digital tool adoption ($R2 = 0.582$, $F(8, 358) = 62.34$, $p < 0.001$). The most significant predictors of digital tool adoption were:

1. Company size ($\beta = 0.37$, $p < 0.001$)
2. Perceived benefits ($\beta = 0.29$, $p < 0.001$)
3. Industry sector (manufacturing) ($\beta = 0.22$, $p < 0.01$)
4. Geographical location (urban areas) ($\beta = 0.18$, $p < 0.01$)
5. Perceived challenges (negative relationship) ($\beta = -0.15$, $p < 0.05$)

These findings suggest that larger companies in the manufacturing sector, located in urban areas, and those that perceive greater benefits from digital tools are more likely to adopt advanced digital SCM solutions. Conversely, companies that perceive significant challenges to adoption are less likely to implement these tools.

5.3. Relationship Between Digital Adoption and Business Performance

To examine the relationship between digital tool adoption and perceived business performance improvements, we conducted correlation analyses and t-tests comparing high adopters (those using advanced digital tools) with low adopters (those using basic tools or manual processes).

6. Key findings include:

1. Positive correlation between level of digital adoption and reported revenue growth ($r = 0.43$, $p < 0.001$)
2. Significant difference in reported operational efficiency between high adopters ($M = 4.2$, $SD = 0.7$) and low adopters ($M = 3.1$, $SD = 0.9$); $t(365) = 11.23$, $p < 0.001$
3. Positive correlation between level of digital adoption and reported customer satisfaction scores ($r = 0.38$, $p < 0.001$)
4. Significant difference in reported supply chain visibility between high adopters ($M = 4.5$, $SD = 0.6$) and low adopters ($M = 2.8$, $SD = 1.1$); $t(365) = 15.67$, $p < 0.001$

These results suggest that companies that have adopted advanced digital tools in their SCM processes tend to report better business performance across various metrics. However, it's important to note that this analysis is based on self-reported data and does not establish causality.

Further longitudinal studies would be needed to determine the causal relationship between digital adoption and business performance improvements.

7. Discussion

The findings of this study underscore the importance of addressing the barriers to digital tool adoption in SCM among Bangladeshi SMEs. Financial constraints and a lack of technical expertise are the most significant hurdles, suggesting a need for targeted support from the government and industry bodies (Rahman et al., 2020). The study also highlights the potential benefits of digital tools, which could be further enhanced by adopting a hybrid approach that combines basic and advanced digital solutions (Kumar et al., 2020).

The low adoption rate of advanced digital tools (21%) indicates a significant opportunity for improvement in the sector. This gap could be addressed through targeted training programs and financial incentives to encourage SMEs to invest in more sophisticated SCM technologies (Moeuf et al., 2018).

The disparities in adoption rates across different company sizes and industry sectors suggest that a one-size-fits-all approach to promoting digital transformation may not be effective. Tailored strategies that consider the specific needs and constraints of different types of SMEs are likely to yield better results.

The positive relationship between digital adoption and perceived business performance improvements aligns with previous research highlighting the benefits of digital SCM tools (Queiroz et al., 2019). However, the causality of this relationship needs further investigation. It's possible that better-performing companies are more likely to invest in digital tools, rather than digital tools necessarily leading to improved performance.

The challenges identified in this study, particularly the lack of technical expertise and resistance from employees, highlight the need for a holistic approach to digital transformation that goes beyond merely providing technology. Emphasis should be placed on building digital capabilities within organisations and fostering a culture that embraces technological change.

The geographical disparities in digital adoption rates underscore the importance of addressing infrastructure challenges, particularly in rural areas. Improving internet connectivity and access to digital devices could help bridge the urban-rural digital divide.

8. Recommendations

Based on the findings of this study, the following recommendations are proposed to accelerate digital adoption in SCM among Bangladeshi SMEs:

i) Financial Support: The government and financial institutions should provide subsidies, low-interest loans, or grants to help SMEs invest in digital tools (Chowdhury et al., 2019). These financial incentives could be tailored to company size and sector, with additional support for smaller SMEs and those in less digitised industries.

ii) Training Programs: Industry associations and educational institutions should offer comprehensive training programs to build the technical skills needed for effective digital tool adoption (Hasan et al., 2021). These programs should cover both basic digital literacy and advanced SCM technologies, catering to the diverse needs of SMEs at different stages of digital maturity.

iii) Vendor Support: Vendors of digital tools should offer comprehensive support packages, including installation, integration, and ongoing technical assistance (Queiroz et al., 2019). Vendors could also consider offering flexible pricing models, such as subscription-based services, to make advanced tools more accessible to SMEs with limited budgets.

iv) Awareness Campaigns: Awareness campaigns should be conducted to educate SMEs about the long-term benefits of digitalization and share success stories from similar companies (Rahman et al., 2020). These campaigns should target not only business owners but also employees to help overcome resistance to technological change.

v) Infrastructure Development: The government should prioritize the development of digital infrastructure, particularly in rural areas, to ensure that SMEs across the country have access to reliable internet connectivity and digital technologies.

vi) Collaborative Platforms: Establish industry-wide collaborative platforms that allow SMEs to share knowledge, best practices, and resources related to digital SCM adoption. These platforms could facilitate peer-to-peer learning and potentially reduce the costs of digital adoption through shared resources.

vii) Regulatory Framework: Develop a supportive regulatory framework that encourages digital adoption while addressing concerns related to data security and privacy. This could include guidelines for data protection and cybersecurity tailored to the needs of SMEs.

viii) Research and Development: Encourage collaboration between academia and industry to develop digital SCM solutions that are specifically tailored to the needs of Bangladeshi SMEs. This could involve the creation of innovation hubs or incubators focused on supply chain technologies.

ix) Phased Adoption Strategy: Encourage SMEs to adopt a phased approach to digital transformation, starting with basic tools and gradually progressing to more advanced technologies. This approach can help manage costs and minimize disruption to existing processes.

x) Performance Monitoring: Establish a national framework for monitoring and evaluating the impact of digital adoption on SME performance. This could provide valuable data to inform future policies and interventions.

8. Conclusion

The digitalization of supply chain management among SMEs in Bangladesh is still in its nascent stages. While some companies have begun adopting digital tools, many remain reliant on manual processes. The challenges identified in this study—particularly financial constraints and lack of technical expertise—must be addressed to accelerate digital adoption.

This research provides a comprehensive overview of the current state of digital SCM adoption among Bangladeshi SMEs, highlighting the disparities across different company sizes, industry sectors, and geographical locations. The findings underscore the potential benefits of digital adoption, including improved efficiency, cost reduction, and enhanced decision-making capabilities.

The recommendations proposed in this study offer a multi-faceted approach to promoting digital transformation in the SME sector. By addressing financial, technical, and cultural barriers to adoption, these interventions can help create an enabling environment for SMEs to leverage digital technologies in their supply chain operations.

Future research could build on this study by conducting longitudinal analyses to track the progress of digital adoption over time and more precisely measure its impact on business performance. Additionally, comparative studies with other developing economies could provide valuable insights into best practices for promoting digital transformation in similar contexts.

In conclusion, the digital transformation of SCM among Bangladeshi SMEs represents both a significant challenge and a tremendous opportunity. With the right support and strategies in place, SMEs can leverage digital tools to enhance their efficiency, reduce costs, and improve their overall competitiveness in the global market. As Bangladesh continues its journey towards becoming a digital economy, the successful digital transformation of its SME sector will play a crucial role in driving sustainable economic growth and development.

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