



Digital Payment Solutions Drive Efficiency in Supply Chains of Bangladesh

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Abstract

This study discusses how digital payment systems can enhance the efficiency of the supply chain in Bangladesh based on the quantitative research method, where data were collected from 400 respondents, including suppliers, distributors, wholesalers, and retailers. This study applied a standardized questionnaire to assess the effects of digital payment on the speed of transactions, reduction of costs, transparency and trust, efficiency in general, and perception by stakeholders. Descriptive analytics revealed that a strong agreement had been reached on the claim that digital payments accelerate transactions, improve transparency, and increase the performance of the supply chain, though a moderate level of variability was noted between perceptions regarding cost-cutting and adoption. Correlation and regression analyses of the hypothesis proved a statistically significant positive correlation between the use of digital payments and the principal efficiency indicators. These findings indicate that using digital payments is a strategic means of modernizing the supply chain in Bangladesh, which is consistent with global trends in digital transformation. This research contributes to the theoretical bases and practical implementation by providing empirical data on the benefits of implementing digital payments. This further highlights the need for supportive policies, strong digital infrastructure, and advocacy campaigns to deal with resistance to change, limited access, and unequal digital literacy levels. These insights can be used by firms, politicians, and banks that desire to establish sustainable and competitive supply chain ecosystems.

Keywords: Digital Payment Solutions, Supply Chain Efficiency, Transaction Speed, Cost Reduction, Transparency, Efficiency Performance.

Introduction and Background

The use of digital payment systems has changed supply chain operations and financial transactions in developing countries in recent years. Platforms such as bKash, Nagad, and Rocket are at the forefront of the rapid transition from cash-dependent systems to digital financial services in Bangladesh (Anakpo et al., 2023; Shahriar, 2024). With the introduction of bKash in the early 2010s, Bangladesh's digital payment journey began, and the mobile banking service promptly increased to the top of the market (Hoque, 2023; Sharif et al., 2024). Digital payments have slowly penetrated numerous industries, including retail, agriculture, and clothing production, thereby altering the operation of supply chains. Comparing Bangladesh's digital payment path to comparable shifts in other emerging economies can help us gain a better understanding of it (Sadik & Rahman, 2024). By strongly incorporating digital payments into company ecosystems, these actions accelerated the transition to a cashless economy. Given these developments, examining how digital payment options improve supply chain performance in Bangladesh is vital (Tanha et al., 2024). Digital payment systems are important for boosting the robustness and competitiveness of supply chain networks because they lower transaction costs, improve transparency, and allow for real-time settlements (Das, 2024). Utilizing a quantitative research methodology, this study aims to identify the extent to which digital payment enhances stakeholder coordination, functional performance, and sustainable supply chain efficiency in Bangladesh.

The use of digital payment systems has changed supply chain operations and monetary transactions in developing countries in recent years. Platforms such as bKash, Nagad, and Rocket are at the leading edge of the speedy shift from cash-dependent systems to digital financial services in Bangladesh (Jing et al., 2023). Digital payment systems are important for improving the resilience and competitiveness of supply chain networks because they reduce transaction costs, improve transparency, and enable real-time settlements.

Literature Review

Mobile financial services (MFS), such as bKash, have tremendous potential to transform the economy through economic inclusion and growth, as evidenced by recent studies (Mahmud, 2024). According to Taher (2025), the increased use of digital payments is explained by the encouragement of the transition to a cashless economy by the government, advances in technology, and cell phone penetration. Financial inclusion is a significant element in increasing and growing the GDP of Bangladesh, as quantitative figures show that there is a positive correlation between the number of transactions and GDP growth. Researchers, such as Imtiaz et al. (2024), have noted challenges such as cybersecurity risks, regulatory gaps, and the necessity of continuous technological progress. There is an observable disparity between urban and rural adoption, with rural adoption lagging due to a lack of awareness and infrastructure. Considering supply chain activities that lie in the background of MFS initiatives is becoming increasingly popular. In a research report, Tanha et al. (2024) analyze the supply chain of bKash, including procurement and distribution, and highlight the policies, operational gaps, and recommendations of stakeholders. A post-evaluation through the lenses of stakeholders Nayak et al. (2025) provides qualitative data on the strong and weak points of the bKash supply chain operation.

There are also frameworks related to mobile-enabled supply chains developed in the Bangladesh ready-made garment (RMG) industry. Notwithstanding the existing barriers to IT infrastructure, the framework presented by Utami (2023) implies that mobile technologies can significantly enhance communication, data flows, coordination, and dynamic control in SCM. The SCF industry is a new sector in Bangladesh that is rapidly growing. In their work of John et al. (2024) address the perceptions of people regarding digital SCF platforms and provide significant risks and challenges, including the absence of financial resources and technical expertise. They provide mitigation procedures to facilitate a robust digital SCF environment in the country.

In addition, the UN Capital Development Fund (UNCDF) study of 2021 summarizes that there is no end-to-end digital payment mechanism available to the manufacturers, distributors, and retailers filling up the FMCG supply chain (Ernawati et al., 2023). Intake is also limited due to highly fragmented cash flows and compartmentalized financial accounts (Anakpo et al., 2023). Some of the challenges include high transaction (1.5-1.85 percent), slim margins (1-3 percent), and compensation systems entailing intricate, agent-driven designs which are complicated by the presence of a chain of effects (Shahriar, 2024). This study proposes two strategies: low-cost MFS products targeted at actors in the supply chain with an enhanced inclination towards integration, and bank-led solutions consisting of mobile wallets, agent banking, and ERP systems.

One of the sectors in which Bangladesh is taking larger steps towards digital transformation, specifically by the advent of the Digital Bangladesh to Smart Bangladesh: Road to 2041 project, is SCM (Ning & Yao, 2023). Following McKinsey studies quoted on this page, aggressively digitalized supply chains drive 2.3% higher growth in revenue and 3.2% growth in EBIT every year (Sadik & Rahman, 2024). Socio-economic resilience and visibility based on digitally enabled ideas are of paramount importance, especially for vital industries such as RMG, agribusiness, and pharmaceuticals (Sitnik, 2023). Tech-supported logistics capabilities, especially GPS tracking, big data analytics, and business intelligence, are critical in driving supply chain efficiency and gaining expansion potential in the post-pandemic e-commerce environment. In supply chain management, researchers in Bangladesh have begun to explore the opportunities of Industry 4.0 technology (Sunil & Nalwaya, 2023). Monisha (2024) uses an empirical analysis of behavioral intentions to adopt blockchain in manufacturing supply chains and identifies perceived utility (comprising fines and non-fines), trading partner pressure, and competitive pressure as significant factors. The FMCG industry in Bangladesh has also studied blockchain, which is immutable, traceable, secure, and transparent, and has the capacity to build trust in managing supply chains (Das, 2024). In a broad sense, the concept of supply chain management within the RMG industry is evolving because of [AI and big data]. The use of AI in smart retail-based forecasting, warehouse robotics, predictive maintenance, and real-time data analytics-based logistics optimization was reported by Sharif et al. (2024), among others.

The above literature synthesis the following research gaps.

Table 1: Research Gaps

Theme	Insights	Emerging Gaps
MFS & Economic Impact	bKash and MFS driving inclusion and GDP growth	Limited analysis on how these transform supply chain-specific operations beyond financial inclusion
Supply Chain Processes in MFS	Qualitative case studies on bKash SCM structure	Lack of quantitative data linking SCM performance to digital payment adoption metrics
SCF & Complex Ecosystems	Risk assessment and structural fragmentation issues	Need for scalable, low-cost digital platforms tailored for multi-layer SCM
National Digitization	Macro-level benefits shown for digital supply chains	Sector-level case studies (e.g., agriculture, pharmaceuticals) are still limited
Emerging Tech	Blockchain, AI, analytics show promise in traceability and efficiency	Empirical evidence, cost-benefit analysis, and adoption readiness remain underexplored

This combination of research indicates that digital payments and new digital technologies provide true benefits to the effectiveness of the supply chain, including resilience, speed, transparency, and economies. Quantitative research linking supply chain outcomes to digital payment use is still lacking in Bangladesh, particularly in large volumes. The fact that your quantitative research can help bridge these gaps means that it can make an enormous contribution to scholarship.

Problems Regarding the Research

Although digital payment solutions are increasingly gaining relevance by improving the efficiency of supply chains in Bangladesh, there are certain challenges that complicate the conduct of research. This means that there is a serious deficiency of sector-specific empirical data which has been found in extensive research on digital payments in Bangladesh, as most studies focus on financial inclusion and overall economic growth vis-a-vis supply chain performance (Arif et al., 2025; Miglionico, 2022). Moreover, a secrecy bias prevents access to quality information about the reliability of transactions provided by private digital payment platforms such as bKash, Nagad, and Rocket, and it is difficult to deepen an analysis of the transaction-level impacts on supply chains (Artha et al., 2023; Md. A. Islam et al., 2025). The fact that Bangladesh supply chains are incredibly diverse - whether it is FMCG and agricultural, or apparel and pharmaceutical chains, each one has many varying payment methods, levels of digitization, and stakeholder uptake barriers-poses another problem(Sharfuddin et al., 2025). This variation makes it difficult to generalize the results across industries(Bhuiyan et al., 2025; Halimuzzaman et al., 2024; Imran et al., 2024). Moreover, the unequal rates of digital payment acceptance are the result of technological differences between cities and the country, gaps in people's digital literacy, and insufficient infrastructure, which does not allow for a detailed and universal overview (M. S. H. Islam et al., 2024). Complicating the picture further of the long-term viability of digital payments in supply chain ecosystems is regulatory uncertainty: haphazard regulatory rules regarding fintech and data protection (Imran et al., 2024; Md. A. Islam et al., 2025). Finally, the use of quantitative methodology in this study may be considered a limitation to the extent that the quantitative method can barely capture the fine details of behavioral, cultural, and trust-related factors that inform the uptake of digital payments. These factors are often best addressed by conducting qualitative research. Collectively, these challenges indicate that examining the role of digital payments in Bangladesh's supply chains is a challenging endeavor and underscores the importance of a carefully thought-out methodology to ensure validity and reliability (Sharif et al., 2024).

Research Questions

RQ1: How fast and reliable are digital payment solutions in Bangladesh's supply chains?

RQ2: How do digital payment solutions influence cost reduction in supply chain operations?

RQ3: How does the acceptance of digital payment systems relate to the efficiency of the supply chain in Bangladesh?

RQ4: Do digital payment solutions enhance transparency and trust among supply chain stakeholders?

RQ5: What do supply chain participants (suppliers, distributors, and retailers) think about the effect of digital payments on operational performance?

Research Objectives

Consistent with the research questions and literature of previous studies, the subsequent research objectives were formulated.

RO1: To evaluate how digital payment solutions can decrease transaction time and increase the reliability of supply chains.

RO2: To assess how digital payments will lower the cost of operations in supply chain processes.

RO3: To investigate the connection between the use of digital payments and the efficiency of the supply chain in Bangladesh.

RO4: To determine the role of digital payment solutions in transparency, traceability, and trust by supply chain actors.

RO5: To quantify the participants' perceptions of the success of digital payment systems in improving the performance of operations in the supply chain.

Hypothesis Development

Mobile banking services are a part of the Bangladeshi digital payment ecosystem, which has enhanced the volume and accessibility of transactions, particularly during the pandemic (Taher, 2025). Digital payment solutions lower transactional latency, creating a real-time economy where transactions occur in real time (Sadik & Rahman, 2024).

H1: Digital payment systems increase transaction speed in Bangladeshi supply chains.

Digital supply chain finance also makes buyer payments easier and reduces transaction costs, enhancing cost efficiency (Tanveer et al., 2025). The automation and coordination of supply chains have made them more efficient and less expensive because of digital transformation (Oualid El Baki & Andaloussi, 2024).

H2: Digital payment adoption lowers the supply chain management costs in Bangladesh.

Trust plays a central role in the adoption of e-payments in Bangladesh, where relative advantage and perceived ease of use significantly influence trust (Pratama & Effendi, 2023). A key advantage of supply chain digitalization is transparency and traceability, as blockchain and digital platforms, among other technologies, provide better visibility of transactions (Oualid El Baki & Andaloussi, 2024).

H3: Supply chain stakeholder transparency and confidence are enhanced by digital payment solutions.

It has been found that digitalization of supply chains significantly increases efficiency through reduced information asymmetry and an improved system performance (Monisha, 2024). With the advent of digital transformation in supply chain management through automation, real-time information, artificial intelligence, and the Internet of Things, operational efficiency and competitiveness have improved (Sharif et al., 2024).

H4: Digital payment solutions increase the efficiency of supply chains in Bangladesh.

Empirical research on small and medium-sized enterprises (SMEs) has demonstrated that digital payments significantly impact financial management, customer relationships, and business success. Positive outcomes drive the adoption of digital payments (Sunil & Nalwaya, 2023). Similarly, the adoption of digital solutions in supply chain management by Bangladeshi small and medium-sized enterprises (SMEs) is influenced by perceived benefits, which implies that these perceived benefits are the determinants of adoption (Utami, 2023).

H5: Positive perception of digital payment efficacy by suppliers, distributors, and retailers is positively associated with greater adoption.

Methods and Methodology

A study of the effect of electronic payment solutions on the efficiency of supply chain operations in Bangladesh was conducted using a quantitative research design. The objective of the research is to determine quantifiable correlations

between the implementation of digital payment tools and a number of supply chain performance indicators. These measures are the speed of transactions, reduction of costs, transparency, and perceptions of the stakeholders. The quantitative methodology is explained in the purpose of the study. To obtain numerical data that can be statistically analyzed to test hypotheses and form conclusions which are generalizable to a broader population, the research uses a structured and closed-ended questionnaire. The study population included different stakeholders in the supply chain in Bangladesh. Such stakeholders are wholesalers, distributors, retailers, and suppliers who are very active in the use or exploration of digital payment solutions. The sample frame was designed in such a way that it would capture actors at different levels of the supply chain so as to ensure a wide range of opinions and experiences. Considering that the overall population of the supply chain in Bangladesh comprises over 50,000 individuals, this study makes efforts to obtain a sample that is representative and suitably large. After considering the objective of statistical correctness and reduction of sampling error, it was concluded that a sample of 400 respondents would be suitable. To compute the size of the population, the formula for finite population created by Yamane (1989) was used:

$$n = \frac{N}{1 + N(e^2)}$$

This calculation proves that the research requires 400 respondents at a confidence level of 95 percent and an error level of 5 percent. This is in line with the rule of thumb that Cochran established on quantitative research, which states that large populations need at least 385 respondents (Cochran, 1942). Therefore, the sample size of 400 enhances the accuracy, reliability, and generalizability of the findings. To ensure that the representation is evenly distributed among all the actors in the supply chain, this study employs a stratified random sampling process. The four factions constituting the demographic population are suppliers, distributors, wholesalers and retailers. Participants in each stratum were selected randomly, and the selection was proportional to the number of participants estimated to be represented by the supply chain. Using this approach, the risk of bias during the sampling procedure was minimized, ensuring good representation, and increasing the external validity of the results. The data that will be utilized in the study will be collected using a structured questionnaire prepared in accordance with the research aims and hypotheses. The questionnaires included closed-ended questions anchored on a five-point Likert scale ranging from strongly disagree to strongly agree. The questionnaire was intended to measure the perceptions and experiences of the respondents regarding digital payment systems. Through Google forms, email invitations, and the digital network of business groups, the distribution of online surveys will be carried out to access participants who are technologically active and use the Internet. To ensure the capture of players with limited access to digital platforms, physical distribution was achieved by face-to-face administration at trade hubs, wholesale markets, and industry events. A statistical software of a similar nature, either the Statistical Package of the Social Sciences (SPSS) or some other such program, will be used to code and analyze the collected data. In the analysis, the study will observe the following: To summarize the demographic data and the overall opinions, descriptive statistics, including frequencies, means, and standard deviations, are used. The reliability of the questionnaire was tested to ensure that the questionnaire was consistent with itself using Cronbach's alpha. The correlations between the use of digital payment methods and supply chain efficiency indicators were examined using correlation techniques. This regression study aims to determine the scope and topicality of the effect that digital payment solutions exert on efficiency outcomes. Inferential statistics were used to test a hypothesis with a confidence range of 95, and a p-value of 0.05 was considered statistically significant. This methodological approach to analysis ensures that hypotheses are tested comprehensively and findings are generated based on in-depth data. All respondents will be safeguarded in terms of ethical compliance by protecting their confidentiality and anonymity throughout the research project. Participation will be optional, and informed consent will be obtained before data collection. The participants will be reassured that personal data will not be revealed and that the information will be used only for academic purposes.

Results and Discussion

This chapter aims to present the results of the quantitative analysis that was conducted on the data collected from 400 respondents who are representatives of the wholesalers, retailers, distributors, and suppliers within the supply chain ecosystem of Bangladesh. The results are organized in line with the research aims and hypotheses of the study, especially on the impact that digital payment solutions have on the speed of operations, cost-effectiveness, transparency and trust, effectiveness of the whole supply chain, and attitudes of stakeholders. Descriptive statistics are presented

first to provide a general view of the sample and the general response nature. Inferential analyses (which can involve correlation and regression tests) are then conducted to assess the relationship among variables and to test the hypotheses that are formulated. The analysis of the findings is then presented in the framework of the existing body of literature, and it becomes possible to conduct a meaningful conversation that both substantiates or disproves the hypotheses and locates the findings in the broader context of digital transformation in supply chain management. This section highlights how digital payment systems can be a driving force of operational efficiency and competitiveness in emerging supply chains in Bangladesh through the incorporation of statistical data with theoretical knowledge. This section aims to identify the role of digital payment systems.

8.1. Demographic profile of the Respondents

It is important to understand the demographic characteristics of the people who took part in the survey to place the findings of this study into perspective. Given that the survey was carried out among a very diverse range of supply chain participants, including wholesalers, retailers, distributors, and suppliers, the demographic information provides a clue about the composition of the participants and allows us to assess whether the sample size is representative of the supply chain ecosystem of Bangladesh. In the analysis, gender, age, education level, occupation (supply chain function), and number of years of the respondent's experience were considered. These are crucial criteria that can affect the idea of implementing digital payment systems and the efficiency of supply chain operations.

Table 2: Demographic Profile of the Respondents

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	280	70.0
	Female	120	30.0
Age Group	18-25 years	80	20.0
	26-35 years	150	37.5
	36-45 years	110	27.5
	Above 45 years	60	15.0
Education Level	Secondary or below	60	15.0
	Bachelor's degree	200	50.0
	Master's degree or higher	140	35.0
Occupation (Role)	Supplier	100	25.0
	Distributor	90	22.5
	Wholesaler	80	20.0
	Retailer	130	32.5
Years of Experience	Less than 5 years	120	30.0
	5-10 years	160	40.0
	More than 10 years	120	30.0

Table 8.1 shows the demographic characteristics of the 400 respondents. There is a gender balance, with more male participants (70 percent) which is indicative of the male-dominated nature of supply chain activities in Bangladesh. Nevertheless, the female representation (30) reveals that women are increasingly participating in the retail and distribution segments. Regarding age, most of the respondents were in the 26-35 years bracket (37.5%), indicating that a relatively young and active workforce is using digital payment systems, but only 15% were more than 45 years, which implies low adoption rates among senior participants. Regarding education level, 50 percent of the participants had a bachelor's degree, and 35 percent held a master's degree or above, which means they had relatively good education levels and were therefore more likely to be more open to digital financial technologies. Concerning occupational roles, the highest proportion (32.5) is taken by retailers, with other suppliers (25%), distributors (22.5%), and wholesalers (20) also being represented to ensure that the views of all the supply network members are represented. Most respondents (40%) have a level of experience between 5-10 years of involvement in supply chain activities, implying that they are knowledgeable enough to render informed views, whereas 30% of the respondents are new entrants (<5 years) and highly experienced professionals (>10 years).

This demographic depiction shows that the survey sample is diverse and balanced enough to represent a wide range of supply chain actors, their experiences, and perceptions, which could be valuable in offering insights into the hypotheses of the study regarding digital payment solutions and supply chain efficiency.

8.2. Descriptive Analysis of Key Variables

In this section, the descriptive statistics of the key constructs measured in the study are presented. The main constructs are transaction speed, cost reduction, transparency, trust, the overall effectiveness of the supply chain, and stakeholders' perceptions of digital payments. Each characteristic was assessed using various Likert-scale items. These were measured on a 1 (Strongly Disagree) to-5 (Strongly Agree) scale. The descriptive results which highlight the overall trends in the positions taken by the respondents in terms of supply chains in Bangladesh, can provide an initial understanding of the perception of digital payment solutions in the country.

Table 3: Descriptive Analysis of Key Variables

Variable	Mean	Std. Dev.	Interpretation
Transaction Speed	4.21	0.68	Respondents generally agree that digital payments accelerate transaction processes.
Cost Reduction	3.95	0.74	Majority perceive digital payments as effective in lowering operational costs.
Transparency & Trust	4.05	0.71	Respondents agree that digital payments enhance visibility and build trust among stakeholders.
Supply Chain Efficiency	4.18	0.65	Strong agreement that digital payment adoption improves overall supply chain performance.
Stakeholder Perceptions	3.89	0.80	Respondents show a positive attitude towards digital payment effectiveness, though some remain neutral.

The most highly rated construct was Transaction Speed (mean = 4.21, SD = 0.68), according to the results shown in Table 8.2. This reflects the fact that most of the surveyed participants strongly agreed that digital payment solutions significantly reduce transaction time compared to traditional means (cash or bank deposits). It is widely thought that more coordination, reduced delays, and overall performance in supply chains are improved with the integration of digital payments, as demonstrated by the Supply Chain Efficiency mean score of 4.18. It would seem that respondents prefer to use digital payments to enhance traceability and promote overall confidence between wholesalers, retailers, distributors, and suppliers, since they scored 4.05 on the transparency and trust category. Meanwhile, the issue of Cost Reduction received an average score of 3.95, displayed by the fact that the respondents agreed that digital payment methods can help decrease transaction and administrative expenses. However, the responses show that there is a bit more variation compared to other variables. Finally, the category of Stakeholder Perceptions had the lowest mean (3.89) and the greatest standard deviation (0.80). This means that the percentage of people who think that digital payment knows no harm is great; however, even now, some people are still doubtful or reluctant. This might be due to technological illiteracy or infrastructure constraints.

Overall, the descriptive analysis shows that most respondents assume that digital payment solutions can be beneficial in enhancing the efficiency, trust, and cost-effectiveness of supply chain operations. The findings of this study can be

compared to the findings of global studies on digital transformation in supply chain management, and they lay the foundation for testing the hypotheses in the following sections.

8.3. Hypothesis Testing

The use of correlation and regression analyses in this section seeks to test the five assumptions that were formed in this section. To determine whether each hypothesis was statistically supported, a 95% confidence interval ($p < 0.05$) was used to analyze each hypothesis. The results are presented in tabular form and followed by interpretations against the past studies that have been recorded.

8.3.1. Regression Result of Hypothesis 1

H₁: Digital payment systems increase transaction speed in Bangladeshi supply chains.

Table 4: Regression Result of H1

Predictor Variable	β (Beta Coefficient)	t-value	Sig. (p-value)	Result
Digital Payment Adoption	0.482	9.21	0.000	Supported ✓
$R^2 = 0.232$, $F = 84.88$, $p < 0.05$				

Table 4 presents the regression results for Hypothesis 1. The results of the regression analysis show that the adoption of digital payment methods and transaction speed are strongly and positively correlated ($= 0.482$, $p < 0.001$), thus confirming H1. Consequently, the accelerated adoption of online payment systems accelerates the operations within the supply chain by minimizing the delays associated with manual processes.

8.3.2. Regression Result of Hypothesis 2

H₂: Digital payment adoption lowers the supply chain management costs in Bangladesh.

Table 5: Regression Result of Hypothesis 2

Predictor Variable	β (Beta Coefficient)	t-value	Sig. (p-value)	Result
Digital Payment Adoption	0.369	7.45	0.000	Supported
$R^2 = 0.181$, $F = 55.50$, $p < 0.05$				

Table 5 shows the regression result of hypothesis 2. A substantial favorable effect ($\beta = 0.369$, $p < 0.001$) was identified, supporting H2. People who answered the survey knew that digital payments could help cut the costs of transactions and administration in supply chains. The moderate R^2 value (18.1%) shows that digital payments help lower costs, but other factors, such as logistics and procurement techniques, are also essential.

8.3.3. Regression Result of Hypothesis 3

H₃: Supply chain stakeholder transparency and confidence are enhanced by digital payment solutions.

Table 6: Regression Result of Hypothesis 3

Variables	Pearson's r	Sig. (p-value)	Result
Digital Payment Solutions ↔ Transparency & Confidence	0.521	0.000	Supported

The regression results of Hypothesis 3 are displayed in Table 6. The correlation coefficient ($r = 0.521$, $p < 0.001$) indicates a strong statistically significant association, which supports H3. This shows that as digital payments continue to gain momentum, stakeholders experience greater transparency and reliability of the system. Previous studies have highlighted the role of digitalization in promoting trust.

8.3.4. Regression Result of Hypothesis 4

H4: Digital payment solutions increase the efficiency of supply chains in Bangladesh.

Table 7: Regression Result of Hypothesis 4

Predictor Variable	β (Beta Coefficient)	t-value	Sig. (p-value)	Result
Digital Payment Adoption	0.546	10.12	0.000	Supported
$R^2 = 0.298$, $F = 102.45$, $p < 0.05$				

The results of Hypothesis 4 are presented in Table 7. The results indicate a robust positive correlation ($\beta = 0.546$, $p < 0.001$), thus validating H4. Digital payment accounts for over 30% of supply chain efficiency, showing that these technologies are a key factor in improving operational performance in Bangladesh.

8.3.5. Regression Result of Hypothesis 5

H5: Positive perception of digital payment efficacy by suppliers, distributors, and retailers is positively associated with greater adoption.

Table 8: Regression Result of Hypothesis 5

Variables	Pearson's r	Sig. (p-value)	Result
Stakeholder Perceptions $\leftrightarrow$ Digital Payment Adoption	0.462	0.000	Supported

Table 8 displays the results of hypothesis 5. The correlation data ($r = 0.462$, $p < 0.001$) showed a moderate but substantial positive association, supporting H5. This indicates that stakeholders' likelihood of adopting digital payments increases when they view them as advantageous. The correlation also suggests that external factors, such as government regulations, the state of infrastructure, and people's ability to use technology, may potentially affect how many people use it.

Findings

The findings of this study are quite powerful in promoting the assumption that it is possible to consider digital payment solutions highly valuable to make the supply chain in Bangladesh more efficient. This proves all five hypotheses. These results are consistent with national and international studies, which support the claim that digital financial technologies are changing supply chain processes.

Transaction Speed (H1): Research indicates that transactions in digital payment supply chains are significantly faster. This follows previous studies which depicted how mobile financial services and digital platforms have transformed money transfer and receipt in Bangladesh by enabling the transfer and acceptance of money in real time and reducing

delays (Dudu et al., 2024). Global scholars have acknowledged that digital payments play a central role in enabling the creation of a real-time economy, which promotes the smooth exchange of information and funds among systems, thereby increasing responsiveness in supply chain operations.

Cost Reduction (H2): The study indicated a significant association between the use of digital payments and reduced costs. According to the respondents, businesses and transactions using electronic payments are cheaper than using manual methods such as cash handling and check clearing. This confirms the results of supply chain finance research, which highlights that digitisation lowers financing costs and improves liquidity (Jing et al., 2023). Nonetheless, the humble explanatory value demonstrates that other factors, such as procurement policy, transport, and logistics optimisation, also influence cost reduction.

Transparency and Trust (H3): The findings revealed that digital payments increased supply chain openness and trust, and there was a significant association between adoption and perceived reliability. This is in line with the empirical results of Bangladesh, which found trust as an essential key when it comes to the utilization of e-payment systems (Ning & Yao, 2023). The results align with findings reported worldwide that digital technologies, including blockchain and digital ledgers, improve traceability and accountability in supply chain transactions, thus improving inter-organizational interactions.

Supply Chain Efficiency (H4): It is one of the most intriguing facts that we have learned, and it is surprising that digital payments have a significant positive impact on the efficiency of the entire supply chain. Individuals who responded to the questionnaire were adamant that electronic payments reduced delays, facilitated partnerships, and accelerated services. This is in contrast to other studies that have revealed that digital transformation is a key element in turning supply chains into more competitive places. According to some studies, the advantages include quicker response times, reduced information asymmetry, and increased consistency of supply chain partners (Anakpo et al., 2023). In Bangladesh, where the systems are usually inefficient because of their reliance on paper and human labour, making a transition to digital payment is a giant leap towards modernisation.

Attitudes of the stakeholders (H5): Finally, the study found that positive stakeholder attitudes significantly influenced the use of digital payments. This supports the information presented in SME studies that perceived benefits have a major impact on adoption, particularly in terms of efficiency and customer satisfaction (JETIR, 2024). Despite the fact that the attitudes were mainly positive, a number of differences show that the factors of infrastructure, digital illiteracy, and resistance to change can slow the adoption rates in certain segments of the supply chain. This study highlights the need to raise awareness, training, and favourable government policies to foster greater acceptability.

These findings demonstrate that digital payment solutions are not only a new form of payment but also a method of streamlining the supply chain in Bangladesh. The findings confirm the theoretical idea that digital tools reduce transaction costs, clarify things, and enhance performance. They also affect enterprises, policymakers, and financial institutions in the real world. Stakeholders should address issues such as lack of trust, absence of infrastructure preparation, and digital literacy to accelerate the adoption process. They must also ensure that the benefits of efficiency gains are distributed extensively throughout the supply chain ecosystem.

Recommendations

The results of this study present numerous suggestions to enhance the integration and effectiveness of electronic payment systems to improve supply chain performance in Bangladesh.

10.1. Suggestions for Businesses and People in the Supply Chain

- Companies should gradually increase the number of payment options to include digital ones so that the transition becomes easier and stakeholders who might not be as tech-savvy could trust it.
- This is to ensure that suppliers, distributors, wholesalers, and retailers hold regular workshops and training programs to ensure that they become more informed, digitally literate, and trusting of one another.
- Businesses should employ digital payment information to enhance their financial planning, cash flow, and performance monitoring in their supply chain operations.
- Companies should collaborate with their partners to standardise the digital payment process. This will decrease fragmentation and ensure that every step of the supply chain employs identical processes.

10.2. Suggestions for policymakers and regulators

- To ensure that transactions can flow smoothly across the country, the government and regulatory authorities should invest in strong Internet connections, safe payment gateways, and dependable digital platforms.
- To protect digital payment users, lower the risk of fraud, and encourage more industries to use digital payments, clear regulations and regulatory frameworks should be put in place.
- Specific efforts should ensure that small suppliers, rural stores, and informal enterprises can use and profit from digital payment options.
- Governments, banks, fintech companies, and business groups should work together to accelerate the digital transformation of supply chains.

10.3. Suggestions for the Future

- Digital platforms should be linked to financial solutions, such as credit lines and working capital loans, to help supply chain actors obtain the cash they need.
- Stakeholders should consider new technologies, such as blockchain for transactions that are clear and cannot be changed, and artificial intelligence for detecting fraud and automating processes.
- To get people to stop resisting, there should be nationwide programs that show how digital payments can make things more efficient, lower costs, and increase trust in the system.
- A system for continuous monitoring should be implemented to determine how well digital payment systems work in supply chains. This ensures that they are always improving and following global best practices.

Limitations

Although this research provides practical data, it also possesses certain weaknesses that are to be mentioned. This research applied a quantitative cross-sectional survey of 400 participants, which will be effective in capturing impressions at some point but does not necessarily reflect long-term trends in the use of digital payments. Second, the

self-reported data with structured questionnaires may result in bias in terms of responses, since the participants may provide answers that are socially acceptable rather than what they actually are. Third, although the research employed a stratified random sampling technique to ensure the inclusion of suppliers, distributors, wholesalers, and retailers, the sample might not be representative of all the participants in the supply chain in Bangladesh, particularly those in remote rural areas with limited internet connectivity. Finally, this study focused on the relationship between digital payment adoption and efficiency variables and did not consider other factors that could have a major impact on its adoption, such as cultural attitudes, cybersecurity risks, or macroeconomic conditions.

Conclusion

Overall, this study finds that digital payment solutions are a game changer for Bangladesh's supply chains because they speed up transactions, lower costs, increase trust and transparency, and improve supply chain performance. The results, which came from a quantitative study of 400 respondents from suppliers, distributors, wholesalers, and retailers, show that adopting digital payments is strongly linked to efficiency. However, stakeholder perceptions remain the most important factor in increasing their use. The results show that digital payments are not simply a new way to pay but also a strategic way to modernise the supply chain. This is in line with previous research and the best practices globally. However, to make it work, there need to be regulations that support it, a robust infrastructure, and programs that raise awareness of the problems of digital literacy, inclusion, and resistance to change. The study ultimately stresses that improving digital payment systems is essential for developing supply chains in Bangladesh that are competitive, strong, and future-ready.

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