Comprehensive Analysis of Mobile Banking Trends in Bangladesh: Data-Driven Insights on Growth, Seasonal Patterns, and the Impact of COVID-19

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ABSTRACT

This study examines mobile banking trends in Bangladesh from January 2016 to April 2024 using statistical and time-series analysis to explore key patterns in the sector's growth and transformation. The findings reveal steady expansion in the number of mobile banking agents, subscribers, transactions, and transaction values over the study period. Statistical techniques such as time-series decomposition, moving averages, and correlation analysis indicate that the COVID-19 pandemic significantly accelerated the adoption of digital financial services. The results also highlight clear seasonal patterns, with notable spikes in transaction volumes during major cultural and religious events such as Eid, Pahela Boishakh, and Durga Puja. Correlation analysis demonstrates strong positive relationships among mobile banking agents, subscribers, transaction counts, and transaction values, suggesting that these metrics evolve in a closely interconnected manner. A comparative assessment of pre-COVID, COVID-19, and post-COVID periods shows a substantial increase in mobile banking activity during the pandemic, followed by a moderated but sustained growth trajectory in the post-pandemic phase. Moving average analysis further confirms the long-term upward trend in transaction volumes by smoothing short-term fluctuations. Overall, the findings indicate that mobile banking has become an essential component of Bangladesh's financial ecosystem, with important implications for financial inclusion, digital financial services, and policy development.

Keywords: Mobile Banking, Trend Analysis, Time-Series Analysis, COVID-19 Impact, Seasonal Patterns, Financial Inclusion

INTRODUCTION

Mobile banking has rapidly evolved into a critical channel for financial transactions in Bangladesh, transforming the way individuals access and manage financial services. The widespread adoption of mobile phones and the advancement of digital technologies have positioned mobile banking as an important component of the country's financial ecosystem (Rahman, 2020). Mobile banking services enable users to perform various financial activities—such as payments, transfers, and remittances—through mobile devices, offering convenience, accessibility, and efficiency. As a result, these services have significantly improved access to financial services for unbanked and underbanked populations, contributing to the broader process of financial inclusion in Bangladesh (Akhtaruzzaman et al., 2017). The rapid expansion of mobile banking services has been driven by major service providers such as bKash, Rocket, and Nagad, which have played a dominant role in the development of the sector. These platforms have enabled millions of users, particularly in rural and underserved areas, to access

financial services without relying on traditional banking infrastructure. Consequently, mobile banking has become an important tool for improving financial inclusion and empowering individuals who previously had limited access to formal financial systems (Khan, 2015). The increasing availability of transactional data generated by mobile banking platforms has also created opportunities to analyze usage patterns and understand the growth dynamics of digital financial services. Analytical approaches applied to large transactional datasets can reveal patterns in customer behavior, service adoption, and transaction trends, providing insights that help improve service efficiency and expand financial access (Ngai, Xiu, & Chau, 2009; Pathak & Mishra, 2019). Processing high volumes of transaction data allows financial institutions to identify operational trends, optimize service delivery, and recognize emerging growth opportunities within the digital financial ecosystem (Donner & Tellez, 2008).

The COVID-19 pandemic further accelerated the adoption of mobile banking services worldwide. Lockdowns, social-distancing measures, and restrictions on physical movement encouraged individuals to rely more heavily on digital financial platforms for everyday transactions (Jebun, 2020). During this period, mobile banking became an essential mechanism for maintaining financial activities, enabling individuals and businesses to perform transactions remotely while minimizing physical contact (Weber & Darbellay, 2010). This shift highlighted the importance of digital financial services in maintaining financial intermediation during times of crisis. Understanding the evolving trends of mobile banking is therefore essential for policymakers, financial institutions, and other stakeholders seeking to improve digital financial services and promote broader financial inclusion (Huda & Chowdhury, 2017). Analysis of transaction patterns and adoption trends can provide insights into how external factors—such as technological development, economic conditions, and major events like the COVID-19 pandemic—affect the usage of mobile banking services (Mousumi & Jamil, 2010). Furthermore, examining these trends can help identify existing challenges in the sector, including service reliability, accessibility issues, and customer awareness, which must be addressed to ensure sustainable growth (Sarker, Podder, & Alam, 2020).

Against this background, the present study aims to provide a comprehensive analysis of mobile banking trends in Bangladesh using longitudinal data from January 2016 to April 2024. By applying statistical and time-series analytical techniques, the study investigates growth patterns, seasonal variations, and the impact of the COVID-19 pandemic on mobile banking adoption and transaction behavior. The findings are expected to offer valuable insights for policymakers, financial institutions, and researchers seeking to better understand the evolution of digital financial services and to support strategic decision-making for the continued development of mobile banking in Bangladesh.

LITERATURE REVIEW

The evolution of mobile banking has significantly transformed the global financial landscape, particularly by expanding financial inclusion through digital technologies. In many developed economies, mobile banking services focus heavily on improving user experience through advanced technological solutions such as mobile wallets, peer-to-peer payment systems, and the integration of mobile platforms with broader digital banking ecosystems (Smith et al., 2019). These innovations have enhanced transaction efficiency, reduced operational costs for financial institutions, and improved accessibility to financial services for users across both urban and rural areas (Rahman, 2020). In developing countries, mobile banking has played an even more critical role by providing financial services to populations that previously lacked access to traditional banking infrastructure. Platforms such as M-Pesa in Kenya, GCash in the Philippines, and bKash in Bangladesh have demonstrated how digital financial services can promote financial inclusion, reduce poverty, and increase economic participation (Aker & Mbiti, 2010). In Bangladesh, mobile banking services—primarily offered through providers such as bKash, Rocket, and Nagad—have experienced rapid expansion, both in terms of user adoption and the growth of agent networks (Bangladesh Bank, 2020). This expansion has enabled individuals in rural areas, women, and low-income populations to access financial services that were previously unavailable to them (Rahman, 2019).

The increasing availability of mobile banking transaction data has also created opportunities for researchers to analyze patterns in user behavior and service adoption. Analytical techniques applied to large transaction datasets have been used to study customer behavior, predict transaction patterns, and improve service delivery (Ngai, Xiu, & Chau, 2009; Pathak & Mishra, 2019). Such analyses help financial institutions better understand the dynamics of mobile banking usage and identify potential areas for operational improvement and service innovation (Donner & Tellez, 2008). Despite its rapid growth, mobile banking continues to face several challenges. Issues related to

security, user trust, and infrastructure limitations remain key barriers to the broader adoption of digital financial services (Kumar et al., 2017). In the context of Bangladesh, factors such as limited network coverage, device accessibility, and digital literacy particularly affect the adoption of mobile banking services in rural areas (Rahman & Khan, 2021). Furthermore, customer awareness and trust remain critical determinants influencing the continued expansion of mobile banking platforms (Islam et al., 2019).

Recent studies have also examined the impact of the COVID-19 pandemic on digital financial services. The pandemic accelerated the adoption of mobile banking in many countries, including Bangladesh, as individuals increasingly relied on digital platforms for payments, remittances, and financial management during lockdowns and social distancing measures (Akter & Ray, 2021). This period highlighted the importance of mobile banking as a resilient financial tool capable of supporting economic activities during crises (Auer & Böhme, 2020). However, the rapid expansion of digital financial services during this time also exposed structural challenges such as network congestion, fraud risks, and the persistent digital divide (Bangladesh Bank, 2021).

Although existing literature has extensively examined the role of mobile banking in promoting financial inclusion and digital finance adoption, several research gaps remain. In particular, limited studies have conducted comprehensive longitudinal analyses of key mobile banking indicators such as agent networks, subscriber growth, transaction volumes, and transaction values. Moreover, relatively few studies have explored seasonal transaction patterns or conducted comparative analyses across pre-COVID, COVID, and post-COVID periods. Addressing these gaps can provide deeper insights into the factors driving the growth and sustainability of mobile banking services. Therefore, a comprehensive empirical analysis of mobile banking trends in Bangladesh can contribute valuable insights for policymakers, financial institutions, and researchers seeking to understand the evolving dynamics of digital financial services (Madhavi, 2012).

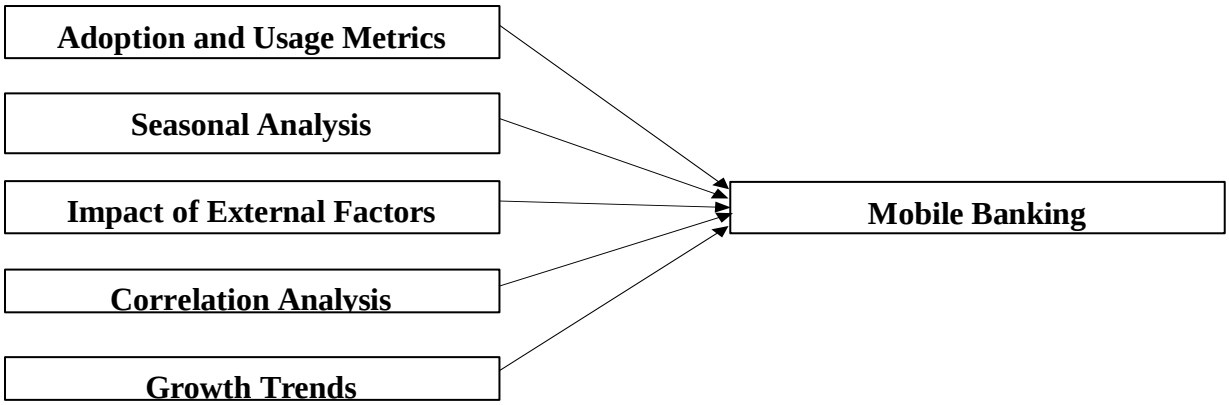
THEORETICAL FRAMEWORK

The theoretical foundation of this study is informed by established theories of technology adoption and digital financial inclusion. In particular, the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) theory provide a conceptual basis for understanding the rapid growth of mobile banking services. These frameworks explain how technological innovations are adopted by users and how external factors influence the diffusion of digital financial services within a society. The Technology Acceptance Model (TAM) suggests that individuals adopt new technologies primarily based on two key determinants: perceived usefulness and perceived ease of use (Davis, 1989). In the context of mobile banking, perceived usefulness refers to the extent to which users believe that mobile banking services enhance the efficiency of financial transactions, while perceived ease of use reflects the simplicity and accessibility of mobile banking platforms. As mobile banking services become more convenient and widely available, these factors encourage increased adoption and continued usage of digital financial services. Similarly, Diffusion of Innovation (DOI) theory explains how new technologies spread through populations over time (Rogers, 2003). According to this theory, the adoption of innovations depends on factors such as relative advantage, compatibility with users' needs, complexity, trialability, and observability. Mobile banking services in Bangladesh demonstrate several of these characteristics, particularly relative advantage and accessibility, which have contributed to the rapid expansion of services offered by platforms such as bKash, Rocket, and Nagad. Building on these theoretical perspectives, this study analyzes the evolution of mobile banking services in Bangladesh using key indicators that reflect adoption and usage patterns. These indicators include the number of mobile banking agents, subscribers, transactions, and transaction amounts. These variables represent measurable dimensions of technology adoption and service diffusion within the financial ecosystem.

In addition to adoption patterns, the framework also considers temporal and contextual factors that influence mobile banking activity. Time-series analysis is used to identify seasonal variations in transaction patterns, which may be associated with cultural and economic events such as Eid, Pahela Boishakh, and Durga Puja. Furthermore, the framework incorporates the influence of external shocks, particularly the COVID-19 pandemic, which significantly accelerated the adoption of digital financial services by encouraging contactless financial transactions. The relationships among mobile banking agents, subscribers, transaction volumes, and transaction values are also examined to understand how different components of the mobile banking ecosystem interact. An expanding agent network improves service accessibility, which can increase the number of subscribers and subsequently lead to higher transaction volumes and transaction values.

Overall, the proposed framework integrates technology adoption theory with empirical analysis of mobile banking indicators. By combining theoretical insights with longitudinal data obtained from Bangladesh Bank, the framework provides a structured approach to analyzing growth trends, seasonal patterns, and external influences shaping the development of mobile banking services in Bangladesh.

Figure 1: Research Framework



Source: Author's own elaboration

METHODOLOGY

Data Collection

The dataset used in this study was obtained from publicly available reports published by Bangladesh Bank, covering the period from January 2016 to April 2024. The dataset includes monthly statistics on key mobile banking indicators, namely the number of mobile banking agents, the number of subscribers, the total number of transactions, and the transaction volume measured in crore Taka (Bangladesh Bank, 2020). These indicators provide comprehensive insights into the scale and growth of mobile banking services in Bangladesh over time. The data were collected from official Bangladesh Bank publications and compiled into a structured dataset for analysis. Since the statistics are reported on a monthly basis, the dataset is suitable for time-series analysis and trend evaluation. The availability of consistent monthly observations enables the examination of long-term growth patterns, seasonal variations, and changes in mobile banking activity during significant events such as the COVID-19 pandemic (Rahman, 2020).

Data Processing

Data preprocessing was conducted to ensure the dataset was suitable for statistical analysis. Python libraries including pandas, numpy, matplotlib, seaborn, and statsmodels were used for data handling, visualization, and time-series analysis. The dataset was first imported into a pandas DataFrame to facilitate data manipulation and analysis. An initial inspection was performed to verify data formatting and ensure consistency across variables. The dataset was examined for missing values, and no missing observations were detected, indicating completeness of the data. Outlier detection was conducted using visual inspection techniques such as boxplots and scatter plots. Observed outliers were carefully reviewed to determine whether they represented data errors or genuine fluctuations in mobile banking activity. Valid outliers were retained in the dataset because they may reflect significant economic events or seasonal variations in transaction behavior (Madhavi, 2012).

Analytical Techniques

Several statistical and time-series analytical techniques were employed to examine mobile banking trends in Bangladesh. Data visualization methods, including line charts, bar charts, and heatmaps, were first used to identify general patterns and relationships among the key mobile banking indicators (Mousumi & Jamil, 2010). Time-series decomposition using Seasonal and Trend decomposition based on Loess (STL) was applied to separate the observed transaction data into trend, seasonal, and residual components (Islam et al., 2019). This approach enables the identification of long-term growth patterns and recurring seasonal fluctuations in mobile banking transactions.

Correlation analysis was conducted to examine the relationships among mobile banking agents, subscribers, transaction counts, and transaction values. A correlation matrix and heatmap visualization were used to illustrate the strength and direction of these relationships (Khan, 2015). To smooth short-term fluctuations and highlight long-term trends in transaction volumes, moving average techniques were applied using 7-month and 12-month intervals (Weber & Darbellay, 2010). These moving averages provide a clearer view of the underlying growth trajectory of mobile banking activity. The impact of the COVID-19 pandemic was analyzed through a comparative time-series approach by dividing the dataset into three periods: pre-COVID, COVID-19, and post-COVID phases. This comparative analysis allowed the study to evaluate how the pandemic influenced the adoption and usage of mobile banking services (Jebun, 2020).

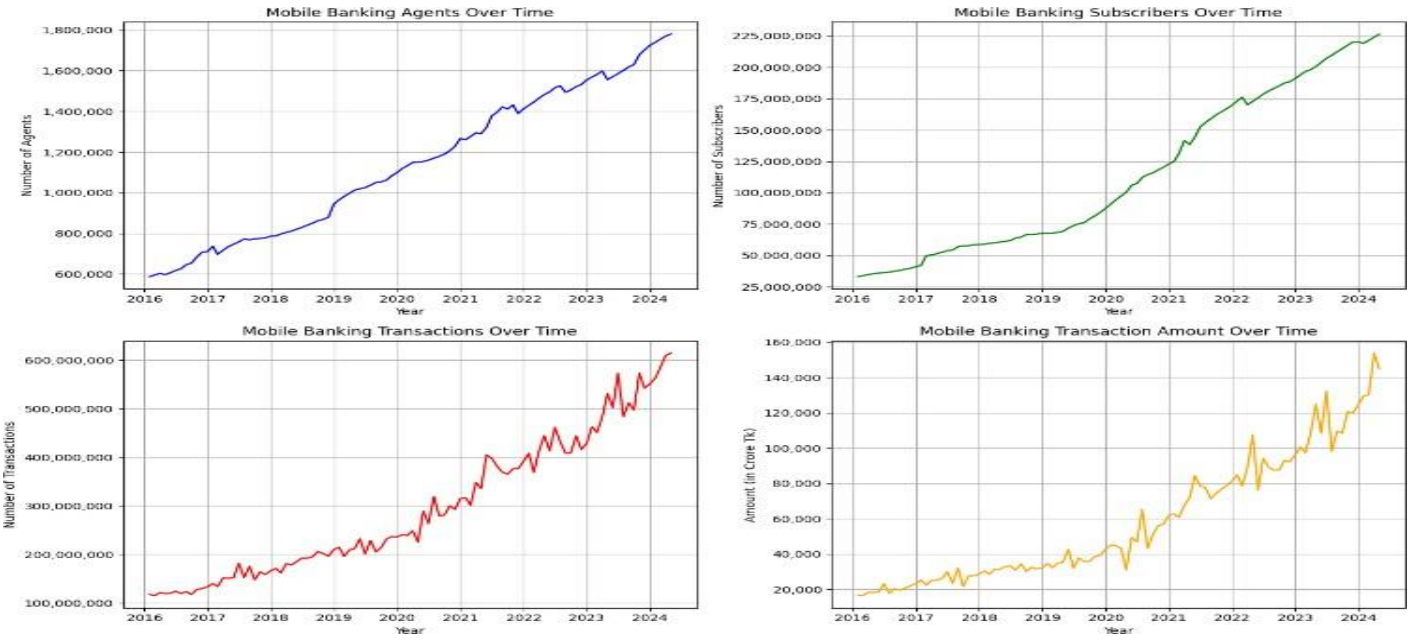
Additionally, year-over-year growth analysis and monthly trend analysis were conducted to examine seasonal patterns and identify recurring fluctuations in mobile banking activity. These analytical techniques collectively provide a comprehensive understanding of growth trends, seasonal variations, and external influences affecting the development of mobile banking in Bangladesh (Huda & Chowdhury, 2017).

RESULTS

Visualizing Key Mobile Banking Trends

From January 2016 to April 2024, mobile banking in Bangladesh experienced substantial growth across all key indicators. The number of mobile banking agents increased from approximately 586,901 to more than 1.8 million, while the number of subscribers rose significantly from 33 million to over 220 million, indicating widespread adoption of mobile financial services. Similarly, the number of monthly transactions increased from 117 million to nearly 600 million, reflecting the growing reliance on mobile banking platforms for financial activities. Transaction values also expanded considerably during this period, rising from approximately 16,600 crore Taka to over 140,000 crore Taka. The time-series analysis further reveals periodic spikes in transaction volumes, particularly during major cultural and religious events such as Eid and Pahela Boishakh, when financial activity typically increases due to higher consumer spending and monetary transfers.

Figure 2: Key Mobile Banking Trends 2016-2024



Source: Author's own elaboration, based on collected data (2025).

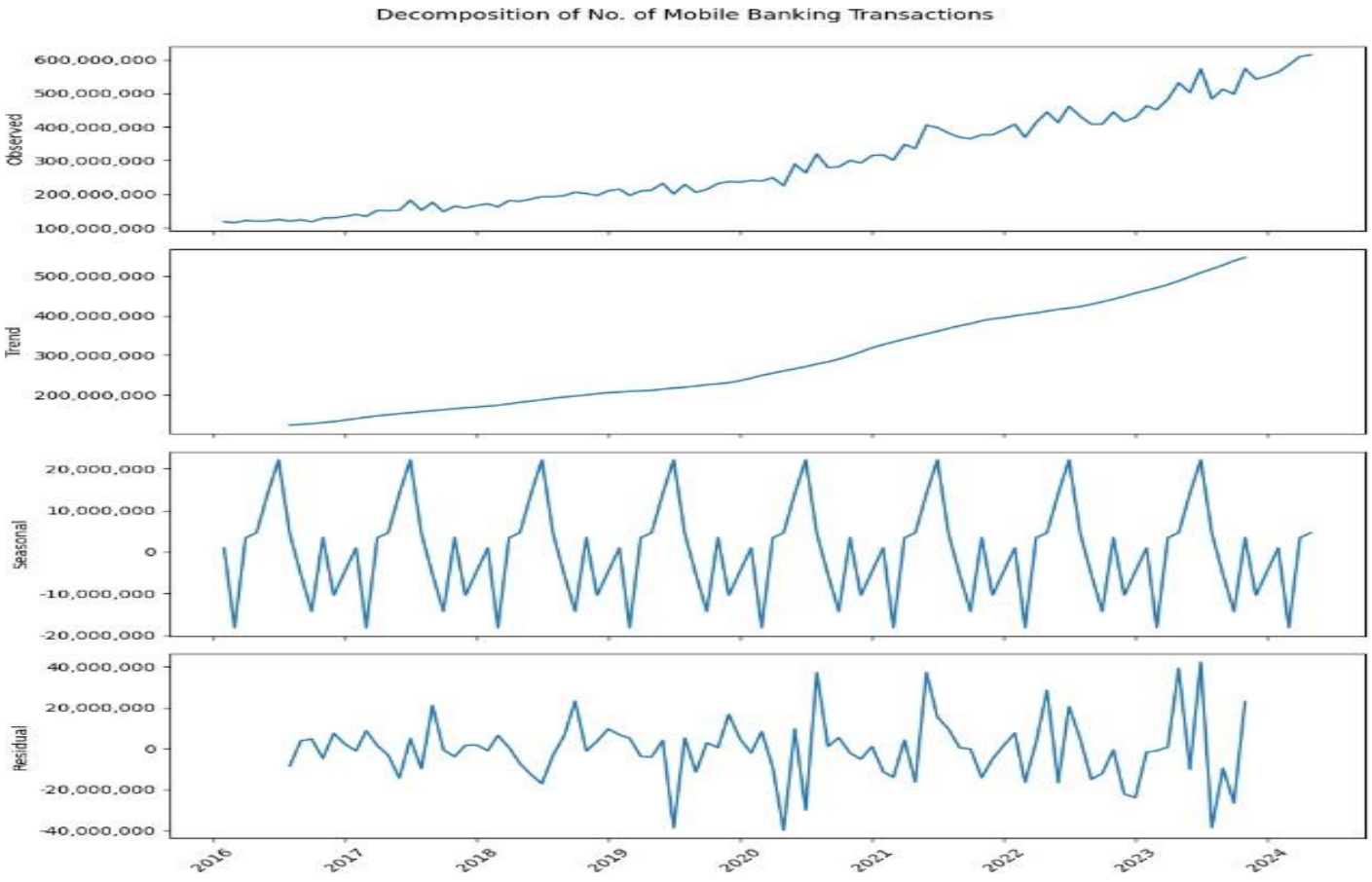
Figure 2 illustrates these trends across four key mobile banking indicators: agents, subscribers, transaction counts, and transaction values. The consistent upward trajectory observed in all four metrics highlights the rapid expansion of digital financial services in Bangladesh over the study period.

These trends indicate an increasing dependence on mobile banking services within the financial ecosystem of Bangladesh. The simultaneous growth in agents, subscribers, transactions, and transaction values reflects the continued expansion of digital financial infrastructure and broader adoption of mobile banking services. Moreover, the observed seasonal peaks suggest that cultural and economic events play an important role in shaping transaction patterns. Overall, the results demonstrate the sustained growth and increasing importance of mobile banking as a key component of the country's financial system.

Decomposition of Time Series

The time-series decomposition of mobile banking transaction data provides important insights into the underlying transaction patterns. The decomposition separates the data into three components: trend, seasonal, and residual. The trend component shows a clear upward trajectory between 2016 and 2024, indicating the continuous expansion of mobile banking usage in Bangladesh. This steady increase reflects the growing adoption of digital financial services and the increasing reliance on mobile platforms for financial transactions. The seasonal component reveals recurring fluctuations in transaction volumes over time. These periodic variations are closely associated with cultural and economic events such as Eid and Pahela Boishakh, during which financial activity typically increases due to higher consumer spending and monetary transfers. The presence of these recurring patterns highlights the influence of socio-cultural factors on mobile banking transaction behavior. The residual component represents irregular fluctuations that are not explained by the long-term trend or seasonal patterns. These variations may arise from short-term economic changes, policy interventions, or other unexpected events affecting transaction activity. Figure 3 presents the decomposition results, illustrating the trend, seasonal, and residual components of mobile banking transactions from 2016 to 2024.

Figure 3: Trend, Seasonal, and Residual over time (2016-2024)



Source: Author's own elaboration, based on collected data (2025).

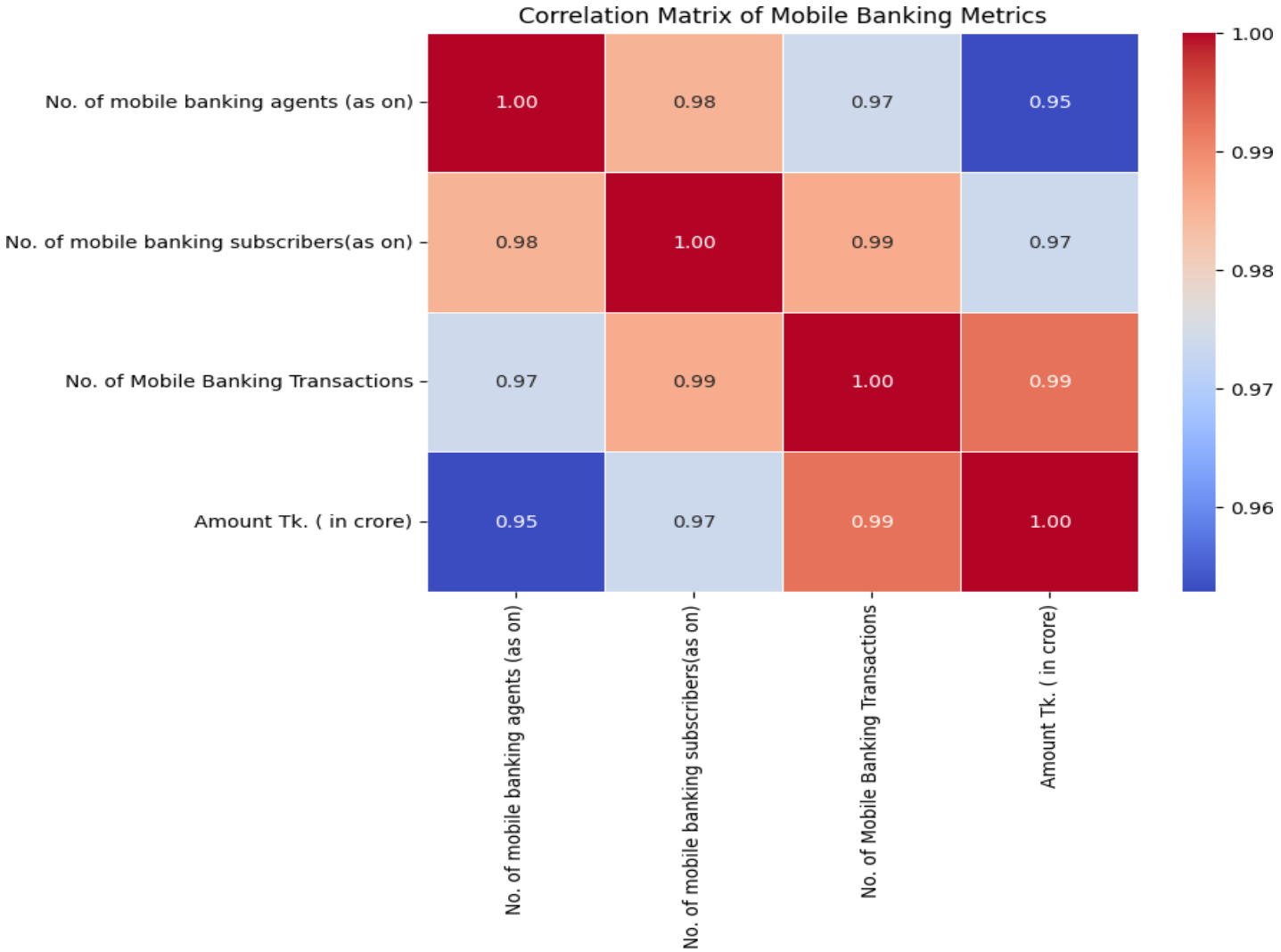
The results highlight a strong long-term upward trend in mobile banking transactions, reflecting the continued expansion of digital financial services in Bangladesh. The seasonal patterns further demonstrate that transaction volumes tend to increase during major cultural and religious events. Together, these findings provide evidence

that both long-term technological adoption and recurring socio-economic factors contribute to the observed growth in mobile banking activity.

Correlation Analysis

The correlation matrix of mobile banking indicators (Figure 4) reveals strong positive relationships among the key variables: the number of agents, subscribers, transactions, and transaction values. These results suggest that the growth of one component of the mobile banking ecosystem is closely associated with the expansion of the others. In particular, the correlation between mobile banking agents and subscribers (0.98) indicates that an increase in the agent network significantly contributes to the growth of the subscriber base by improving service accessibility. Similarly, the correlation between the number of transactions and transaction value (0.99) demonstrates that higher transaction activity naturally leads to larger total transaction volumes. Additionally, the relationship between subscribers and transaction value (0.97) suggests that as more individuals adopt mobile banking services, the overall volume of financial transactions conducted through these platforms increases.

Figure 4: Correlation matrix of mobile banking metrics



Source: Author's own elaboration, based on collected data (2025).

Overall, the strong correlations among these indicators highlight the interconnected nature of mobile banking development. The expansion of the agent network improves accessibility, which encourages greater user adoption and subsequently increases transaction activity and transaction values. These findings emphasize the importance of strengthening mobile banking infrastructure to sustain the continued growth of digital financial services in Bangladesh.

Year-over-Year Growth Visualization

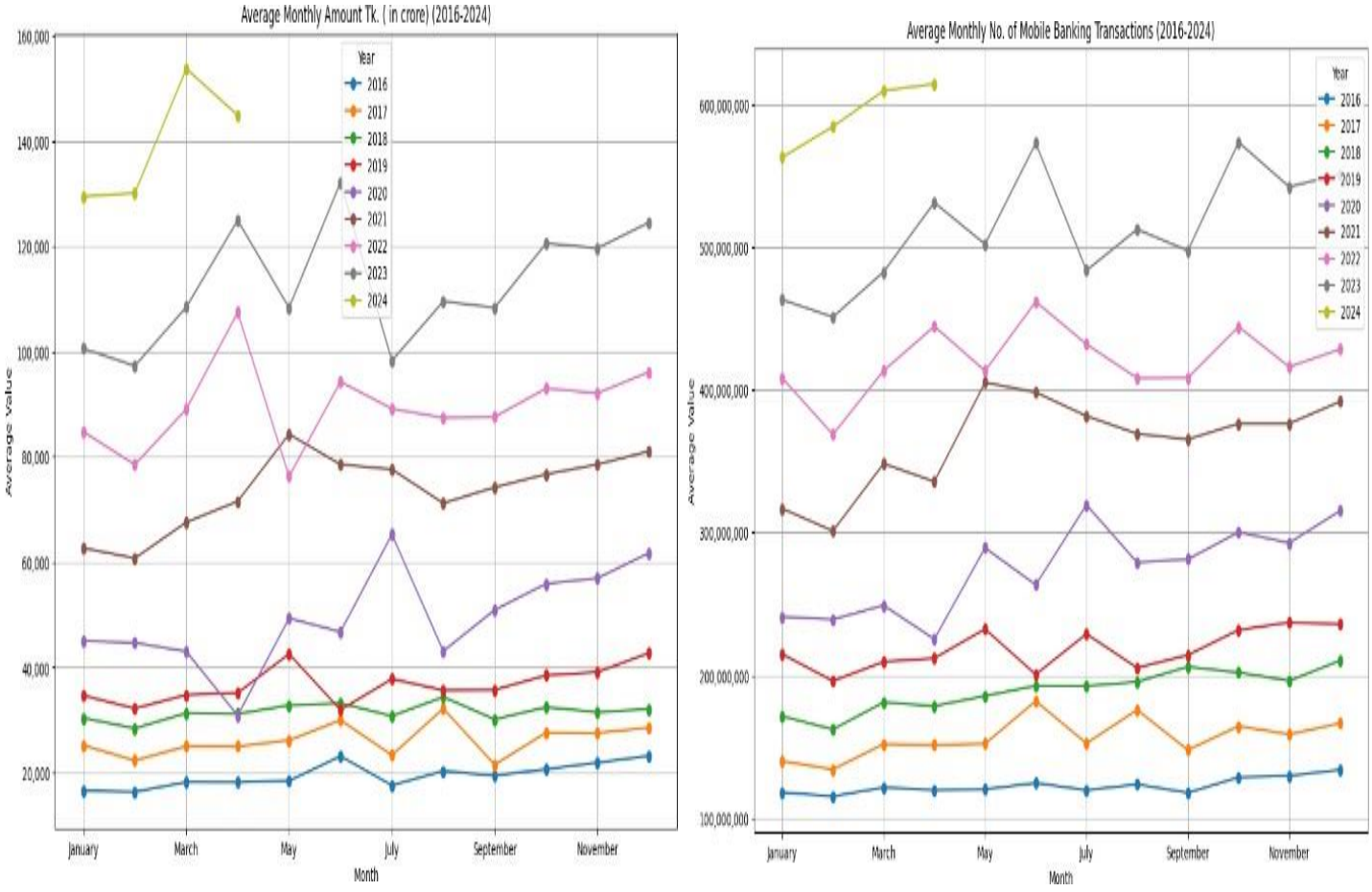
The year-over-year analysis of mobile banking indicators from 2016 to 2024 reveals substantial and consistent growth across all key metrics, including the number of agents, subscribers, transactions, and total transaction value. As illustrated in the first plot of Figure 5, the number of mobile banking agents steadily increased from approximately 586,901 in early 2016 to more than 1.7 million by 2024. A particularly noticeable acceleration occurred after 2020, likely influenced by the COVID-19 pandemic, which increased demand for digital financial services as physical banking activities became limited.

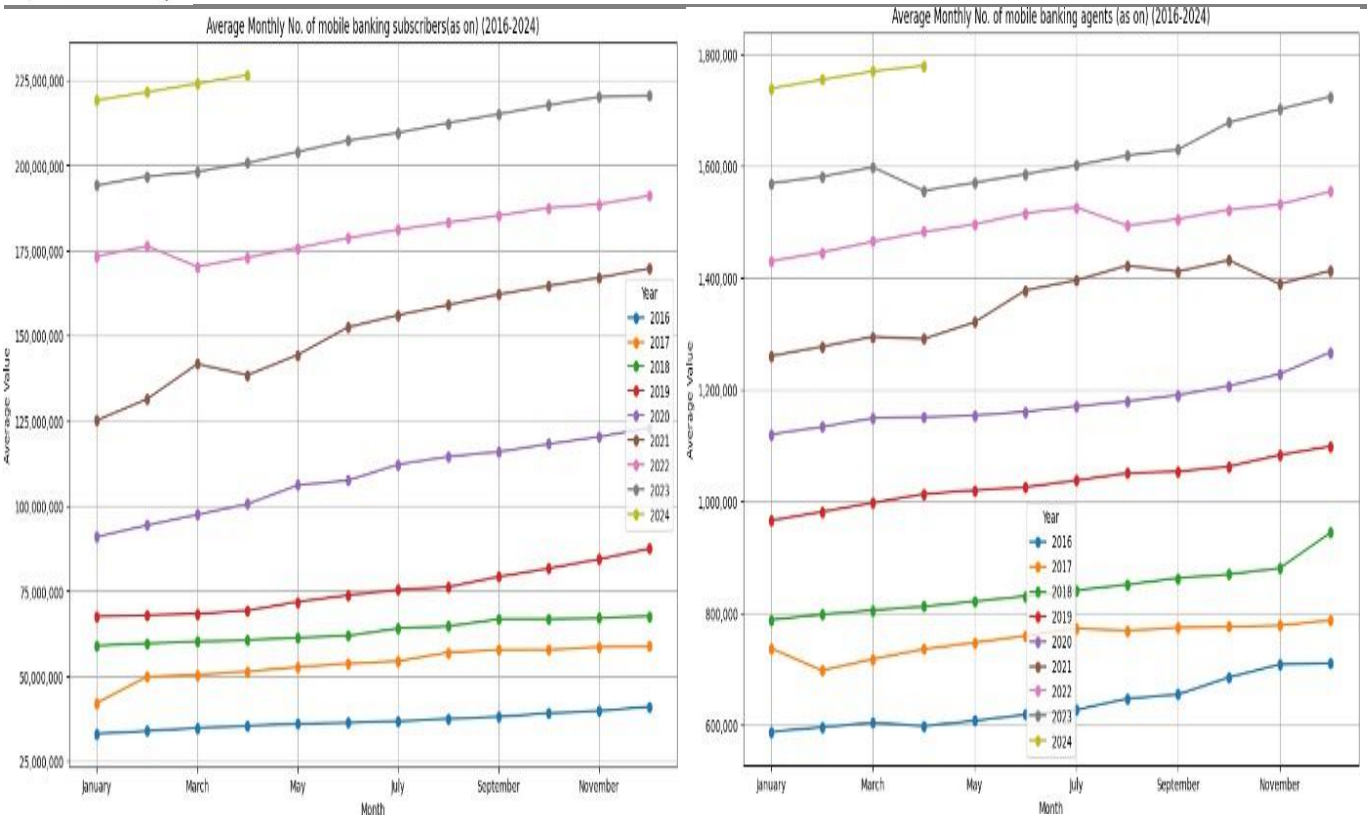
The second plot shows a similar pattern for mobile banking subscribers, which increased significantly from 33 million in January 2016 to over 220 million by 2024. The most rapid expansion occurred between 2020 and 2021, when many individuals relied more heavily on mobile banking platforms for everyday financial transactions during lockdown periods.

The third plot illustrates the growth in monthly mobile banking transactions, which rose from approximately 117 million transactions per month in 2016 to nearly 600 million by 2024. This sharp increase reflects the expanding role of mobile banking in facilitating financial transactions such as bill payments, fund transfers, and digital purchases.

Similarly, the fourth plot shows that the monthly transaction value increased from around 16,600 crore Taka in 2016 to more than 140,000 crore Taka by 2024. This growth was particularly pronounced during the pandemic period, partly due to increased digital payments, government financial transfers, and business transactions conducted through mobile platforms.

Figure 5: Yearly growth of mobile banking in Bangladesh





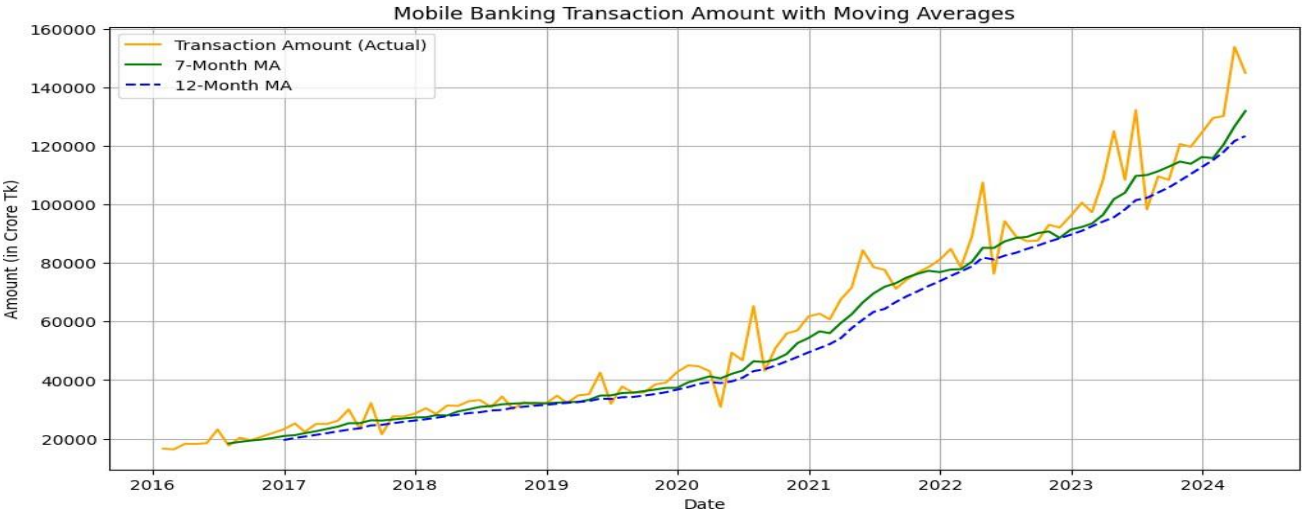
Source: Author's own elaboration, based on collected data (2025).

Finally, these results demonstrate the rapid expansion of mobile banking services in Bangladesh over the study period. The COVID-19 pandemic played a significant role in accelerating this transition toward digital financial services. Even after the pandemic period, the continued growth of agents, subscribers, transactions, and transaction values suggests that mobile banking has become an essential component of the country's financial system and an important driver of financial inclusion.

Moving Average Calculation

The moving average analysis, presented in Figure 6, smooths short-term fluctuations in mobile banking transaction amounts and highlights the underlying long-term trend. The figure displays both the actual transaction values and the calculated 7-month and 12-month moving averages.

Figure 6: Moving average of mobile banking transaction amount



Source: Author's own elaboration, based on collected data (2025).

By applying these moving averages, short-term volatility is reduced, allowing a clearer observation of long-term changes in transaction activity. Both the 7-month and 12-month moving averages show a consistent upward trend from 2016 to 2024, indicating sustained growth in mobile banking transactions over the study period. While the actual transaction values (represented by the orange line) exhibit periodic fluctuations, the moving average curves provide a smoother representation of the overall growth trajectory. These short-term fluctuations may be influenced by seasonal events, economic conditions, or temporary market changes. However, the consistent upward movement of the moving averages confirms the long-term expansion of mobile banking transactions in Bangladesh.

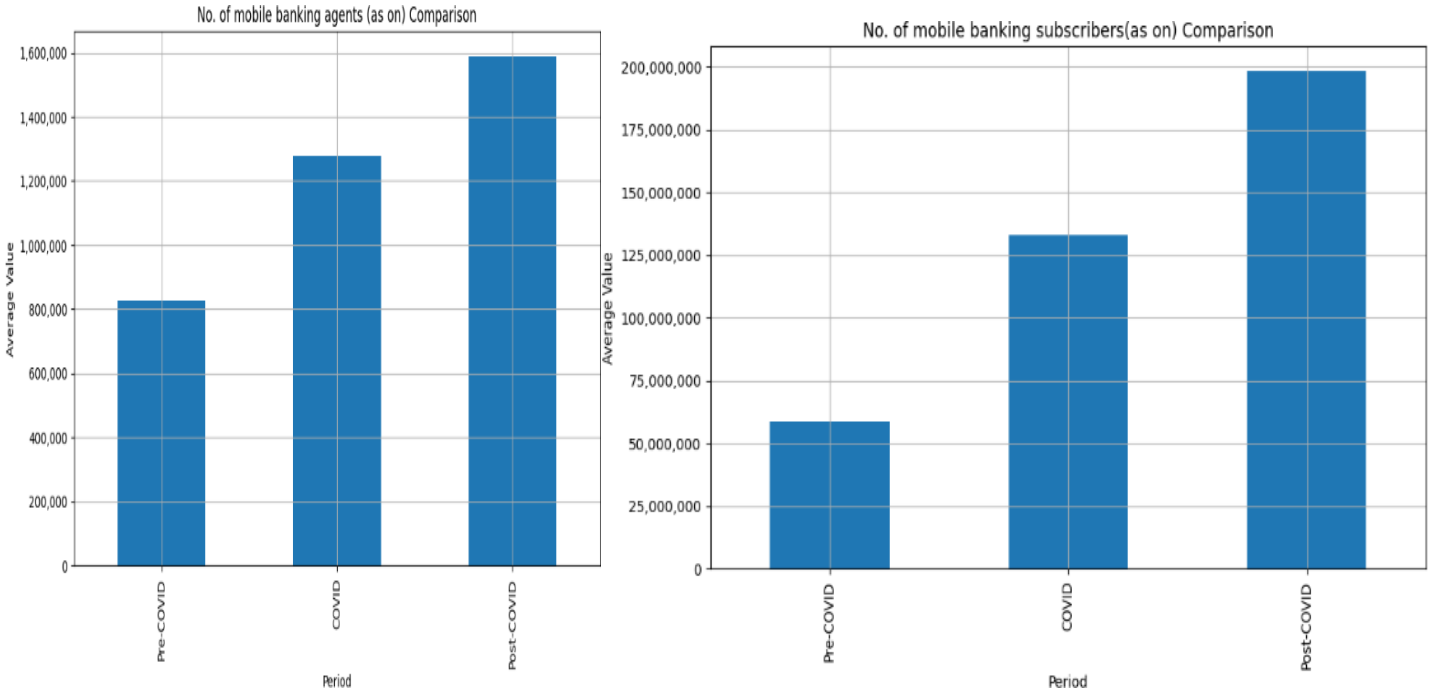
Overall, the moving average analysis demonstrates that mobile banking transactions have experienced strong and sustained growth over time. The smoothing of short-term variations confirms that the overall trend remains positive, reflecting the increasing adoption of digital financial services and the growing role of mobile banking within Bangladesh's financial system.

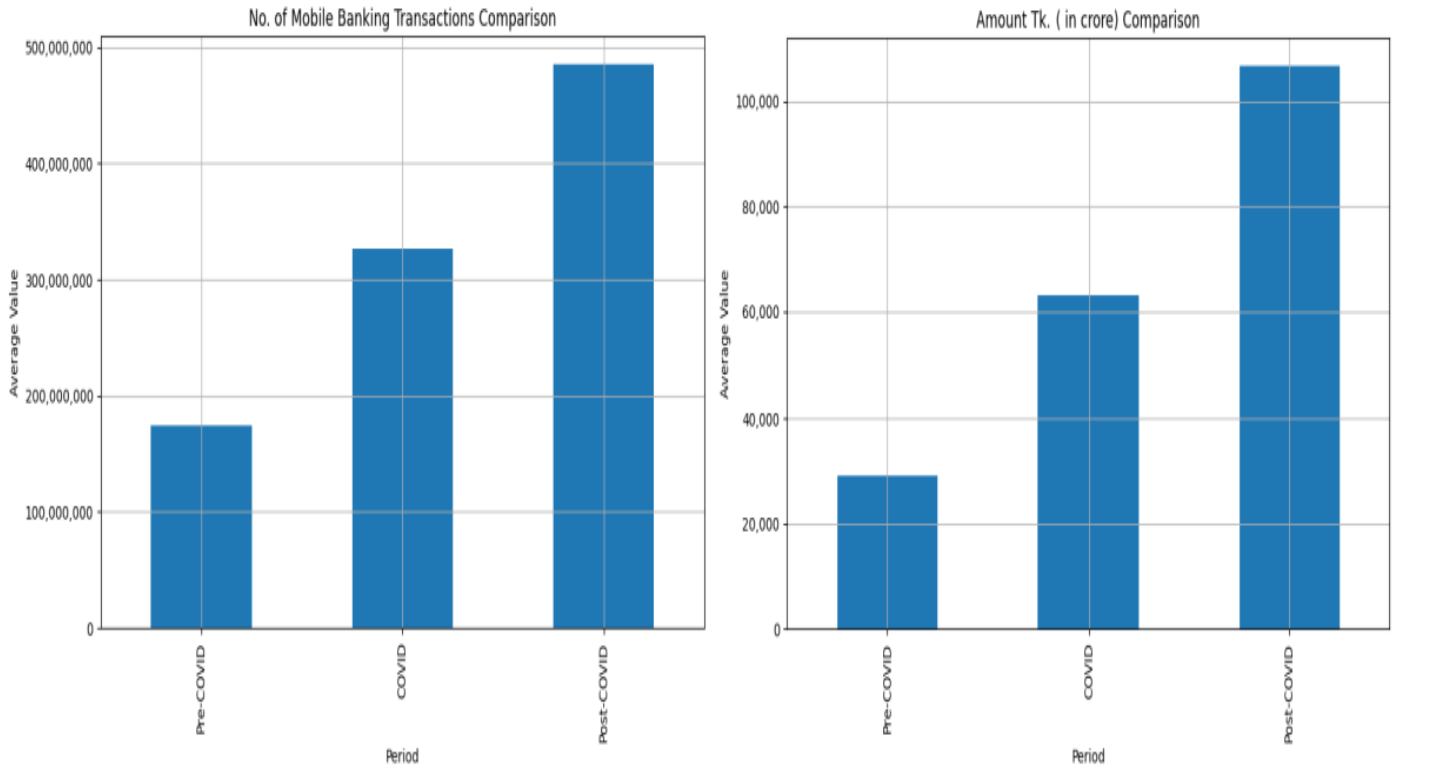
Comparative Analysis (Pre-COVID, COVID, Post-COVID)

The comparison of mobile banking trends across the pre-COVID, COVID-19, and post-COVID periods (Figure 7) reveals substantial growth in all key indicators, with the COVID-19 pandemic acting as a major catalyst for the adoption of digital financial services. Before the pandemic, mobile banking services in Bangladesh were already experiencing steady growth. During the pre-COVID period, the number of agents reached approximately 828,085, while the subscriber base expanded to around 58.7 million users. At that time, mobile banking systems processed an average of 174.3 million transactions per month, with a total transaction value of approximately 29,176 crore Taka. During the COVID-19 period, the adoption of mobile banking increased significantly. The number of agents expanded to approximately 1.28 million, while the number of subscribers rose to about 133 million. Monthly transactions increased to around 326 million, and transaction values rose sharply to approximately 63,145 crore Taka. This rapid expansion can be attributed to lockdown measures, social distancing requirements, and the increased need for contactless financial services.

In the post-COVID period, the mobile banking sector continued to grow, although at a slightly moderated pace. The number of agents increased to approximately 1.59 million, while the number of subscribers expanded further to 198.3 million. Monthly transactions averaged 485 million, and the total transaction value increased to approximately 106,687 crore Taka. These results indicate that many of the digital financial behaviors adopted during the pandemic have persisted beyond the crisis period.

Figure 7: Mobile-banking trends across three distinct periods, Pre-COVID, COVID, and Post-COVID





Source: Author's own elaboration, based on collected data (2025).

Altogether, the comparative analysis demonstrates that the COVID-19 pandemic significantly accelerated the adoption of mobile banking in Bangladesh. Although growth rates moderated after the pandemic, the continued expansion of mobile banking services indicates that digital financial transactions have become a permanent and essential component of the country's financial landscape.

Monthly Trend Analysis

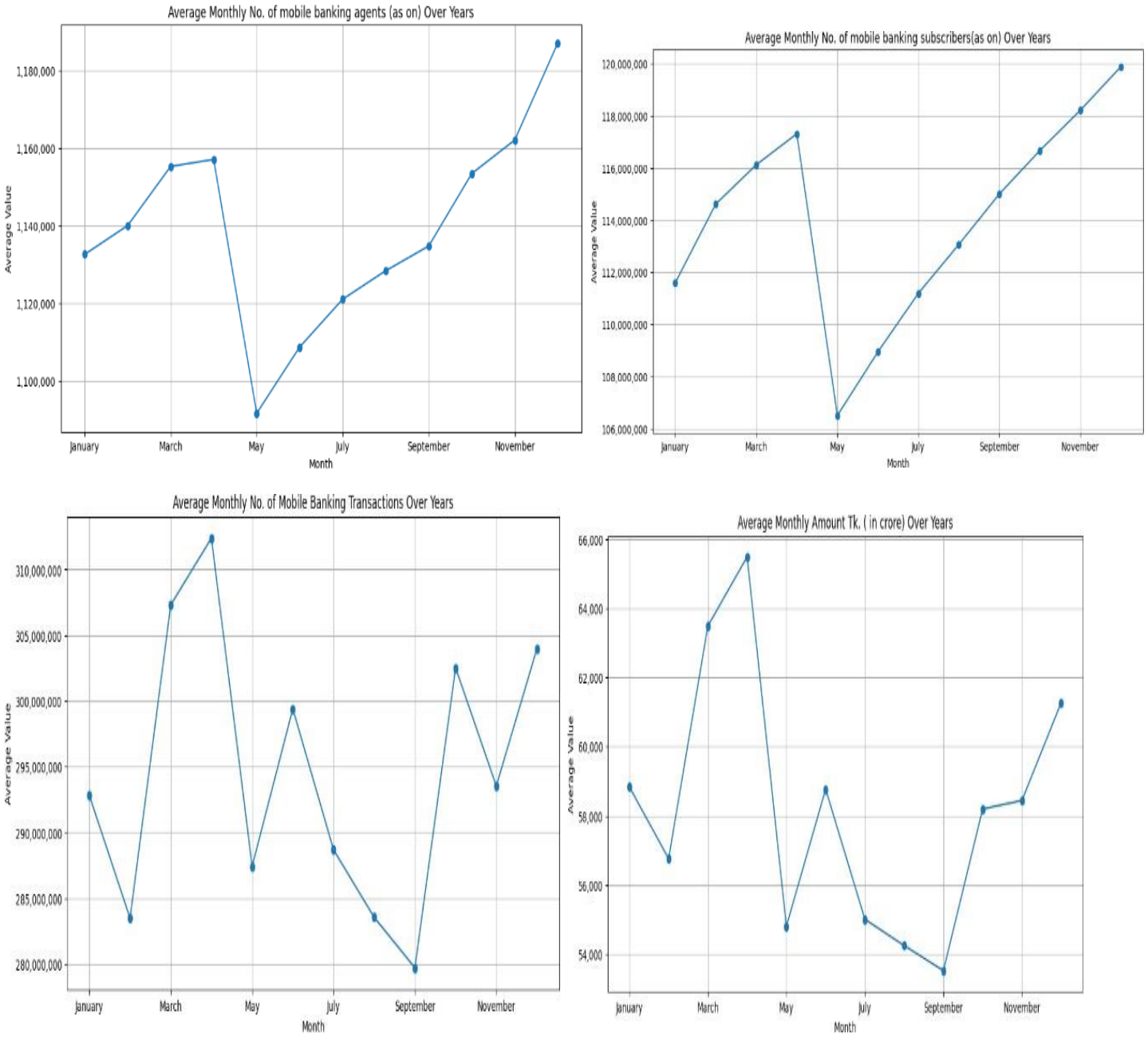
The monthly trend analysis of mobile banking indicators reveals clear seasonal fluctuations and event-driven variations in the use of mobile banking services in Bangladesh. Figure 8 illustrates the average monthly patterns for mobile banking agents, subscribers, transactions, and transaction amounts. The results indicate that the number of mobile banking agents tends to peak in December, which may be associated with increased economic activity during the end-of-year period.

Seasonal business activities, promotional campaigns, and increased consumer spending during this time may contribute to the higher demand for mobile banking services and the expansion of agent networks. A similar pattern is observed for mobile banking subscribers, with higher values also recorded in December. This increase may reflect end-of-year marketing campaigns and promotional efforts by service providers aimed at attracting new users to mobile banking platforms.

The monthly transaction data show notable peaks during March and April, which correspond with major cultural and religious events such as Eid-ul-Fitr and Pahela Boishakh (Bengali New Year). These events are typically associated with increased financial activities, including gift purchases, family transfers, and festival-related spending, which contribute to higher transaction volumes.

Transaction amounts display a comparable pattern, with increased values observed in March, April, and October. The peak in April is closely associated with Pahela Boishakh, while the increase in October coincides with Durga Puja, a major Hindu festival characterized by substantial consumer spending on celebrations and religious activities. Additionally, Eid-ul-Adha, which occurs approximately two months after Eid-ul-Fitr according to the Islamic lunar calendar, also contributes to increased financial transactions, particularly in August or September depending on the lunar cycle.

Figure 8: Monthly trend analysis of mobile banking metrics



Source: Author's own elaboration, based on collected data (2025).

Overall, the results suggest that cultural and religious events play a significant role in shaping mobile banking activity in Bangladesh. Festivals such as Eid-ul-Fitr, Eid-ul-Adha, Durga Puja, and Pahela Boishakh lead to noticeable increases in financial transactions and mobile banking usage. While fixed-calendar events such as Pahela Boishakh and Durga Puja produce predictable seasonal peaks, lunar-calendar events such as Eid introduce variability in the timing of transaction spikes. These findings highlight the influence of socio-cultural factors on digital financial behavior and provide useful insights for financial institutions seeking to manage transaction demand during peak periods.

DISCUSSION

This study provides a comprehensive analysis of mobile banking trends in Bangladesh between January 2016 and April 2024, revealing consistent growth across key indicators such as the number of mobile banking agents, subscribers, transaction volumes, and transaction values. The results demonstrate a strong upward trajectory in mobile banking activity over the study period, reflecting the increasing reliance on digital financial services within the country. The statistical analyses, including time-series decomposition, moving average analysis, and

correlation analysis, highlight important patterns in the evolution of mobile banking services. In particular, the strong correlations observed among agents, subscribers, transactions, and transaction values indicate that these elements of the mobile banking ecosystem are closely interconnected. The expansion of the agent network plays a critical role in improving service accessibility, which in turn encourages higher adoption of mobile banking services and increased transaction activity.

The findings also confirm the significant influence of the COVID-19 pandemic on the adoption of digital financial services. During the pandemic period, the number of agents increased substantially from approximately 828,085 to 1.59 million, while the number of subscribers expanded from 58.7 million to 198.3 million. Similarly, the volume of mobile banking transactions more than doubled during this period. These trends suggest that restrictions on physical movement and limited access to traditional banking services accelerated the adoption of mobile banking platforms as a convenient and contactless alternative. The moving average analysis further confirms the long-term growth of mobile banking transactions by smoothing short-term fluctuations in transaction values. This analysis demonstrates that despite temporary variations caused by seasonal events or economic factors, the overall trend of mobile banking activity has remained strongly upward. Seasonal patterns observed in the data also reveal that cultural and religious events significantly influence mobile banking activity in Bangladesh. The results indicate that agent and subscriber growth tends to peak in December, likely due to increased economic activity and promotional campaigns at the end of the year. In contrast, transaction volumes and transaction values show peaks during March and April, which correspond with major cultural and religious celebrations such as Eid and Pahela Boishakh. These recurring seasonal patterns suggest that social and cultural factors play an important role in shaping digital financial behavior.

Overall, the findings highlight the growing importance of mobile banking in promoting financial inclusion in Bangladesh. By expanding access to financial services, mobile banking platforms enable individuals in rural and underserved areas to participate more actively in the formal financial system. However, sustaining this growth will require continued improvements in digital security, financial literacy, infrastructure development, and service innovation. Addressing these challenges will be essential for ensuring the long-term sustainability and resilience of mobile banking services in Bangladesh.

Limitations And Future Research

While this study provides valuable insights into the growth and evolution of mobile banking in Bangladesh, several limitations should be acknowledged. First, the dataset used in this study was obtained from official reports published by Bangladesh Bank. Although these data are reliable and comprehensive, they primarily capture aggregated statistics and may not fully reflect all aspects of mobile banking activities. Important factors such as regional variations, customer satisfaction, user experience, and detailed service usage patterns were not included in the dataset (Bangladesh Bank, 2020). Second, the analysis covers the period from January 2016 to April 2024, which limits the ability to examine longer historical trends in mobile banking adoption prior to 2016. Including earlier data could provide a more comprehensive understanding of the long-term evolution of mobile financial services in Bangladesh (Rahman, 2020). Furthermore, the study focuses mainly on key quantitative indicators—such as the number of agents, subscribers, transactions, and transaction values—without incorporating broader external factors such as macroeconomic conditions, technological developments, regulatory changes, or shifts in consumer behavior (Sarker, Podder, & Alam, 2020). Another limitation is that while the study identifies seasonal patterns in mobile banking activity, the underlying behavioral drivers of these fluctuations were not examined in detail. Future research could complement quantitative analysis with qualitative approaches to better understand user behavior and motivations behind mobile banking usage (Islam et al., 2019).

Future studies could extend this research in several ways. Incorporating longer time-series data, including observations prior to 2016, would allow for a more comprehensive analysis of long-term trends in mobile banking adoption (Kumar et al., 2017). Additionally, future research could include customer-level indicators, such as user satisfaction, transaction success rates, and fraud-related incidents, to provide a more detailed assessment of mobile banking performance (Madhavi, 2012). Qualitative research methods, such as interviews with mobile banking users and agents could also provide deeper insights into user behavior, service preferences, and adoption challenges (Mousumi & Jamil, 2010). Furthermore, emerging technologies such as artificial intelligence, blockchain, and 5G networks may significantly influence the future development of mobile banking services and

should be examined in future studies (Aker & Mbiti, 2010). Comparative research analyzing mobile banking development in Bangladesh alongside other South Asian or developing economies could also help identify best practices and policy implications for improving digital financial services (Rahman & Khan, 2021). Additionally, examining the impact of regulatory frameworks and government policies on mobile banking adoption would provide further insights into how institutional interventions shape the development of digital financial ecosystems (Huda & Chowdhury, 2017).

By addressing these limitations and exploring these research directions, future studies can contribute to a deeper understanding of mobile banking development and support the formulation of effective strategies and policies to enhance financial inclusion and digital financial innovation in Bangladesh (Weber & Darbellay, 2010).

CONCLUSION

This study provides a comprehensive analysis of mobile banking trends in Bangladesh from January 2016 to April 2024. The findings reveal substantial growth across key indicators, including the number of mobile banking agents, subscribers, transaction volumes, and transaction values. This growth reflects the increasing importance of mobile banking as a convenient, accessible, and contactless financial service, particularly during periods of economic disruption such as the COVID-19 pandemic. The analysis demonstrates strong relationships among mobile banking indicators, highlighting the interconnected nature of the mobile banking ecosystem. In particular, the expansion of the agent network plays an important role in increasing service accessibility, which contributes to higher subscriber adoption and increased transaction activity. These findings underscore the significance of agent networks in supporting the continued growth of mobile banking services. The COVID-19 pandemic represented a major turning point for the adoption of digital financial services. The results show that mobile banking activity increased significantly during the pandemic period as individuals and businesses relied more heavily on digital platforms for financial transactions. The sustained growth observed during the post-COVID period suggests that many of these behavioral changes have persisted beyond the immediate crisis. Seasonal patterns were also identified in mobile banking activity, with transaction peaks occurring during major cultural and religious events such as Eid and Pahela Boishakh. These recurring fluctuations indicate that socio-cultural factors play an important role in shaping digital financial behavior in Bangladesh. The findings have important implications for policymakers and financial institutions. Continued expansion of mobile banking services will require improvements in digital security, financial literacy, technological infrastructure, and service innovation. Strengthening these areas can further support financial inclusion by enabling underserved and unbanked populations to access formal financial services. Overall, this study contributes to the growing body of literature on digital finance by providing a detailed empirical analysis of mobile banking trends in Bangladesh. The insights generated from this research offer valuable guidance for policymakers, financial institutions, and researchers seeking to support the sustainable development of mobile banking and digital financial ecosystems.

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