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Financial Inclusion through Agent Banking in Bangladesh: A Panel Data Analysis of Outreach Determinants

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Abstract

Agent banking has become a key financial inclusion channel since its formal launch in 2013 and now has more than 21 million accounts opened by 2023. Bank-level determinants of the breadth of outreach have been relatively understudied, despite their fast growth. This study takes into account six bank-level variables: total assets, tenure, agent outlet density, operational efficiency, liquidity strategy, and credit risk, which were computed from an unbalanced panel data set of 30 commercial banks for the period 2016-2024. Estimation uses a cluster-robust Fixed Effects model, which is validated using the Hausman test of specifications. The results show that the size of institutions (total assets) and the maturity of their operations (tenure) are important positive predictors of outreach breadth, whereas lending intensity (defined as loan-to-deposit ratio) is a significant negative predictor. There are no statistically significant effects of agent outlet density, operational efficiency, or credit risk. These results highlight the fact that sustainable agent banking outreach is a product of size and experience, not necessarily outlet expansion or cost reduction, and thus have implications for regulatory design and bank-level strategy for agent banking outreach in Bangladesh.

Keywords: Agent banking, financial inclusion, outreach breadth, fixed effects, Bangladesh.

1. Introduction

The agent banking model, a branchless banking approach in which the retail outlets serve as agents for the banks, has become a cost-effective way to bring banking services to the unbanked in the developing world (Ivatury and Mas, 2008; Kumar et al., 2006). The model helps banks reach beyond their traditional branches and to reduce delivery cost by outsourcing cash in and cash out, deposits, bill payment, and account opening to local retailers (Ivatury and Mas, 2008). In Kenya and Brazil, agent networks have enhanced access to formal financial services in remote and low-income regions, with the potential to have a major impact on access to financial services in other developing countries. Agent banking was formally introduced in Bangladesh in 2013 to tackle the financial access crisis in rural areas and is now one of the key financial inclusion channels

providing rapid growth in accounts and financial outreach (Bangladesh Bank, 2013; Bangladesh Bank, 2024). Outreach is generally interpreted in terms of breadth, or the size of the reach via active clients/accounts, and this study adds to the existing literature by measuring change in breadth over time and determining what factors at the bank level contributed to that change (Schreiner, 2002).

It is also suggested in the literature that outreach can be bank-specific. Financial viability to expand agent banking may be more in the case of bigger banks, and tenure may be indicative of the growth of institutional learning and trust over time (Barney, 1991). Agent density may have network effects, operational efficiency, liquidity strategy, and credit risk may affect the sustainable expansion of banks' agents (Katz and Shapiro, 1985; Cull et al., 2007; Stiglitz and Weiss, 1981). But the evidence on these aspects in Bangladesh is scarce, particularly for commercial banks. To study the width of agent banking outreach and determinants at the bank level, the present study thus focuses on the extent of agent banking outreach and its bank-level factors based on the panel data of the Bangladesh Bank.

The study, therefore, addresses the following research questions: what is the current trend in the agent banking outreach breadth in Bangladesh, and how do total assets, tenure, agent density, operational efficiency, liquidity strategy, and credit exposure risk influence it? Accordingly, the study aims to examine outreach trends and analyze the effects of these six bank-level determinants on agent banking breadth using panel data from Bangladesh Bank.

2. Literature Review

Outreach is used to refer to the effort by financial institutions to extend banking services to an ever-wider audience, with the breadth of outreach capturing the scale and reach of that outreach (Jonathan Conning, 1999).

Breadth of outreach is the extent of access a financial institution offers and is typically quantified by the number of active clients/accounts. Breadth is important in financial inclusion research because it tells us how much of the population a financial service is reaching, particularly the previously unbanked. Agent banking is an ideal – but not the only – measure of outreach since it measures the number of people accessing the service and not the number of outlets. Previous research on outreach and financial inclusion has generally demonstrated that branchless models can increase access by lowering distance and transaction costs and hence can be appropriate for underserved markets (Schreiner, 2002; Ivatury & Mas, 2008).

One of the reasons for outreach growth is bank capacity. Bigger banks typically possess more capital, better balance sheets, and have the capacity to invest in new technology, agent recruitment, monitoring, and liquidity management. Likewise, tenure may be an important factor since banks with agent banking for a longer time may have accumulated experience, trust and efficiency over time. Whenever networks become mature, the effect of agent density may wane, but it is generally anticipated that higher densities of agents will facilitate outreach by providing more access points.

Other factors like operational efficiency, liquidity strategy and credit risk are also pertinent as they influence the sustainability and prioritization of outreach activities (Barney, 1991; Ozili, 2021).

Even with these understandings, there is a lack of literature in one important aspect; few studies have focused on the combined effect of the bank-level determinants as a case of commercial banks in Bangladesh. Most of what has been done is description or a cross-section. In 2013, Bangladesh Bank launched agent banking to serve the financially excluded and rural population by engaging financial agents, and the system is designed as a lower cost approach to access financially excluded clients (Bangladesh Bank, 2013; The Daily Star, 2023). This leaves a void of evidence regarding the factors that motivate agent banking outreach in Bangladesh. This study aims to test whether total assets, tenure, agent density, operational efficiency, liquidity strategy and credit exposure risk are associated with outreach breadth (Uddin & Sultana, 2019; Nisha et al., 2020).

3. Research Methodology

The chapter elaborates the empirical method adopted to study the factors impacting breadth of outreach in agent banking in Bangladesh. It highlights bank-specific features, operational efficiency, liquidity policy and credit risk as the key determinants.

The study is carried out through a quantitative approach by using secondary data collected from the quarterly report of agents, banking report of Bangladesh Bank and financial statement of the banks. The sample comprises 30 commercial banks during 2016-2024, taking the year end value in Q4 in each of the years as a representative snapshot of each bank's position in the year.

The dependent variable is breadth of outreach (log of total active agent banking accounts). The independent variables are total assets, tenure, agent density, operational efficiency, liquidity strategy, and credit risk. GDP growth and inflation are not included in the fixed effects model as they are controlled for by year effects; capital adequacy ratio is a control variable.

Model: Breadth of Outreach

$$BO_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 TEN_{it} + \beta_3 AD_{it} + \beta_4 EFF_{it} + \beta_5 LDR_{it} + \beta_6 LDR_{it} + \beta_7 CAR_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

The empirical analysis starts with descriptive statistics, normality testing, correlation analysis, and multicollinearity testing. Both fixed and random-effects models are estimated, and the Hausman test is used to select the model. The main results are estimated using a fixed-effects regression approach, with bank clustering and year dummies.

The study is based on secondary data that are publicly available, and thus does not include issues of privacy or confidentiality.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1: Descriptive analysis

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew	Kurt
Breadth	270	10.557	2.558	1.099	15.769	-.455	3.868
Total Assets	270	413000	405000	24730	2474863	2.592	10.773
Tenure	270	3.233	2.753	0	9	.444	2.04
Density	270	4.272	8.605	.007	51.562	3.612	17.027
Efficiency	270	267.892	3550.834	-101.43	58397	16.339	267.986
Liquidity	270	85.036	13.69	36.09	140.97	-.672	6.031
Credit Risk	270	7.789	11.045	0	90.72	4.66	30.231

Descriptive statistics of 30 commercial banks operating agent banking service in Bangladesh are shown in Table 3 for 2016-2024 (N = 270). The mean breadth of outreach is 10.557 (SD = 2.558) and is approximately normally distributed, suggesting the log transformation is appropriate. The distribution of total assets is very skewed (skew = 2.592) and is well documented to have a concentration in Bangladesh's banking sector. Tenure (0-9 years, mean = 3.233) is consistent with progressive market entry post-2013. High kurtosis (17.027) in agent outlet density suggests that there are fewer banks with more developed networks. The distributional irregularity is extremely high for operational efficiency (Mean = 267.89, SD = 3,550.83), with all but one outlier observation.

4.2 Correlation and Multicollinearity

Table 2: Correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Breadth	1.000									
(2) Total assets	0.389*	1.000								
(3) Tenure	0.676*	0.208*	1.000							
(4) Density	0.573*	0.009	0.299*	1.000						
(5) Efficiency	0.025	0.017	0.017	-0.029	1.000					
(6) Liquidity	-0.151*	-0.245*	0.166*	-0.230*	-0.007	1.000				
(7) Credit Risk	0.053	0.290*	0.234*	-0.107	-0.019	0.043	1.000			
(8) CAR	-0.077	-0.305*	-0.106	-0.032	0.004	-0.005	-0.636*	1.000		
(9) Inflation	0.254*	0.224*	0.691*	0.037	-0.042	0.160*	0.357*	-0.172*	1.000	
(10) GDP	0.295*	0.248*	0.732*	0.073	0.042	0.178*	0.191*	-0.060	0.674*	1.000

The Pearson correlation analysis (Table 4) shows that breadth is significantly and positively associated with total assets ($r = 0.389$), tenure ($r = 0.676$) and density ($r = 0.573$) and significantly and negatively associated with liquidity ($r = -0.151$, $p = 0.030$). There is no significant bivariate relationship between efficiency and breadth or credit risk and breadth. Notably, there is a high association of tenure with inflation ($r = 0.691$) and GDP growth ($r = 0.732$), which can be

interpreted as the macroeconomic expansion during agent banking's scaling time. No significant multicollinearity issues are observed among all the predictors from the VIF diagnostics (Table 5, mean VIF = 1.75; maximum VIF = 2.33).

4.3 Model Selection

Table 3: Hausman Test

Test	Chi-square	p-value	Decision
Hausman specification test	27.21	0.0072	Fixed Effects preferred

The Hausman specification test ($\chi^2(12) = 27.21$, $p = 0.007$) is used to ascertain whether the null hypothesis of random effects is rejected or not, and, therefore, if Fixed Effects estimation is appropriate. Theoretically, this is a consistent situation with the Resource Based View because time-invariant bank-specific characteristics (such as brand recognition, branch networks, agent relationships) are systematically related to regressors.

4.4. Regression results

Table 4: Fixed Effect Regression Analysis

Breadth	Coef.	Std. Err.	t-value	p-value
Total assets	0	0	3.68	.001***
Tenure	.619	.072	8.55	.000***
Density	-.034	.023	-1.50	.144
Efficiency	0	0	-0.31	.757
Liquidity	-.038	.015	-2.49	.019**
Credit risk	.005	.008	0.56	.577
CAR	-.019	.028	-0.69	.495

Mean dependent variable	10.557	SD dependent variable	2.558
R-squared	0.692	Number of observations	270

*** $p < .01$, ** $p < .05$, * $p < .1$

Table 4 provides cluster-robust Fixed Effects estimates (within $R^2 = 0.692$, $F = 2,664.93$, $p < 0.001$) showing the model accounts for 69.2% of the variation in breadth within banks.

There is a positive and significant correlation between Total assets and breadth ($p = 0.001$), supporting H1. As expected from Financial Intermediation Theory (Diamond and Dybvig, 1983), and previous Bangladesh studies (Kabir et al., 2024; Nisha, 2020), larger banks have more resources for investing in agents, technology and monitoring systems.

Each additional year of operation is the strongest predictor ($\beta = 0.619$, $p < 0.001$), and there is a 0.619 unit increase in logged active accounts per additional year of operation, consistent with H2. This within-bank effect is an affirmation that the growth of outreach would be generated from operational experience, a finding predicted by Rifat (2025) and by the Institutional Theory which contends that as a regulatory system matures, its participation barriers are reduced progressively (Ozili, 2023).

The agent outlet density was found to be statistically insignificant ($p = 0.144$), thus the null hypothesis (H3) was accepted. Although there is a high bivariate correlation ($r = 0.573$), the correlation switches signs after including bank fixed effects and tenure, indicating that density is in fact capturing underlying bank size and experience. This suggests a downward trend in more developed networks, where further outlets lead to reduced returns in terms of new customers, a trend that is not reflected in the linear assumption of Transaction Cost Theory on access costs.

There is also insignificant relationship between operational efficiency and H4 ($p = 0.757$). The cost to income ratio is not very sensitive to agent channel growth as agent operations contribute a small percentage of total banking activity. This is in contrast with the study of MFI in which the evidence suggests that agents' income is not linked to the efficiency of the parent bank, and consistent with the Bangladesh agent banking model, where agents receive commission fees, and the efficiency of the parent bank is structurally separate from the income of the agents (Hermes et al. 2011, Cull et al. 2009).

The results shows that the liquidity strategy (Loan to deposit ratio) is negatively related to the growth of breadth, which is consistent with the hypothesis H5 ($\beta = -0.038$, $p = 0.019$). Banks that are more aggressive with their lending focus less resources and attention on agent banking. This is in line with the Bangladesh Bank statistics that agent banking is mostly deposit based (Bangladesh Bank, 2023), and the results that the deposit mobilizing institutions reach a larger number of clients (Hartarska & Nadolnyak, 2007; Serrano-Cinca et al., 2023).

The credit risk, or NPL ratio, is not significant ($p = 0.577$), so that H6 is accepted. In Bangladesh, however, the NPL dynamics in agent banking do not have an automatic link to outreach variation because agent banking is structurally separate from the lending book, with most of its activities taking place in the deposit mobilization and remittance parts of the business. Unlike the MFI contexts, in which NPLs have constraint implications for the inclusion activities, in Bangladesh, the link between NPL and outreach variation is not automatic, as agent banking is structurally

distinct from the lending book with its activities largely revolving around deposit mobilization and remittances.

Similarly, the regulatory capital buffers (capital adequacy ratio) are insignificant ($p = 0.495$), suggesting that capital buffers do not explain within-bank outreach variation on their own.

Table 5: Summary table (Expected and Actual result comparison)

Variable	Expected Sign	Actual Sign
Total Assets	Positive (+)	Supported
Tenure	Positive (+)	Supported
Density	Positive (+)	Rejected
Efficiency	Negative (-)	Rejected
Liquidity	Negative (-)	Supported
Credit Risk	Negative (-)	Rejected

5. Conclusion

5.1 Implications and Policy Recommendations

Ease the entry barrier for smaller banks to access the larger banks' existing agent networks, as part of formal arrangements. As already mentioned, there is a model for interoperable shared infrastructure, both in Brazil (correspondent banking) and Uganda (the bilateral network-sharing agreement between FINCA and Centenary Bank) (Kumar et al., 2006; WSBI, 2021).

Implement tiered licensing based on tenure. Tenure is the best predictor of outreach, and therefore policies should focus on retention rather than quick expansion. Similar to India's progressive business correspondent framework (Reserve Bank of India, 2019), three-stage framework – basic services (years 1-2), expanded permissions (years 3-5) and full-service designation – with the addition of microcredit and government payments (year 6+) would translate the operational continuity into a tangible regulatory advantage.

Set licensing requirements for agents. The adverse consequences of high loan-to-deposit ratios are part of a larger agent float issue. Light-touch guidelines that set minimum levels of float as a function of average daily transactions will have a meaningful impact on the number of hours agents spend inactive, the biggest contributor to agent inactivity in Sub-Saharan African markets as identified by MicroSave Consulting (Njeru et al., 2018).

Re-examine NPL-linked restrictions and blanket NPL-based restrictions could be disproportionate for channels that mainly provide deposit and remittance services, as credit risk is not significant for outreach. Cull et al. (2018) propose targeted revision to allow banks to take part in systemic stability without sacrificing it.

Shift to active account metrics: Outlet counts are becoming more of an indicator of dormant account accumulation than truly engaged accounts. A better measure of meaningful inclusion would be to include metrics as accounts with at least one transaction in the last 90 days, piloting this as an additional reporting category, which would better reflect meaningful inclusion and motivate agents to change their incentives accordingly (Chen, 2013).

5.2 Limitations and Future Directions

This study analyzed the factors that affect the breadth of agent banking outreach of 30 commercial banks in Bangladesh during 2016-2024 (N = 270 bank-year observations) through a Fixed Effects panel regression model with robust standard errors clustered at the bank level.

The results reveal that the total assets (H1) and tenure (H2) are both positive and significant contributors to breadth, and the loan-to-deposit (LTR) ratio (H5); a proxy for liquidity strategy, is also significant and negative. No statistically significant effects are found for agent outlet density (H3), operational efficiency (H4), and credit risk (H6). Taken together, these results suggest that the two drivers of outreach breadth are institutional scale and operational maturity; a facilitating condition is deposit-oriented liquidity management. Growth and cost-efficiency of outlets, on the other hand, are not sufficient to drive inclusion within banks.

There are significant limitations to the study. Analysis is performed at the bank level only, and the characteristics of the clients (such as their level of income, gender, geographic location etc.) are not observed. Because of the high level of non-normality in available information, an estimation of depth of outreach was not possible. Moreover, reverse causality may not be completely ruled out and fixed effects controls for unobserved bank heterogeneity are provided. Future research could utilize account-level data and dynamic panel techniques to more accurately determine causality and if scale improvements lead to service depth for the poorest customers.

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A Comparative Study of Content Genre Preferences of Gen Z Across Local and Global OTT Platforms in Dhaka

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Abstract

The consumption pattern of Gen Z particularly in OTT platforms has significantly changed in the last few years. This study explores the content genre preferences of Gen Z users in Dhaka across both local and global OTT platforms. A quantitative descriptive research approach was adopted, collecting data from respondents primarily aged between 13 and 27 living in Dhaka. The findings reveal that OTT consumption is part of the daily routines of Gen Z, with most users spending one to three hours daily on such platforms. Global OTT platforms demonstrate stronger popularity due to their diverse content libraries and high production quality, whereas local platforms maintain relevance through culturally relatable content. The study further highlights that genre preference varies across demographics, with action, thriller, and comedy emerging as dominant choices. However, local content genres such as drama and romance continue to attract a loyal audience segment. Overall, the research provides valuable insights into how OTT platforms can tailor their content strategies to better engage Gen Z audiences in Dhaka.

Keywords: OTT platforms, Generation Z, content genre preference, streaming behavior, Dhaka.

1. Introduction

Unlike traditional television, OTT platforms offer on-demand access, personalized recommendations, and a wide variety of genres, making them especially appealing to younger audiences. Among these, Generation Z stands out as a key consumer segment due to their strong digital presence and evolving viewing habits. Both global platforms and local streaming services are competing to capture audience attention, particularly in urban areas like Dhaka. While global platforms often dominate due to their vast libraries and advanced technology, local platforms offer culturally relevant content that resonates deeply with domestic audiences. This study focuses on understanding the genre preferences of Gen Z users across these platforms. By comparing local and global OTT services, the research seeks to uncover patterns in content consumption and identify the factors that influence user's content choices. Understanding these trends is crucial for marketers, content creators, and OTT service providers aiming to strengthen their position in an

increasingly competitive market.

1.1. Research Question

1. What content genres are most preferred by Generation Z users on local and global OTT platforms in Dhaka?
2. How do genre preferences of Gen Z differ between local and global OTT platforms?

1.2 Research Objectives

1. To identify the most preferred content genres among Gen Z users on local and global OTT platforms in Dhaka.
2. To examine differences and similarities in genre preferences between local and global OTT platforms among Gen Z.

2. Literature Review

Several studies conducted between 2019 and 2026 highlight how the Gen Z demographic engages with OTT platforms, focusing on motivations, genre preferences, and platform comparisons. Research consistently identifies Gen Z as a major driver of OTT growth. Ahn (2022) found that Gen Z users prefer mobile streaming and value on-demand access to diverse content. Similarly, Mondal (2026) observed that personal interests, relaxation, and social connectivity strongly influence OTT usage, with many users turning to streaming platforms for stress relief. Yeole et al. (2022) further emphasized that content variety, perceived quality, peer influence, and user interface design significantly affect subscription decisions. In addition, Bhattacharyya et al. (2022) highlighted that visual elements such as thumbnails and trailers play a key role in shaping content selection.

Genre preference is another important factor influencing engagement. Ahn (2022) noted that diverse genre offerings, especially original content, attract users to global platforms. Industry insights (Variety, 2025) also suggest a shift toward short-form content alongside continued interest in genres such as crime and horror. Earlier studies by Dasgupta and Grover (2019) and Tiwari and Rai (2021) indicate that web series and films dominate OTT consumption, with many users subscribing to multiple platforms. Gangwar et al. (2020) found that mobile phones and laptops are the primary devices used for streaming. Comparative studies reveal differences between local and global platforms. Mursalin et al. (2017) emphasized the need for improved content quality for local platforms to remain competitive. While global platforms attract users through diverse international content and advanced recommendation systems, local platforms offer culturally relatable narratives. Mondal (2026) found that Gen Z users prefer a mix of global and local content, with exclusive originals playing a key role in engagement. Rahman et al. (2025) found that personal preference and peer recommendations strongly influence content selection among university students. RSI International (2024) highlighted the growing popularity of binge-watching and the increasing demand for both local and international content. Despite these insights, there is limited research comparing genre preferences between local and global platforms within Dhaka, which

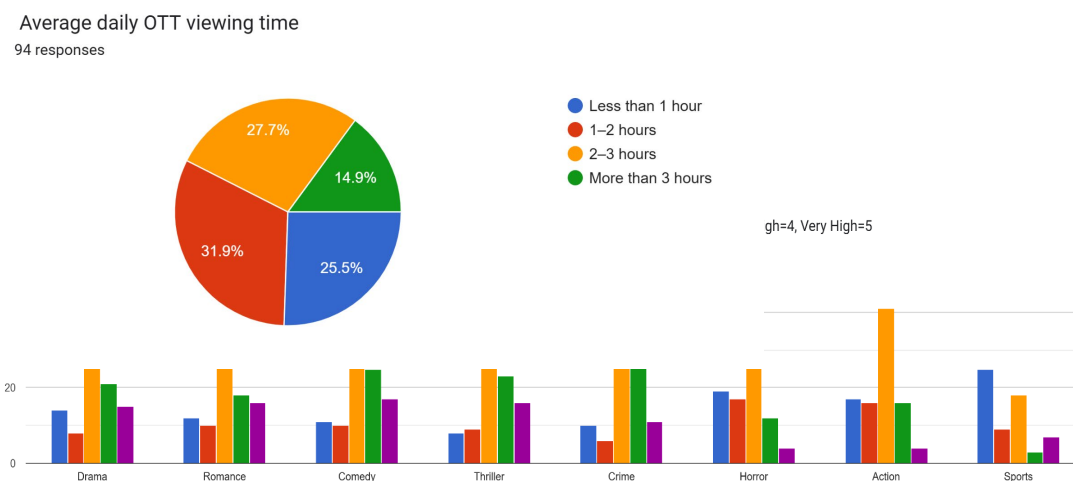
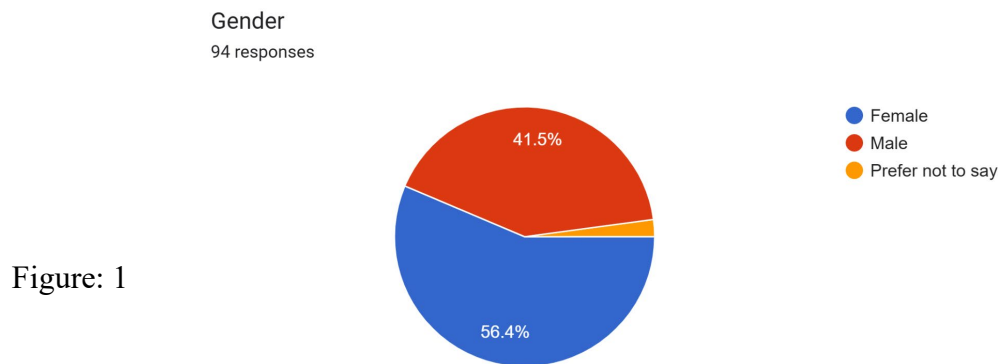
this study aims to address.

3. Methodology

A quantitative research design was used, along with a structured questionnaire for data collection. The sampling method was non probability, purposive sampling, targeting active GenZ OTT users in Dhaka with sample size being 94. The collected data was analyzed using descriptive statistical methods to identify patterns and trends in OTT consumption. Percentage analysis was used to interpret demographic characteristics, viewing habits, and genre preferences while charts and graphs were used to visually represent the findings.

4. Findings and Discussion

Most respondents reported spending between one to three hours per day on streaming platforms. In terms of platform preference, global OTT platforms appear to have a stronger foothold among users. This can be attributed to their diverse content libraries, high production quality, and advanced recommendation systems. These features create a more engaging and immersive viewing experience, which resonates well with Gen Z audiences.



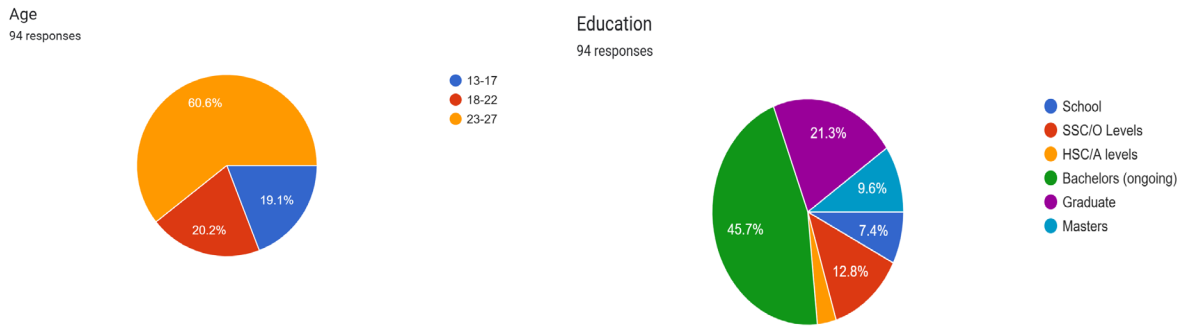


Figure: 3 & 4

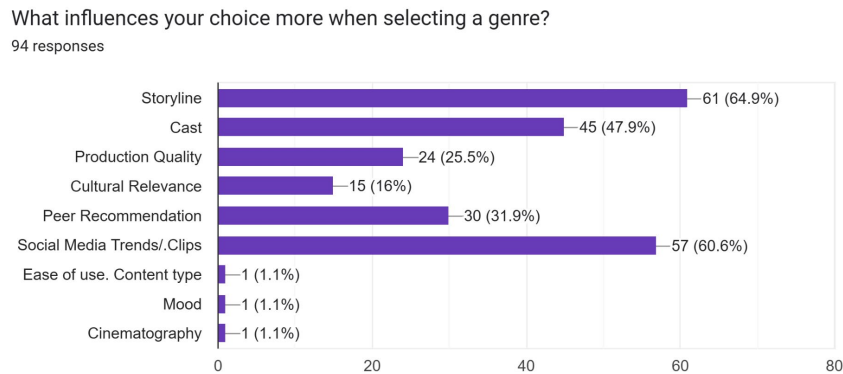


Figure: 5

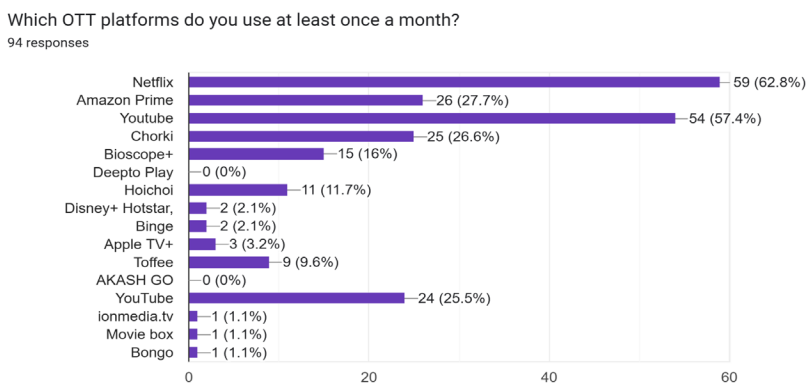


Figure: 6

But, local OTT platforms are not without their strengths. They continue to attract users through culturally relevant content that reflects local values, language, and social contexts. For many viewers, this relatability adds an emotional connection that global platforms may lack. When it

comes to genre preferences, clear patterns emerge. Action, thriller, and comedy are among the most popular genres across both local and global platforms. These genres are particularly appealing due to their entertainment value and ability to hold viewer attention. At the same time, genres such as drama and romance show stronger preference on local platforms. This suggests that while users enjoy global content for its variety and quality, they turn to local platforms for stories that feel more familiar and culturally grounded.

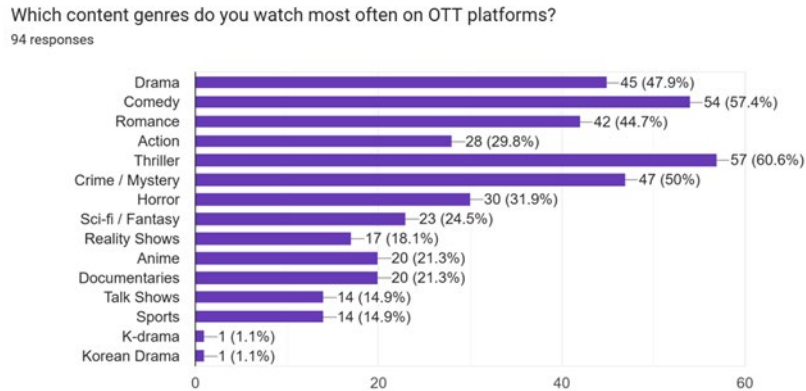


Figure: 7

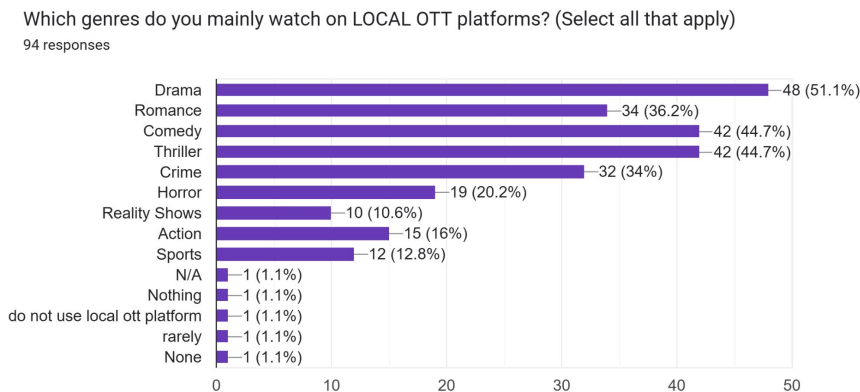


Figure: 8

Which genres do you mainly watch on GLOBAL OTT platforms? (Select all that apply)

94 responses

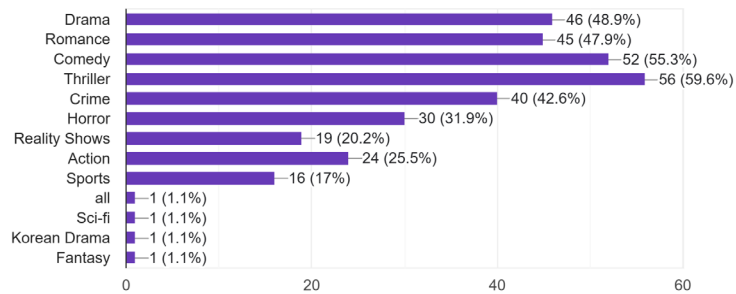
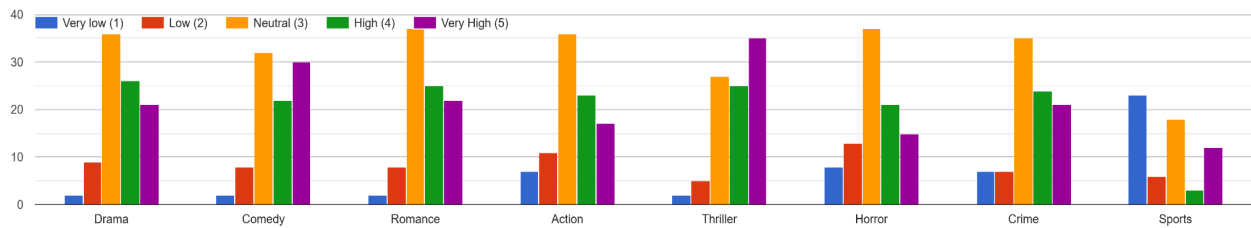


Figure: 9

Interestingly, the study also highlights a hybrid viewing behavior among Gen Z users. Rather than relying on a single platform, many users switch between local and global services depending on their mood, preferences, and available content. This indicates that competition in the OTT market is not just between platforms, but also between content types and genres.

Please rate your interest in the following genres on GLOBAL OTT platforms: (5-point Likert scale) Very Low=1, Low=2, Neutral=3, High=4, Very High=5



Please rate your interest in the following genres on LOCAL OTT platforms: (5-point Likert scale) Very Low=1, Low=2, Neutral=3, High=4, Very High=5

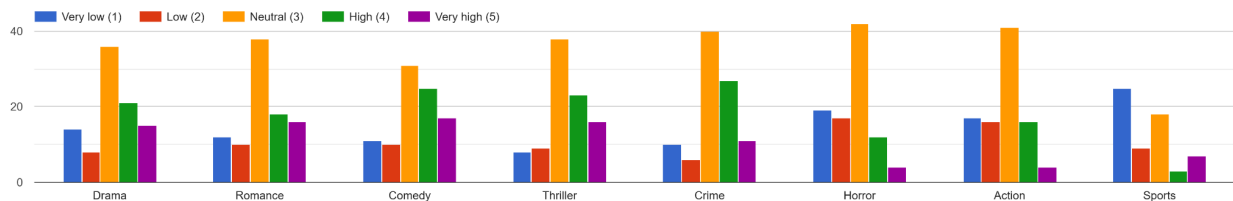


Figure: 10 & 11

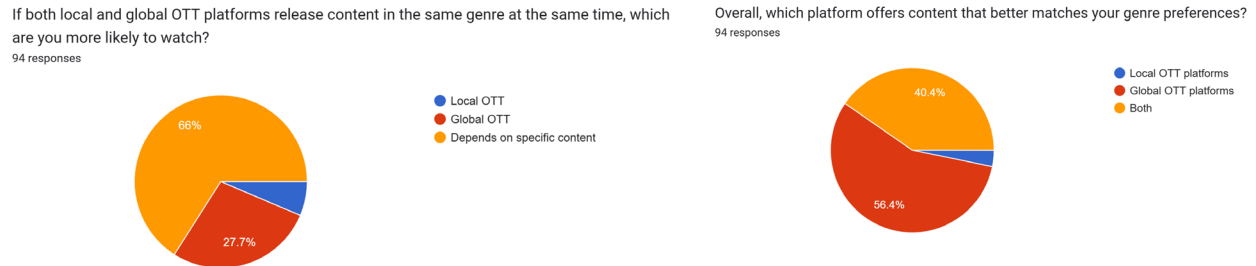


Figure: 12 & 13

Overall, the results suggest that both local and global OTT platforms have unique strengths. While global platforms dominate in terms of scale and quality, local platforms hold a niche advantage through cultural relevance. For sustained growth, both types of platforms must continue to adapt to the evolving preferences of Gen Z audiences and bring content variety.

5. Recommendation

As the majority of respondents fall within the 23–27 age group, OTT platforms should tailor content toward young adults with higher independence and decision-making power in content consumption. Since a good number of users spend 1–3 hours daily on OTT platforms, platforms should focus on retention strategies for moderate users first.

6. Conclusion

This study provides a comprehensive understanding of the content genre preferences of Gen Z users across local and global OTT platforms in Dhaka. The findings highlight that OTT consumption is an integral part of Gen Z's daily life, driven by convenience, variety, and personalization. Global platforms currently enjoy a competitive advantage due to their extensive content libraries and superior production quality. However, local platforms remain relevant by offering culturally resonant content that connects with audiences on a deeper level.

Genre preference plays a critical role in shaping viewing behavior, with action, thriller, and comedy emerging as dominant choices. At the same time, local genres such as drama and romance continue to attract a dedicated audience. The study also reveals that Gen Z users exhibit flexible and dynamic viewing habits, often switching between platforms based on their preferences. This highlights the importance of content strategy in retaining user engagement.

In conclusion, the OTT market scope in Dhaka presents significant opportunities for both local and global platforms. By understanding the preferences and behavior of Gen Z audiences, platforms can develop more targeted and effective content strategies, ensuring long-term success in an increasingly competitive environment.

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Influence of Psychological Factors on Investment Decisions Among Bangladeshi Millennial Investors

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Abstract

This study examines the influence of behavioral finance factors on the investment decisions of millennial investors in Bangladesh. Using a quantitative survey approach, data were collected from 35 respondents through a structured questionnaire based on five-point Likert scales. The study analyzed five psychological factors: heuristics, prospect theory, emotions, market impact, and herding. Descriptive results showed a high mean score for investment decisions ($M = 18.74$, $SD = 1.01$), indicating strong investment decisiveness among respondents. Multiple regression analysis revealed that the overall model was statistically significant ($F = 3.863$, $p = 0.008$), explaining 40.0% of the variation in investment decisions ($R^2 = 0.400$). Emotion ($\beta = 0.183$, $p = 0.012$) and herding ($\beta = 0.388$, $p = 0.036$) had significant positive effects, while heuristics, prospect theory, and market impact were not statistically significant. The findings suggest that emotional responses and social influence are key drivers of investment behavior among Bangladeshi millennial investors.

Keywords: Behavioral finance, Millennial investors, Investment decision, Psychological factors, Bangladesh.

1. Introduction

Classical finance adopts a normative view of investor decision-making, assuming that investors act rationally, possess adequate market knowledge, and seek to maximize utility or satisfaction (Baker & Nofsinger, 2010). In contrast, behavioral finance explains actual investor behavior by showing that decisions are often shaped by psychological and emotional factors. Riaz and Iqbal (2015) argue that behavioral finance reveals key limitations of traditional finance theories, as real investors do not always behave rationally as conventional models assume. Behavioral finance recognizes that investors often deviate from rational behavior due to cognitive and emotional biases. It therefore considers real-world investment decisions by acknowledging limitations in human judgment. Baker and Nofsinger (2010) identify four major themes of behavioral finance:

heuristics, framing, emotions, and market impact. These behavioral finance themes explain how cognitive shortcuts, information framing, and emotions such as fear and confidence shape investor decisions. Their combined effects may produce market anomalies, speculation, and deviations from traditional assumptions of market efficiency. De Bondt and Thaler (1985) provide early evidence that investors often overreact to recent information, highlighting the role of psychological biases in investment behavior.

Tversky and Kahneman (1974) demonstrate that investment decision-making is impacted by chronic psychological prejudices stemming from heuristic thinking, resulting in misinterpretation of information and decisions that diverge from sensible economic predictions.

Behavioral finance has improved understanding of deviations from rational investor behavior, yet empirical evidence from South Asian emerging markets remains limited. Bangladesh's market conditions, including information asymmetry and varied financial literacy, may intensify behavioral biases. This study examines how key behavioral factors influence investment decisions among Bangladeshi millennial investors.

The survey conducted by Lusardi and Oggero (2017) titled **“Millennials and Financial Literacy: an economy-by-economy breakdown”** revealed that only approximately 21% of Millennial investors from Bangladesh (aged 15-34) possessed financial literacy, let alone awareness of other variables influencing their choice of investment.

1.1 Research Objective

This study examines the influence of behavioral finance factors on the investment decisions of Bangladeshi millennial investors. It focuses on heuristics, prospect theory, emotions, market impact, and herding to assess deviations from rational finance assumptions. The study also provides empirical evidence from Bangladesh's emerging market context.

2. Literature review

Traditional finance is predicated on the premise of entirely rational investors, utilizing fundamental concepts involving the Modigliani–Miller propositions, portfolio theory of Markowitz, and Fama's “efficient-market hypothesis”. The failure of these theories to elucidate observed investor behavior resulted in the development of behavioral finance, that integrates psychological variables to more accurately depict how investors choose investments (Statman, 1999).

Landberg (2003) clarified that investor behavior is strongly influenced by the pursuit of financial gain and fear of potential losses, which may lead to irrational decisions under uncertainty. Fromlet (2001) contends that traditional finance theories are limited in explaining such behavior because they often overlook psychological factors and systematic deviations from rationality. Among millennials, investment hesitation is also linked to limited financial knowledge and the lasting impact of the 2008 financial crisis, which increased distrust toward financial institutions (Hooker, 2017).

Heuristics are mental shortcuts that streamline decision-making when investor expectations are unclear or ambiguous. As Kahneman (2011) argues, investors rely on heuristics such as accessibility, authenticity, and anchoring, leading to an overemphasis on easily recalled information, conclusions derived from inadequate samples, and excessive dependence on initial reference points all of which produce systematic biases in investment decisions. This discussion examines three such biases: Overconfidence, Representativeness, and the Gambler's Fallacy.

Overconfidence is widely recognized in behavioral finance as a cognitive bias that affects investors' perceived knowledge and forecasting ability. Among millennial investors, this bias may influence risk preference, trading frequency, and overall investment behavior. Cheng (2007) notes that overconfident investors often overestimate their ability when evaluating investment assets.

Representativeness bias refers to a heuristic in which investors rely on perceived similarities or current trends rather than objective evaluation. This may lead them to assume that past performance will continue in the future. Jha (2016) argues that such reasoning can cause investors to undervalue key information and engage in risky investment decisions. The gambler's fallacy reflects an irrational belief that independent events are influenced by prior outcomes, leading investors to perceive random events as predictable patterns (Rkaesh, 2013). This bias may cause investors to make flawed decisions based on assumed connections between unrelated market events.

Kengatharan and Kengatharan (2014) further distinguish Expected Utility Theory from Prospect Theory, noting that the former emphasizes rational expectations while the latter highlights investor irrationality shaped by beliefs.

Framing constitutes an additional tendency that results in flawed decisions. Fromlet (2001) asserts that framing is a behavioral bias that influences investment decisions by shaping how market information is presented and interpreted. Investors may rely on visual or simplified representations of information rather than evaluating its underlying characteristics (Diacon & Hasseldine, 2007). Mbakuala (2012) shows that risk cautious investors integrate the impact of framing in their reactions to profits or losses incurred.

Mental accounting refers to the practice of individuals categorizing finances into distinct accounts for various reasons, which adversely affects their decision-making, particularly about purchase and investing choices.

Emotions such as fear, greed, disappointment, and satisfaction can significantly shape financial decision-making. Baker and Nofsinger (2010) argue that market sentiment is often unpredictable and may lead investors toward poorly evaluated actions. Lovallo and Kahneman (2003) further suggest that optimism bias arises when investors rely on an internal, emotion-driven perspective rather than objective external evidence. Shefrin (2007) characterized the delusion of authority as the propensity of individuals to presume they can affect a situation or result, but lacking any actual control over it. This tendency results in overtrading, hence escalating costs.

Regret aversion may cause investors to avoid decisions that could lead to future regret, including both financial losses and missed gains (Pompian, 2011). This emotional hesitation can interact with market-level biases, as investors often overreact or underreact to new information based on past experiences, market cycles, and price trends, thereby contributing to volatility and market anomalies (Barberis & Shleifer, 2003; Baker & Nofsinger, 2010). Herding further reinforces these effects when investors imitate other market participants and rely on shared market signals rather than independent analysis (Kengatharan & Kengatharan, 2014).

2.1 Research Problem and Hypothesis

Bangladeshi millennials are increasingly active in the stock market, yet their investment decisions often reflect psychological biases rather than rational choice. Due to limited empirical research in this context, this study examines how behavioral finance factors influence their risk assessment, portfolio selection, and investment decisions.

Hypothesis 1

H1: The application of heuristics significantly influences the investment decisions of Millennials in Bangladesh.

Hypothesis 2

H2: The prospect theory does significantly influence the investment decisions of Millennials in Bangladesh.

Hypothesis 3

H3: Emotions have substantial influence on Millennials' investing decisions of Millennials in Bangladesh.

Hypothesis 4

H4: The market impact does significantly influence Millennials' investing decisions of Millennials in Bangladesh.

Hypothesis 5

H5: The influence of herding is substantial in the investment decisions of Millennials in Bangladesh.

3. Research Methodology

This study adopted a quantitative survey approach to examine how psychological perceptions affect the investment choices of Bangladeshi millennial investors, using 35 responses. Descriptive statistics were first applied to summarize participant profiles and key research variables. Multiple regression analysis was then conducted to assess the combined influence of predictor variables on the outcome variable.

3.1 Sampling procedure

The study used convenience sampling to select 35 people to get insights about their observations and views about their investment patterns.

3.1.1 Variables

Dependent variable(Y): Investment Decision of Millennial Investors

Independent variable:

- Heuristics
- Prospect Theory
- Emotions
- Market Impact
- Herding

3.1.2 Study Instrumentation

The study employed a 32-item questionnaire using five-point Likert scales to assess the proposed hypotheses and study variables. Of these, 23 items measured the main constructs, including five independent variables: heuristics, prospect, emotions, market impact, and herding. The arithmetic magnitude of each independent variable stood determined by factor analysis the responses of all questions designated for that variable. Demographic and investor profile information was also collected to describe the respondents.

3.2 Data Analysis

Multivariate linear regression was conducted to assess behavioral finance factors. The analysis examined their influence on millennial investors' investment decisions. Coefficients and significance levels were used to evaluate the relationships.

3.3 Model Specification

A linear regression model was employed:

$$Y = \beta_0 + \beta_1 (Heuristics) + \beta_2 (Prospect Theory) + \beta_3 (Emotions) + \beta_4 (Market Impact) + \beta_5 (Herding) + \epsilon_{it}$$

4. Results and Discussion

The questionnaire captured demographic information, including respondents' age group, gender, education level, stock market investment background and investor type, in order to present a clear profile of the participants involved in this study.

Characteristics	Category	Count	Percentage
Age Group	31-40	4	11.4%
	41-50	18	51.4%
	51-60	13	37.1%
	Over 60	0	0.0%
Gender	Male	34	97.1%
	Female	1	2.9%
Education Level	Primary Education	0	0.0%
	Secondary Education	4	11.4%
	Honours	9	25.7%
	Master's	20	57.1%
	PhD	2	5.7%
Investment Experience	Less than a year	0	0.0%
	1 to 4 years	10	28.6%
	5 to 9 years	15	42.9%
	10 years and above	10	28.6%
Investor Type	Retail/Individual	30	85.7%
	Institutional/Professional	5	14.3%

Demographic Characteristics of Survey Respondents (n=35)

The Based on 35 valid responses, most respondents were aged 41–50 years (51.4%) and predominantly male (97.1%). The majority held Master's degrees (57.1%). In terms of investment profile, 42.9% had 5–9 years of experience, and most were retail or individual investors.

4.1 Descriptive Statistics

The representational metrics reveal wherein the study variables are characterized by generally high mean score and relatively low level of dispersion, indicating a tendency toward agreement among respondents on the psychological statements including the questionnaire.

Variables	Mean	Median	Std.Dev.	Minimum	Maximum
<i>Investment Decision</i>	18.74	19	1.01	17	20
<i>Heuristics</i>	27.63	27	1.57	24	30
<i>Prospect Theory</i>	13.63	14	1.11	12	15
<i>Emotions</i>	13.91	14	2.39	9	19
<i>Market Impact</i>	9.11	9	0.68	8	10
<i>Herding</i>	18.66	19	1.08	17	20

The investment decision score showed a high mean of 18.74 with low variation ($SD = 1.01$), indicating strong investment decisiveness among respondents. Heuristic behavior also recorded a high mean score of 27.63, while prospect theory, market impact, and herding showed relatively high averages with limited dispersion. Emotion had the greatest variability, with the highest standard deviation ($SD = 2.39$) and the widest response range.

4.2 Regression Analysis

SUMMARY

OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.632
R Square	0.4
Adjusted R Square	0.296
Standard Error	0.847
Observations	35

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	13.867	2.773	3.863	0.008
Residual	29	20.819	0.718		
Total	34	34.686			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	10.252	3.73	2.748	0.01	2.62	17.88	2.623	17.88
Heuristic	0.089	0.106	0.837	0.409	-0.13	0.307	-0.129	0.307
Prospect Theory	-0.028	0.18	-0.158	0.875	-0.4	0.339	-0.396	0.339
Emotion	0.183	0.069	2.668	0.012	0.04	0.323	0.043	0.323
Market Impact	-0.369	0.244	-1.513	0.141	-0.87	0.13	-0.868	0.13
Herding	0.388	0.177	2.195	0.036	0.03	0.75	0.027	0.75

4.3 Discussion

Multiple regression analysis examined the influence of heuristics, prospect theory, emotion, market impact, and herding on investment decisions. The model was statistically significant, with $F = 3.863$ and $p = 0.008$. The results showed moderate explanatory power, with $R = 0.632$, $R^2 = 0.400$, and adjusted $R^2 = 0.296$.

$$Y = 10.252 + 0.089x_1 - 0.028x_2 + 0.183x_3 - 0.369x_4 + 0.388x_5$$

Where,

$Y = \text{Investment Decision}$

$x_1 = \text{Heuristic}$

$x_2 = \text{Prospect Theory}$

$x_3 = \text{Emotion}$

$x_4 = \text{Market Impact}$

$x_5 = \text{Herding}$

Emotion ($\beta = 0.183$, $p = 0.012$) and herding ($\beta = 0.388$, $p = 0.036$) showed statistically significant positive effects on investment decisions. In contrast, heuristics ($\beta = 0.089$, $p = 0.409$), prospect theory ($\beta = -0.028$, $p = 0.875$), and market impact ($\beta = -0.369$, $p = 0.141$) were not significant at the 5% level. Therefore, H3 and H5 were supported, while H1, H2, and H4 were not supported.

5. Conclusion

5.1 Main Findings

Emotion and herding were identified as statistically significant positive predictors of investment decisions. These findings suggest that both internal emotional responses and external social influence meaningfully shape investors' decision-making behavior. Thus, the study indicates that investment choices are influenced not only by individual psychological factors but also by the actions and opinions of other market participants.

5.2 Recommendations

Investor awareness and financial education programs in Bangladesh should emphasize behavioral influences, particularly emotion and herding, as these factors significantly affect millennial investors' decisions. Brokerage houses, financial advisors, and regulatory bodies should support rational investment practices through timely and reliable market information. Future research should use larger and more diverse samples to strengthen external validity and deepen understanding of psychological influences on investment choices in Bangladesh.

5.3 Limitations of the Study

The study has several methodological limitations, including a small sample size of 35 respondents, which limits the generalizability of the findings. The sample was also concentrated among male and retail investors, reducing its representativeness of the broader Bangladeshi investor population. Additionally, the model explains 40.0% of the variation in investment decisions, suggesting that other financial, social, or contextual factors remain unexplored in this study.

5.4 Future Directions

Future research should use a larger and more diverse sample across age groups, professions, and investor categories to improve representativeness. Broader sampling would support more reliable conclusions about investor behavior in Bangladesh. Future studies should also include additional predictors, such as financial literacy, risk propensity, and income level, to better explain variations in investment decisions.

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Buy Now Pay Later (BNPL) and Consumer Debt Behavior: Evidence from Smartphone Loans

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Abstract

This paper will look at how Buy Now Pay Later (BNPL) financing is related to consumer debt behavior with a particular look at the smartphone installment purchases in Bangladesh. The study seeks to examine the effect of software-based mechanisms of digital asset control, like locking of gadgets remotely, on repayment behavior and psychological reaction of consumers. The quantitative research design was chosen and primary data was gathered by a structured survey of 37 BNPL users. Repayment patterns and behavioral factors were evaluated using descriptive statistics, cross-tabulation and logistic regression analysis.

The results show that BNPL is commonly viewed as an easy way to finance, which alleviates financial stress. Nevertheless, the existence of mechanisms locking devices can affect the behavior of repayment considerably. A significant percentage of surveyed people had paid installments in advance in order to circumvent restrictions on their phones, which is in line with the theory of loss aversion in behavioral finance. The findings of cross-tabulation also indicate that perceived risk and functional disruption are important factors to promote repayment in time. Even though the regression model was not significant, the general results indicate that behavioral and technological aspects play a better role in determining repayment behavior, compared to the traditional financial factors like income.

The authors draw a conclusion that the enforcement mechanisms based on Fintech can be successfully used to enhance the repayment discipline and decrease the default risk. The results add to the existing body of research about BNPL by emphasizing the relevance of applying behavioral knowledge with technological interventions in new markets such as Bangladesh.

Keywords: Buy Now Pay Later (BNPL), Consumer Debt Behavior, Fintech, Smartphone Financing, Repayment Behavior, Device Locking Mechanism.

1. Introduction

The world of financial ecosystem has been changing quickly as a result of the growth of digital financial technologies. Buy Now Pay Later (BNPL) is one of the biggest advancements in

consumer finance as it enables customers to shop and pay in installments with little or no interest in the short term. The model has become popular especially among the younger consumers because of its flexibility and accessibility as opposed to the traditional banking system.

BNPL is becoming increasingly popular around the world. High usage rates can be observed among such countries as the United States, United Kingdom, and Australia, primarily among Millennials and generation Z. BNPL is relatively new in Bangladesh, but the country has a high growth potential as a result of the growing use of digital payments. Recent statistics reveal that 34 and 11 percent of adults have made digital payments and accessed formal lending respectively in 2024, which is a positive sign of the BNPL growth. The market is estimated to grow to USD 1.17 billion by 2025 and the growth is projected to go on.

The smartphone sector is a key driver of BNPL growth, with mobile gadgets being a necessity among consumers. Nevertheless, the emergence of BNPL has also brought about issues like repayment discipline, over-indebtedness and default risks. To solve these dilemmas, certain suppliers have designed software-based digital asset control system, including remotely locking devices in the event of default payments. In this research, special attention will be paid to the effect of these mechanisms on consumer repayment behavior and psychology.

1.1. Research Problem, Objectives, and Scope

Although the use of BNPL is on the rise, there is a dearth of literature on the impact of technological enforcement strategies, i.e. device locking, on repayment behavior. Although the existing research on the spending habits and credit availability, the psychological effect of the repayment enforcement is not well-researched, particularly in such an emerging economy as Bangladesh.

1.2. Study Objectives

The purpose of the study is to examine the effect of software-based digital asset control mechanisms on repayment behavior among BNPL users.

- To examine psychological variables like perceived risk, loss aversion and financial obligation in repayment choices.

1.3. Scope

The research target BNPL clients in Bangladesh with the specific target of urban and semi-urban residents who have bought smartphones or other electronics using installment financing. It investigates repayment behavior in the short-term (3-6 months) and omits the long-term credit systems and technical design factors.

2. Literature Review and Theoretical Framework

As it is pointed out in the literature, BNPL has its roots in the old-fashioned installment systems, and it became a significant Fintech innovation. Digitization, penetration of smartphones and

demand on flexible payment drive its growth. Nonetheless, research indicates that BNPL has the effect of decreasing the pain of payment, which promotes increased spending and possibly undermines financial discipline.

Speaking of the behavioral finance theories, they are instrumental in explaining the usage of BNPL:

Present Bias & Hyperbolic Discounting: In comparing between present and future, consumers are more concerned with immediate gratification than with the future payments.

Loss Aversion: People are more driven to prevent losses rather than to benefit, and device locking is a good behavioral trigger.

Cognitive Dissonance: Customers might experience anxiety between satisfaction in purchases and the loan repayment.

Also, the perceived risk theory indicates that the observable impacts (e.g., the locking of the phone) can also have substantial effects on the repayment behavior. The BNPL enforcement mechanisms provide instant and physical effects, unlike the conventional credit systems, where penalties are delayed, making the urge to pay more urgent.

3. Methodology

The study adopts a quantitative research design using primary and secondary data.

- Primary Data: Collected through structured Google Forms survey targeting BNPL smartphone users.
- Sample Size: 37 respondents participated and were selected using convenience sampling.
- Secondary Data: Academic literature, Fintech reports, and industry publications.

Data Analysis Techniques:

- Descriptive statistics (frequencies, percentages)
- Cross-tabulation analysis
- Logistic regression analysis

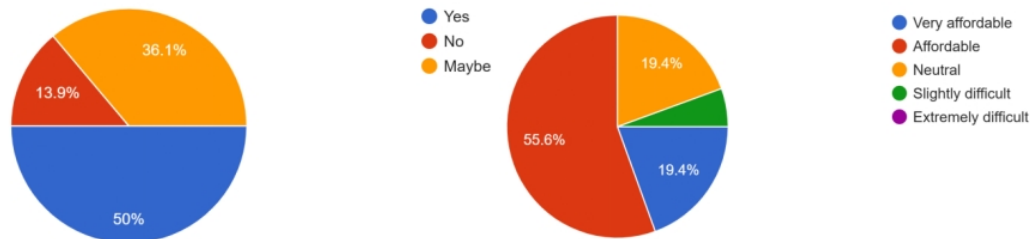
The dependent variable (Y) is early repayment behavior, while independent variables (X) include phone locking influence, financial pressure, BNPL perception, and income level.

4. Findings and Discussion

4.1. The usage and perception of BNPL

The results show that BNPL is generally viewed as a convenient financial instrument that would lessen the financial load in the present moment. Most respondents concurred that BNPL simplifies the buying process as opposed to paying a lump sum.

Using BNPL again for future purchases: EMI affordability compared to full payment:

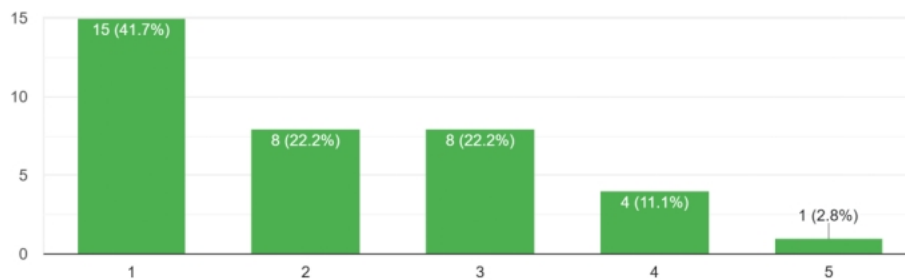


4.2. Repayment Behavior (Psychological Impact)

A large percentage of users said that they paid their installments on time or earlier than the due date. Notably: The percentage of strongly agreeing and agreeing that they pay early to avoid being locked out of their phones was 41.7 and 22.2 respectively. A very low percentage disagreed, which meant that they were highly influenced behaviorally.

Percentage of customers paying EMI before due date to avoid phone lock:

Likert Scale (1-5)
Strongly Agree-Strongly Disagree



The analysis proves that the presence of device-locking mechanisms has a strong impact on the repayment decisions:

- The fear of losing phone functionality pushes the users (proving loss aversion argument)
- Mobile phone is a necessity (communication, education, finance), which makes repayments more urgent.

4.3. Cross-Tabulation Analysis

4.3.1. Phone locking influence vs early payment

Strongly believing in the effect of phone locking, the respondents are more likely to repay early. The experiences of phone locking are distributed among various levels of financial pressure which point to the possibility that psychological stimuli have more influence than economic pressure.

COUNTA of Timestamp The possibility of phone locking encourages me to pay on time. (Likert Scale; 1=strongly agree, 5=strongly disagree)	Have you ever paid your installment earlier than the due date to avoid phone locking?		
	No	Yes	Grand Total
1	3	12	15
2	3	6	9
3	6	2	8
4		4	4
5	1		1
Grand Total	13	24	37

4.3.2. Behavior Response to Enforcement (Actual behavioral response to Fintech enforcement):

COUNTA of Timestamp Have you ever experienced phone locking due to missed EMI?	If yes, how did phone locking affect your repayment decision?					
	Caused financial stress	Felt unfair	No effect	Paid after few days	Paid immediately	Grand Total
No	1	2	19	2	3	27
Yes	1	1		2	7	11
Grand Total	2	3	19	4	10	38

Among users who got their phones locked:

- Majority promptly paid following the restriction.
- There were a few cases of stress or dissatisfaction, but compliance was high.

This brings to light a discrepancy between perceived behavior and actual behavior-users might not take the effect seriously until they are enforced.

4.4. Regression Analysis

A logistic regression model was used to examine factors affecting early repayment behavior.

Variables (1-4)	Coefficient	P-value	Standard Error	Interpretation
Lock Influence (V1)	-0.91	0.12	0.599	Strongest effect
Financial Pressure (V2)	0.79	0.11	0.506	Weak effect
BNPL Perception (V3)	-0.11	0.84	0.575	Insignificant
Income (V4)	-0.07	0.84	0.358	insignificant

Regression Statistics	
Chi Square	7.625735797
Residual Dev.	38.20328432
# of iterations	6
Observations	36

- Chi-square value (7.626) indicates limited explanatory power, but it is not very strong.
- All variables had p-values > 0.05, meaning the model is not statistically significant.

- **Residual Deviance** = 38.2, **Sample size** $\approx$ 36–37
- **df** = 36 - 4 = 32

These are not too far apart, but; slightly higher deviance $\rightarrow$ model does not fit very strongly. This may imply that the independent variables and the sample size included in the model are not sufficient to fully explain early repayment behavior among BNPL users.

However, coefficient patterns provide useful insights:

- Phone locking influence: Negative coefficient $\rightarrow$ stronger perception leads to earlier repayment.
- Financial pressure: Positive but weak relationship.
- BNPL perception & income: Insignificant effects.

Although statistically weak, the regression results align with descriptive findings, suggesting that behavioral and technological factors play a more important role than purely financial variables. Besides, due to limited number of sampling, there is a possibility of insignificance but it can be ignored with extended number of samples and independent variables.

5. Conclusion

5.1. Findings

This research paper concludes that BNPL financing is a very important tool in increasing consumer access to products by alleviating the immediate financial load. Financial capability is not a major factor but behavioral and technological aspects determine the repayment behavior. The device-locking mechanisms are effective psychological incentives to reinforce the discipline of repayment by aversion to loss and perceived risk. Although the regression findings were not significant, the steady trends in the descriptive and cross-tab analyses prove the significance of enforcement systems founded on Fintech.

Overall, the study can add to the current body of research by emphasizing the importance of digital asset control mechanisms in consumer debt behavior. It shows that a combination of financial services and technological enforcement tools can be productive in shaping repayment trends, especially in the developing economies such as Bangladesh.

5.2. Recommendations

Based on the findings, the study recommends:

1. **Use of Fintech Enforcement Mechanisms:** BNPL providers should continue using device-locking systems as they effectively improve repayment discipline. However, they must ensure transparency to avoid customer dissatisfaction.
2. **Customer Awareness and Education:** Users should be informed about repayment obligations, penalties, and system operations to build trust and reduce confusion.
3. **Improved Credit Assessment:** Strengthening verification processes and addressing issues like fake guarantors can reduce default risk and improve lending quality.

5.3. Limitation of the Study

This study is subject to several limitations. The sample size is relatively small and based on convenience sampling, which may limit generalizability. Additionally, the regression model showed limited statistical significance, indicating that other unobserved variables may influence repayment behavior. Future research could include larger samples and more advanced modeling techniques.

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The Effect of Environmental, Social, and Governance (ESG) Performance on the Financial Performance of Banks: Evidence from the Banking Sector of Bangladesh

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Abstract

This study displays the effect of Environmental, Social and Governance (ESG) performance on the financial performance of banks in Bangladesh. The study analyses cross sectional data from 38 banks for the year 2024. ROA is used as a substitute for financial performance and bank size, age, and non-performing loan (NPL) ratio are taken as control variables. The analyzed data indicates that overall ESG performance has a statistically significant negative influence on Return on Asset (ROA) and environmental factors have the most significant negative relationship with profitability but social and governance factors reflect a positive but statistically insignificant influence on ROA. Moreover, bank size has a strong positive influence on ROA while the NPL ratio has a significant negative influence which indicates that higher credit risk reduces profitability. The study suggests that banks should think of ESG as a long-term strategic investment, put a strong emphasis on reducing non-performing loans, and strengthen social and governance practices, but approach environmental initiatives more cautiously.

Keywords: ENV, SOC, GOV, NPL ratio, ESG.

1. Introduction

The banking sector has an important role in the development of any country's economic situation as it supports trade, investment and industrial growth. To achieve economic stability, it is very important to have a strong banking system. In recent years the performance of Bangladeshi banks hampers because of the raising of bad loans. 35% of the total outstanding loans in 2025 are non-performing loans. So, to solve this issue one of the ways is implementing Environment, Social and Governance (ESG) practices in bank operations. It indicates how organizations are handling environmental issues, responding to social needs and maintaining the transparency and responsibility of the governing body.

According Ahmed et al. (2018), ESG not only improves the chance of profitability but also improves the governance and social responsibility factors which will eventually affect the banks

financial performance. Moreover, it helps banks to make more prudent lending decisions and it leads to better financial performance. There are some disputes about the relation between bank performance and ESG. So, this study focuses on conducting an empirical research on the effects of ESG performance on the banking system in Bangladesh.

1.1. Research objective

The main objective of this study is to analyze the relationship between Environmental, Social, and Governance (ESG) performance and the financial performance of banks. It is mainly focused to analyze whether ESG practices improve or reduce profitability and it is going to be determined by Return on Assets (ROA) as it is straightforward and uniform across firms and industries (Ahmed et al., 2018). Moreover, it is focused to identify which components of ESG have the most significant influence on bank performance.

2. Literature Review

There are a lot of research papers where researchers try to analyze the relationship between ESG performance and bank performance. A study was conducted to see the relation between ESG factors and banks financial performance during the Covid-19 pandemic and they took data from 333 banks located in 53 countries in Asia, Europe and America. They took ROA, ROE & EPS dependent variable, ESG and its components as independent variable and bank size, leverage, loan to total deposit ratio, GDP per capita as their control variable and found that environmental performance had a negative influence on profitability but social expenditure had a positive influence on banks profitability (Dragomir et al., 2022).

Another research was conducted on 30 private commercial banks in Bangladesh in 2018 on considering ESG factors in banks' lending and found that considering ESG factors in lending helps to improve banks Return on Asset by 5.8% and among the ESG components governance had the most significant positive influence. They discovered that age had a negative influence on performance but size had a positive effect on performance (Ahmed et al., 2018).

So, research connected to ESG practice and bank performance is in the evolving stage. Previous studies show that ESG improves bank performance but its effectiveness is limited due to weak regulatory framework, data limitation and external influences. Moreover, there is some research on the effect of ESG practice on banks financial performance in Bangladesh. So, this study focuses to find out the effect of ESG and its individual components on banks financial performance in Bangladesh for the year of 2024.

3. Hypothesis

Higher ESG performance leads to better financial performance of the banking system in Bangladesh.

Functional model of this hypothesis –

ROA= f [ESG, control variable (size, age, NPL ratio)]

4. Methodology

This study employs a descriptive quantitative research design using secondary data to find the impact of ESG performance on the financial performance of banks in Bangladesh. This study focuses on a total 38 banks including private and state-owned banks and they are selected based on the data availability. The report covers the year 2024 only and the data is collected from the annual reports of banks.

4.1. Sampling Method: Purposive sampling method is used and in this method data are selected based on their connection to the research objectives and the availability of the required information.

4.2. Variables

Dependent variables: Financial performance and it is measured by Return on Asset (ROA).

Independent Variable: ESG performance.

Control Variable: It helps to keep things fair. The control variables are

1. Bank size= log (total asset) [Here asset is taken as a proxy for size]
2. Age
3. NPL ratio

4.3. Model Specification: here we try to find the impact of ESG and its individual components on ROA.

ESG impact on ROA

$$ROA = \alpha + \beta \text{ ESG} + \beta \text{ SIZE} + \beta \text{ AGE} + \beta \text{ NPL_ratio} + \varepsilon$$

Environment, Social and Governmental factors impact on ROA

$$ROA = \alpha + \beta \text{ ENV} + \beta \text{ SOC} + \beta \text{ GOV} + \beta \text{ SIZE} + \beta \text{ AGE} + \beta \text{ NPL ratio} + \varepsilon$$

4.4. Data analysis technique

EViews 14 student version is used to run descriptive statistics, correlation matrix and regression analysis.

5. Findings and Discussion

5.1. Descriptive Statistics

Table 1: Descriptive statistics of the variables

	ROA	ESG_SCORE	ENV	SOC	GOV	SIZE	AGE	NPL_RATIO
Mean	-0.4974774...	81.2631578...	27.4210526...	25.1578947...	28.6842105...	26.3084092...	29.5789473...	21.4848304...
Median	0.35100593...	81	26	26	29	26.7102131...	26.5	14.8568472...
Maximum	1.73639424...	99	39	30	30	28.4474036...	59	68.5517478...
Minimum	-10.146987...	64	13	16	25	22.4600949...	5	1.28773612...
Std. Dev.	2.58650993...	10.7695371...	7.06965949...	4.14941425...	1.59569121...	1.45885799...	14.2632235...	22.0756720...

Descriptive statistics reveal that the average ROA of 38 banks is negative at -0.497 and the median is positive, which means that a small number of banks with big losses drag the mean down. The overall ESG practices are high with an average score of 81.26. Environmental, Social, and Governance scores have a mean of 27.42, 25.16 and 28.68 respectively. The standard deviation of 10.77 shows that there are moderate variations in the performance of banks in terms of ESG. Concerning control variables, the age of the banks is 29.58 years on average and bank size is 26.31 on average, which implies high asset bases. The average NPL ratio stands at 21.49 with a large range and large standard deviation (22.08) and thus there is a large variation in credit risk amongst banks.

5.2. Correlation Matrix

Table 2: Analyzing the correlation among all the variables

	ROA	ESG_SCORE	ENV	SOC	GOV	SIZE	AGE	NPL_RATIO
ROA	1	0.07685656...	0.00583362...	0.13969039...	0.12962071...	0.38681275...	-0.1959351...	-0.5861797...
ESG ...	0.07685656...	1	0.93884489...	0.86149512...	0.34939294...	0.26685253...	0.10067911...	-0.3091675...
ENV	0.00583362...	0.93884489...	1	0.67023989...	0.16304063...	0.29804342...	0.18192128...	-0.2528410...
SOC	0.13969039...	0.86149512...	0.67023989...	1	0.24448447...	0.24074902...	0.04225314...	-0.2663236...
GOV	0.12962071...	0.34939294...	0.16304063...	0.24448447...	1	-0.1454885...	-0.2363739...	-0.2738650...
SIZE	0.38681275...	0.26685253...	0.29804342...	0.24074902...	-0.1454885...	1	0.38164276...	0.09395907...
AGE	-0.1959351...	0.10067911...	0.18192128...	0.04225314...	-0.2363739...	0.38164276...	1	0.46662241...
NPL ...	-0.5861797...	-0.3091675...	-0.2528410...	-0.2663236...	-0.2738650...	0.09395907...	0.46662241...	1

It indicates the relationship between the variables used like ROA, ESG score and its components, control variables. The result shows a positive weak relationship between ESG score and ROA. Similarly environmental (0.0058), social (0.14) and governance (0.13) components also have weak positive relationships with ROA. The control variables that have moderate positive correlation with ROA is bank size (0.39) while NPL ratio is negatively associated with ROA with a mean value of -0.59. The correlation result suggests that though ESG factors have weak relation with profitability, NPL ratio and bank size plays an important role in influencing bank profitability.

5.3. Regression Analysis

5.3.1. Model 1 : ESG impact on Return on Asset (ROA)

Table 3: ESG effect on ROA

Dependent Variable: ROA Method: Least Squares Date: 04/18/26 Time: 19:26 Sample: 1 38 Included observations: 38				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.46897	5.421277	-3.406755	0.0017
ESG_SCORE	-0.067472	0.029448	-2.291204	0.0285
SIZE	0.968595	0.215120	4.502582	0.0001
AGE	-0.008842	0.024592	-0.359531	0.7215
NPL_RATIO	-0.082205	0.015738	-5.223505	0.0000
R-squared	0.610555	Mean dependent var		-0.497477
Adjusted R-squared	0.563350	S.D. dependent var		2.586510
S.E. of regression	1.709153	Akaike info criterion		4.031953
Sum squared resid	96.39977	Schwarz criterion		4.247424
Log likelihood	-71.60710	Hannan-Quinn criter.		4.108616
F-statistic	12.93400	Durbin-Watson stat		1.891683
Prob(F-statistic)	0.000002			

The ESG score coefficient is -0.067 and the p value is 0.029 means significantly ESG has a real negative impact on banks profitability. The age coefficient is -0.0088 and its p value 0.72 indicating age does not have a significant effect. The coefficient for banks size is 0.969 and it has a strong positive influence as its p value is 0.0001 means size enhances ROA. The coefficient for NPL ratio is -0.082 and its p value is almost zero means it has a significant impact on ROA. The value of R-squared is 0.611 implying that this model accounts nearly 61.1% of the change in ROA and the rest 38.9 percent change in the ROA is attributed to other variables not included in the model.

5.3.2 Model 2: Environmental, Social and Governance impact on ROA

Table 4: Environmental, Social and Governance impact on ROA

Dependent Variable: ROA Method: Least Squares Date: 04/18/26 Time: 19:27 Sample: 1 38 Included observations: 38				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-25.26303	7.896783	-3.199154	0.0032
ENV	-0.144588	0.055956	-2.583976	0.0147
SOC	0.040090	0.092435	0.433717	0.6675
GOV	0.110383	0.187893	0.587480	0.5611
SIZE	1.000213	0.215038	4.651331	0.0001
AGE	0.000516	0.024779	0.020836	0.9835
NPL_RATIO	-0.082562	0.015508	-5.323719	0.0000
R-squared	0.646224	Mean dependent var		-0.497477
Adjusted R-squared	0.577751	S.D. dependent var		2.586510
S.E. of regression	1.680732	Akaike info criterion		4.041158
Sum squared resid	87.57065	Schwarz criterion		4.342818
Log likelihood	-69.78200	Hannan-Quinn criter.		4.148486
F-statistic	9.437673	Durbin-Watson stat		1.845701
Prob(F-statistic)	0.000007			

This model identifies which ESG components affect banks' ROA. The environmental coefficient is -0.145 and p value of 0.015 indicating a significant negative impact on ROA. Social has a coefficient of 0.04 (p value 0.67), and governance 0.11 (p value 0.56); both show positive but insignificant effects. Bank age has an insignificant impact (p value 0.98) despite a small positive coefficient of 0.0005. Bank size has a strong positive and significant effect (coefficient 1.0002 & p value 0.0001). The NPL ratio (coefficient is -0.083) has a significant negative impact on ROA, showing that higher bad loans reduce profitability. The R² value of 0.65 indicates that 65% of the variation in ROA is explained by the model, and the F-statistic value 0.000007 confirms overall model significance.

6. Conclusion

6.1. Main Findings

ESG score has a significant negative effect on ROA, mainly driven by the environmental (ENV) component. This suggests that, in the short term, ESG practices create additional costs for banks. Social (SOC) and governance (GOV) show positive but insignificant effects. Bank size has the strongest positive impact on performance, showing that larger banks utilize assets more efficiently. In contrast, the NPL ratio has a strong negative impact and is the second most influential factor, reflecting the issue of high bad loans in the Bangladeshi banking sector.

6.2. Limitations

This study has several limitations. First, it is based on a single year of data, which may not capture the long-term benefits of ESG investments. Second, the analysis relies on secondary data from annual reports, where incomplete or inconsistent ESG disclosures may affect measurement accuracy. Third, the sample size is relatively small, covering only 38 banks. Finally, the study does not consider country-level factors such as GDP growth, inflation, interest rates, and political stability, which could influence both ESG practices and bank profitability.

6.3. Future Directions

Future research should focus on fulfilling these drawbacks by using larger sample size and longer time period and include other variables such as microeconomic factors and banks specific factors like Capital adequacy ratio and Cost to income ratio to have a more in depth analysis on the relationship between ESG and bank financial performance in Bangladesh.

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The Integration of Artificial Intelligence in Accounting Practices in Bangladesh: A Case Study on Dana Engineers International Limited

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Abstract

The rapid growth of digital technologies has significantly transformed accounting practices across organizations worldwide. Artificial Intelligence (AI) integrated accounting software is increasingly being adopted to improve accounting efficiency, accuracy, automation, and financial decision-making. This study examines the impact of AI-integrated accounting software on accounting practices at Dana Engineers International Limited (DEIL), Bangladesh. The research adopted a descriptive quantitative research design based on primary and secondary data. Primary data were collected through a structured questionnaire survey from 26 employees working in accounting and finance-related departments of the organization. Descriptive statistical tools such as frequency distribution, percentage analysis, mean score, and standard deviation were used to analyze the data. The findings reveal that AI-based accounting software positively influences accounting efficiency, reduces manual errors, enhances workflow automation, and improves financial monitoring and control systems within the organization. The study also identifies that employees believe AI technologies contribute significantly to financial data analysis, forecasting, and strategic decision-making. Despite several challenges such as technological infrastructure limitations and the need for employee training, the overall findings indicate that AI-integrated accounting systems have a strong positive impact on accounting practices in DEIL. The study recommends further investment in AI-enabled accounting technologies and continuous employee training to maximize the benefits of digital accounting systems.

Keywords: Artificial Intelligence, Accounting Software, Automation, Financial Reporting, ERP, Bangladesh.

1. Introduction

The advancement of digital technologies has transformed accounting practices across the world. Artificial Intelligence (AI), Enterprise Resource Planning (ERP) systems, cloud accounting, and automation technologies are increasingly becoming essential tools in modern accounting operations. Traditional accounting systems that relied heavily on manual processing are gradually

being replaced by AI-enabled systems capable of processing financial information more efficiently and accurately.

In Bangladesh, organizations are increasingly adopting digital accounting technologies to improve operational efficiency and financial transparency. Dana Engineers International Limited (DEIL), a leading engineering solutions company in Bangladesh, uses ERP-based accounting systems to manage its accounting and financial activities. AI-integrated accounting software assists organizations in automating repetitive tasks, reducing manual errors, improving financial monitoring, and enhancing decision-making.

Despite the growing use of AI technologies in accounting, limited empirical research exists regarding the practical impact of AI-integrated accounting software on accounting practices in Bangladeshi organizations. Therefore, this study aims to examine how AI-integrated accounting software improves efficiency, accuracy, and automation in accounting practices at DEIL.

The primary research question of this study is:

How does the integration of Artificial Intelligence with advanced accounting software improve the efficiency, accuracy, and automation of accounting practices at Dana Engineers International Limited?

The objectives of this study are:

- To examine the impact of AI-integrated accounting software on accounting efficiency.
- To analyze the role of AI in improving financial information accuracy.
- To identify how AI technologies automate accounting processes.
- To evaluate the role of AI in financial monitoring and decision-making.

This study contributes to the growing body of knowledge regarding AI adoption in accounting practices in Bangladesh and provides practical insights for organizations seeking to modernize their accounting systems.

2. Literature Review

2.1. Artificial Intelligence in Accounting

Artificial Intelligence has become one of the most transformative technologies in accounting practices. AI enables organizations to automate repetitive accounting tasks, process large volumes of financial data, and improve decision-making capabilities. Ibrahim (2025) stated that AI technologies significantly improve accounting automation and financial analysis capabilities. Similarly, Hossain et al. (2025) found that AI integration enhances accounting information systems by improving processing speed and information quality.

Islam et al. (2024) examined the integration of blockchain and AI technologies into accounting practices in Bangladesh and concluded that such technologies improve transparency, security, and real-time reporting. Chowdhury et al. (2025) also identified technological readiness and organizational capability as important factors influencing AI adoption in Bangladeshi accounting firms.

2.2. Adoption of Accounting Software in Bangladesh

Accounting software has become increasingly important for improving operational efficiency and financial management. Hossain (2025) found that cloud accounting systems improve financial reporting and accessibility among SMEs in Bangladesh. Saad et al. (2022) argued that perceived usefulness and ease of use significantly influence cloud accounting adoption.

Sarker and Islam (2022) identified that cloud accounting systems enhance data accessibility and organizational efficiency. Shahadat et al. (2023) further revealed that technological, organizational, and environmental factors strongly influence digital technology adoption in emerging economies.

2.3. Automation and Efficiency in Accounting Practices

Automation is one of the major advantages of AI-based accounting systems. Rakibuzzaman et al. (2025) identified that automated financial reporting improves reporting speed and operational efficiency. Islam and Mita (2026) found that fintech accounting automation reduces manual errors and improves workflow efficiency.

Cloud-based accounting systems also support organizations in improving financial monitoring and reducing business risks through real-time financial information management (Nduokafor et al., 2024).

2.4. Accuracy and Reliability of Financial Information

Accurate and reliable financial information is critical for organizational decision-making. Monteiro et al. (2023) identified that organizations adopting AI technologies are more likely to produce high-quality financial information and maintain stronger internal control systems. Al-Omush et al. (2025) highlighted that AI-based auditing systems improve audit transparency and reduce human errors.

Sultana et al. (2025) emphasized that digital accounting systems significantly improve the reliability and transparency of financial information in developing countries.

2.5. AI and Decision Making in Accounting

AI technologies contribute significantly to financial analysis and managerial decision-making. Islam et al. (2024) noted that AI supports predictive financial analysis and business performance improvement. Uddin et al. (2024) found that data visualization and AI-assisted reporting improve investment and strategic decision-making.

Akhter et al. (2025) also concluded that modern accounting technologies support managerial

decision-making by providing timely and accurate financial reports.

2.6. Challenges of AI Adoption in Bangladesh

Despite the advantages of AI technologies, organizations in Bangladesh face several challenges in technology adoption. Mahmud and Uddin (2023) identified financial constraints, technological infrastructure limitations, and lack of technical expertise as major barriers.

Alzahrani et al. (2021) found that employees often resist ERP implementation due to fear of job displacement and unfamiliarity with technology. Marocco et al. (2024) emphasized that organizational culture and inadequate employee training also hinder AI adoption.

2.7. Research Gap

Existing studies mainly focus on theoretical discussions regarding AI adoption in accounting or general technological transformation. However, limited empirical studies examine the practical impact of AI-integrated accounting software on everyday accounting practices in Bangladeshi organizations.

Therefore, this study fills the research gap by investigating how AI-integrated accounting software influences accounting efficiency, accuracy, automation, and financial decision-making in Dana Engineers International Limited.

3. Materials and Methods

3.1. Research Design

This study adopted a descriptive quantitative research design to examine the impact of Artificial Intelligence and advanced accounting software on accounting practices at Dana Engineers International Limited.

3.2. Data Sources

Both primary and secondary data were used in this study.

Primary Data

Primary data were collected through a structured questionnaire survey conducted among employees working in the accounting and finance-related departments of DEIL.

Secondary Data

Secondary data were collected from:

- Academic journals
- Research articles
- Online databases

- Company documents and reports
- Books related to accounting technology

3.3. Population and Sample

The population of this study consisted of employees involved in accounting and finance operations at DEIL. A sample of 26 respondents was selected based on convenience sampling due to time and accessibility limitations.

3.4. Variables of the Study

Independent Variable

- Integration of Artificial Intelligence in advanced accounting software.

Dependent Variables

- Efficiency of accounting practices
- Accuracy of financial information
- Automation of accounting tasks
- Financial monitoring and control
- AI-supported decision-making

3.5. Data Collection Method

A structured questionnaire was developed using Google Forms. Most survey questions were measured using a five-point Likert scale where:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

3.6. Data Analysis Technique

Descriptive statistical methods were used for data analysis, including:

- Frequency distribution
- Percentage analysis
- Mean score analysis
- Standard deviation

- Graphical presentation

3.7. Ethical Considerations

Participation in the survey was voluntary, and respondents were assured of confidentiality and anonymity. The collected data were used strictly for academic purposes.

4. Results and Discussion

4.1. Respondents' Profile

The majority of respondents were Managers (30.8%) and Finance Executives (26.9%), indicating that most participants were directly involved in accounting and financial management activities. Additionally, a large proportion of respondents had over one year of professional experience and extensive familiarity with accounting software systems.

The findings also show that Dana AOP ERP is the primary accounting software used in DEIL, with 84.6% of respondents confirming its usage.

4.2. Efficiency of Accounting Practices

The findings indicate that AI-integrated accounting software significantly improves accounting efficiency. The overall mean score for efficiency-related variables was 4.15, indicating a strong positive impact.

Employees agreed that accounting software increases the speed of accounting operations, reduces processing time, and helps accountants to complete tasks more efficiently.

4.3. Accuracy of Financial Information

The study found that AI-based accounting software improves financial reporting accuracy and reduces human errors. The overall mean score for financial information accuracy was 4.08.

Respondents agreed that automated systems ensure data consistency and improve the reliability of financial records.

4.4. Automation of Accounting Tasks

Automation was identified as another major advantage of AI-integrated accounting systems. The overall mean score for automation-related variables was 4.10.

Respondents stated that accounting software reduces manual accounting work, simplifies routine accounting tasks, and enhances workflow automation.

4.5. Financial Monitoring and Control

Financial monitoring and control recorded the highest mean score (4.21) among all variables. This indicates that AI-based accounting systems significantly improve financial tracking, internal control systems, and monitoring of financial transactions.

The findings suggest that ERP-based accounting systems strengthen transparency and support organizational financial management.

4.6. AI and Decision-Making

The study also found that employees strongly believe AI technologies support financial analysis, forecasting, and strategic decision-making. The overall mean score for AI-supported decision-making was 4.10.

AI systems help organizations analyze large volumes of financial data and generate insights that improve financial planning and managerial decision-making.

4.7. Overall Discussion

Overall, the findings demonstrate that AI-integrated accounting software positively affects accounting practices in Dana Engineers International Limited. The implementation of ERP-based accounting systems has enhanced efficiency, automation, financial accuracy, and internal control systems.

The findings are consistent with previous studies that identified AI technologies as important drivers of accounting transformation and operational efficiency.

5. Conclusion

The integration of Artificial Intelligence and advanced accounting software has significantly transformed accounting practices in modern organizations. This study examined the impact of AI-integrated accounting software on accounting practices at Dana Engineers International Limited.

The findings reveal that AI-based accounting systems improve accounting efficiency, reduce manual errors, automate routine accounting activities, and strengthen financial monitoring and control systems. Employees also perceive AI technologies as valuable tools for financial analysis and strategic decision-making.

Despite challenges such as technological infrastructure limitations and employee resistance to technological changes, the overall impact of AI adoption on accounting practices is highly positive.

The study recommends that organizations continue investing in AI-enabled accounting technologies and provide regular training programs to employees to maximize the benefits of digital accounting systems. Organizations should also strengthen technological infrastructure and expand automation features within ERP systems.

Although this study focused on a single organization, it contributes valuable practical insights regarding AI adoption in accounting practices in Bangladesh. Future research may consider larger samples and multiple organizations to provide broader understanding regarding the impact of AI technologies on accounting and financial management.

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Barriers to AI Integration in the Banking Sector of Bangladesh: A Case Study of Islami Bank Bangladesh PLC

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Abstract

This study adopts a qualitative descriptive research design to explore the barriers to Artificial Intelligence (AI) integration within the commercial banking sector of Bangladesh, focusing specifically on Islami Bank Bangladesh PLC. Utilizing a triangulation approach consisting of semi-structured interviews, qualitative surveys, and field observations, the research examines three main dimensions: Perceived Security Risk, Technological Infrastructure Readiness, and the Digital Human Capital Gap. The findings reveal a regulatory paradox where security risk acts as a major compliance barrier due to a lack of definitive central bank frameworks. Additionally, structural inertia caused by frequent daily server crashes and an outdated Core Banking System (CBS) hampers real-time AI implementation, while rigid recruitment practices fail to attract tech-savvy talent. The study recommends drafting AI-specific circulars, upgrading hardware resilience, and overhauling recruitment pathways to transition AI from a supporting tool to a core decision-maker.

Keywords: Artificial Intelligence, Banking Sector, Bangladesh, Technological Infrastructure, Human Capital Gap.

1. Introduction

The banking sector of South Asia stands in an uncertain but transformative position as the surge of AI integration disrupts the usual model of operation and redefines financial intermediary parameters. This metamorphosis aligns with the current state of the Bangladeshi banking sector, as the new government shapes the financial sector from its devastating appearance caused by large amounts of corruption, loan defaults, and money laundering. Integrating AI in banking operations is no longer a luxury but a regulatory and competitive necessity, as well as a requirement to cut back on extra manpower in this dire situation. This transition towards AI integration will help transform relationship-based, labor-intensive banking operations into a more transparent, data-centric, and algorithm-driven system. Even though the possibilities for AI to improve the credit scoring model, fraud detection, and enhance customer experience are huge, the drive towards actual integration remains unmatched compared to global standards.

Within the Bangladeshi context, the momentum is driven by the national "Smart Bangladesh 2041" vision, a strategic framework that envisions a technology-driven, inclusive economy. For Bangladesh, the drive towards the "Smart Bangladesh 2041" vision encompasses a technology-driven framework to incorporate the inclusion of the mass population in the economy. However, the current state of adoption remains nascent. The current integration rate is very poor. In 2024 and 2025, many commercial banks issued digital banking licenses, but often trapped themselves in the pilot phase and reduced the scaling of the AI solution to only basic chatbots. This shows the immense gap between the conceptual potential and the practical scenarios of the sector. This indicates a significant latency between the conceptual potential of AI and its institutional realization, a gap that is being addressed through new regulatory mandates and a shift in organizational culture. Local financial institutions face a trifecta of complex situations: maintaining cybersecurity, building AI-incorporating infrastructure, and attracting a tech-savvy workforce during a period of massive brain drain.

This study adopts a qualitative descriptive research design, aiming to provide an in-depth understanding of the key factors influencing AI integration in the banking sector of Bangladesh. By examining Perceived Security Risk, Technological Infrastructure Readiness, and the Digital Human Capital Gap, this research seeks to develop a rich, interpretive understanding of the challenges and opportunities surrounding AI integration. The study emphasizes capturing expert insights, organizational perspectives, and contextual realities to present a comprehensive descriptive account of AI adoption in the banking sector.

1.1. Research Questions

1. To what extent does Perceived Security Risk act as a deterrent to the adoption and integration depth of Artificial Intelligence within the commercial banking sector of Bangladesh?
2. How does the Technological Infrastructure Readiness affect the effective adoption of AI-driven financial services?
3. What is the relationship between the Human Capital Gap (tech-savvy manpower shortage) and the rate of AI implementation in the banking sector?

1.2. Research Objectives

1. To explore the impact of Perceived Security Risk on strategic decision-making regarding AI implementation in the banking sectors of Bangladesh.
2. To investigate the connection between Technological Infrastructure Readiness and the AI adoption ability of the commercial banks of Bangladesh.
3. To understand the degree to which the Human Capital Gap hinders AI integration in the banking sector.

2. Literature Review

The historical courses of South Asian banking have been characterized by information asymmetry, high transaction costs, and a frequent digital divide, excluding large segments of potential customers from financial markets (Fazal et al., 2023). The rise of Artificial Intelligence, including machine learning, robotic processing automation, and natural language processing, provides a beneficial resolution on paper as well as in real-life scenarios (Rashmi, 2021). The global market size for AI automation for banking was around USD 43 billion in 2025, which is projected to grow to around USD 240 billion by 2033 (Research, 2025). In the Asia Pacific region in 2024, the projected market size was around USD 51 billion, which was surpassed effortlessly (Alavalapati Saroj Mithra et al., 2023). In the coming years, the surge towards aggressive and mature integration will heavily impact the market.

Surveys conducted by the Bangladesh Institute of Bank Management (BIBM) reveal that only 29% of local banks have introduced AI-based solutions, often limited to narrow applications like cash counting or basic KYC assessment (Khan et al., 2021). According to another study by BIBM, around 25% of the local banks use AI-based solutions with a narrow use capacity of cash disbursement and Know Your Customer (KYC) assessment. The available literature on AI in banking proposes immense potential for AI, but at the integration level, there is a significant research gap for defining specific causal relations that will incorporate or enhance quick AI integration while maintaining socio-economic factors.

3. Materials and Methods

3.1. Research Type

This research follows a qualitative, exploratory, and descriptive approach combined with first-hand participant observation to strengthen its claims. The exploratory method is used to interpret the experiences of the officers who closely monitor banking operations, while a descriptive method explains recurring trends and institutional barriers. This study gains an "insider perspective" as the researcher served as an intern within a major financial institution, in this case, Islami Bank Bangladesh PLC. This way, the interpretation of the data goes deeper, as theoretical findings can be compared with the practical realities of CBS, infrastructure limitations, and corporate culture.

3.2. Research Design

A qualitative research design was implemented by utilizing a triangulation approach for all three primary data sources:

Semi-Structured Interviews: Primary conversations with the IT-in-charge, the manager of operations, and officers of Islami Bank Bangladesh PLC were conducted to capture discerning technical and regulatory narratives. The researcher interviewed five Islami Bank Bangladesh PLC officials, ranging from the Head of the Branch to officers who handle the IT and Database infrastructure.

Qualitative Surveys: Distributed via Google Forms to gather broader perspectives from branch-level officers of other banks who face varying degrees of AI readiness, including Meghna Bank PLC, Bangladesh Krishi Bank, Janata Bank, and Al-Arafah Islami Bank PLC. The Google Form was sent to more than 10 officers holding different positions across different banks. After a primary examination, 5 responses were selected for the analysis.

Field Observations (Participant Observation): The researcher's own professional observations were gathered during an internship period spanning from 4th January 2026 to 4th April 2026 at Islami Bank Bangladesh PLC. The observations focused on operational efficiency and technical fluidity of the Core Banking System (CBS) when integrated with digital platforms, the behavioral disposition and digital literacy of employees toward adopting automated workflows, and the identification of specific manual redundancies that present high potential for AI-driven optimization.

This multimodal approach enables the researcher to cross-reference interview findings with personal first-hand experience and observations of current banking technologies and talent management gaps.

3.3. Sampling

A purposive sampling method was used to select participants. Even though the main focus was the AI integration capacity of IBBPLC, because of the small sample size, the researcher wanted to verify and compare the responses of IBBPLC officers with samples from other banks. The participants included 6 bank officials (IT-in-charge, manager of operations, and officers) from Islami Bank Bangladesh PLC and 4 bank officials from other banks (Bangladesh Krishi Bank, Meghna Bank PLC, Al-Arafah Islami Bank PLC).

3.4. Data Collection Method

Primary data was collected via semi-structured meetings and recorded through contemporaneous field notes and a pre-designed thematic checklist.

A Google Forms link was distributed via direct outreach through instant messaging platforms (WhatsApp) to a purposive sample of the researcher's professional network.

Printed questionnaires were personally administered by the researcher during scheduled face-to-face meetings to accommodate participants.

The researcher's own structural observations during the internship period were also incorporated.

3.5. Data Analysis

The data was analyzed using a thematic approach, focusing primarily on four major themes:

Theme 1: Perceived Security Risk & Regulatory Influence

Theme 2: Technological Infrastructure Readiness

Theme 3: Human Capital & The "Tech-Savvy" Shortage

Theme 4: The "Possibility"

4. Results and Discussion

The qualitative insights extracted from the interviews of the bank officials of Islami Bank Bangladesh PLC, survey results from other banks, and the researcher's observations are organized thematically below. They focus on the structural and institutional barriers that define the current landscape of AI integration in Bangladesh.

4.1. Theme 1: The Regulatory Paradox and Perceived Security Risk

One of the most repeated narratives among the participants was the fear of the unknown, driven by a combination of regulatory ambiguity and perceived security and compliance risks.

- **Findings:** Most interviewees agreed that AI automation has enormous potential if integrated correctly. However, the integration density remains low due to a lack of definitive policy from the central bank providing safety nets for legal errors. Monirul Islam, FAVP at Islami Bank Bangladesh PLC, noted that while the bank has enough resources to implement AI-driven credit scoring, there is no specific circular from Bangladesh Bank governing the legal risk of automated errors. Consequently, the board remains extremely hesitant to adopt AI solutions.
- **Discussion and Triangulation:** This finding suggests that Perceived Security Risk functions not just as a technical concern, but as a rigid regulatory barrier. It aligns directly with the researcher's internship observations, where many manual processes (such as NID cross-checking) remain manual due to internal compliance regulations requiring physical human signatures on documents, rather than a lack of technical support. This requirement prevents AI from making core decisions, leaving it as a mere supporting tool. Compliance mandates for human signatures are costly for both banks and customers. For instance, Islami Bank Bangladesh's omni-channel banking app, Cellfin, was created to enable branchless banking. However, if a user forgets their password or changes their device, they must physically visit the account-opening branch to fill out a paper application. Anika Nowshin, an Assistant Officer in the ADC department, expressed frustration, noting that although the system performs verification via account-linked phone numbers, OTPs, and facial recognition, legal compliance still mandates a physical branch visit for Cellfin app issues.

4.2. Theme 2: Technological Infrastructure Readiness

Participants shared mixed responses regarding technological infrastructure readiness.

- **Findings:** The technological readiness required to implement AI solutions within the Core Banking System (CBS) is not sufficiently fortified. While higher-level officers claimed the bank invested adequately in technological capabilities to handle AI, lower-level first-hand users held a different view. Md Mesbah Uddin, AVP & Head of the Branch (Jashore, IBBPLC), stated that the bank has strong technological capacity compared to other mainstream banks. Conversely, Abdul Bari, ADC-in-charge at the Mohammadpur Krishi Market Branch, argued that technological capacity is insufficient to run day-to-day CBS operations smoothly, which compromises banking efficiency, harms corporate reputation, and costs customers valuable hours.
- **Discussion and Triangulation:** The researcher observed frequent daily server crashes, which disrupt banking operations for more than one hour on average per day. Branch computers lack up-to-date hardware capable of processing heavy operations. Furthermore, due to security risks, the CBS software is highly outdated and completely disconnected from any support system outside the bank. Computers regularly fail to execute basic operations due to low processing power and poor maintenance, and power supplies cannot sustain hardware during power cuts. Anika Nowshin described the tedious nature of these infrastructure failures within the ADC department, explaining that if the power cuts out mid-way through the multi-step process required to open an iBanking account, the computer shuts down, forcing the officer to restart the entire process from the beginning. Ultimately, the current infrastructure is unready to support real-time AI solutions.

4.3. Theme 3: Human Capital & The "Tech-Savvy" Shortage

Successfully deploying and utilizing AI within a CBS requires a technologically capable workforce.

- **Findings:** Mixed responses were received regarding human capital capabilities. Md. Rowshan Ali, Manager Operations at IBBPLC (Mohammadpur Krishi Market Branch), argued that the recruitment process serves as a barrier to acquiring tech-savvy personnel. The entrance exams do not align with the actual operational needs of the bank, lack department-specific policies, and test skills that have nothing to do with technological ability. As a result, many new recruits cannot adequately run regular technological operations, let alone deploy AI solutions. Md Newaz Sharif, an officer at the same branch, remarked that individuals who thoroughly understand the computing system but fail the standardized entry exam are passed over for candidates who pass the exam but lack fundamental computing knowledge.
- **Discussion and Triangulation:** The researcher's observations confirm a distinct shortage of tech-savvy manpower. During the internship, the researcher encountered numerous veteran officers with over 10 years of experience who struggled with basic computer functions and faced difficulties adapting to minor system updates. Additionally, the

mundane, repetitive nature of banking roles fails to attract or retain younger, tech-savvy generations. Due to minimal changes in job roles over time, long-serving officers gradually lose their adaptability to technological shifts.

4.4. Theme 4: The "Possibility": Identifying Strategic Entry Points

This theme explores immediate "pockets of opportunity" where AI holds immediate transformative potential within the Bangladeshi banking sector, moving past institutional barriers.

- **Findings:** Despite significant hurdles, a consensus exists that specific operational areas are ripe for AI transformation, with experts identifying automated credit scoring and fraud detection as top priorities. Monirul Islam (FAVP) highlighted that the historical data ecosystems necessary for AI-driven credit scoring are already present within the bank. Furthermore, the consumer success of apps like Cellfin indicates a substantial market appetite for branchless banking, provided the backend can support it.
- **Discussion and Triangulation:** The viability of AI is highlighted by friction in current manual workflows. The researcher observed that officers spend a significant portion of their day on redundant data verification, such as manually cross-checking NID details that are already digitally accessible. Implementing AI as an automated "pre-verification" layer would exponentially increase operational efficiency without requiring a total overhaul of the legal framework. While upper management demonstrates an intent to innovate, the potential of AI remains blocked by an institutional reliance on human signatures for compliance. Therefore, immediate opportunities lie in using AI to pre-process massive volumes of mundane tasks.

5. Conclusion

This study provides a comprehensive exploration of the institutional and structural landscape governing AI integration within the commercial banking sector of Bangladesh. By utilizing a qualitative exploratory design, the research successfully captured the nuanced "behind-the-scenes" operational realities that define the current stage of digital transformation.

5.1. Main Findings

The study identified three primary barriers acting as a "digital anchor" that prevents banks from scaling AI solutions beyond basic pilot phases:

- **The Regulatory Paradox:** Security risk functions primarily as a regulatory hurdle rather than a technical one. The absence of clear policies or circulars from the central bank creates a safety vacuum, leaving boards hesitant to approve AI budgets due to potential legal liabilities for automated errors.

- **Structural and Technical Inertia:** Operational realities are defined by frequent server crashes, outdated hardware, and rigid legacy Core Banking Systems (CBS) that lack the resilience required for real-time AI integration.
- **The Human Capital Mismatch:** Recruitment processes do not match the technical needs of modern banking departments. Veteran staff often struggle with basic digital adaptability, while mundane roles fail to attract or retain tech-savvy younger generations.

Through participant observation, the study exposed daily operational frictions that conflict with official institutional narratives, such as the mandate for physical signatures on advanced applications like Cellfin despite the availability of digital biometric verification.

5.2. Policy Implications and Recommendations

Regulatory and Policy Level (Bangladesh Bank)

- **Drafting an AI-Specific Circular:** The central bank must issue a clear framework defining the legal liability of automated errors to provide boards with a "safety net" to approve AI budgets.
- **Adopting International Principles (FEAT & Veritas):** Bangladesh Bank can adopt the FEAT (Fairness, Ethics, Accountability, and Transparency) principles used by the Monetary Authority of Singapore to provide a risk-based framework for compliance. Under this approach, low-risk tools (like chatbots) face simple rules, while high-risk tools (like credit scoring) undergo stringent assessments. Bangladesh could also deploy open-source evaluation toolkits similar to Singapore's Veritas initiative.
- **Deploying the FREE-AI Governance Framework:** Bangladesh could mirror India's NITI Aayog framework (FREE-AI), utilizing its "Seven Sutras" as practical governance pillars to ensure AI tools align with societal values and build digital trust. Following RBI trends, this includes mandating a Chief AI Ethics Officer (CAIEO) and implementing Human-in-the-Loop (HITL) controls so that humans retain final decision-making power.
- **Approval of Digital Signatures:** Regulatory frameworks should be updated to accept advanced biometric or AI-verified digital signatures over physical signatures for routine tasks like password resets.

Table 1: Comparison of Proposed Regulatory Frameworks

Feature	Singapore (MAS)	India (RBI)	Bangladesh (Proposed)
Core Philosophy	FEAT Principles (Fairness, Ethics, Accountability, and Transparency)	Seven Sutras (Trust, People-First, etc.)	Needs a "Digital Trust" Framework
Regulatory Tool	Veritas Toolkit (Technical)	FREE-AI Pillars (Governance/Policy)	Circular-based Guidance
Human Element	High focus on transparency	Mandatory Chief AI Officer	Focus on "Technical Re-skilling"
Safety Net	Risk-Materiality Assessment	AI Innovation Sandboxes	Safe-Harbor for AI Pilots

Institutional and Infrastructural Level

- **Modernizing Hardware and Power Resilience:** Financial institutions must upgrade physical processing power at the branch level and invest in robust UPS/backup power configurations to prevent data loss during electrical outages.
- **Transitioning to API-First CBS:** Banks should move away from rigid, siloed legacy systems and transition toward an "API-first" architecture to allow for smooth plug-and-play integration of modern AI modules.

Human Capital and Recruitment

- **Specialized Recruitment Pathways:** Entrance exams should be overhauled to include technical and digital literacy assessments that accurately reflect department needs.
- **Continuous Upskilling and Tech-Incentives:** Implement mandatory, continuous digital training programs to combat adaptability loss among long-serving staff.
- **Creating a Tech-Friendly Culture:** Automate low-value, repetitive tasks to shift roles toward innovative problem-solving, creating an environment that appeals to younger generations.

Table 2: Priority of Immediate AI Opportunities

Operational Area	AI Solution	Key Function	Outcome / Value Creation
Credit Scoring	Predictive Analytics	Uses historical internal data to assess risk	Improves accuracy in lending decisions
Fraud Detection	Pattern Recognition AI	Monitors transactions in real time	Early detection of suspicious activities
NID Verification	Automated Pre-check System	Cross-verifies national ID data instantly	Reduces manual workload and processing time

5.3. Future Directions

Immediate opportunities for AI in Bangladesh remain highly viable within high-volume, low-complexity domains like fraud detection and data pre-verification. AI integration in Bangladesh will progress as a gradual evolution rather than a rapid revolution. For AI to transition from a basic supporting tool into a core decision-maker, the sector must look beyond purchasing software and systematically resolve its foundational trinity: drafting clear regulatory frameworks, upgrading physical infrastructure resilience, and modernizing human resource recruitment and upskilling policies. Only by resolving these core problems can the Bangladeshi banking sector harness the power of AI to enhance operational efficiency and financial inclusion across the South Asian market.

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