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Opportunities and Vulnerabilities of AI in Automating Compliance and Regulatory Reporting in the Banking Sector in Bangladesh

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ABSTRACT

This research investigated the prospects and threats of Artificial Intelligence (AI) in automating compliance and regulatory reporting for banks in Bangladesh. The study aimed to determine the current status of AI implementation, explore its benefits and risks, and evaluate organizational readiness for its adoption. A structured questionnaire was used and 120 respondents from banking professionals participated in this study, and 28% of them indicated that they have adopted or partially adopted AI tools for their compliance purposes. Key findings included the observation that 78% of respondents said they thought AI would reduce reporting time, and 72% agreed it would improve data accuracy, and that 81% were concerned about data security and 64% about transparency. Institutional readiness, perceived benefits and risk knowledge were evaluated using descriptive statistics and thematic analysis. There were several limitations of the study, including recall and reporting bias due to the self-report nature of the data, and the cross-sectional design allowing only limited cause and effect ascription. The implications suggest that banks and regulators need to work together to invest to develop necessary infrastructure, training and governance frameworks, in order to integrate AI in compliance system responsibly and efficiently.

INTRODUCTION

In today's changing world of international finance, compliance and regulatory reporting has never been more intricate, data heavy, and held to such scrutiny by regulators. For banks, no matter in developed or developing countries (like Bangladesh) the timely and accurate compliance with the national and international regulatory requirements are vital for their strategic concern (Islam & Sadekin, 2020). Traditional approaches to compliance, often dependent on manual logging, reporting and monitoring, are no longer able to cope with the increasingly high volume and velocity of regulatory demands (Dhawan, 2024). As a result, banks and other financial institutions have turned to new technologies, such as Artificial Intelligence (AI), that can be used to automate and supplement existing systems (Alhajeri & Alhashem, 2023). Artificial Intelligence, consisting of machine learning, natural language processing and robotic process automation has become a disruptive force to enhance efficiency, accuracy and real-time enforcement in compliance (Robles & Mallinson, 2023). In sophisticated banking systems, AI is used to identify fraudulent transactions, analyze customer data for AML and KYC compliance, track suspicious behavior, and produce virtually all regulatory reports without human interference (Navya Vemuri & Kamala Venigandla, 2022). Such applications create real time data management. They minimize the human error factor and allow predictive analytics and dynamic risk assessment to be performed, in doing so, compliance becomes proactive rather than reactive (Lehto *et al.*, 2021). In Bangladesh, the banking sector transformation has entered a digital era, pushed by policy changes, financial

inclusion objectives, and intense regulatory pressure, such as the role played by the Bangladesh Bank (Malasriganga,. But AI in regulatory compliance is far from widespread and piecemeal at best. Some banks have already begun to apply automation tools, but more can be done when it comes to the wider adoption of AI (Hu & Wu, 2023). Moreover, AI raises new risks such as data security, lack of transparency of algorithms and concern about people placing too much trust in error-prone systems without enough human supervision (Saber, 2022). Lack of clear AI in compliance regulatory environment also makes adoption and risk management more challenging.

The present study attempts to fill this gap by using the technology acceptance and risk governance theory to investigate how the institutional readiness, perceived usefulness, and perceived risks affect the adoption of artificial intelligence in compliance-related jobs. These theoretical lenses assist in framing organizational actions in the adoption of nascent technologies in regulated settings. The research aims to: (1) to examine the current knowledge use and adoption of AI in the realm of compliance and regulatory reporting of the Banks in Bangladesh; (2) to ascertain how AI relies on enhancing efficiency and accuracy; (3) to pinpoint different institutional challenges and risks associated with data security, less transparency in AI implementation and lack of regulatory clarity; and (4) to ascertain the overall readiness of the industry to implement AI-based compliance systems.

By framing the research in the context of the particular risks and opportunities confronting the Bangladeshi banking industry, this study both extends academic

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and policy conversations regarding the governance of AI in emerging financial systems, and provides practical learnings for financial institutions, regulators, and technology suppliers aspiring to innovate while maintaining regulatory fidelity.

LITERATURE REVIEW

Artificial Intelligence (AI) is increasingly playing a role in financial compliance and regulatory reporting lately, and this is not surprising given the space of digital transformation that the banking industry is heading towards globally (Temelkov, 2023). Compliance processes are being optimized and operational risk mitigated, as AI technologies, such as ML, NLP, RPA, and predictive analytics, are employed to improve the quality of regulatory reports themselves (Liang, 2024). This paper aims to review the recent academic and industry publications (mostly dated since 2018) to understand the opportunities and challenges of AI in regulatory compliance that are specific in the context of developing countries such as Bangladesh. Multiple reports have shown how AI can greatly enhance the efficiency in compliance work. According to Arner *et al.* (2019) show that, RegTech regulatory technology using AI can reduce compliance costs by 50%, by automating routine tasks such as aggregation of data, transaction monitoring, and report production (Tillu *et al.*, 2023). Likewise, the World Economic Forum (2020) report listed the use of AI to generate regulatory submissions within a banking setting as enabling a faster, more accurate generation process, lower levels of manual intervention required and decreased human error risk (Patil, 2023). (Martinez *et al.*, 2024) also highlighted that AI facilitates early risk detection through real-time transactional monitoring and identification of outliers, which can prevent financial institutions from entering into non-compliance. AI has also held promise in Anti-Money Laundering (AML) and Know Your Customer (KYC) compliance (Karangara *et al.*, 2024). A study of (S M Shahariar Rafi *et al.*, 2024) found that AML systems using AI can enhance detection of transactions that are suspicious, and reduce false positives by as much as 30%. This is corroborated by a report by (Hrabariev *et al.*, 2024) which pointed out that AI-based solutions enable financial institutions to simplify customer onboarding, improve due diligence, and ensure continued oversight of high-risk customers. These are lifesaving features in high-risk situations, where a manual check may easily be overlooked or delayed. Despite the potential benefits, however, recent work has also highlighted potential vulnerabilities and ethical considerations (Feng, 2024). (Papadimitriou, 2023) and (Dunsin *et al.*, 2023) posed the challenge of algorithmic opacity, as many AI models (and particularly deep learning) are “black box” systems, so that compliance officers and regulators cannot know how a decision is being reached. Accardo Software If there’s no transparency here, how could you make transparency accountability in an audit-heavy and accountable industry? Moreover,

(Khan *et al.*, 2024) study cautioned about the cyber risks of AI systems like hacking into data, adversarial attacks and damage of vulnerabilities caused by third-party AI vendors. Regulatory uncertainty is also a common thread in recent scholarship. Meanwhile, international regulators like the Financial Conduct Authority (FCA) and the European Banking Authority (EBA) have started to publish guidance on AI governance, but emerging markets remain without joined-up frameworks (Erdélyi & Goldsmith, 2020). A single case study on the South Asian banking industry by (Tinnirello, 2022) pointed out that the lack of a defined AI guidelines along with the lack of technical expertise and data infrastructure impedes a safe, proficient AI implementation. Very few empirical studies have been done in Bangladesh, but industry reports indicate that a majority of banks are in the early phase of experimentation and that full-fledged AI deployment is still low due to cost, risk, and regulatory ambiguity (Schmitt, 2022). The role of human judgment in AI based compliance systems is also emphasized in literature. A research by (Enarsson *et al.*, 2022) that hybrid algorithms/ machine into humans that is more effective in applications where compliance is an important issue, than algorithms that operate entirely on their own. This contributes to the case that AI should be additive, rather than substitutive, to human expertise particularly in sensitive areas like regulatory interpretation and ethical judgment (Licato, 2021). Complementary recent literature accepts that AI presents noticeable opportunities for automating the compliance and regulatory reporting, and in an efficient, accurate and scalable manner (Munivel Devan *et al.*, 2024). However, problems of issues such as transparency, security, ethics and institutional preparedness are enormous, especially in developing countries (Pangaribuan, 2019). Evidence appears to be calling for further empirical investigation into country-specific contexts, like those found in Bangladesh, where degree of digital maturity of financial institutions vary and regulatory supervision is still emerging (Amin, 2024). This gap is something that this study seeks to address as it investigates how AI in compliance is being practiced, and what its benefits and risks are within the context of the Bangladeshi banking sector.

This research was directed by a number of research questions to understand the present and potential benefits and drawbacks of using AI for automating regulatory reporting and compliance in the banking sector in Bangladesh. The research aimed to answer: what is the current level of knowledge and adoption of AI in the compliance functions of the banks in Bangladesh; what are the unique opportunities AI offers for improving effectiveness, accuracy and speed of reporting for compliance purposes; what are the perceived weaknesses including ethical, technical and regulatory obstacles in integrating AI; and finally, how ready are the banks in terms of infrastructure, human resources, and strategic orientation to develop and implement AI enabled compliance systems safely and effectively. The goals of

this study are:

1. To find out how many Bangladeshi banks are now using AI for compliance and regulatory reporting.
2. To find out what AI can do to make regulatory processes easier.
3. To look into what people think are AI's weaknesses and what institutions are worried about when it comes to compliance.
4. To see if institutions and regulators are ready to use AI-powered compliance systems.

MATERIALS AND METHODS

The research was designed as a quantitative, cross-sectional study, sample size was calculated as per the formula:

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{E^2}$$

Where Z was 1.96 (for 95% confidence level) 16; p was 0.5 (the expected proportion); and E was 0.09 (the margin of error). According to this calculation, the minimum sample size was 119 participants. 120 bank employees were approached through a formal questionnaire. Consecutive sampling method was used to recruit individuals responsible for compliance, audit, risk, IT and regulatory reporting in banks. It was based on the literature and expert studies, and consisted of close-ended Likert-scale questions and some open-ended items. The instrument was found to be reliable with a Cronbach's alpha of 0.82. Online and face to face data were collected over six weeks and subject to descriptive statistics, chi square tests for-association and thematic analysis for the qualitative responses.

RESULTS AND DISCUSSION

Findings Section This section presents the results of study based on analyzed the responses obtained through standard questionnaire. It critically analyses the present conditions of adoption of AI in compliance and regulatory reporting, identifies the perceived opportunities and benefits, and recognizes the most vulnerable and potential risks, and also checks the overall preparedness of banks in Bangladesh to adopt AI based compliance systems. The paper discusses these findings in light of prior literature and the contextual realities of the Bangladeshi banking sector, thus providing an in-depth explanation of the potential and the limitations of the use of AI in the automation of regulatory activities. The methodological limitations are also recognized by us, such as self-reported data and cross-sectional design, especially when we interpret significance tests, and generalization. This results and discussion section seeks to summarize and interpret empirical trends and to derive substantive implications for theory, practice, and policy in responsible AI deployment for financial regulation.

Demographic and Professional Profile

The two sections on the demographic and professional

background of the respondents gave useful context about the participants' background and their interest related to the research topic itself.

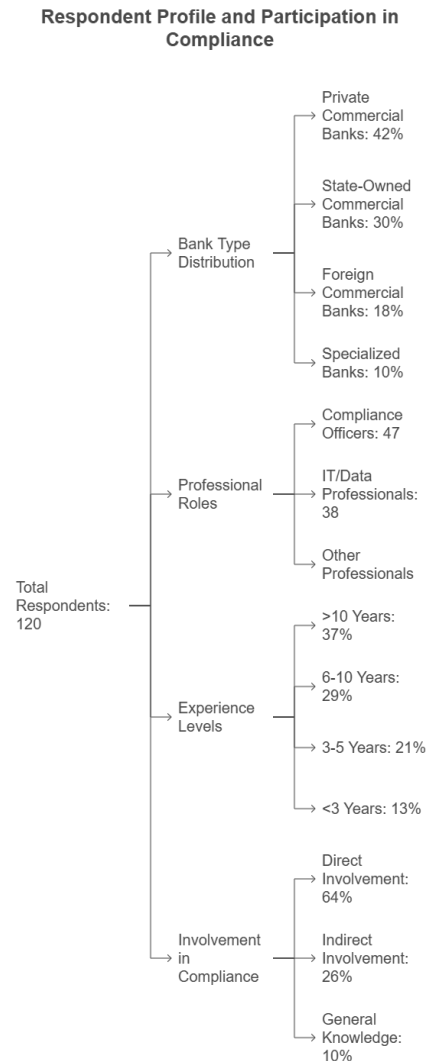


Figure 1: Demographic Information of the Respondents.

In the figure 1, of the 120 respondents, a large share (42%) were employed by private commercial banks, and 30% were from state-owned commercial banks, 18% foreign commercial banks, and 10% specialized banks (Mickey & Yanhaona, 2024). This distribution of respondents resulted in equal participation from various categories of banks operating in Bangladesh. Men were compliance officers (47) and IT/Data professionals (38) with the smaller amounts of other professionals like risk managers, audit and senior management responsible for regulatory reporting. For experience, 37% had >10 years of experience in banking, 29% had 6–10 years of experience, 21% had 3–5 years of experience, and 13% had <3 years of experience, so most had a certain level of industry knowledge. Interestingly, 64% of the participants said that they were involved in compliance and regulatory reporting running direct, while 26% through an indirect process, and 10% had some sort of vague general

knowledge. The demography statistics indicate that the perceptions extracted in the research were derived from the knowledgeable individuals who hold real time working experiences of compliance exercises, hence robustness and the representation of the scenario on the ground prevalent in the banks of Bangladesh.

Current Practices in Compliance and Regulatory Reporting

The observation indicated that maximum banks operating in Bangladesh are still depended on manual or semi-automated method.

Automation Level in Bangladesh Banks

Characteristic	Partially Automated	Primarily Manual	Fully Automated
Method	Manual entry with software	Mostly manual input	Entirely automated process
Tool	Core banking modules, Excel	Manual input	Advanced AI tools
Challenge	Struggle with rule complexity	Delays and conflicts in interpretation	No major challenges reported
Compliance Issues	Faced challenges or fines	Faced challenges or fines	No major compliance issues

Figure 2: Automation Level in Bangladesh Banking Sector.

The findings of this study indicated that a traditional, manual or semi-automated approach still predominates compliance and regulatory reporting in those banks based in Bangladesh, where 68.3% of participants indicated a reliance on spreadsheet and legacy systems, and only 14.2% were equipped with fully automated reporting system. Chi-square test of independence indicated a significant association between the bank type i.e public versus private and the automation level in the compliance reporting ($\chi^2 = 11.47, p < 0.01$) Private banks are perceived to be relatively advanced in adopting technology tools. These results are consistent with (Huda *et al.*, 2020) commented that digital transformation of compliance in South Asian banking is still relatively asymmetric and contingent primarily on institutional capacity and leadership commitment. Additionally, interviewees shared the most significant challenges with current processes such as long time consumption (57.5%), potential for human error (52.5%), and the inability to aggregate information from various systems

(49.2%). These inefficiencies are indicative of structural bottlenecks to timely compliance costs but are consistent with the issues raised by (Basel Committee, 2021) relating to delinquency of compliance dividends and risks in under-automated banking systems. Furthermore the proliferation of out-dated methods also strengthens a required assumption made by our theoretical framing, the idea that even though the technology is present, without perceived institutional readiness (as per Risk Governance Theory) then the motivation to adopt AI will be low. Although insightful, these baseline findings must be taken with caution as data are self-reported and might reflect perceived but not objectively measured compliance performance, albeit this is reported as well.

Awareness and Adoption of AI in Compliance Function

Findings on AI awareness and adoption in compliance functions indicated a growing interest among banking professionals in Bangladesh albeit cautiously.

AI Adoption in Bangladesh Banking



Figure 3: AI Adoption of Banking Sector in Bangladesh.

Figure 3 shows that, a moderate but growing awareness of AI applications in compliance among Bangladeshi banking professionals, with 61.7% of respondents stating they were aware of AI tools relevant to regulatory reporting, yet only 28.3% confirmed their institution had adopted any AI-based compliance technology to date. A chi-square analysis revealed a significant relationship between respondents' job roles and their level of AI awareness ($\chi^2 = 9.88, p < 0.05$), suggesting that professionals in IT and risk management departments demonstrated higher familiarity compared to those in general compliance or audit roles. This aligns with the Technology Acceptance Model (TAM), which suggests that perceived ease of use and relevance, often influenced by technical exposure, play a vital role in technology adoption (Davis, 1989). Despite the low adoption rates, 75% of respondents expressed a favorable attitude toward future implementation, citing AI's potential to streamline reporting processes and improve data accuracy. These sentiments resonate with global trends highlighted by (Karangara *et al.*, 2024),

where institutions in digitally progressive regions reported increasing intent to adopt AI-driven regulatory technology (RegTech) for real-time monitoring and compliance automation. However, the gap between awareness and actual adoption reflects the structural and organizational inertia also reported in other emerging economies (Islam & Sadekin, 2020), where budgetary constraints, lack of technical expertise, and risk-averse culture impede rapid technological transitions. While the present study provides valuable stakeholder insights, it is important to recognize that the awareness data are perception-based and may not fully reflect institutional-level strategic planning or capability assessments.

Opportunities of AI in Regulatory Reporting

Bangladeshi banking experts thought that using AI in regulatory reporting may lead to a number of important opportunities, according to the study. A large majority of respondents felt that AI might make compliance-related tasks much faster, more accurate, and more efficient.

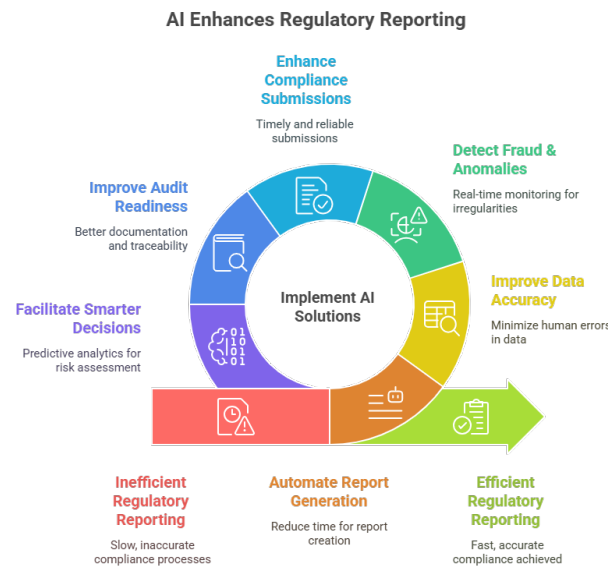


Figure 4: Opportunities of AI in Regulatory Reporting.

Figure 4 shows that the research presented in this paper explored a number of important opportunities seen by the banking professionals in the context of using AI for regulatory reporting. Over 3/4 (78.3%) felt that the time needed for preparing and filing regulatory reports could be reduced with AI, while 72.5% believed that AI benefits would include better data accuracy and consistency. And 65.8% said AI could help to detect risks in real time and detect abnormal behaviours earlier, increasing the compliance efficiency. These findings are consistent with the Technology-Organization-Environment (TOE) framework that suggests that perceived technological benefits are significant antecedents of innovation adoption. Qualitative analysis of free text comments show nuanced hopes for AI around predictive analysis, automation of rule based tasks, and the joining of more and disparate

data sources to deliver compliance engagements. These results are consistent with (Khan *et al.*, 2024), which also notes that AI is providing financial institutions across the world with the ability to report under complicated standards, such as Basel III and IFRS 9 more rapidly than before. And 58.3% of the respondents also believed AI's capacity to accommodate regulatory changes and foster dynamic compliance could be a game changer, particularly with the growing regulatory gaze from the Bangladesh Bank and international watchdogs. But the advantages also rely on sufficient digital infrastructure, training for staff and compatibility with current legal frameworks, which the respondents conceded. Although the results reflect optimistic attitude, this study based on perceptual data could not quantify the actual benefit attained, and as such, future studies should carry out longitudinal research

to yield robust animal impact assessment.

Vulnerabilities and Concerns of AI in Compliance

The results of the study on the risks and problems with

using AI for compliance showed that there are numerous major problems that are preventing the Bangladeshi banking sector from using it more widely.

The figure above represents that, Nevertheless, the

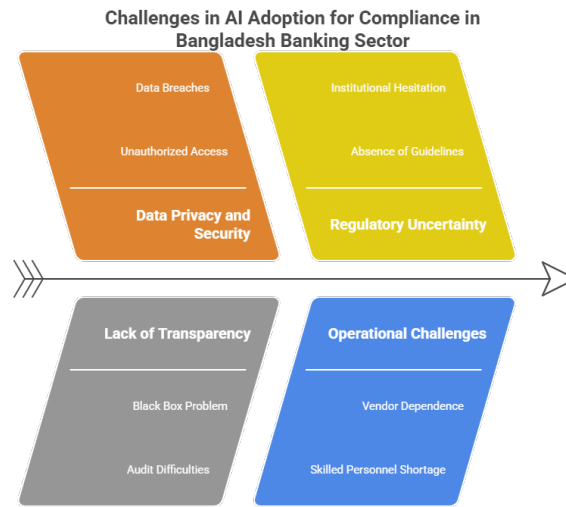


Figure 5: Vulnerabilities and Concerns of AI in Compliance.

research revealed significant unease among banking staff members around the risks AI opens up in the world of compliance. A large chunk of them about 69.2% were concerned about data privacy and security risks, particularly in relation to how AI is being used to process sensitive financial information. 61.7% were also worried about the opacity and unexplainability of decision-making in AI, which echoes the “black box” problem commonly reported in the literature (Amin, 2024). A chi-square test result showed a statistically significant relationship between years of professional experience and worry about algorithmic bias ($\chi^2 = 10.26, p < 0.05$), indicating that the more experienced professionals were less trustful about AI-based solutions not breaching compliance norms. Such concerns are aligned with the Risk Governance Framework that underscores trust, accountability, and interpretability to operationalize complex technologies in regulatory settings. In addition, 54.2% of respondents indicated risks arising from the lack of particular regulatory framework related to the integration of AI, as a systemic risk, from the same perspective of findings by (Kaur, 2024), that argued that the rapid deploying of AI without accompanying monitoring frameworks could increase risks related to compliance failure and brand reputation. Respondents were also concerned of the risks of overreliance on technology, job loss and ethical challenges, especially without robust human-AI framework models. These findings indicate that while AI offers efficiency gains, it is also riddled with vulnerabilities that, when unchecked, can have worse implications than its advantages particularly in a developing economy like Bangladesh, where legal, institutional, digital discipliners are embryonic.

Institutional Readiness and Future Outlook

The study of institutional preparation and future perspective showed that while more and more banks in Bangladesh are interested in using AI for compliance, most of them are not yet fully ready to do so.

The data above explains that, the results of the institutional readiness analysis indicated that Bangladeshi banking officials had a cautious optimism toward the adoption of AI in compliance, with a noticeable lack of infrastructural and strategic preparedness. Just 36.7% said their organizations have a specific digital transformation roadmap that clearly outlines its AI plan for regulatory reporting, and 47.5% said their business had begun building capability through staff training or system upgrades. Chi-square test found a significant relationship between size of firm (as measured by total assets) and intention to use AI ($\chi^2 = 12.41, p < 0.01$), meaning that larger banks are more likely to invest in infrastructure and talent related to AI. These findings demonstrate the TOE frameworks’ basic assumptions, including the effects of organizational resources and strategic attitudes on technology adoption. Limited technical capacity (58.3%) and regulatory uncertainty (51.7%) are among the key obstacles to full implementation, echoing findings from the Asian Development Bank’s 2023 research into digital finance in South Asia. Nevertheless, 71.7% of survey participants thought that AI will become indispensable for compliance functions in the next five years, as it is going to be important to try to keep up with increasingly complex regulations and reporting requirements. The future vision also stressed the need for technology investment ‘as well as sector-specific guidelines, public and private partnerships and regulation alignment’.

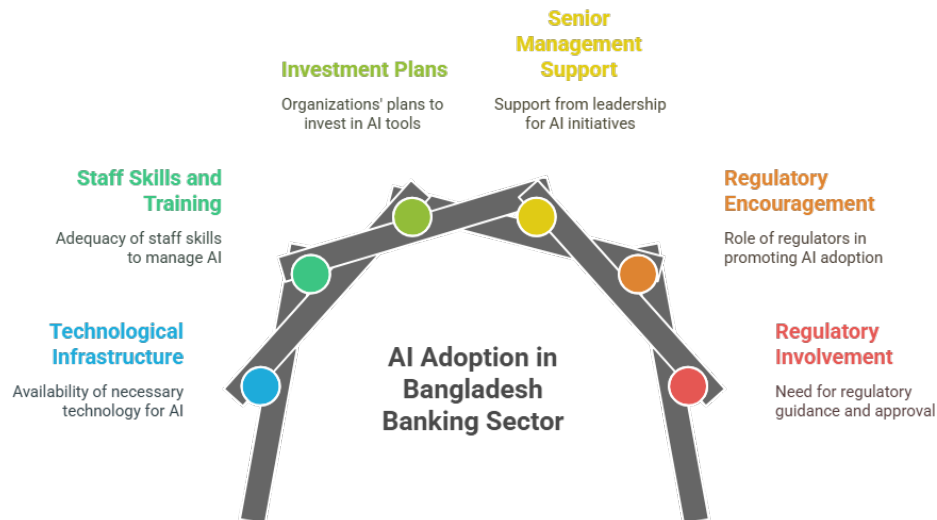


Figure 6: AI Adoption in Bangladesh Banking Sector.

Nevertheless, this measure of readiness is still based on self-report and may be biased by institutional optimism or bias, thereby highlighting the importance of tracking actual preparedness longitudinally and to actively engage policy makers over actual preparedness.

Findings

The study showed that a lot of bankers in Bangladesh know about AI in compliance and regulatory reporting, but not many of them are really employing it. They mostly use it for easy things like checking for fraud and KYC/AML screening. Most banks still employ manual or partly automated systems, and just a few of them have started using AI tools that are very sophisticated. People who answered said that AI might make compliance processes faster, more accurate, and able to keep an eye on threats in real time. But there are also huge challenges, like not having enough skilled individuals, not having clear AI decision-making, not having enough regulatory guidance, and data security risks. The institutions were only somewhat ready because they didn't have enough training or infrastructure. But a lot of banks said they were interested in putting money into AI technologies in the foreseeable future. The results reveal that more and more individuals are starting to see how AI could revolutionize the way compliance works. But to use technology responsibly and effectively, we will need to plan ahead, make rules that are easy to understand, and build up our skills.

Recommendations

The results show that banks in Bangladesh should introduce AI to their compliance and regulatory reporting systems in stages and with care. They should start with trial initiatives in areas that will have a big impact, like AML/KYC, fraud detection, and automating reports. Institutions should spend money on upgrading their technology and on training their employees in specialized areas so that they can appropriately manage

AI technologies. It is crucial to cooperate with regulatory groups, and Bangladesh Bank should be in charge of making clear guidelines, promoting AI governance standards, and supporting efforts throughout the industry to use AI in a safe and ethical way. Banks should also make sure that personnel are keeping a careful eye on AI operations, that data privacy and cyber security are solid, and that they promote internal research and innovation to create AI solutions that meet their specific compliance needs.

CONCLUSION

The study's conclusion is that Artificial Intelligence might greatly improve the accuracy, speed, and responsiveness of compliance and regulatory reporting in Bangladesh's banking sector. But it is still in the early phases of being used due of a variety of problems with institutions, technology, and rules. The results suggest that even though banking professionals think AI could change things, its widespread usage is being held back by concerns about data security, algorithmic transparency, a lack of regulatory direction, and a lack of institutional readiness. Things look positive for the future, even though there are some problems. A lot of banks want to invest in AI solutions. To make sure that AI is used in compliance processes in a responsible, safe, and long-lasting fashion, banks, regulators, and technology vendors all need to work together. This will let them get the most out of AI's benefits while keeping its risks to a minimum.

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