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Stakeholders' Readiness for AI-Driven Banking Business in Bangladesh

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Foreword

As a part of the ongoing dissemination of BIBM research output, the present research monograph contains the findings of the research project: "Stakeholders Readiness for AI-Driven Banking Business in Bangladesh".

BIBM publishes all of its research outcome in different titles depending on the nature of the report. The present research monograph contains the finding of the research project: "Stakeholders Readiness for AI-Driven Banking Business in Bangladesh". The research team is attempted to e explore whether stakeholder including banks, clients/customers, regulators, vendors/service providers are ready to adopt or accept AI driven banking operation in Bangladesh, specifically, the research team investigates the level of readiness among key stakeholders within the Bangladeshi banking industry for the widespread adoption of Artificial Intelligence (AI); examine the key roles of the stakeholders to AI in the banking industry of Bangladesh; and identify the issues and challenges about the widespread adoption of AI in the banking industry of Bangladesh. It gives me immense satisfaction, on behalf of BIBM, to disseminate this valuable academic resource having significant policy implications to the practitioners of the banks and financial institutions, regulatory agencies, policy makers as well as to the academics and common readers. I hope, this monograph will enrich our understanding the stakeholders' readiness in adopting AI in the banking sector of Bangladesh.

We look forward to get feedback from our esteemed readers on this issue which certainly would help us improving upon our research activities in the years to ahead.

Md. Akhtaruzzaman, Ph.D.
Director General, BIBM

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Stakeholders' Readiness for AI-Driven Banking Business in Bangladesh

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Abbreviations

AI	Artificial Intelligence
BEFTN	Bangladesh Electronic Funds Transfer Network
BB	Bangladesh Bank
BoD	Board of Director
BTRC	Bangladesh Telecommunication Regulatory Commission
CIB	Credit Information Bureau
DPS A/C	Deposit Pension Scheme Account
DMZ	Demilitarized Zone
DSS	Decision Support System
e-KYC	Electronic Know Your Customer
EIS	Executive Information System
FGD	Focus Group Discussion
ICT	Information and Communications Technology
MoICT	Ministry of Information and Communications Technology
NPSB	National Payment Switch Bangladesh
RTGS	Real-Time Gross Settlement
ROI	Return on Investment
RPA	Robotic Process Automation
SOC	Security Operations Center
SOAR	Security Orchestration, Automation, and Response
SIEM	Security Information and Event Management
TOE	Technology-Organization-Environment
VAPT	Vulnerability Assessment and Penetration Testing

Executive Summary

Companies consider and use Artificial Intelligence (AI) to create value in the product's and service's value chain process. AI eventually changed the work-life setting of the employees around the world. Moreover, without a doubt, artificial intelligence will lead to changes in our workforce. AI dramatically improved the efficiency of employees, reduced costs, improved work environment, increased sophistication in work-process, reduced error rate in the work-place, supported better and prompt decision making, improved cyber-security and innovation in the processes and services. The regulatory, social, political and ethical roles and responsibilities are also reengineered due the use of AI in workstation. AI also has significant impact on the banking sector around the globe. The major impact of AI on the banking industry includes enhanced customer experiences, increased operational efficiencies, better risk management, reduction of error in selection right borrower etc. In the banking sector, AI is being deployed across various functions, including customer service, risk management, fraud detection, process automation, and personalized marketing, among others. There are many factors that drives the adoption and utilization of AI within the banking sector, shedding light on the factors motivating banks to embrace AI technologies. Some of these are technological advancement, changing customer expectations, regulatory pressures, competitive dynamics, cost effectiveness and enhancing decision making capabilities.

The generic objective of the study is to explore whether stakeholder including banks, clients/customers, regulators, vendors/service providers are ready to adopt or accept AI driven banking operation in Bangladesh. However, the specific objectives of the study are – i) investigates the level of readiness among key stakeholders within the Bangladeshi banking industry for the widespread adoption of Artificial Intelligence (AI); ii) examine the key roles of the stakeholders to AI in the banking industry of Bangladesh; and iii) identify the issues and challenges about the widespread adoption of AI in the banking industry of Bangladesh. The research report contains seven chapters. These are literature review, research methods, summary findings and analysis, AI adoption in banks and role of central bank to handle the challenges and some suggestions and recommendations.

The study uses both primary and secondary data. A semi-structured questionnaire has been developed to assess level of stakeholders' readiness for AI adoption in the banking industry of Bangladesh. Before developing the questionnaire, the study conducts an intensive desk-based literature review. A Focus Group Discussion (FGD) with the Head of IT and/or representatives of Head of IT from the commercial banks, representatives from Bangladesh Bank, IT vendor or service providers have been conducted. Using the semi-structure questionnaire, the study collects data and analyzed 33 sample respondents' banks including 04 State-Owned banks, 02 foreign banks, 21 private commercial banks and 06 Islamic banks. Judgmental sampling technique was used to collect the data. Moreover, to assess the clients'

readiness for the AI driven banking industry, the study designed a semi-structured questionnaire after the FGD and relevant literature review. A total 351 customers response have been analyzed to assess the customers readiness of AI.

Regarding Bangladesh Bank (BB) readiness, the study finds that though BB acknowledges the importance of investigating AI in banking, the current level of research appears insufficient. The existing IT regulatory framework is not very well prepared to handle. The overwhelming majority (82% of Banks) believe that the framework is prepared to some extent. The findings reflect a focus on ensuring the privacy and security of customer data, alongside the need for AI solutions to align with existing regulations. Most of the banks (95%) think that the most favored collaborative approach should be through the development of clear regulatory guidelines governing AI implementation in banking.

Based on the bank's assessment, our findings show that bank customers in Bangladesh are not highly aware of the AI-driven banking industry. The majority of customers (54%) exhibit an elementary awareness level (also known as "aware to some extent"). Merely 15% of participants in the survey are making full use of AI-powered financial advice for their assets/investments. Approximately 46% of banks are utilizing these robot advisors to a moderate or lesser extent and significantly, 38% of participants are not utilizing AI-powered financial advisors at this time.

Regarding banks' readiness, the study finds that just 6% of banks are well equipped to integrate AI technologies. The majority of banks (43%) believe they are only "moderately prepared," while 36% are "somewhat prepared" and uncomfortably, 15% banks are "not prepared at all" for the use of AI. More than 80% banks believe that regulatory compliance, technological infrastructure, skilled workforce, and data quality and availability are the most crucial elements to consider when evaluating AI preparedness in the banking industry. The banking professionals ranked the most important aspects for AI implementation, these are strong cybersecurity measures (88%), scalable computing resources (76%), real-time data processing (82%), advanced data analytics capabilities (85%), and seamless integration with legacy systems (73%). The study finds that no bank has adopted AI-powered solutions or technology on a large scale. In some capacity, 65% of banks have already implemented AI, and 32% intend to do so soon. Moreover, a significant portion of banks (49% banks) have already leveraged AI to enhance their operations and services specially in the area of RPA and AI enabled Cyber defense by 52% banks. Again, nearly 15% banks are using credit scoring, 6% for e-KYC and 6% for AI based HR hiring. Further, 40% of banks are utilizing AI for real-time monitoring in collaboration with Security Operations Centers (SOCs); 30% for Security Orchestration, Automation, and Response (SOAR); 51% for Security Information and Event Management (SIEM) systems while negligibly 3% banks using a built-in firewall feature that learns and adapts to network traffic, subsequently blocking or allowing packets based on acquired knowledge. Only 3% banks using Web Application Firewall, Separated MZ & DMZ firewall configuration, Vulnerability Assessment &

Penetration Testing (VA & PT), and implementing Awareness Programs as a part of AI readiness. The majority of banks (77%) do not currently have any AI strategy or policy in place.

Regarding third-party AI readiness, the study finds that 73% banks identified insufficient infrastructure and technical capabilities as a barrier to adopting AI technologies; around 58% banks mentioned limited financial budgets as a challenge in implementing AI solution; resistance to change within organizations by 52% of banks. Further, 61% of the surveyed banks indicate a lack of adequate infrastructure as a hindrance; 79% emphasize the shortage of skilled personnel as a major obstacle; 85% banks emphasized that there is a lack of awareness about the benefits of AI; 39% banks think that the uncertainty about regulatory compliance is another challenging factor related to AI implementation. The study identified six (06) key considerations for ensuring the ethical use of AI in the banking sector of Bangladesh. These are fairness and transparency in AI algorithms (73% banks), protection of customer data privacy (85%), responsible handling of sensitive information (82%), compliance with ethical guidelines and codes of conduct (67%), minimizing algorithmic biases and discrimination (42%) and collaboration with academic institutions for ethical audits (36%).

Regarding the regulatory authority, there is a positive awareness level and no unsatisfied ratings. 84% (banks) of those survey respondents said that the Regulatory Authority is good or very good. 80% banks reported that taken initiatives to some extent or at moderate level. 16% banks tell the "High level initiatives", indicating a proactive stance for AI adoption; approximately 91% of banks state that the MoICT has undertaken initiatives, either somewhat or moderately; the BTRC and Finance Ministry's activities yield almost the same ratings and outcomes as those of MoICT.

On the other hand, only 7% banks have AI hardware. While 40% banks have moderate level of software availability, 46% banks have "not available" or "available to some extent"; 43% of banks mention that network and communication infrastructure is moderately available for AI implementation; approximately one-third of banks (32%) mention the availability level of 4 (out of 5) in terms of cybersecurity solutions for AI-driven fraud or attacks.

Regarding the customer readiness, the finds that 28% respondents use debit card followed by 27% uses internet banking, 24% credit card and 21% SMS banking. Further, 89% IT related service users receive notification immediately after the transaction. Again, the study finds that 98% respondents did not face any experience in hacking the bank account. Among the respondents 40.4% bankers use BEFTN followed by 33.8% NPSB and 25.8% RTGS as payment method. The study reported that 66% respondents have experience of opening bank account via on-line while 92% customers have no experience to lodge loan application via on-line. Again, 92% customer use mobile phone app for regular banking transaction. Based on the 5-point Likert Scale analysis, the study finds that 61.31% customer strongly agreed

that they are accustomed and habituated to use the internet-based banking operation while only 30.57% customers strongly agreed that they confident and capable to lodge loan application via online. Further, around 61% customer strongly believed that they are habituated to do app-based banking. Currently, 30.96% customer agreed that they are ready to accept any banking operation using AI in the banking operation. However, only 17.41% customer strongly agreed that the bank has sufficient capacity to handle any cyber-crime in the banks while only 15% customer strongly agreed that Bangladesh Bank (BB) has sufficient capacity to handle any cyber-crime in the commercial banks and the BB itself.

The study identified some major challenges or concerns of AI adoption in the banking sector of Bangladesh. These are cybersecurity Threats / Attacks due to vulnerabilities in AI Systems, Data Security and Privacy, Data Quality, Data Management and Governance in AI, High Cost of AI Implementation in Banking and Financial Service, Aligning AI Strategy with the Business Strategy or Business Goals, Bank Management is reluctant to allocate sufficient Financial Budget for AI, Measure the ROI of AI Projects, Regulatory Compliance, Transparency and Explainability: Ensuring Fairness and Ethical Use of AI in Decision Making, Insufficient Technological Infrastructure for AI, Lack of Expertise and Skilled Personnel to handle AI solutions, lack of Alternate Opportunity; Unemployment or Job Displacement Concerns due to AI Adoption, and etc.

Stakeholders Readiness for AI-Driven Banking Business in Bangladesh

1. Background

1.1 Introduction

The profound effects of Artificial Intelligence (AI)[1] on our society, which will have far-reaching on the legal, political, economic, and regulatory spheres. AI is continued to shape and transform our social, personal and business life. It also changed the economic transactions of people around the world. One of the greatest impacts of AI is the way of delivering services by the companies. Companies consider and use AI to create value in the product's and service's value chain process. AI eventually changed the work-life setting of the employees around the world. Moreover, without a doubt, artificial intelligence will lead to changes in our workforce. The alarmist headlines focus on how people are losing their jobs to machines, but the real challenge is assisting individuals in finding their passion again and embarking on new projects that need their unique skills. According to PwC, Artificial Intelligence (AI) will likely displace 7 million existing jobs in the UK between 2017 and 2037, but it may also generate 7.2 million new ones. Dealing with this uncertainty and the fact that some people's means of subsistence will change could be challenging.

The regulatory, social, political and ethical roles and responsibilities are also reengineered due the use of AI in workstation. AI dramatically improved the efficiency of employees, reduced costs, improved work environment, increased sophistication in work-process, reduced error rate in the work-place, supported better and prompt decision making, improved cyber-security and innovation in the processes and services (Khan et al., 2021). The impact of AI on the banking industry is also significant and transformative, with AI technology revolutionizing the way banks operate, interact with customers, and manage risk. The major impact of AI on the banking industry includes enhanced customer experiences, increased operational efficiencies, better risk management, reduction of error in selection right borrower etc. (Ronanki, 2019; Khan et al., 2021).

The rapid evolution of technology, particularly Artificial Intelligence (AI), is reshaping the banking landscape worldwide. AI encompasses a range of technologies such as machine learning, natural language processing, robotic process automation, and predictive analytics, among others, which enable computers to perform tasks that traditionally require human intelligence. In the banking sector, AI is being deployed across various functions, including customer service, risk management, fraud detection, process automation, and personalized

[1] Artificial Intelligence (AI) refers to "computers that have cognitive abilities similar to humans, which could result in massive efficiency improvements for both organization and their clients" (Khan et al., 2021).

marketing, among others. AI has been successfully adopted in different sectors irrespective of its size and nature around the globe including the banking sector (Alzaidi, 2018). Alzaidi (2018) finds that similarly many other sectors the banking sector in Middle-East had shown moderate level of adoption and acceptance of AI in their operation. Moreover, the Middle-East has mixed-pace of acceptance of AI tools in the local banking industry. The banking industry of Bangladesh is undergoing a profound transformation driven by technological advancements, particularly in the realm of Artificial Intelligence (AI).

There are many factors that drives the adoption and utilization of AI within the banking sector, shedding light on the factors motivating banks to embrace AI technologies. Some of these are technological advancement, changing customer expectations, regulatory pressures, competitive dynamics, cost effectiveness and enhancing decision making capabilities.

Technological advancements – is one of the primary drivers of AI adoption in banking is the continual advancement and refinement of AI technologies. Breakthroughs in machine learning algorithms, increased computing power, and the proliferation of big data have significantly enhanced the capabilities of AI systems. Banking institutions are leveraging these technological advancements to develop innovative solutions for improving customer experiences, streamlining operations, and mitigating risks.

Moreover, changing customer expectations is rapidly evolving customer expectations are compelling banks to embrace AI-driven solutions to deliver personalized, convenient, and seamless banking experiences. Customers now demand round-the-clock access to banking services through digital channels, along with tailored product recommendations and proactive assistance. AI-powered chatbots, virtual assistants, and predictive analytics enable banks to meet these expectations by offering personalized recommendations, resolving queries in real-time, and anticipating customer needs.

On the other hand, stringent regulatory requirements and compliance standards impose significant challenges on banks, necessitating the adoption of AI-driven solutions for regulatory compliance and risk management. AI technologies such as natural language processing and machine learning algorithms facilitate the automation of compliance processes, detection of suspicious activities, and adherence to regulatory guidelines. By leveraging AI, banks can enhance regulatory compliance, minimize operational risks, and ensure data security and privacy.

Competitive dynamics is intensifying competition within the banking industry is driving institutions to invest in AI technologies to gain a competitive edge. Banks are leveraging AI for customer acquisition, retention, and loyalty programs, as well as for optimizing pricing strategies and product offerings. Additionally, AI enables banks to analyze vast amounts of

data to gain actionable insights into customer behavior, market trends, and competitor activities, empowering them to make informed strategic decisions.

Cost efficiencies is the pursuit of cost efficiencies and operational excellence is another key driver of AI adoption in banking. AI-powered automation, robotic process automation (RPA), and cognitive technologies enable banks to automate repetitive tasks, streamline processes, and reduce operational costs. By automating back-office functions, optimizing resource allocation, and minimizing manual errors, AI helps banks achieve significant cost savings while improving efficiency and productivity.

AI empowers banks with advanced analytical capabilities and predictive modeling tools, enabling data-driven decision-making across various functions. From credit scoring and loan underwriting to investment management and fraud detection, AI algorithms analyze vast datasets to identify patterns, detect anomalies, and predict outcomes with greater accuracy. By augmenting human decision-making with AI-driven insights, banks can make more informed and timely decisions, thereby enhancing risk management practices and driving business performance.

Regarding how the stakeholders use AI, there is a relationship between AI and their willingness to embrace it in production and operating procedures. The stakeholders' acceptance of AI also depends on its sophistication and character. A wide range of diverse parties that are both directly and indirectly connected to the applications of AI are considered stakeholders. A stakeholder is an individual, group, or organization that either has a stake in the business or is unaffiliated with it. Customers (service recipients), service providers, IT vendors, regulators, software and hardware engineers, etc. are among the significant players.

1.2 Objectives

Based on the above explanation, the generic objective of the study is to explore whether stakeholder including banks, clients/customers, regulators, vendors/service providers are ready to adopt or accept AI driven banking operation in Bangladesh. However, the specific objectives of the study are –

i) investigates the level of readiness among key stakeholders within the Bangladeshi banking industry for the widespread adoption of Artificial Intelligence (AI);

ii) examine the key roles of the stakeholders to AI in the banking industry of Bangladesh; and

iii) identify the issues and challenges about the widespread adoption of AI in the banking industry of Bangladesh.

1.3 Chapter Plan

The research report contains seven chapters. After explaining background and objectives of the study in Chapter-1, literature review has been covered in Chapter-2 followed by research methods in Chapter-3. Chapter-4 includes summary findings and analysis including Bangladesh Bank readiness for the deployment of AI in Banking in 4.1; Bank's Assessment regarding Customer Readiness and Bank's Perception about the Significance and Advantages of AI-driven banking business in 4.2; Bank's Readiness for AI-Driven Banking Business in 4.3; Third Party Readiness for AI-driven Banking Business in 4.4 and Customer Awareness in AI in 4.5. Again, Chapter-5 explains challenges of AI adoption in banks and role of central bank to handle the challenges. Finally, suggestions and recommendations are incorporated in Chapter-6.

2. Literature Review

Thowfeek et al. (2020) focuses on the burgeoning impact of Artificial Intelligence (AI) in the banking sector, emphasizing the dual aspects of drivers and barriers to AI adoption. It delves into how AI technologies have transcended experimental applications to become pivotal in enhancing operational efficiencies, customer satisfaction, and financial performance within the banking industry. It outlines the research objective: to analyze drivers and barriers to AI implementation in banking, through semi-structured interviews with 28 AI experts from the Sri Lankan banking and finance sectors. The study employs a qualitative methodology, leveraging interviews to explore the technological, organizational, and environmental dimensions influencing AI adoption, based on the Technology-Organization-Environment (TOE) framework. The study offers a nuanced understanding of the multifaceted drivers and barriers to AI adoption in banking. It proposes strategic recommendations, including fostering a culture of innovation, enhancing data management capabilities, and developing ethical frameworks for AI utilization. This research contributes significantly to the literature on AI in banking by providing an empirical exploration of its adoption dynamics within the Sri Lankan context. Its use of the TOE framework offers a comprehensive lens for examining AI adoption, presenting a balanced view of the opportunities and challenges faced by banks. However, the study's geographical focus on Sri Lanka may limit the generalizability of its findings. Additionally, the rapid evolution of AI technologies necessitates ongoing research to capture emerging trends and drivers in AI adoption.

Bandara et al. (2019) introduced a novel maturity model aimed at evaluating the banking sector's readiness and adaptation to Industry 4.0 technologies. The model is designed against the backdrop of rapid technological advancements that have induced a significant shift from physical to virtual operations across industries, with a particular emphasis on the financial sector. The study employs content analysis and case study methodologies, supplemented by

semi-structured interviews with senior banking managers, to develop and validate a maturity model. This model assesses banks' readiness across seven dimensions: Products and Services, Technology and Resources, Strategy and Organization, Operations, Customers, Governance, and Employees, through a Likert-scale based questionnaire. The maturity model proposed comprises five levels—Initial, Managed, Defined, Established, and Digital Oriented—assessed across seven defined dimensions. Its primary contribution is in bridging the gap in maturity assessment models tailored to the service sector, offering banks a structured tool to evaluate their progress and areas for improvement.

Holmström (2022) explores the pivotal role Artificial Intelligence (AI) plays in the digital transformation of organizations. The author introduces an AI Readiness Framework designed to assess an organization's capability to leverage AI technologies across four crucial dimensions—technologies, activities, boundaries, and goals. This framework aims to assist managers in navigating the challenges posed by digital transformation, highlighting the need for a nuanced understanding of AI's potential to drive organizational change. While the framework offers a valuable conceptual model, the document could benefit from more detailed guidance on practical implementation strategies and overcoming specific challenges. However, AI Readiness Framework marks a significant contribution to the discourse on AI and digital transformation. By offering a structured approach to evaluating AI readiness, the framework empowers organizations to make informed decisions and adopt strategies that align with their digital transformation goals.

The research by Mehdiabadi et al. (2020) delves into the intricate relationship between Industry 4.0—the Fourth Industrial Revolution characterized by digitalization and integration of technology in all sectors—and Banking 4.0, the response of the banking sector to these technological advancements. The paper aims to explore the technological trends of Industry 4.0, identify key indicators for creating a strategic roadmap for fourth-generation banks, and examine the readiness of these banks to embrace Industry 4.0 technologies. This research successfully bridges the conceptual gap between Industry 4.0 and Banking 4.0, providing a clear and comprehensive roadmap for banks willing to embrace digital transformation. The use of global banking examples enriches the discussion by offering tangible insights into the application of Industry 4.0 technologies in banking.

Ryzhkova et al. (2020) explores the implications of Artificial Intelligence (AI) in the banking industry, focusing on the perspectives of both employees and consumers towards AI deployment in banking operations. The article adeptly captures the nuanced attitudes towards AI within the banking sector, providing valuable insights into both the opportunities and challenges posed by AI integration. The inclusion of empirical data from Sberbank employees enriches the analysis, offering a grounded perspective on AI's operational impact. While the research sheds light on significant aspects of AI in banking, it could benefit from

a broader exploration of consumer attitudes, potentially incorporating a wider demographic to capture diverse consumer experiences with AI. Furthermore, the study's focus on a single institution, albeit a major one, might limit the generalizability of its findings across the banking sector. Altogether the article offers a cogent examination of the interplay between AI technologies and human elements within the banking sector, highlighting the transformative potential of AI alongside the need for addressing the accompanying challenges. The study underscores the importance of fostering a balanced approach to AI integration, where technological advancements are harmonized with human-centered considerations to achieve optimal outcomes in banking services and customer satisfaction.

Fridgen et al. (2022) presents a comprehensive exploration of how retail banks can effectively manage investments in Artificial Intelligence (AI)-related IT capabilities. The paper employs digital options theory as a theoretical lens and augments it with the Technology-Organization-Environment (TOE) framework to analyze the adoption and implementation of AI in the banking sector. Through interviews with 23 experts in the retail banking industry, the study illuminates the strategic management of AI investments and the significance of considering a wide array of internal and external factors that influence these investments. The study introduces the concept of a "generate" process, underscoring the proactive investments required to create the foundation for AI options. This extends the digital options theory by emphasizing the need for initial investments that are not directly tied to specific AI applications but rather generate a wide array of future possibilities. This work not only advances academic understanding but also provides valuable implications for banking professionals aiming to harness the potential of AI effectively.

The study by Mamela (2021) presents a structured examination of how Artificial Intelligence (AI) influences workforce performance within the context of a South African bank. The study incorporates various components of AI, including machine learning, deep learning, natural language processing, big data, voice and vision recognition, robotics, and expert systems, along with AI ethical principles. Utilizing both qualitative and quantitative research methodologies, the project employs descriptive and inferential statistics for data analysis. The study discovers that all examined factors significantly impact workforce performance. This suggests that increased awareness and integration of AI components can positively affect the bank's strategic decisions, resource allocation, and enhancement of workforce performance through AI adoption and adaptation.

3. Research Methods

The study uses both primary and secondary data. Through a comprehensive review of existing literature, industry reports, and case studies, this paper identifies and analyzes the primary factors influencing the implementation of AI technologies in banking.

A semi-structured questionnaire has been developed to assess level of stakeholders' readiness for AI adoption in the banking industry of Bangladesh. Before developing the questionnaire, the study conducts an intensive desk-based literature review to explores the key drivers propelling the adoption and integration of AI within banking service sectors. These drivers encompass technological advancements, changing customer expectations, regulatory pressures, competitive dynamics, cost efficiencies, and the pursuit of enhanced decision-making capabilities.

Focus Group Discussion: After identifying the key drivers and before developing the questionnaire, the study conducts a Focus Group Discussion (FGD) with the Head of IT and/or representatives of Head of IT from the commercial banks, representatives from Bangladesh Bank, IT vendor or service providers.

Designing the Semi-Structure Questionnaire and Questionnaire Survey: After the FGD and relevant literature review the study designs a semi-structured questionnaire (Appendix-1) which has been bated with the industry IT expert for modification. Then, the research team finalized the semi-structure questionnaire. The questionnaire includes covering technological infrastructure, regulatory frameworks, customer acceptance, and organizational preparedness of banks, technology providers, regulatory bodies, and the consumer base related questions. This questionnaire has been sent to IT department of the commercial banks in Bangladesh. Total 33 banks responded the questionnaire (Table-3.1).

Table 3.1: Sample Respondents

Bank Category	Population	Sample
A. State-Owned Banks (SBs)	09	04
B. Private Banks		
a) Foreign Banks	09	02
b) Private Banks	33	21
c) Islami Banks	10	06
Total	61	33

Clients' Readiness Survey: Further, to assess the clients' readiness for the AI driven banking industry, the study designed a semi-structured questionnaire (Appendix-2) after the FGD and relevant literature review. A total 351 customers response have been analyzed in this regard.

4. Analysis and Findings

4.1 Bangladesh Bank Readiness for the Deployment of AI in Banking

4.1.1 Status of Conducting Research or Study by BB about the AI's Potential Impact on the Banking Sector

Artificial Intelligence (AI) is poised to significantly reshape the banking industry in Bangladesh. To understand and prepare for this transformation, the role of central bank is crucial. Table-4.1 depicts that BB conducts research to some extent about the potential impact of AI's on the country's banking sector. The results indicate that, though BB acknowledges the importance of investigating AI in banking, the current level of research appears insufficient. The dominance of responses indicating "to some extent" suggests a need for more in-depth and focused studies.

Table 4.1: Conducting Research by the BB on AI's Potential Impact

Status of Conducting Research or Study on AI's Potential Impact	% of Banks
Yes, extensive research	9%
Moderate research	18%
To some extent	73%
No, not conducted any research	0%

4.1.2 Level of Well-preparedness of the Existing Regulatory Framework of BB to Address AI-driven Banking Business/Innovations

The increasing integration of artificial intelligence (AI) into banking operations poses new challenges to regulatory frameworks. The research study assesses the preparedness of Bangladesh Bank's (BB) existing regulations to effectively manage AI-driven financial innovations.

Table 4.2: Preparedness Status of the Existing BB Regulatory Framework

Level of Well-preparedness of the Existing Regulatory Framework of BB	% of Banks
Very well-prepared	0%
Moderately prepared	18%
Prepared to some extent	82%
Not at all prepared	0%

According to the opinion survey of banks through questionnaire, we find that the existing framework is not very well prepared to handle AI in banking (Table-4.2). Only 18% considered it "moderately prepared." The overwhelming majority (82% of Banks) believe that the framework is prepared to some extent. The research results indicate that while the existing BB regulatory framework offers a foundation, there is substantial room for

improvement to comprehensively address the unique challenges and complexities of AI-driven banking business.

4.1.3 Essential Regulatory Considerations for AI Implementation in the Banking Sector

The increasing use of AI in banking offers significant benefits but also raises important regulatory concerns. The study highlights the key regulatory considerations identified by banks in Bangladesh as they are taking plan to integrate AI solutions. The following table (Table-4.3) shows a clear picture of the bank's views regarding the regulatory considerations or requirements for the successful implementation of AI in our banking systems ensuring safety, security and reliability.

Table 4.3: Essential Regulatory Considerations for AI Implementation

Sl.	Regulatory Considerations / Requirements for AI Implementation	% of Banks
1	Compliance with data protection laws	90
2	Adherence to anti-money laundering regulations	75
3	Ethical use of customer data	90
4	Transparency in AI decision-making	86
5	Integration with existing banking laws and regulations	78
6	Collaboration with different regulatory authorities	57
7	Ensuring Cyber Security	93
8	Data accuracy and adequacy	75

The findings reflect a focus on ensuring the privacy and security of customer data, alongside the need for AI solutions to align with existing regulations. Concerns surrounding transparency and explain ability highlight the importance of ethical AI implementation.

4.1.4 Initiatives or Strategy of Bangladesh Bank to Collaborate with the Banking Industry and Technology Stakeholders to Promote AI Adoption in Banks

Bangladesh Bank plays a pivotal role in driving innovation and technological advancement within the country's financial sector. The integration of Artificial Intelligence (AI) has transformative potential but requires strategic collaboration among the central bank, banking institutions, and technology stakeholders. The study examines the possible strategies that should be taken by central bank to foster this cooperation.

Table 4.4: Strategy of BB to Collaborate with the Banking Industry and Technology Stakeholders

Sl.	Plan or Strategy of BB to Collaborate with the Banking Industry and Technology Stakeholders	% of Banks
1	Through regulatory guidelines	95
2	By fostering partnerships and knowledge sharing	74
3	Through financial support and incentives	35
4	By organizing AI-focused events, special training and workshops	87
5	By introducing new laws and regulations	48

Most of the banks (95%) think that the most favored collaborative approach should be through the development of clear regulatory guidelines governing AI implementation in banking. Others significant strategies may be – (1) Fostering partnerships and knowledge sharing between stakeholders and (2) Organizing AI-focused different events like special training, workshops, seminar and roundtable discussion to facilitate the better understanding of AI adoption, business benefits and also potential risks.

4.2 Bank's Assessment Regarding Customer Readiness and Bank's Perception about the Significance and Advantages of AI-driven Banking Business

4.2.1 Awareness Level of Your Customers about the AI-Driven Banking Business

Artificial Intelligence (AI) is rapidly transforming the financial services landscape. AI-driven solutions streamline banking operations, improve customer experiences, and enhance risk management. The aim of the research is to shed light on the public's current awareness of AI's integration into banking systems within our country and analyzes the awareness levels of banking customers regarding the use of Artificial Intelligence (AI) in the financial services industry within our country.

Table 4.5: Awareness Level of Bank's Customers about the AI-Driven Banking Business

Awareness Level of Bank's Customers about the AI-Driven Banking Business	% of Banks
Yes, very aware	0
Moderately aware	46
Aware to some extent	54
Not aware at all	0

Based on the bank's assessment, our findings (Table-4.5) show that bank customers in Bangladesh are not highly aware of the AI-driven banking industry. The majority of customers (54%) exhibit an elementary awareness level (also known as "aware to some extent"). A considerable proportion (46%) exhibits a moderate comprehension of AI-

powered financial applications. These findings point to the necessity of stepping up customers' awareness and communication programs that emphasize AI's application in the banking industry.

4.2.2 Bank's Perception about the Significance and Benefits of AI-Driven Banking Business

The data (Table-4.6) shows that bank personnel have an overall favorable opinion of AI. The majority of respondents (54%) agree with the statement, suggesting that AI technology is generally well-liked and accepted. Furthermore, a sizable percentage (23%) strongly concurs that AI is not only valuable but also personable and approachable. Notably, 23% of respondents agreed (minimally agreed) with the statement in some way. This implies that certain banks could still need further explanations or assurances on the advantages and possibilities of artificial intelligence. The statement in Table-4.7 indicates that banks have a highly positive view of the benefits of implementing AI in banking.

Table 4.6: Bank's Perception about the Statement – "AI is Valuable and Friendly"

Level of Agreement	% of Banks
Strongly agree	23
Agree	54
Somehow agree	23
Do not agree at all	0

Table 4.7: Bank's Perception about the Statement – "AI in Banking is Beneficial?"

Level of Agreement	% of Banks
Strongly agree	46
Agree	54
Somehow agree	0
Do not agree at all	0

4.2.3 Using the Advantages of an AI-Powered Automated Financial Advisor to Make Investments in the Market

AI-powered financial advisors have the potential to provide individualized solutions and democratize investing advice. Resolving usability issues, trust issues, and awareness gaps is necessary for them to reach their full potential. Better financial outcomes for banks and clients as well as increased adoption are expected benefits of strategically tackling these areas. The study unveils banks perceptions of AI-driven automated (robot) financial advisors.

Table 4.8: Benefit of AI-Driven Automated Financial Advisor

Taking Benefit of AI-Driven Automated Financial Advisor for Investing Money in the Market	% of Banks
Yes, taking benefits fully	15
Moderately benefited	23
Some extent	24
No, not taking any benefits	38

Merely 15% of participants in the survey (Table-4.8) are making full use of AI-powered financial advice for their assets/investments. Approximately 46% of banks are utilizing these robot advisors to a moderate or lesser extent. Significantly, 38% of participants are not utilizing AI-powered financial advisors at this time. These findings imply that opinions on AI-powered financial advisors are divided. Even while some banks find these technologies useful, there is still much space for further acceptance and understanding.

4.2.4 Preference for Human Involvement in Banking and Financial Services in Addition to AI

From Table-4.9, we observe the bank's opinion regarding how much they prefer human intervention alongside AI within banks. The data reveals a diverse range of preferences regarding the level of human involvement alongside AI. 31% of respondents prefer no human intervention (fully AI-driven) banking. 38% favor partial human intervention (moderately AI-driven). An identical proportion (31%) desire moderate human intervention (some extent AI-driven). Notably, no respondents expressed a preference for fully human intervention (no AI-driven) banking.

Table 4.9: Level of Human Intervention in Banking in Addition to AI

Preference for Human Involvement Alongside AI in Banking	% of Banks
No human intervention (Fully AI driven)	31
Partial human intervention (Moderately AI driven)	38
Moderately human intervention (Some extent AI driven)	31
Fully human intervention (No AI driven)	0

4.2.5 AI Driven Banking Seems to be Convenient for Customers in Bangladesh

Artificial Intelligence (AI) in banking is simplifying processes and providing customers with more convenience. This study evaluates bank viewpoints on the convenience that AI offers to customers in Bangladesh's banking industry. The majority of clients find AI-driven banking products convenient, according to research findings, which point to a very good future.

Table 4.10: Status of Bank's Perception about the AI-powered Banking Seems to be Convenient for Customers in Bangladesh

AI Driven Banking Seems to be Convenient for Customers in Bangladesh	% of Banks
Very convenient	15
Convenient	77
Somehow convenient	8
Not at all convenient	0

Table-4.10 shows that 15% of respondents said that clients find AI-driven banking to be very convenient. The vast majority of the banks (77%) say it's "convenient." This finding exposes a highly favorable view about the convenience of AI-driven banking and financial services for the customers in Bangladesh. This positive sentiment suggests these technological advancements are positively impacting the banking experience. The potential benefits include faster service, 24/7 accessibility and personalized solutions.

4.3 Bank's Readiness for AI-Driven Banking Business

4.3.1 Preparedness Level of Banks for Implementing AI-driven Technologies

The state of the bank's readiness to introduce AI-based banking and financial services is shown in Table 4.11. A really precarious position is evident here. According to the report, just 6% of banks are well equipped to integrate AI technologies. The majority of banks (43%) believe they are only "moderately prepared," and only 36% believe they are "somewhat prepared" for the introduction of AI. Uncomfortably, 15% of banks said they are "not prepared at all" for the use of AI. These findings suggest that while the banking industry recognizes the potential of AI, there's a mixture of cautious optimism and hesitancy toward full-scale implementation.

Table 4.11: Status of Preparedness Level for Implementing AI in Banks

Preparedness Level of Bank for Implementing AI-driven Technologies	% of Banks
Very prepared	6%
Moderately prepared	43%
Somewhat prepared	36%
Not prepared at all	15%

4.3.2 Key Areas that the Banks Need to Address to Become More Prepared for AI Adoption in Banking

Table 4.12: Status of Key Areas to Address for The Preparation of AI Adoption

Sl.	Key Areas to Address for the Preparation of AI Adoption	% of Banks
1	Skill Development and Training for Employees	99
2	Enhancing Data Quality and Availability	76
3	Strengthening Cybersecurity Measures	79
4	Establishing A Clear AI Strategy and Roadmap	88
5	Collaborating with Technology Partners or Vendors	76
6	Analysis for Implementation of Suitable AI Technologies	3
7	Technology Budgets	12

AI is poised to radically reshape industries across the globe, and the banking sector offers significant opportunities for transformative impact. To succeed, banks must thoroughly understand and address the fundamental requirements for successful AI implementation. The study analyzes the survey data to pinpoint the most critical areas for banks to focus their efforts in preparation for broader AI adoption.

Table-4.12 shows that the majority of banks (80% on average) place emphasis on the following five crucial areas: developing a clear AI strategy and roadmap; strengthening cybersecurity measures; improving data availability and quality; developing training and skill development programmes; and working with vendors or partners in the technology space. These results underline the necessity of reskilling and upskilling initiatives to guarantee that workers are competent in the design, use, and upkeep of AI systems. Effective AI systems are built on solid, well-organized data, which makes this area of concentration essential. In addition, banks emphasize the value of working with suppliers or partners in the technological space, recognizing the advantages of outside expertise knowledge. Banks need to have a clear strategy and roadmap for integrating AI, one that addresses how it will change internal processes and customer experiences.

4.3.3 Important Factors for Assessing AI Readiness in the Banking Sector

AI is rapidly transforming the global banking industry. This study aims to assess factors influencing AI readiness in the Bangladeshi banking sector, providing insights to guide future adoption strategies.

Table 4.13: Banks' Assessment about Important Factors for Assessing AI Readiness

Sl.	Important Factors for Assessing AI Readiness	% of Banks
1	Data Quality and Availability	80
2	Regulatory Compliance	82
3	Technological Infrastructure	88
4	Customer Trust and Privacy	67
5	Workforce Skills and Training	85
6	Market Competition	40
7	Security Readiness	6
8	Gap Analysis between Existing Structure & AI Technology	9
9	Customer Confidence on AI	9
10	Enhanced Audit Procedure on AI	9
11	Ethical Use of Data	6
12	Cyber Security	9

According to Table-4.13, the majority of banks (more than 80%) believe that regulatory compliance, technological infrastructure, skilled workforce, and data quality and availability are the most crucial elements to consider when evaluating AI preparedness in the banking industry. That means that the basis for a successful AI application in the Bangladeshi banking sector is formed by the four most important factors: technology, workforce, legislation, and data. Forty percent of banks perceive that market competitiveness is a significant factor in determining the level of AI preparedness.

Banks acknowledge that customer-related issues, such as confidence and trust, are crucial. This emphasizes the necessity of customer education and strategies for fostering trust. Remarkably, comparatively low relevance values were assigned to aspects such as security preparation and ethical data use. This might point to a knowledge gap or a possible area where long-term AI adoption could be strengthened.

4.3.4 The Components that are Crucial for Establishing a Robust AI Infrastructure in Banks in Bangladesh

Table 4.14: Crucial Components for Establishing a Robust AI Infrastructure

Sl.	Crucial Components for Establishing A Robust AI Infrastructure	% of Banks
1	High-speed internet connectivity	55
2	Scalable computing resources	76
3	Advanced data analytics capabilities	85
4	Real-time data processing	82
5	Robust cybersecurity measures	88
6	Seamless integration with legacy systems	73
7	Data availability	6
8	Maintain 24/7 power backups in all the backups in all the branches and uposhakha	9
9	Highly secured physical infrastructure	9
10	Error free and compatible input data generator for AI algorithms	9
11	Ethical decision-making measures	6

The paper investigates critical elements needed to successfully implement artificial intelligence (AI) in Bangladeshi banks. The following are factors that banking professionals ranked as being of the utmost importance: Strong cybersecurity measures (88%) scalable computing resources (76%) real-time data processing (82%), advanced data analytics capabilities (85%), and seamless integration with legacy systems (73%). The paper emphasizes that although artificial intelligence (AI) has enormous potential to change banking, in order to apply AI successfully, foundational issues including data availability, error-free data, cybersecurity, and strong infrastructure must be carefully addressed.

4.3.5 Rate of Bank's Readiness in Adopting and Implementing AI Technologies

AI is rapidly transforming the banking industry. This study evaluated banks' readiness to adopt and execute AI technologies across various critical areas. The findings illuminate strengths and weaknesses, offering insights for future strategic planning. Respondents rated their bank's preparedness on a scale of 1 ("Not Ready") to 5 ("Fully Ready") in the following ten areas:

Table 4.15: Rate of Bank's Readiness in Adopting and Implementing AI Technologies

Sl.	Name of Areas	Rate of Readiness Level (1 to 5) (% of Banks)				
		1	2	3	4	5
1	Data Management and Quality Control	4	10	55	28	3
2	Technological Infrastructure	3	17	30	43	7
3	Regulatory Compliance	9	16	28	41	6
4	Employee Skills and Training	10	28	45	14	3
5	Customer Trust and Privacy	7	21	41	21	10
6	Integration with Existing Systems	10	26	39	25	0
7	AI Strategy and Roadmap	17	35	38	10	0
8	Collaboration with Fintech and AI Solution Providers	17	33	30	20	0
9	Ethical Use of AI	13	17	33	27	10
10	Monitoring and Governance of AI Systems	14	35	35	12	4
	Average Rating of Readiness	**10**	**24**	**37**	**24**	**4**

(1= Not Ready/No Initiatives, 2= Beginning/Initial Stage, 3=Ready to some extent, 4= Moderately Ready, 5=Fully Ready)

In terms of taking proactive measures to be ready to adopt and implement AI technologies in banking and financial services, Table-4.15 presents a very weak scenario. In average only 4% banks mention that they are fully ready, 24% banks are moderately ready, 37% banks are ready to some extent, 24% banks are at initial stage and 10% banks are not ready at all.

The results show that the banking industry's level of AI readiness varies widely. Although banks have a solid basis in technology and data management, they still lack (gaps exist) strategic vision, external engagement or collaboration, and personnel/ workforce development.

4.3.6 Adoption of AI-Driven Technologies or Solutions in Banking Operations

The study looks at how our banks are currently implementing AI. Table 4.16 reveals that no bank has adopted AI-powered solutions or technology on a large scale. In some capacity, 65% of banks have already implemented AI, and 32% intend to do so soon. The study's findings show that the banking industry is quite interested in implementing AI. Considering that almost two thirds of banks have already used AI in some capacity (in small scale of AI applications).

Table 4.16: Status of Adopting AI Powered Solutions

Adoption of AI-driven technologies or solutions	% of Banks
Yes, extensively	0
Yes, to some extent	65
No, but planning to in the near future	32
No plans for AI adoption	3

Instead of being a cutting edge, AI is starting to become the norm. The absence of extensive adopters highlights the early stages of AI integration for many banks. Most are using AI on a smaller scale, likely for specific functions rather than across the entire organizational processes. AI is rapidly reshaping the banking landscape. Banks recognize its transformative potential, and adoption rates illustrate a strong commitment to staying competitive through AI integration. As AI advancements continue, its role in banking will likely become even more prominent.

4.3.7 The Recent Use of AI Technology in Banks

According to Table-4.17, it reveals that a significant portion of banks are already leveraging AI to enhance their operations and services specially in the area of RPA (49% banks) and AI enabled Cyber defense (52% banks). This result highlights the growing importance of cybersecurity in the financial industry and the potential of AI to mitigate cyber threats. RPA automates repetitive tasks, improving efficiency and productivity. Chabot are utilized by 24% of banks, demonstrating their potential to enhance customer service by providing 24/7 support and automating basic interactions. Predictive analytics is employed by 21% of banks, enabling them to anticipate customer needs and make data-driven decisions.

Table 4.17: Status of Using AI Technology in Banks

Sl.	Type of AI Technology Currently Used in Banks	% of Banks
1	RPA	49
2	Chabot	24
3	Predictive Analytics	21
4	AI enabled Cyber defense	52
5	Credit Scoring	15
6	AI based HR hiring	6
7	Planning to implement soon	3
8	e-KYC	6
9	Currently any AI technology is not used in banks	9

Other AI technologies such as credit scoring (15%), AI-based HR hiring (6%), and e-KYC (6%) are also being adopted by some banks. However, their usage is not yet as widespread as the aforementioned technologies. A small percentage of banks (9%) reported not currently using any AI technology. This suggests that while AI adoption is on the rise in the banking sector, there is still room for further growth.

4.3.8 Applications of AI in Cyber Security Management

This research report aims to provide an in-depth analysis of how banking institutions are incorporating AI into their Cyber Security practices. The primary data was collected from banks, with a focus on understanding the specific AI applications being utilized. The findings indicate a diverse range of AI tools and strategies employed by banks to enhance their cybersecurity posture.

Table 4.18: Use of AI in different Cyber Security Areas/Measures

Sl.	Use of AI in Different Cyber Security Areas	% of Banks
1	Automated threat hunting	46
2	SOC backed real time monitoring	40
3	SOAR	30
4	Not being used in cyber security	12
5	SIEM	51
6	Built-in firewall feature to learn first and later block/allow packets based on knowledge	3
7	Real-time sandboxing for suspicious traffic	3
8	Web Application Firewall	3
9	Separated MZ & DMZ firewall	3
10	VA & PT	3
11	Awareness Program	3

According to our findings (Table-4.18), we observe that a significant portion of banks (46%) reported using AI for automated threat hunting. This approach involves leveraging machine learning algorithms to identify and respond to potential cyber threats in real-time, enhancing the efficiency of threat detection and mitigation processes.

Approximately 40% of banks are utilizing AI for real-time monitoring in collaboration with Security Operations Centers (SOCs). This integration enhances the banks' ability to monitor and respond promptly to security incidents, ensuring a proactive cybersecurity stance. Security Orchestration, Automation, and Response (SOAR) tools are employed by 30% of banks. This technology allows for the automation of incident response processes, enabling quicker and more efficient handling of cybersecurity incidents.

Security Information and Event Management (SIEM) systems are the most widely adopted AI application among surveyed banks, with 51% implementing this technology. SIEM helps in centralizing and analyzing security event logs, aiding in the early detection of potential threats.

A small percentage (3%) of banks reported using a built-in firewall feature that learns and adapts to network traffic, subsequently blocking or allowing packets based on acquired knowledge. This approach showcases a novel use of AI in firewall management. Similarly, 3% of banks are employing real-time sandboxing for analyzing and isolating suspicious network traffic. This method adds an additional layer of security by evaluating potentially harmful activities in a controlled environment.

Various banks are also utilizing AI for specific purposes such as Web Application Firewall, Separated MZ & DMZ firewall configuration, Vulnerability Assessment & Penetration Testing (VA & PT), and implementing Awareness Programs, each accounting for 3% of the surveyed institutions. A small percentage (12%) of banks indicated that they are not currently utilizing AI in their cybersecurity practices. This suggests potential opportunities for these institutions to explore and implement AI solutions to bolster their cyber defenses.

In conclusion, the research findings highlight the diverse ways in which banking institutions are leveraging AI for cybersecurity management. From automated threat hunting to real-time monitoring and innovative firewall features, these applications collectively contribute to enhancing the overall security posture of banks. The varying adoption rates suggest a dynamic landscape where institutions are continually exploring and implementing advanced AI technologies to stay ahead of evolving cyber threats. As the financial industry continues to embrace digital transformation, the integration of AI in cybersecurity practices remains a crucial aspect for safeguarding sensitive information and maintaining the trust of customers.

4.3.9 AI-Driven Banking Services

Financial institutions are rapidly embracing AI to streamline operations, enhance customer experiences, and mitigate security risks. Table-19 explains how banks perceive the potential of AI in transforming various banking services. The data presented is based on a survey which asked banks to select all that apply regarding which services should be AI-driven.

Table 4.19: Which banking Services should be AI Driven?

Sl.	Types of AI-Driven Banking Services	% of Banks
1	E-KYC (A/C opening)	79
2	Customer risk rating	79
3	Loan processing (BB)	70
4	Cyber security – Authentication & Authorization	67
5	Call Centre – Customer Service	70
6	Phone Banking (BB)	30
7	Internet Banking/Mobile Apps – Authentication and Authorization (BB)	46
8	Decision Support System (DSS) & EIS	58
9	Nano/Micro loan through digital platform	70
10	Content creation related to banking	3
11	Customer service and recommend deposit	3
12	Investment risk rating	3

The research reveals that five banking services emerged as frontrunners for AI adoption: E-KYC for A/C opening (79%), Customer risk rating (79%), Loan processing (70%), Call Center for Customer Services (70%) and Nano/Micro loan through digital platform (70%). These findings suggest that banks prioritize leveraging AI for tasks that involve high volumes of data processing, repetitive workflows, and aspects that significantly affect customer satisfaction.

AI can automate Know Your Customer (KYC) processes, expediting account opening procedures and enhancing customer onboarding experiences. AI algorithms can analyze vast amounts of customer data to generate accurate risk profiles, enabling banks to make informed lending decisions and personalize product recommendations. For loan processing (BB), AI can streamline loan application assessments, expedite approvals, and improve efficiency in loan processing workflows.

The research findings also indicate that banks recognize the potential of AI to strengthen cybersecurity measures, improve customer service interactions, and automate loan approvals for smaller loan amounts. Additionally, AI-powered decision support systems can provide valuable insights to inform strategic decision-making.

4.3.10 Developing Artificial Intelligence (AI) Strategy/ Policy in Banks

Table 4.20: Status of having AI Strategy or Policy in Banks

Does your bank have any Artificial Intelligence (AI) strategy/ policy in place?	% of Banks
Yes	23
No	77

According to Table-4.20, the vast majority of banks (77%) do not currently have an AI strategy or policy in place. Conversely, 23% of banks have made the initiative to develop and put into action an AI strategy. The majority of banks surveyed did not have an AI strategy

or policy in place, which suggests that the banking industry is lagging behind in the use of AI technologies. There are a number of reasons for this lack of acceptance, but the most frequent ones are lack of knowledge and awareness, financial limitations (budget constraints), worries about privacy and data security, and regulatory ambiguity.

4.3.11 Technology Roadmap for AI-driven Banking Business

Table 4.21: What is Technology Roadmap as Depicted in the AI Strategy of Banks?

Technology Roadmap	% of Banks
Short Term	0
Mid Term	38
Long Term	63

In recent years, the banking sector has witnessed a rapid transformation driven by technological advancements. To understand the strategic direction of banks, we have examined the responses related to the technology roadmap, with a particular focus on the short, mid, and long-term perspectives. The research results revealed the following breakdown in the adoption of technology across different timeframes.

There was not a noticeable emphasis on short-term technology goals among the banks assessed. This implies that significant advancements or investments in technology might not occur in the near future. Currently, banks are either solving urgent operational issues or consolidating their current technology.

With an eye towards the medium term, a sizable percentage of banks (38%) are actively investing in technology. This suggests that within the next few years, there will be a strategic focus on improving customer experience, operational efficiency, and the introduction of innovative solutions. Data analytics, cybersecurity, and digital banking systems can be important investment areas.

The majority of banks (63%) questioned are committed to continuous technological progress, as evidenced by their long-term strategic planning. This long-term focus or orientation implies that banks are looking ahead and being ready for new developments in the field, including blockchain, AI, and quantum computing.

4.4 Third Party Readiness for AI-driven Banking Business

4.4.1 How does Third Party Vendors Address Data Security and Privacy Concerns when Providing AI Solutions to Banks?

Table 4.22: Data Security and Privacy Concerns Addressed by Third Party Vendors

Sl.	Name of Areas	% of Banks
1	Strong encryption and data protection	80
2	Regular security audits and assessments	52
3	Compliance with data protection regulations	64
4	Employee training on data security	58
5	Ethical use of data	3

The usage of third-party AI solutions in banking is growing as a result of the advancement of digital transformation, raising serious concerns about the risks to data security and privacy that these solutions may pose. According to Table-4.22, it shows that protecting data with strong encryption is the prime concerning issue. Banks also place a strong emphasis on employee data security training, compliance with data protection laws, and routine security audits and assessments. Low response is observed for the ethical use of data, but it is also another big concerning issue for the banks.

4.4.2 Readiness of the Ecosystem in Bangladesh for AI Driven Banking Services

Table 4.23: Level of Preparedness of the Ecosystem in Bangladesh

Level of Preparedness	% of Banks
Fully prepared	4
Partially prepared	20
Prepared to some extend	66
Not at all prepared	10

According to Table-4.23, the ecosystem for AI-driven banking in Bangladesh exhibits a varied level of preparedness. Majority of the banks (86%) think that the ecosystem is partially prepared or prepared to some extent. Opinion of 10% banks is that ecosystem of our country is not ready or prepared at all for the integration with AI. The research findings provide valuable insights for policymakers, industry stakeholders, and individual banks to fully prepared our ecosystems for the AI integration.

4.4.3 From Vendor Perspective what Facilities Lacks in Bringing AI Driven Banking Technologies in Bangladesh?

Table 4.24: Shortage of Facilities from Vendor Perspective

Sl.	Name of Areas	% of Banks
1	Investment	73
2	Infrastructure	61
3	Skilled personnel	79
4	Business Opportunity in Bangladesh	40
5	Market Reputation	12
6	Customer Confidence	3
7	Data accuracy	12
8	Legal frameworks	9
9	Regulatory challenges	6
10	Legal and ethical framework of AI	9

From a vendor standpoint, there are several obstacles to overcome in Bangladesh when implementing AI-driven banking solutions. The goal of the study is to paint a clear picture of the lack of infrastructure facilities that will impede the banking industry's adoption of AI.

According to Table-4.24, a significant percentage of banks (73%) acknowledge the financial investment required for adopting AI-driven technologies. This includes costs associated with

infrastructure, software development, and ongoing maintenance. 61% of the surveyed banks indicate a lack of adequate infrastructure as a hindrance. This includes the need for robust hardware, network capabilities, and cybersecurity measures to support AI applications. The majority of banks (79%) emphasize the shortage of skilled personnel as a major obstacle. This includes professionals with expertise in AI development, data science, and machine learning. Some banks (9%) express concerns about the perceived business opportunities in Bangladesh, which might affect their willingness to invest in AI-driven technologies.

This research provides valuable insights for policymakers, financial institutions, and technology providers aiming to navigate the challenges and unlock the full potential of AI in the banking industry in Bangladesh.

4.4.4 Factors to Hinder the Adoption of AI-driven Technologies in the Banking Sector of Bangladesh

Table 4.25: Factors Hindering the Adoption of AI in Banks

Sl.	Name of Areas/Factors	% of Banks
1	Lack of awareness about AI benefits	85
2	Insufficient infrastructure and technical capabilities	73
3	Limited financial budget for AI implementation	58
4	Resistance to change within the organization	52
5	Uncertainty about regulatory compliance	39
6	Insufficient data	9
7	Ethical Implication	6
8	Potential job threat	9
9	Lack of confidence of the customers	6
10	The perception that AI-driven technologies are not yet mature or reliable enough for the banking sector	3
11	Lack of skilled AI professionals in the job market	3
12	Concerns about data security and privacy	3
13	Quality and accuracy of the data	3

The findings (Table-4.25) point to a number of important variables that have slowed the adoption of AI technology in the banking industry. A significant obstacle, according to the majority of banks (85%), is "lack of awareness about the benefits of AI." This suggests that in order to emphasize the benefits that AI-driven technology might offer to the banking sector, extensive education and awareness campaigns are required.

Approximately 73% of banks identify insufficient infrastructure and technical capabilities as a barrier to adopting AI technologies. Addressing this issue requires investment in upgrading technological infrastructure and providing necessary training to personnel to ensure seamless integration.

Around 58% of banks mentioned limited financial budgets as a challenge in implementing AI solutions. This suggests the necessity for financial institutions to allocate sufficient resources for AI adoption, emphasizing the potential long-term benefits and return on

investment. Resistance to change within organizations was reported by 52% of banks, indicating a need for change management strategies and internal communication programs. These initiatives can help employees understand the positive impact of AI on their roles and the overall efficiency of banking operations.

Approximately 39% of banks think that the uncertainty about regulatory compliance is another challenging factor related to AI implementation. Collaboration between regulatory bodies and financial institutions is crucial to establish clear guidelines, ensuring compliance and fostering a supportive regulatory environment for AI adoption.

4.4.5 Key Considerations for Ensuring the Ethical Use of AI in the Banking Sector

Table 4.26: Factors to be Considered for Ensuring the Ethical Use of AI

Sl.	Name of Areas/Factors	% of Banks
1	Fairness and transparency in AI algorithms	73
2	Protection of customer data privacy	85
3	Responsible handling of sensitive information	82
4	Compliance with ethical guidelines and codes of conduct	67
5	Minimizing algorithmic biases and discrimination	42
6	Collaboration with academic institutions for ethical audits'	36
7	Relationship management	6
8	Establishing clear governance frameworks for AI	3
9	Reduce conflict of interest	3

AI has become an integral part of the banking sector, offering numerous benefits in terms of efficiency, customer service, and decision-making. However, the ethical use of AI in this context requires careful consideration to uphold fairness, transparency, and data privacy. This report explores key considerations based on the survey responses from various banks in Bangladesh and provides recommendations for ensuring the ethical use of AI in the banking sector.

Based on the opinion survey of our banking sector, the study identifies six (06) key considerations for ensuring the ethical use of AI in the banking sector of Bangladesh: fairness and transparency in AI algorithms (73% banks), protection of customer data privacy (85%), responsible handling of sensitive information (82%), compliance with ethical guidelines and codes of conduct (67%), minimizing algorithmic biases and discrimination (42%) and collaboration with academic institutions for ethical audits (36%) (Table-4.26).

4.4.6 The Degree of knowledge and Awareness that Various Bank Stakeholders have Regarding the Adoption of AI

This research aims to assess the knowledge and awareness levels of various stakeholders within the banking sector regarding AI adoption. The study utilizes a five-point readiness scale, ranging from 1 (Unsatisfactory) to 5 (Excellent).

Table 4.27: Level of AI Awareness

Different Stakeholders	Rate of Awareness Level (1 to 5) (% of Banks)				
	1	**2**	**3**	**4**	**5**
Banking Customer	24	53	20	3	0
Board of Director (BoD)	7	27	30	26	10
Executive Management	0	21	40	35	4
Business Operation Management	3	27	37	30	3
IT Operation Management	0	7	27	56	10
Cyber Security Management	0	6	27	57	10
Lower Level Banking Officials	7	48	41	4	0
Regulatory Authority	0	12	44	40	4

[1= Unsatisfactory, 2= Satisfactory, 3 = Good, 4 = Very Good and 5 = Excellent]

Table-4.27 reveals a relatively low level of awareness and understanding regarding the successful implementation and upkeep of AI-powered banking systems. Merely 3% of customers are rated as very good, and none are rated as excellent. Remarkably, the majority of customers' awareness levels (77%) remain between satisfactory and dissatisfied. At the BoDs level, there are mixed levels of awareness, with 26% having very good awareness. Both the satisfactory and unsatisfactory categories have room for development. There are no dissatisfied ratings and 75% of respondents rank executive management as good or very good. These indicate positive awareness levels. We observe balanced awareness levels in the case of business operation management, however there is still room for improvement in both very good and unsatisfactory areas.

In order to ensure the effective management of AI based financial products and services, stakeholders in IT operation management and cyber security management need to raise their knowledge and awareness levels to an excellent level. Currently, they are primarily in the good or very good category. Lower-level banking officials are found to have a largely inadequate degree of awareness; thus, by appropriate training, this level of awareness should be enhanced to an excellent or very good level in order to operate AI services efficiently.

Regarding the Regulatory Authority, there is a positive awareness level and no unsatisfied ratings. 84% of those surveyed said that the Regulatory Authority is good or very good.

However, in order to guarantee efficient oversight of the AI-powered banking system, the regulatory body's expertise level needs to be raised to an exceptional degree.

4.4.7 Readiness or Availability of AI Based Resources

This research report aims to evaluate the readiness of banks in adopting AI-based resources across various areas critical to the banking sector. The assessment covers hardware availability, software availability, network and communication infrastructure, cybersecurity solutions for AI-driven fraud/attacks, and the availability of skilled manpower.

Table 4.28: Availability/Sufficiency Level of AI Based Resources

Name of Resources	Rate of Availability Level (1 to 5) (% of Banks)				
	1	**2**	**3**	**4**	**5**
Hardware availability	7	21	32	40	0
Software availability (AI tools and Solutions)	21	25	40	14	0
Network and Communication	0	25	43	25	7
Cyber Security solution for AI driven fraud/attack	7	25	36	32	0
Skilled manpower	14	50	32	4	0

[1= Not available, 2= Available to some extent, 3 = moderately available, 4 = Available at high level and 5 = Available at very high level]

According to Table-4.28, the research findings and analysis is as follows:

Availability of AI based Hardware: Only 7% banks tell that hardware is not availability for AI implementation. However, a significant portion (40%) mention the readiness level 4, suggesting a substantial base with high-level hardware availability. The absence of banks reporting availability level 5 indicates an opportunity for improvement in achieving optimal hardware infrastructure for AI applications.

Software Availability (AI Tools or Solutions): While 40% of banks express a moderate level of software availability, but a reasonable number of banks (approximately 46%) mention the availability level at “not available” or “available to some extent”, indicating a vulnerability state of software preparedness. Effective initiatives should be taken by the bank management.

Network and Communication: 43% of banks mention that network and communication infrastructure is moderately available for AI implementation. Interestingly, only 7% banks reported being at the highest availability level (5), suggesting a potential area for improvement.

Cybersecurity Solution for AI-Driven Fraud/Attack: Approximately one-third of banks (32%) mention the availability level of 4 in terms of cybersecurity solutions for AI-driven fraud or attacks. However, 7% and 25% banks tell the availability level at 1 and 2 respectively, emphasizing the need for ensuring more robust cybersecurity measures.

The availability of skilled manpower for AI is seen to be in really poor condition in our banking industry. Half of the banks state that skilled manpower for AI implementation is availability to some extent while 14% banks mention "not available", indicating a shortage of skilled professionals in developing and maintaining AI based baking system.

4.4.8 Level of Infrastructure Support and Initiatives of Regulatory Authorities to Promote AI Driven Banking Business in Bangladesh

The integration of Artificial Intelligence (AI) in the banking sector has become a global trend, enhancing efficiency, customer experience, and decision-making processes. This report evaluates the level of infrastructure support and initiatives undertaken by regulatory authorities in Bangladesh to promote AI-driven banking business. The data presented below reflects the rate of initiatives taken by the key regulatory bodies, with scores ranging from 1 to 5.

Table 4.29: Level of Infrastructure Support and Initiatives of Regulatory Authorities

Name of Areas	Rate of Initiatives Level (1 to 5) (% of Banks)				
	1	2	3	4	5
Bangladesh Bank	0	30	50	16	4
ICT & Telecom Ministry	0	30	61	9	0
BTRC	5	41	45	9	0
Finance Ministry	14	41	36	9	0

[1= Don't take any initiative, 2= To some extent, 3 = Moderate, 4 = High level and 5 = Very high level]

According to Table-4.29, the research findings and analysis is as follows:

Initiatives taken by Bangladesh Bank: The majority of banks (80%) mention that BB has taken initiatives to some extent or at moderate level. 16% banks tell the "High level initiatives", indicating a proactive stance.

ICT & Telecom Ministry: Approximately 91% of banks state that the MoICT has undertaken initiatives, either somewhat or moderately. Merely 9% of banks inform "High level initiatives," suggesting that they should be more proactive in helping to the implementation of AI-powered business in Bangladesh.

The BTRC and Finance Ministry's activities yield almost the same ratings and outcomes as those of MoICT. Additionally, they ought to focus more on adopting sensible measures to use AI in banking and other financial services.

4.5 Customer Awareness on Artificial Intelligence (AI)

The study conducted a primary survey on the customers' awareness on artificial intelligence in day-to-day banking transaction. We include bankers, clients and business person as sample respondents. We use snowball sampling technique following Jilani et al. (2020). A non-probability sampling strategy when the samples contain uncommon qualities is called snowball sampling or chain-referral sampling. This sampling method involves asking current participants for recommendations on how to find the necessary sample populations for studies. Using this sampling technique, a primary data source proposes additional possible data sources that could be involved in the research projects. The sole foundation of the snowball sampling approach is referrals.

A 351-total number of respondents has been analyzed to examine the level of customer awareness on AI in the banking industry of Bangladesh. The summary biography of the respondents is depicted in Table-4.30. While there are around 80% respondents are male around 20% rest with female. Among them 50% respondents are within 35 to 44 years of age. Although the study covers all of the geographical division of Bangladesh, 82% respondents are from Dhaka division followed by Chittagong Division (9.04%) and Khulna Division (3.61%).

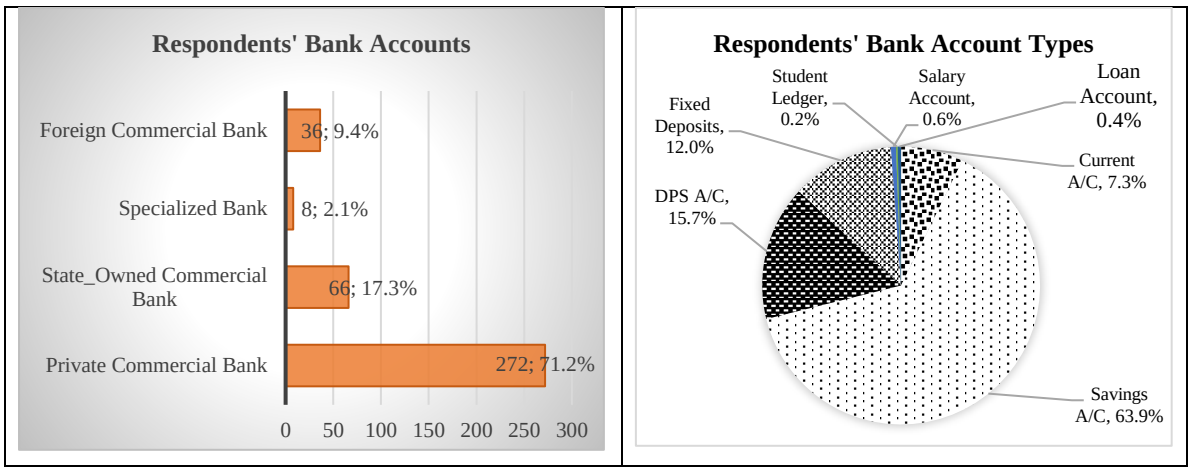
Table 4.30: Biography of the Respondents

Particulars		Figure in %
Gender	Male	80.12
	Female	19.88
Age Range	Below 25	2.88
	25-34	37
	35-44	50
	45-54	10
	55 and above	1
Division	Dhaka	81.63
	Chittagong	9.04
	Rajshahi	3.01
	Barisal	0.39
	Khulna	3.61
	Sylhet	0.90

Particulars		Figure in %
	Mymensingh	1.51
Profession/Occupation	Banker	84.96
	Teacher/Trainer	1.77
	Student	8.26
	Businessman	2.0
	Others	3.59
Monthly Income	Below 40000	13
	40000 – 60000	29
	60000-80000	23
	Over 80000	35
Qualification	Less than Undergraduate	0.57
	Undergraduate	14
	Post Graduate	84
	Phd/Higher studies	2

Among the respondents, around 85% respondents are bankers followed by students (8.26%), businessmen (2%) and teachers/trainer (1.77%). Most of the respondents are post graduate (84%) while only 14% were undergraduate. Based on the income analysis, it shows that 35% respondents' income is more than Tk. 80,000 followed by 29% respondents' income between Tk. 40,000 to Tk. 60, 0000 (Table-4.30).

Figure 4.1: Respondents' Bank Account and Account Types

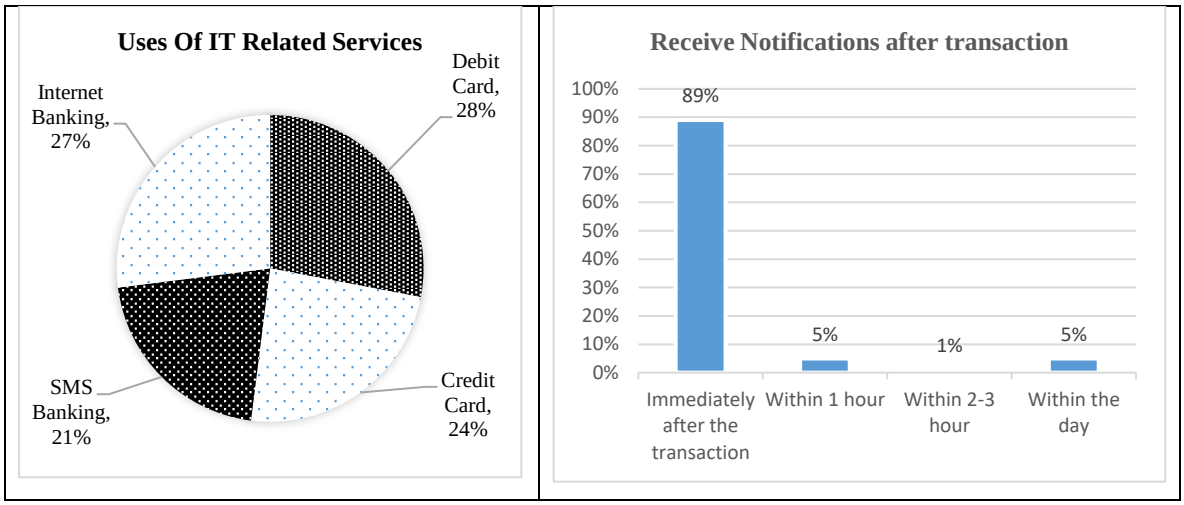


Source: Survey Data Analysis

Figure-5.1 shows the respondents' bank account and types of deposit and loan account they maintained. It shows that around 71% respondents'-maintained account with private commercial banks while around 17% bank accounts are maintained in state-owned

commercial banks in Bangladesh. Among these accounts, around 64% bank accounts are saving accounts followed by DPS (15.7%) and Fixed Deposit (12%).

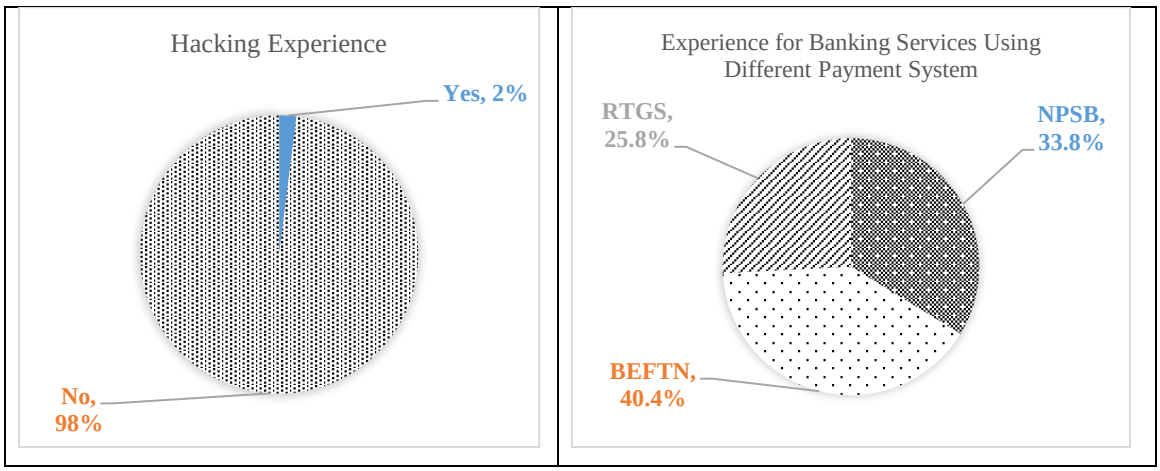
Figure 4.2: Uses of IT Related Services and Notification Received after Transaction



Source: Survey Data Analysis

Figure-4.2 explains the respondents uses of IT related services and notification received after transaction. It found that 28% respondents use debit card followed by 27% uses internet banking, 24% credit card and 21% SMS banking. Further, 89% IT related service users receive notification immediately after the transaction.

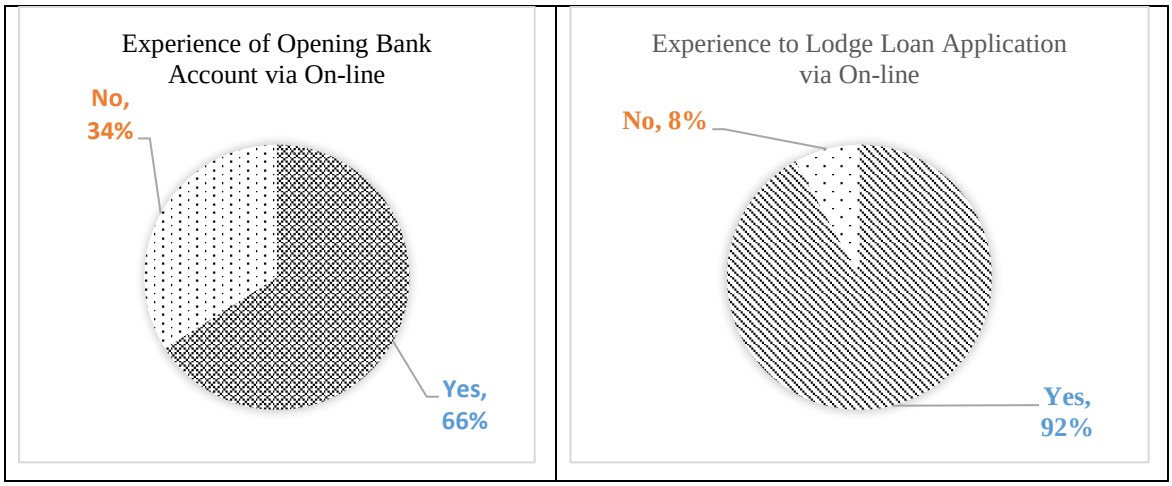
Figure 4.3: Experience to Face Hacking and Experience for Banking Services Using Different Payment System



Source: Survey Data Analysis

Moreover, Figure-4.3 depicts the respondents' experiences to facing hacking and experience for banking services using different payment system. The study found that 98% respondents did not face any experience in hacking the bank account. Among the respondents 40.4% bankers use BEFTN followed by 33.8% NPSB and 25.8% RTGS as payment method.

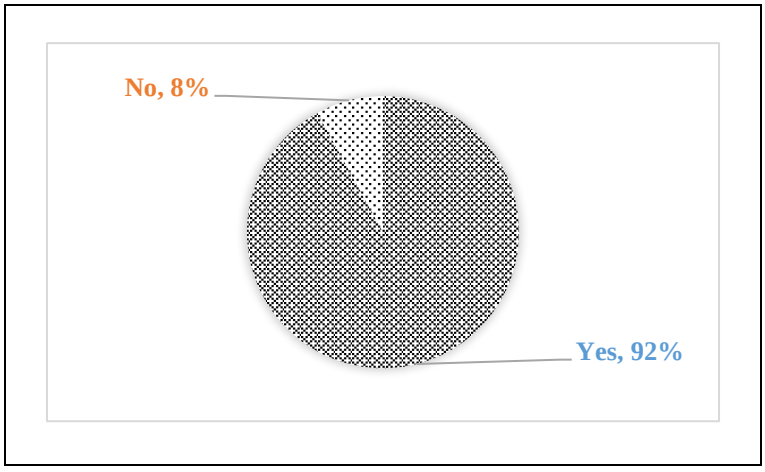
Figure 4.4: Experience of Opening Bank Account Via On-line and Lodge Loan Application Via On-line



Source: Survey Data Analysis

Figure-4.4 explains the respondents experience of opening bank account via on-line and experience to lodge loan application via on-line. It found that 66% respondents have experience of opening bank account via on-line while 92% customers have no experience to lodge loan application via on-line. Again, 92% customer use mobile phone app for regular banking transaction (Figure-4.5).

Figure 4.5: Using Mobile Phone App for Regular Banking Transaction



The study also conducts customer perception survey using 5-point Likert Scale to examine what extend customers agree or disagree for the Artificial Intelligence (AI) for the banking operation in Bangladesh. Table-4.31 explains the customer readiness on AI driven banking industry in Bangladesh.

Table 4.31: Customer Readiness on AI Driven Banking Industry

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am accustomed and habituated to use the internet-based banking operation.	5.03%	4.52%	7.54%	21.61%	**61.31%**
I am habituated to do app-based banking.	7.61%	4.06%	5.58%	21.83%	**60.91%**
I am confident that I am capable to lodge loan application via on-line.	10.88%	9.84%	22.28%	26.42%	**30.57%**
I am confident that I am capable to open a bank account using my Smart Phone via on-line.	7.54%	6.03%	13.07%	31.16%	**42.21%**
I am fear/confusion to use on-line banking because of threats in cyber hacking etc.	17.73%	17.73%	19.09%	**26.82%**	18.64%
I am ready to accept any banking operation using Artificial Intelligence in the banking operation.	10.15%	10.15%	21.32%	**30.96%**	27.41%
I am confident that the bank has sufficient capacity to handle any cyber-crime in the banks.	9.95%	22.39%	**28.36%**	21.89%	17.41%
I am confident that the Bangladesh Bank has sufficient capacity to handle any cyber-crime in the banks.	15.00%	23.00%	**24.50%**	22.50%	15.00%

The study found that 61.31% customer strongly agreed that they are accustomed and habituated to use the internet-based banking operation while only 30.57% customers strongly agreed that they confident and capable to lodge loan application via online. Further, around 61% customer strongly believed that they are habituated to do app-based banking. However, around 42% customers are strongly agreed that they are confident and capable to open a bank account using their Smart Phone via on-line.

Currently, 30.96% customer agreed that they are ready to accept any banking operation using AI in the banking operation. However, only 17.41% customer strongly agreed that the bank has sufficient capacity to handle any cyber-crime in the banks while only 15% customer strongly agreed that Bangladesh Bank (BB) has sufficient capacity to handle any cyber-crime in the commercial banks and the BB itself.

5. Challenges of AI Adoption in Banks and Role of Central Bank to Handle the Challenges

5.1. Challenges of AI Adoption of Banks in Bangladesh

Sl.	Concerns or Challenges of AI Adoption in Banking Industry	% of Banks
1.	Data Security and Privacy	70
2.	Regulatory Compliance	35
3.	Customer Trust, Confidence and Acceptance	25
4.	Transparency and Explainability: Ensuring Fairness and Ethical Use of AI in Decision Making	35
5.	Cybersecurity Threats / Attacks due to vulnerabilities in AI Systems	80
6.	Insufficient Technological Infrastructure for AI	35
7.	Lack of Alternate Opportunity: Unemployment or Job Displacement Concerns due to AI Adoption	33
8.	Data Quality, Data Management and Governance in AI	60
9.	Change Management or Managing Change in Organization Culture for AI adoption (for successful implementation of AI in Banks)	30
10.	Risk of Vendor Dependencies	20
11.	Lack of Proper AI Strategy, Policy and Guideline	25
12.	Ensuring the Industry Collaboration	16
13.	Aligning AI Strategy with the Business Strategy or Business Goals	45
14.	Loss or Decrease of Human Creativity for AI Adoption	15
15.	Knowledge and Awareness Gap of Customer in respect of AI based Services	20
16.	Lack of Expertise and Skilled Personnel to handle AI solutions	42
17.	Absence of Internal Audit and Risk Management in AI	16
18.	How to Measure the ROI of AI Projects	40
19.	Interoperability and Integration with Legacy Systems and 3rd party Fintech Companies	20
20.	Over-Reliance on AI: Excessive Reliance on AI without Human Oversight may improper result in Critical Decisions making	16
21.	Ongoing Maintenance of AI Systems	25
22.	Bengali Language-Based AI Solutions are in Scarcity for Financial Business	8
23.	High Cost of AI Implementation in Banking and Financial Services. Bank Management is reluctant to allocate sufficient Financial Budget for AI	40

5.2. Role of Central Bank to Handle Challenges in AI Adoption

Sl.	The Role of Bangladesh Bank (BB) can Play for Enabling Stakeholders for AI based Banking	% of Banks
1.	Bangladesh Bank may provide **effective policy & necessary guideline** for the development and deployment of AI based products & services in banking sector. BB may develop clear and **comprehensive regulatory frameworks** that guide the adoption of AI in the banking sector.	90
2.	Both the Government & Bangladesh Bank may take proper initiatives to ensure the **availability of robust Infrastructure** for the development and maintenance of AI-driven business operation.	60
3.	**Collaboration with Industry Stakeholders and Knowledge Sharing:** Central banks should facilitate collaboration and partnerships between banks, fintech firms, and technology providers to foster the adoption and diffusion of innovative AI solutions in the banking sector. Foster collaboration between regulators, banks, fintech companies, and academia to accelerate AI innovation, sharing best practices and knowledge and to develop a common understanding of the benefits and risks of AI-based banking.	70
4.	Central banks may facilitate **Industry-wide Forums and Incentives** for AI adoption.	20
5.	Bangladesh Bank may form a strong **AI Committee** for monitoring and reconstructing potential growth of AI project.	10
6.	**Access to CIB as part of AI initiative and centralized credit bureau:** It will be very effective for the banks, if BB builds an AI based centralized credit bureau and provide access to CIB.	20
7.	**Ensuring privacy and security:** Central bank should ensure that customer privacy and data security are protected when AI is used in the banking industry. BB should set standard or data governance framework to support the interoperability, security and privacy of data.	90
8.	**Supervisory and Risk Management Capabilities** – BB may develop tools to assess, monitor and manage risks associated with AI-based banking systems. Stress testing and risk assessment guidelines can be implemented to evaluate the resilience of AI systems.	40
9.	**Addressing ethical considerations:** BB should consider the ethical implications of AI-based banking and ensure that the technology is used in a responsible and ethical manner. BB may prepare guidelines and principles for ethical, transparent and accountable use of AI in the financial sector.	80
10.	BB may develop rigorous **cybersecurity standards and regulations** to protecting AI systems and the financial sector from cyber threats and financial crime.	30
11.	**Awareness and Skill Development**: Both BIBM and BB can arrange training, workshops, seminars and conferences about AI to increase the AI knowledge base (about the benefits and potential risks of AI) among bank employees, customers and other stakeholders. Central bank can develop technical expertise in AI and machine learning (ML) to help banks to implement AI solutions. BB may offer training programs to help banks,	70

Sl.	The Role of Bangladesh Bank (BB) can Play for Enabling Stakeholders for AI based Banking	% of Banks
	fintech companies, and regulators understand AI concepts, ethics, and regulations. Initiatives should be taken to invest in talent development programs.	
12.	Central bank may play a role in promoting I**nternational collaboration** and **Standardization**, ensuring consistency in AI based cross-border payment or financial services. Central bank may collaborate with international organizations to share best practices and regulatory frameworks.	40
13.	BB may give approval for **AI based solutions in Cloud.**	25
14.	BB may take proper initiative so that banks can **start small-scale AI based pilot projects** as a part of some used cases.	30
15.	**Cost of AI Deployment/Implementation** is very high. But it would be cost-effective if more than one bank or all the banks led/supported by Bangladesh bank take an effective initiative to develop and deploy AI solution.	60
16.	BB may support **research initiatives** exploring the potential and challenges of AI in banking and finance.	30
17.	**Monitor and Review AI Developments** – BB should continuously monitor AI advancements and assess their impact on the banking sector and also should update regulations and guidelines to keep pace with evolving AI trends.	25

6. Suggestions and Recommendations

1. **Developing Dedicated AI Research Unit and Collaboration with Academia and Industry:** Bangladesh Bank may establish a dedicated research unit or task force focused specifically on AI's implications for the banking sector. This unit would conduct comprehensive studies, analyze global trends, and develop policy recommendations. BB may forge partnerships with universities and leading fintech companies to leverage external expertise and foster collaborative research projects. BB should proactively disseminate research findings to the banking industry, facilitating awareness and timely adoption of AI-powered solutions.

   Proactive research on AI in banking may be conducted by both BIBM and BB is essential for informed decision-making, policy development, and the smooth transition to an AI-driven financial landscape. The recommendations outlined above will strengthen BB's research capabilities, benefiting the entire banking sector in Bangladesh.

2. **Developing AI Focused Comprehensive Regulatory Framework:** BB should initiate a review of the existing regulatory framework, identifying gaps and areas in need of updates specifically tailored for AI applications in the banking sector. Collaboration and Consultation with banks, fintech companies, and AI experts is vital in developing a comprehensive and forward-thinking regulatory environment.

BB may explore regulatory approaches adopted by other jurisdictions (International Best Practices) successfully managing AI in finance. This helps adopt proven strategies and avoid pitfalls. For proper capacity building of effective supervision and monitoring of AI-powered banking system, BB should invest in training and development program to ensure they possess the technical knowledge to effectively oversee AI-driven banking processes.

3. **Developing Robust Data Governance Framework and Cybersecurity Strategy for Minimizing AI Risk:** Bangladesh's banking sector needs a comprehensive data governance framework specifically addressing the use of AI. This should cover data collection, storage, usage, and sharing in line with privacy regulations. For this purpose, banks should develop a comprehensive data governance strategy, prioritizing the data quality and security. Banks should also establish strong data quality standards. Banks need to prioritize developing cybersecurity strategies tailored to the specific risks posed by AI. This includes regular vulnerability assessments, incident response plans, and security awareness training for employees. Banks need to invest in cybersecurity infrastructure and develop ethical AI guidelines to mitigate risks and ensure responsible AI use.

4. **Create Knowledge-Sharing Platforms**: Establish formal channels for banks and technology companies to exchange expertise. This could include collaborative research projects, industry forums, and innovation hubs.

5. **Educational Campaigns for Developing Customer Awareness:** Banks should launch targeted campaigns to familiarize customers with the benefits and applications of AI in the financial services. These campaigns might include Social media outreach and Personalized Communication. Banks can leverage AI to personalize customer interactions. This allows for tailored explanations of AI's role in enhancing services for each customer. Initiate educational campaigns and transparency measures to address customer concerns and increase trust in AI-powered banking solutions.

6. **Leverage the Strengths of Both AI and Human Intelligence:** Banks should prioritize developing and implementing AI solutions that are designed to complement and augment human expertise, rather than replace it altogether. This approach can leverage the strengths of both AI and human intelligence, fostering trust and ensuring a smooth transition towards a future of AI-powered banking services.

7. **Proper Budget Allocation and Continuous Investment to Expand AI Capabilities:** Financial institutions need to allocate sufficient budgets for the development and implementation of AI strategies, recognizing the long-term benefits and competitive advantages it can offer. Banks should continue to invest in AI research, Training and

Development of AI solutions that directly address customer needs and pain points. This can include enhancing chatbots, offering AI-powered financial advice, and automating processes. Banks that are already using AI should continue to invest in these technologies and explore new applications. AI can streamline operations, enhance customer service, improve decision-making, and mitigate security risks. As AI continues to evolve, it has the potential to revolutionize the banking industry.

8. **To Enhance AI Preparedness in the Banking Industry:** Banks should develop AI strategy and clear roadmaps for AI adoption, aligned with specific business goals and resource availability. As a part of proactive regulatory engagement, banks can play an active role in shaping AI-related regulations to ensure a smooth and responsible transition. Banks should go in phased approach for implementing AI and may starting with foundational aspects (cybersecurity, data quality) before complex AI applications.

9. **Invest in Workforce Training:** Banks should allocate sufficient budget in awareness campaigns and training programs to educate their staff about the benefits and risks associated with AI technologies. Banks should prioritize programs enabling employees to understand AI principles, data handling, and AI-specific software. Consider partnerships with educational institutions and specialized AI training providers. Implement specialized training for the Board of Directors, encourage Executive management involvement in cybersecurity initiatives, strengthen training for IT and cybersecurity teams and arrange targeted awareness campaigns for lower-level banking officials.

10. **Proper Vendor Management to Mitigate Outsourcing AI Risk:** As a part of contractual obligations, banks need to include robust data security and privacy clauses in vendor contracts, with clear liability allocation. Banks should implement vendor performance monitoring beyond the initial assessment and maintain open communication between banks and vendors about any data security incidents or breaches.

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Appendices

Appendix-1

BANGLADESH INSTITUTE OF BANK MANAGEMENT

Mirpur, Dhaka.

Research Project

On

Stakeholders readiness for AI driven banking business in Bangladesh

QUESTIONNAIRE

Research Team:

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   Director (Research, Development and Consultancy), BIBM
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3. Md. Abul Kalam Azad, Head of Information Security, EBL
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About Bank/Respondent [s]-

Name of the Bank:	
Address and Contact Number of Head Office:	
Name of the Respondent:	
Designation:	
Division/Department:	
Address and Telephone No:	
E-mail:	
Last Date of Submission	**15 January, 2024**

Note:

1. In case of **'Others'** option in any question, please write down your answer if applicable.
2. Please use additional pages if required for providing details information for answering any question and also attach it with questionnaire.
3. If you require soft copy of this questionnaire, please contact us or send request to our e-mail addresses.

Bangladesh Bank Readiness

1. Does Bangladesh Bank conduct any research or studies on AI's potential impact on the banking sector in Bangladesh?

   a) Yes, extensive research
   b) Moderate research
   c) To some extent
   d) No, not conducted any research

2. How well-prepared the existing regulatory framework of Bangladesh Bank is to address AI-driven banking business/innovations?

   a) Very well-prepared
   b) Moderately prepared
   c) Prepared to some extent
   d) Not at all prepared

3. Which regulatory considerations are essential for AI implementation in the banking sector in Bangladesh? (Select all that apply)

   a) Compliance with data protection laws
   b) Adherence to anti-money laundering regulations
   c) Ethical use of customer data
   d) Transparency in AI decision-making
   e) Integration with existing banking laws and regulations

f) Collaboration with different regulatory authorities
g) Ensuring Cyber Security
h) Data accuracy and adequacy
i) Other (please specify):….

4. What are the biggest challenges or concerns for the Bangladesh Bank in promoting AI-driven banking in Bangladesh? (Select all that apply)

a) Data privacy and security
b) Ensuring fair competition among FIs
c) Regulatory compliance
d) Lack of skilled workforce
e) Public trust and acceptance
f) Other (please specify):…..

5. What role should Bangladesh Bank play in addressing the challenges and concerns related to AI-driven banking in Bangladesh? (Select all that apply)

a) Develop and enforce comprehensive AI regulations
b) Facilitate industry collaboration and knowledge sharing
c) Provide financial incentives for AI adoption
d) Conduct public awareness campaigns
e) Foster partnerships with technology companies
f) Establish AI testing and certification standards
g) Other (please specify):.....

6. How does Bangladesh Bank plan to collaborate with the banking industry and technology stakeholders to promote AI adoption in the banking sector?

a) Through regulatory guidelines
b) By fostering partnerships and knowledge sharing
c) Through financial support and incentives
d) By organizing AI-focused events and workshops
e) By introducing new laws and regulations
f) Other (please specify) ….

Bank's Assessment regarding Customer Readiness and Bank's Perception for AI-driven banking business

1. What is the awareness level of your customers about the AI-driven banking business / financial services in our country?

1. Yes, very aware
2. Moderately aware
3. Aware to some extent
4. Not aware at all

2. How much would you agree to the statement – "AI is valuable and friendly?"

    1. Strongly agree
    2. Agree
    3. Somehow agree
    4. Do not agree at all

3. How much would you agree to the statement – "AI in banking is beneficial?"

    a) Strongly agree
    b) Agree
    c) Somehow agree
    d) Do not agree at all

4. Are you taking benefit of AI-driven automated financial advisor for investing money in the market?

    a) Yes, taking benefits fully
    b) Moderately benefited
    c) Some extent
    d) No, not taking any benefits

5. How much human intervention would you prefer alongside AI within banks?
    a) No human intervention (Fully AI driven)
    b) Partial human intervention (Moderately AI driven)
    c) Moderately human intervention (Some extent AI driven)
    d) Fully human intervention (No AI driven)

6. Is AI driven banking seems to be convenient for customers in Bangladesh?

    a) Very convenient
    b) Convenient
    c) Somehow Convenient
    d) Not at all convenient

Bank's Readiness

1. How prepared do you think your organization is for implementing AI-driven technologies?
    a) Very prepared
    b) Moderately prepared
    c) Somewhat prepared
    d) Not prepared at all

2. What are the key areas that your organization needs to address to become more prepared for AI adoption in banking? (Please select all that apply)
   a) Skill development and training for employees
   b) Enhancing data quality and availability
   c) Strengthening cybersecurity measures
   d) Establishing a clear AI strategy and roadmap
   e) Collaborating with technology partners or vendors
   f) Other (please specify): …

3. How can AI help banks in Bangladesh to address the challenges of credit risk assessment? (Select all that apply)
   a) Automated analysis of creditworthiness
   b) Real-time monitoring of loan performance
   c) Early detection of potential defaults
   d) Customized loan product recommendations
   e) Streamlined loan approval processes
   f) Integration with credit rating agencies
   g) Other (please specify): …

4. Which of the following factors are important for assessing AI readiness in the banking sector in Bangladesh? (Select all that apply)

   a) Data quality and availability
   b) Regulatory compliance
   c) Technological infrastructure
   d) Customer trust and privacy
   e) Workforce skills and training
   f) Market competition
   g) Other (please specify): …

5. Which of the following components are crucial for establishing a robust AI infrastructure in banks in Bangladesh? (Select all that apply)

   a) High-speed internet connectivity
   b) Scalable computing resources
   c) Advanced data analytics capabilities
   d) Real-time data processing
   e) Robust cybersecurity measures
   f) Seamless integration with legacy systems
   g) Other (please specify): …

6. Please rate your bank's readiness in adopting and implementing AI technologies in the following areas on a scale of 1 to 5, where 1 represents "Not Ready" and 5 represents "Fully Ready":

Name of Areas	Rate of Readiness Level (1 to 5)
Data Management and Quality Control	
Technological Infrastructure	
Regulatory Compliance	
Employee Skills and Training	
Customer Trust and Privacy	
Integration with Existing Systems	
AI Strategy and Roadmap	
Collaboration with Fintech and AI Solution Providers	
Ethical Use of AI	
Monitoring and Governance of AI Systems	
Other (please specify): …	

7. Has your organization already adopted AI-driven technologies or solutions in its banking operations?
   a) Yes, extensively
   b) Yes, to some extent
   c) No, but planning to in the near future
   d) No plans for AI adoption

8. Which AI technology are you currently using in your organization/bank? (Select all that apply)

   a) RPA
   b) Chabot
   c) Predictive Analytics
   d) AI enabled Cyber defense
   e) Credit Scoring
   f) Other (Please Specify) …

9. How are you using AI for Cyber Security? (Select all that apply)

   a) Automated threat hunting
   b) SOC backed real time monitoring
   c) SOAR
   d) Not being used in cyber security
   e) SIEM
   f) Other (Please Specify) …

10. Which banking services should be AI driven? (Select all that apply)

    a) E-KYC (A/C opening)
    b) Customer risk rating
    c) Loan processing (BB)
    d) Cyber security – Authentication & Authorization
    e) Call Centre – Customer Service
    f) Phone Banking (BB)
    g) Internet Banking/Mobile Apps – Authentication & Authorization (BB)
    h) Decision Support System (DSS) & EIS
    i) Nano/Micro loan through digital platform
    j) Others (Bank may mention)……..

11. Does your bank have any Artificial Intelligence (AI) strategy/ policy in place?

    a) Yes b) No

a.	If yes, what is your technology Roadmap as depicted in the strategy?	Short Term	Mid Term	Long Term
b.	What was the total AI Investment of your bank in **2022 and 2023** (In crore BDT)?	**2022**	**2023**	

c. What was the sector wise approximate AI investment (In crore BDT) of your bank in **2022 and 2023**?

Name of Sectors	**2022**	**2023**
Robotic Process Automation		
Software		
Network & Hardware		
Information Security		
Training on AI		
Others (Please Specify)…..		
Total AI Investment		

Note: The above lists of AI investment sectors may vary with the policy of Banks. You are requested to put the above values according to your own AI budget allocation policy.

Third Party Readiness

1. How does Third Party Vendors address data security and privacy concerns when providing AI solutions to banking clients? (Select all that apply)
    a) Strong encryption and data protection
    b) Regular security audits and assessments
    c) Compliance with data protection regulations
    d) Employee training on data security
    e) Other (please specify)…….

2. How the ecosystem in Bangladesh is prepared for AI driven banking?
   a) Fully prepared
   b) Partially Prepared
   c) Some extend prepared
   d) Not at all prepared
3. From vendor perspective what facilities lacks in bringing AI driven banking technologies in Bangladesh? (Select all that apply)
   a) Investment
   b) Infrastructure
   c) Skilled personnel
   d) Business Opportunity in Bangladesh
   e) Market Reputation
   f) Others (Please specify) ……..

Bank's Suggestion and Opinions about the Challenges of AI-driven banking business:

4. What factors do you believe are hindering the adoption of AI-driven technologies in the banking sector of Bangladesh? (Please select all that apply)
   a) Lack of awareness about AI benefits
   b) Insufficient infrastructure and technical capabilities
   c) Limited financial budget for AI implementation
   d) Resistance to change within the organization
   e) Uncertainty about regulatory compliance
   f) Other (please specify): ….

5. What are the key considerations for ensuring the ethical use of AI in the banking sector of Bangladesh? (Select all that apply)
   a) Fairness and transparency in AI algorithms
   b) Protection of customer data privacy
   c) Responsible handling of sensitive information
   d) Compliance with ethical guidelines and codes of conduct
   e) Minimizing algorithmic biases and discrimination
   f) Collaboration with academic institutions for ethical audits'
   g) Others (Please specify): ….

6. Do you have any concerns or reservations about the widespread adoption of AI in the banking industry? If yes, please elaborate.

7. What are your expectations for the impact of AI-driven technologies on the banking sector in Bangladesh in the next 5 years/10 years

Sl	Over next 5 years	Over next 10 years
1		
2		
3		
4		

8. Knowledge and Awareness level

Sl	Stakeholders	Awareness Level (1-5)
1	Banking Customer	
2	Board of Director (BoD)	
3	Executive Management	
4	Business operation Management	
5	IT Operation Management	
6	Cyber Security Management	
7	Lower level banking officials	
8	Regulatory Authority	
7	Others (Please specify)	

1= Unsatisfactory, 2= Satisfactory, 3 = Good, 4 = Very Good and 5 = Excellent

9. Availability of AI based resources

Sl	Resources	Availability/Sufficiency level (1-5)
1	Hardware availability	
2	Software availability (AI tools, Solution)	
3	Network and Communication	
4	Cyber Security solution for AI driven fraud/attack	
5	Skilled manpower	
6	Others (Please specify)	

1= Not available, 2= Available to some extent, 3 = moderately available, 4 = Available at high level and 5 = Available at very high level

10. Level of infrastructure support and initiatives of regulatory authorities to promote AI driven banking business in Bangladesh:

Sl	Authority	Level of Initiatives (1-5)
1	Bangladesh Bank	
2	ICT & Telecom Ministry	
3	BTRC	
4	Finance Ministry	

1= Don't take any initiative, 2= To some extent, 3 = Moderate, 4 = High level and 5 = Very high level

11. As banking industry is moving towards Artificial Intelligence (AI), what are the **challenges** are you facing to move in AI enabled service? (Please mention both technology & business challenges)

12. Do you have any special comments/suggestions to make stakeholders ready for AI based banking? Please mention. Use extra page if required. (Please mention both technology and business suggestions)

13. What types of role the central bank can play for enabling stakeholders for AI based banking? **Please put your valuable comments/suggestions.**

Appendix-2

Questionnaire

On

Awareness of Stakeholders readiness for AI driven banking business in Bangladesh

1. Name (Optional): .....
2. Gender: ☐Female ☐ Male
3. Age range: ☐ Below 25 ☐25-34 ☐ 35-44 ☐ 45-54 ☐ 55-64 ☐ Over 64
4. Occupation: ☐ Service ☐ Business ☐ Students ☐ Others
5. **Current division in which you are residing**

   a. Dhaka b. Chittagong c. Rangpur d. Sylhet e. Rajshahi f. Barishal g. Khulna h. Mymensingh
6. Your Profession: a) Banker b) Teacher/Trainer c) Lawyer d) Doctor e) Researcher f) Scientist g) Student h) Businessman i) Others (_____)
7. Qualification: ☐less than Undergraduate ☐Undergraduate ☐ Post graduate ☐ PhD/Higher Degree
8. Monthly income: ☐ Below 30000 ☐ 40000-60000 ☐ 60000-80000 ☐Over 80000
9. Do you have any bank account? ☐ Yes ☐ No
10. Which bank you have account?

    ☐Private Commercial bank ☐State-owned commercial bank

    ☐Foreign commercial bank ☐ Specialized Bank

11. What type of account you have?

☐ Savings A/C ☐ Current A/C

☐ Fixed deposit A/C ☐ DPS A/C ☐ Others

12. Which of the following IT related service currently you are using? (Answer multiple)
    a. Debit Card
    b. Credit Card (Visa/Master Card)
    c. SMS banking
    d. Internet Banking
13. After any transaction in Debit Card/Credit Card/Internet Banking/SMS banking, when do you receive notification from the bank–
    a. Immediately after the transaction
    b. Within 1 hour
    c. Within 1-2 hour
    d. Within 2-3 hour
    e. Within 3-4 hour
    f. After 4 hour
    g. Within the day
    h. Next day
14. Have you ever experienced in hacking your bank account or withdraw/transfer money from your account without your knowledge?
    a. Yes b. No

    If yes, how many times have you experienced in hacking your bank account or withdraw/transfer money from your account without your knowledge?
    a. Never experienced
    b. 1 – 2 times
    c. 2-3 times
    d. 3-4 times
    e. More than 4 times
15. Which of the following banking services currently you are using? (Answer multiple)
    a. BEFTN (Bangladesh Electronic Funds Transfer Network)
    b. NPSB (National Payment Switch Bangladesh)
    c. RTGS (Real Time Gross Transaction)

16. Have you ever experienced to open any kinds of your bank account via on-line?
    a. Yes
    b. No
17. Have you ever experienced to lodge loan application via on-line?
    a. Yes
    b. No
18. Are you using the bank specific App (or software) installed in your mobile phone for regular banking transaction such as balance transfer?
    a. Yes
    b. No
19. To what extent do you agree with the following statement for AI (Artificial Intelligence) banking operation in Bangladesh?

    1= Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; 5= Strongly Agree

1	I am customed and habituated to use the internet-based banking operation.	1	2	3	4	5
2	I am habituated to do app-based banking.	1	2	3	4	5
3	I am confident that I am capable to lodge loan application via on-line.	1	2	3	4	5
4	I am confident that I am capable to open a bank account using my Smart Phone via on-line.	1	2	3	4	5
5	I am fear/confusion to use on-line banking because of threats in cyber hacking etc.	1	2	3	4	5
6	I am ready to accept any banking operation using Artificial Intelligence in the banking operation.	1	2	3	4	5
7	I am confident that the bank has sufficient capacity to handle any cyber crime in the banks.	1	2	3	4	5
8	I am confident that the Bangladesh Bank has sufficient capacity to handle any cyber-crime in the banks.	1	2	3	4	5

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