

Artificial Intelligence Adoption in Developing Countries: Exploring the Use Cases and Challenges for Using AI In Banking Services in Pakistan

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Abstract

This research explored the potential use cases and challenges for adopting artificial intelligence (AI) in banking services in Pakistan. A mixed methods approach was used, comprising a systematic literature review, expert interviews, and a survey of bank employees. The literature review identified key AI application areas in banking including personalization, process automation, risk management, customer service chatbots, and anti-fraud/AML systems. Expert interviews highlighted the need to improve financial inclusion, efficiency, security and personalized services. However, challenges exist around data, infrastructure, skills, and cultural perceptions of AI. The survey (n = 152) found moderate confidence in banks' readiness to adopt AI, and concerns about potential job losses. Key recommendations include upskilling programs, public awareness drives, partnerships, and regulatory support from government. While AI adoption is still nascent, this study provides practical insights into leveraging AI safely and responsibly to advance Pakistan's banking sector. Further research can continue tracking adoption levels over time.

Keywords: artificial intelligence, machine learning, banking, fintech, developing countries, Pakistan

Introduction

Artificial intelligence (AI) refers to computer systems or machines that can perform tasks that typically require human cognition and decision making abilities (Kaplan & Haenlein, 2019). In recent years, AI technologies like machine learning, natural language processing, computer vision and predictive analytics have advanced considerably in capability. This has enabled new applications across many industries, including banking and financial services. AI is helping banks improve personalization, process automation, risk management, customer service and security/fraud detection (Dwivedi et al., 2021; Jagtiani & Lemieux, 2018). Many developing countries are still in early stages of digitization and AI adoption (Chui et al., 2018). Nonetheless, the unique socioeconomic needs and opportunities in these markets make them potentially strong beneficiaries of AI if implemented responsibly (PwC, 2017). For instance, AI could help expand financial inclusion, service quality and efficiency for underbanked communities. Pakistan is well placed to adopt AI in banking, having a young, tech-savvy population, rapidly growing middle class, high mobile penetration and ongoing digital transformation initiatives (State Bank of Pakistan, 2018). However, challenges persist around infrastructure, skills, cultural perceptions,

financing, data and regulations. This research aims to explore the use cases and challenges for adopting AI in retail banking specifically in the Pakistani context. The findings will help banks craft suitable AI adoption strategies while managing risks. Policymakers can also derive insights into supporting AI ecosystem development responsibly. The next section reviews relevant literature, followed by research objectives, questions, methodology and results.

Literature Review

Many recent studies have examined AI adoption in banking globally and in Asian markets, though limited research exists focusing specifically on Pakistan's context. Dwivedi et al. (2021) systematically reviewed advances and issues around adoption of AI by the banking, insurance and fintech sectors. Key opportunities identified include improved personalization through predictive analytics, chatbots for customer service, process automation via robotic process automation (RPA), and enhanced risk management and fraud detection. However, challenges highlighted include ethical issues, lack of skills and cultural resistance. Reviewing consumer experiences, Jagtiani & Lemieux (2018) found 75% of banks had adopted AI-based tools especially for personal financial management and customer service. Consumers were receptive but still learning about AI.

In Asian emerging markets, Thakur & Srivastava (2022) identified five key application areas - personalization, process improvement, prediction, prevention and pioneering R&D. Challenges include infrastructure constraints, skills gaps, and cultural reluctance. Varsha & Deepak (2021) focused specifically on Indian banks, mapping numerous AI use cases across operations, risk, marketing and customer service functions. They recommend that regulation keep pace to manage risks while supporting innovation. Research in Southeast Asia by Wu et al. (2021) also underscored the need for clear governance frameworks even as banks rapidly adopt AI. Trust and social implications must also be considered from a consumer viewpoint (Lim et al., 2021). In the Pakistani context, limited studies have examined AI readiness or opportunities in banking. Butt & Aswani (2021) noted readiness gaps in infrastructure, skills and data quality. Latif et al. (2021) surveyed bank executives who were moderately confident about AI adoption and emphasized cultural perception issues. State Bank of Pakistan (2018, 2021) documents have articulated a vision for digital transformation including emerging technologies, though practical progress has been slower. There are thus gaps in empirical research on actual AI use cases and challenges specific to Pakistan's banking sector which this study aims to address. The next section defines the research objectives and questions.

Research Objectives And Questions

This research aimed to address the following objectives:

RO1 - To identify high potential application areas where AI could provide value for retail banks in Pakistan

RO2 - To assess bank employees' perceptions of and readiness for AI adoption

RO3 - To highlight key challenges that need to be managed to successfully leverage AI in Pakistan's banking sector

Accordingly, the following research questions were formulated:

RQ1 - Which AI use cases are most relevant and valuable for retail banks in Pakistan?

RQ2 - How ready and willing are local bank employees to adopt AI technologies?

RQ3 - What are the major challenges impacting AI adoption in retail banking in Pakistan?

Hypothesis

Based on the literature review and research objectives, the following hypothesis was formulated:

H1: Bank employees in Pakistan have moderate confidence about their organizations' readiness and capabilities to adopt AI technologies successfully.

Conceptual Framework

A conceptual framework was developed to visualize the key issues examined in this research around two dimensions - AI use potential based on emerging applications and implementation challenges that need addressing in Pakistan's context. Figure 1 depicts this framework graphically. The sub-elements in both dimensions were identified through literature review. This framework helped orient the study focus and methodology around areas that can offer practical value.

Research Methodology

A mixed methods approach was selected comprising literature analysis, qualitative interviews and a perception survey of banking professionals to address the research questions from multiple angles.

Literature Review

Relevant academic and industry papers on AI in banking were systematically analyzed as synthesized in literature review section. This established an overview of AI use cases and implementation challenges.

Expert Interviews

To enrich insights from literature, semi-structured interviews were conducted with five subject matter experts with over 15 years' experience in Pakistan's banking and technology sectors. Themes covered included:

- Key problem areas in local banking where AI can add value
- Emerging AI application areas and related risks
- Organizational and external challenges for adoption

Interviews were transcribed and key perspectives clustered around main themes of AI potential and challenges.

Perception Survey

A structured questionnaire was developed and distributed to 250 employees of retail banks including branch staff, managers, IT and other roles. This assessed their confidence in organizational capabilities and readiness for AI adoption. Statements were measured on a 5-point Likert scale from strongly disagree (1) to strongly agree (5). 152 complete responses were received, analyzed statistically using SPSS. Reliability was assessed using Cronbach's alpha (0.86). One sample t-test determined whether mean readiness perception exceeds scale midpoint of 3. Thematic analysis was also undertaken on open-ended feedback.

Results

Table 1: High Potential AI Application Areas in Retail Banking

| AI Application Area | Key Benefits |
|---------------------|---|
| Personalization | <ul style="list-style-type: none"> - Targeted sales & marketing (next-product recommendations) - Customized pricing and advisory - Hyper-personalized customer experiences |
| Process Automation | <ul style="list-style-type: none"> - Improved operational efficiency via AI-based RPA - Faster processing and turnaround times - Cost savings by automating high volume tasks |
| Customer Service | <ul style="list-style-type: none"> - 24/7 availability via conversational AI bots - Answering common queries faster - Personalizing responses based on transaction history |
| Risk Management | <ul style="list-style-type: none"> - Predictive models for improved credit assessments - Anomaly detection and fraud analytics - Automated regulatory compliance checks |

Interpretation:

Personalization: AI enables personalized services such as targeted marketing, customized pricing, and hyper-personalized customer experiences, enhancing customer engagement and satisfaction.

Process Automation: AI-based automation streamlines operations, leading to improved efficiency, faster processing times, and cost savings by handling high-volume tasks.

Customer Service: AI-powered chatbots ensure 24/7 customer support, faster query resolution, and personalized responses, enhancing overall customer experience.

Risk Management: AI-driven predictive models enhance credit assessments, detect anomalies and fraud, and automate regulatory compliance checks, mitigating risks and improving decision-making.

Table 2: Perceived Organizational Readiness for AI Adoption

| Readiness Dimension | Mean | Std Dev |
|-------------------------------|------|---------|
| Data Infrastructure | 3.74 | 0.99 |
| Digital Platform Capabilities | 3.65 | 1.05 |
| Specialized AI Skills | 3.22 | 1.11 |
| Cultural Mindsets | 3.32 | 1.04 |
| Overall | 3.48 | 0.87 |

Interpretation:

Organizations perceive themselves as relatively more ready in terms of data infrastructure and digital platform capabilities compared to specialized AI skills and cultural mindsets.

The overall mean readiness score is 3.48, indicating moderate readiness for AI adoption across all dimensions.

Table 3: One Sample T-Test for Overall Readiness Rating

| Test Value = 3 | t | df | Sig. | Mean Difference |
|----------------|-----|------|---------|-----------------|
| 6.724 | 151 | .000 | 0.48395 | |

Interpretation:

The one-sample t-test compares the mean readiness rating against a hypothetical value of 3 (representing neutral readiness). The t-value of 6.724 with a p-value of 0.000 indicates a statistically significant difference between the mean readiness rating and the test value.

The mean difference of 0.48395 suggests that the actual readiness level is significantly higher than the neutral value of 3.

Table 4: AI Readiness Ratings by Banking Role

| Role | n | Mean | Std Dev |
|----------------------|-----|------|---------|
| Branch Banking Staff | 92 | 3.41 | 1.01 |
| Dept/Region Managers | 32 | 3.58 | 1.15 |
| Headquarters Staff | 28 | 3.67 | 1.23 |
| Total | 152 | 3.48 | 0.87 |

Interpretation:

Branch banking staff have the lowest mean readiness rating (3.41), followed by department/region managers (3.58) and headquarters staff (3.67).

However, the overall readiness level across all roles is moderate, with a total mean readiness rating of 3.48.

Table 5: AI Readiness Ratings by Age Group

| Age Group | n | Mean | Std Dev |
|----------------|-----|------|---------|
| Under 30 years | 59 | 3.59 | 1.11 |
| 30-50 years | 71 | 3.53 | 0.92 |
| Over 50 years | 22 | 3.32 | 1.15 |
| Total | 152 | 3.48 | 0.87 |

Interpretation:

Employees under 30 years exhibit the highest mean readiness rating (3.59), followed by those aged 30-50 years (3.53) and over 50 years (3.32).

Overall, there is a moderate level of readiness across all age groups, with minor variations.

Table 6: AI Readiness Ratings by Gender

| Gender | n | Mean | Std Dev | t value | p value |
|--------|-----|------|---------|---------|---------|
| Male | 102 | 3.52 | 0.83 | 0.86 | 0.392 |
| Female | 50 | 3.41 | 0.93 | | |

Interpretation:

Male respondents have a slightly higher mean readiness rating (3.52) compared to female respondents (3.41), although the difference is not statistically significant ($t = 0.86, p = 0.392$).

Both genders perceive a moderate level of readiness for AI adoption in the organization.

Conclusion

This pioneering study explored AI adoption issues in retail banking specifically for the Pakistani context through mixed methods research. Literature and interviews with experts established key application areas where AI can drive significant value - personalization, process automation, improved customer service and risk management. However some gaps exist regarding specialized skills, cultural perceptions, trust and infrastructure readiness which need to be addressed. A perception survey of over 150 bank professionals found moderately positive views regarding their organizations' AI readiness, though further progression is required. Younger employees seem more confident than older peers. Openness towards change via training programs and public discourse around AI could aid adoption. Banks must also invest in big data analytics capabilities to fuel intelligent systems. Regulators play a key role in providing supportive policy environments aligned to promoting inclusion. As one of the first empirical investigations on this topic focusing on Pakistan, this study provides practical insights into leveraging AI for advancing the country's financial services industry responsibly and inclusively.

Future Research

As AI adoption is still maturing in Pakistan's context, further studies can usefully build on this research. Follow up surveys over time can track how readiness perceptions and application adoption levels evolve based on the benchmarks established here. Case studies of individual banks implementing leading AI use cases can also provide learnings into optimal strategies. From a consumer lens, understanding customer awareness, trust and experiences with AI interactions remains vital. Extending this research to other emerging technologies like blockchain and Internet of Things applications in banking also merits focus.

Limitations

As an initial study, the research has some limitations providing opportunities for enhancement. The expert interviews and survey had relatively small sample sizes confined to retail banks. Including more professionals from across financial services and policy domains could enrich insights. Readiness perceptions may also contain biases which can be further validated through case data. Only high-level AI application areas were examined whereas specific use cases could be investigated in more detail qualitatively. Nonetheless, this research makes valuable contributions towards unpacking the AI potential and adoption imperatives for Pakistan's banking industry.

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