

# The Moderating Role of Employee Expertise in the Relationship Between AI Adoption and Loan Management Performance in the Banking Sector

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## ABSTRACT

The research examines the moderating effect of employee skill on the nexus between artificial intelligence (AI) adoption and loan management performance in the banking industry. With the increasing use of AI in financial processes like credit grading, fraud prevention, and loan disbursement, the human touch continues to play a critical role in ensuring the effective and ethical use of such technologies. This study takes a quantitative stance to establish the extent of employee knowledge that has an impact on the successful deployment of AI systems in loan management. Data were gathered from 400 bank professionals who were directly involved in digital loan processing and were analyzed through regression analysis. Employee competence is found to have a strong positive relationship with both AI integration ( $\beta = 0.800$ ,  $p < 0.001$ ) and loan approval performance ( $\beta = 0.823$ ,  $p < 0.001$ ), confirming that employees who have greater technical and analytical competence can utilize AI tools more efficiently. The research validates that worker competence positively moderates the impact between AI uptake and loan management performance, clearly reflecting the imperative for ongoing skill development and human–AI collaboration. The findings underscore that technological progress in itself is not adequate; good human capital development is equally important to attaining operational excellence in the digital banking environment.

**Keywords:** Artificial Intelligence, Employee Expertise, Loan Management, Banking Sector, AI Adoption, Human–AI Collaboration, Technological Implementation, Loan Approval Performance.

## INTRODUCTION

The banking industry has experienced a deep digital shift over the last few years, with artificial intelligence (AI) leading the charge as a major force driving innovation and cost efficiency. AI technologies are being more widely integrated into loan management systems to automate functions like credit assessment, risk assessment, fraud detection, and loan approval processes. These systems allow banks to process significant amounts of data, make quicker and more precise lending choices, and enhance the entire customer experience (Al-Khatib, 2022). While the use of AI tools is on the rise, their proper implementation relies not just on technological infrastructure but also on the human intelligence that oversees and interfaces with these systems. The employees' role remains pivotal because they ensure that AI technologies are used efficiently and ethically in decision-making (Rabbani et al., 2023).

Employee capabilities are a key determinant that affects the association between AI adoption and loan management performance. Experienced and well-informed employees can better understand AI-supplied data, make contextually valid judgments, and resolve discrepancies or bias that might be introduced in automated systems. With a strong grasp of both financial and technical details, employees are able to complement the power of AI systems, hence improving the accuracy and reliability of loan management results (Mei et al., 2024). This is, however, opposed to narrower expertise or unfamiliarity with AI tools, which causes misinterpretation of results, poor utilization of systems, and ultimately suboptimal performance results. Therefore, employee expertise serves as a moderating factor that decides to what extent AI can be utilized to drive organizational goals, especially in high-risk fields like loan acceptance and credit risk management (Elegunde & Osagie, 2020).

Familiarity with the moderating factor of employee expertise is critical for banks to take full advantage of AI adoption. An advanced technology system without sufficient trained professionals might not be able to realize anticipated levels of efficiency, accuracy, and performance. Hence, success with AI adoption for loan management is contingent on congruence between technological capabilities and human capabilities (AI-Onizat et al., 2024). This research aims to examine how staff expertise affects the integration between AI adoption and loan management performance, noting that human capital building is as important as technology progress. By understanding this interaction, banking organizations can develop specially designed training programs, make investments in ongoing skill acquisition, and develop a culture to enable human–AI partnerships for sustainable performance benefits in the digital age (Alkadi & Abed, 2025).

### **Objective of Study**

To study the influence of employee expertise on the successful implementation of AI in loan management.

### **REVIEW OF LITERATURE**

Artificial Intelligence (AI) uses sophisticated technologies like natural language processing, machine learning, and deep learning to revolutionize financial services (Achary, 2021). The aim of this study is to comprehend the ambit and implementation of AI in India's banking industry, specifically in SME banking services. As fintech continues to gain more prominence, banks are becoming more and more inclined towards adopting AI-based technologies to stay competitive and effective (Malali & Gopalakrishnan, 2020). These technologies enable financial institutions to improve decision-making, optimize processes, and assimilate AI into their planning frameworks. Recent studies, such as that by Dwivedi and Kochhar (2023), explore employees' perceptions of AI implementation in the Indian banking industry using mixed-methods research. Similarly, Singh et al. (2025) highlight AI's growing role in improving operational efficiency and reducing costs. The literature identifies key themes including AI-driven customer service, consumer readiness, financial inclusion, regulatory adaptation, and explicability, suggesting a strong foundation for future research within the theory, context, and methodology (TCM) framework.

### **Hypothesis of Study**

**H<sub>0</sub>:** Employee expertise does not moderate the relationship between AI adoption and loan management performance.

**H<sub>a</sub>:** Higher levels of employee expertise positively moderate the impact of AI adoption on loan management performance.

### **RESEARCH METHODOLOGY**

This research used a quantitative research method to investigate the moderating role of employee expertise in the relationship between adoption of artificial intelligence (AI) and loan management performance in the banking industry. The objective was to find out if greater levels of employee expertise make the improvement of loan processing and approval efficiency more effective through AI.

Information was gathered using a standardized questionnaire completed by 400 bank staff directly engaged in loan administration and computerized processing systems, sampled using purposive sampling with the aim that participants would have relevant AI experience.

The survey employed a five-point Likert scale from "strongly disagree" to "strongly agree" in measuring employee expertise (technical and analytical skills, flexibility, and AI knowledge), AI integration (level of usage, accuracy, and efficiency), and loan performance (speed of approval, minimization of errors, and customer satisfaction).

Regression testing was employed to examine the strength and direction of variable relationships, where AI integration and loan approval scores served as dependent variables and employee expertise as the independent variable. Statistical measures such as R, R<sup>2</sup>, Adjusted R<sup>2</sup>, F-value, t-value, and p-value were tested, and the model was considered significant at a 0.05 level. Assumptions of normality, homoscedasticity, and multicollinearity were checked to guarantee the reliability and validity of the results.

## RESULTS

### Regression Analysis

Regression analysis was used to identify the level to which employee expertise affects the effective use of AI in loan management. The initial model explored the linkage between employee expertise and AI integration. As reflected in Table 2, the R correlation coefficient was 0.800, which reflects a very strong positive relationship.  $R^2$  of 0.641 implies that employee expertise explains 64.1% of variance in AI integration. The ANOVA outcomes ( $F = 709.509$ ,  $p < 0.001$ ) validated the statistical significance of the model that employee expertise is a significant predictor of AI integration. From the coefficient table, it was identified that employee expertise significantly and positively contributes to AI integration ( $\beta = 0.800$ ,  $t = 26.637$ ,  $p < 0.001$ ), showing that skilled employees make a significant contribution toward successful implementation of AI systems in banking operations.

**Table 1.** Variables Entered/Removed<sup>a</sup>

Variables Entered/Removed <sup>a</sup>			
Model	Variables Entered	Variables Removed	Method
1	Employee Expertise Score <sup>b</sup>	.	Enter
a. Dependent Variable: AI Integration Score			
b. All requested variables entered.			

**Table 2.** Model Summary.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.800 <sup>a</sup>	.641	.640	.30881
a. Predictors: (Constant), Employee Expertise Score				

**Table 3.** ANOVA<sup>a</sup>.

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	67.663	1	67.663	709.509	.000 <sup>b</sup>
	Residual	37.956	398	.095		
	Total	105.619	399			
a. Dependent Variable: AI Integration Score						
b. Predictors: (Constant), Employee Expertise Score						

**Table 4.** Coefficients<sup>a</sup>.

Coefficients <sup>a</sup>					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	.350	.120		2.916	.004
	Employee Expertise Score	.793	.030	.800	26.637	.000
a. Dependent Variable: AI Integration Score						

### Regression Analysis

The second regression model tested the effect of employee experience on loan approval performance. As can be seen in Table 6, R-value was 0.823, and R<sup>2</sup> was 0.678, suggesting that 67.8% of loan approval performance variation is explained by employee experience. The ANOVA test gave an F-value of 836.502 (p < 0.001), which ensured that the regression model was significantly strong. The coefficient analysis also confirmed that employee expertise significantly predicts the efficiency of loan management ( $\beta = 0.823$ ,  $t = 28.922$ ,  $p < 0.001$ ). The findings verify that employees with greater levels of expertise effectively handle AI tools, resulting in faster and more precise loan approvals.

**Table 5.** Variables Entered/Removed<sup>a</sup>.

Variables Entered/Removed <sup>a</sup>			
Model	Variables Entered	Variables Removed	Method
1	Employee Expertise Score <sup>b</sup>	.	Enter
a. Dependent Variable: Loan Approval Score			
b. All requested variables entered.			

**Table 6.** Model Summary.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.823 <sup>a</sup>	.678	.677	.28847
a. Predictors: (Constant), Employee Expertise Score				

**Table 7.** ANOVA<sup>a</sup>.

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	69.608	1	69.608	836.502	.000 <sup>b</sup>
	Residual	33.119	398	.083		
	Total	102.726	399			
a. Dependent Variable: Loan Approval Score						
b. Predictors: (Constant), Employee Expertise Score						

**Table 8.** Coefficients<sup>a</sup>.

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.360	.112		3.204	.001
	Employee Expertise Score	.804	.028	.823	28.922	.000

a. Dependent Variable: Loan Approval Score

**Interpretation:** Employee expertise's moderating effect was assessed based on regression analysis. Table 4.20 shows that employee knowledge is an important predictor of AI adoption ( $\beta = 0.800$ ,  $p < 0.001$ ), which demonstrates that knowledgeable employees are more capable of applying AI systems to achieve efficiency. Additional regression studies on the efficiency of loan approval (Tables 4.24–4.26) show that employee knowledge positively moderates the relationship between operational performance and AI adoption ( $\beta = 0.823$ ,  $t = 28.922$ ,  $p < 0.001$ ). These findings substantiate Ha4 and highlight that human capital is essential in achieving the maximum potential of technological innovation. Staff members with more expertise can accurately translate AI-produced insights, make well-educated decisions, and use automation tools effectively, thus maximizing loan approval time, minimizing mistakes, and enhancing overall process quality.

The overall findings suggest that employee expertise significantly moderates the relationship between AI adoption and the performance of loan management. As shown in Table 9, the null hypothesis (H0) that employee expertise doesn't mediate the role of AI adoption on loan management performance is rejected. The alternative hypothesis (Ha) is confirmed to set a premise that greater employee expertise tends to positively mediate the effect of AI adoption on loan management performance. This implies that when employees have good technical expertise, analytical skill, and versatility, they are in a better position to utilize AI systems more effectively, leading to more accurate decision-making, shorter processing time, and enhanced operational performance.

**Table 9.** Results of Hypothesis Testing.

Objective	Hypothesis	Result
To study the influence of employee expertise on the successful implementation of AI in loan management.	<b>H<sub>0</sub>:</b> Employee expertise does not moderate the relationship between AI adoption and loan management performance.	<b>H<sub>a</sub> accepted</b> <b>H<sub>0</sub> rejected</b>
	<b>H<sub>a</sub>:</b> Higher levels of employee expertise positively moderate the impact of AI adoption on loan management performance.	

## DISCUSSION

The findings of the study evidently show that the expertise of employees has a significant moderating effect in improving the link between AI adoption and loan management performance in the banking industry. The regression results reveal high and significant positive correlations between employee knowledge and both integration of AI ( $R = 0.800$ ,  $R^2 = 0.641$ ) and loan approval performance ( $R = 0.823$ ,  $R^2 = 0.678$ ), which reflect highly skilled and knowledgeable employees' valuable contributions towards the efficient use of AI technologies. These results indicate that although AI technologies play a key role in simplifying intricate loan procedures, their full potential can be unlocked only when employees have the necessary technical acumen and analytical skills to handle and interpret AI-powered systems effectively. The models' statistical significance further attests to the fact that banks with more skilled and trained staff are capable of leveraging AI to facilitate quicker loan approval, reduce human error, and enhance service efficiency overall. In addition, the study validates the significance of human–technology synergy, insisting that AI cannot perform at its best without the assistance of well-skilled human resources. Therefore, organizations seeking to advance their loan management effectiveness using

AI implementation must invest in ongoing capacity building and skills development activities in order to ensure workers are well prepared to complement and augment AI capabilities. This synchronization of employee skill with AI adoption not only enhances operational performance but is also conducive to a culture of technological flexibility, innovation, and enduring competitive success in the banking industry.

## CONCLUSION

The research concludes that the expertise of employees plays a key moderating function in enhancing the connection between AI adoption and loan management performance in the banking industry. The regression findings unmistakably show that employees possessing greater technical capability, analytical thinking, and flexibility are more capable of effectively utilizing AI systems, leading to quicker approval of loans, enhanced accuracy of decision-making, and overall performance improvement. The high positive correlation ( $R = 0.823$ ) and explanatory ability ( $R^2 = 0.678$ ) emphasize the role of human capital to achieve maximum AI-based processes. These observations point out that though AI has revolutionary possibilities in terms of revolutionizing the banking sector, its real potential can only be unleashed when it has a human resource base that is aware and can successfully implement these technologies into operational processes. Hence, banks need to invest in ongoing training and capacity development to acquire the skills that will enable them to competently manage AI applications. Increasing employee capabilities will not only make loan management more efficient but also ensure that AI-based decisions are transparent, dependable, and in line with organizational objectives. In a nutshell, the study reiterates that banking greatness is in the future in a harmonious synergy between cutting-edge technology and human intelligence.

## REFERENCES

1. Achary, R. (2021). Artificial intelligence transforming indian banking sector. *International Journal of Economics and Management Systems*, 6.
2. Alkadi, R. S., & Abed, S. S. (2025). Examining consumer intention to adopt AI-powered chatbots in the Saudi banking sector: the moderating role of knowledge in technology. *International Journal of Bank Marketing*.
3. Al-Khatib, A. W. (2022). Intellectual capital and innovation performance: the moderating role of big data analytics: evidence from the banking sector in Jordan. *EuroMed Journal of Business*, 17(3), 391-423.
4. Al-Onizat, H. H., Alarabiat, A. A., Bani-Ata, T. J., Alawamleh, H. A., & Al-ma'aitah, M. A. (2024). Effectiveness of AI-driven knowledge management system in improving the performance of banking sector in Jordan. *Journal of Information Technology Management*, 16(1), 182-200.
5. Dwivedi, A., & Kochhar, K. (2023). Employee's attitude towards artificial intelligence in the indian banking sector. *International Journal of Professional Business Review: Int. J. Prof. Bus. Rev.*, 8(11), 6.
6. Elegunde, A. F., & Osagie, R. (2020). Artificial intelligence adoption and employee performance in the Nigerian banking industry. *International Journal of Management and Administration*, 4(8), 189-205.
7. Malali, A. B., & Gopalakrishnan, S. (2020). Application of artificial intelligence and its powered technologies in the indian banking and financial industry: An overview. *IOSR Journal Of Humanities And Social Science*, 25(4), 55-60.
8. Mei, H., Bodog, S. A., & Badulescu, D. (2024). Artificial intelligence adoption in sustainable banking services: the critical role of technological literacy. *Sustainability*, 16(20), 8934.
9. Rabbani, M. R., Lutfi, A., Ashraf, M. A., Nawaz, N., & Ahmad Watto, W. (2023). Role of artificial intelligence in moderating the innovative financial process of the banking sector: a research based on structural equation modeling. *Frontiers in Environmental Science*, 10, 978691.
10. Singh, R. K., Mishra, R., Kumar, S., & Bag, S. (2025). Applications of Artificial Intelligence for Optimizing Banking and Financial Operations: A Systematic Literature Review and Future Research Agenda. *Journal of Economic Surveys*.