

# A Study of Artificial Intelligence in Banking: Enhancing Customer Experience in the Top 5 Private Banks

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## Abstract

The study represents a brief idea about the Indian banking sector and the implementation of AI in the Top 5 private banks. AI has been adopted more widely in some sectors than others. The banking sector is amongst the few industries that have shown a good acceptance and adoption of this technology. This study explores the adoption of artificial intelligence in the banking sector of Bangalore city. The primary data required to analyze the issue at hand was collected using the survey as a research strategy, the data was collected from 385 customers. The main purpose of this survey is to gather information related to understanding the implementation of Artificial intelligence in the banking sector and its impact. The data collected was also quantitatively analyzed using SmartPLS software. It provides information on the long-term stability of the banking sector and future growth prospects for implementing Artificial intelligence in the banking sector. It can help in understanding customers' perceptions, weaknesses, and ways to improve in the future. The outcomes of this study could provide new insight into customers' perceptions of implementing artificial intelligence in the banking sector.

**Keywords:** Artificial Intelligence, Banking, Customers, Customer Digital Literacy, Customer Service Impact, Customer Satisfaction.

## Introduction

Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that normally require human intelligence and discernment. It is a simulation of human intelligence in machines that think and act like humans. Artificial Intelligence is used in different

industries like finance, health care, etc. Hussain, M. A., & Sudha, D. V. (2024).

AI is also implemented in the banking sector that is implemented to detect fraud, solve customer queries, track customer behavior, and recommend personalized service to them. Artificial intelligence (AI) is one technology that will alter the banking industry; banks are becoming more

popular among customers. Mi Alnaser, F., Rahi, S., Alghizzawi, M., & Ngah, A. H. (2023).

Traditional banks have begun to offer more online services as well. Artificial intelligence helps them automate procedures, make better judgments, and handle customer support requests with fewer resources. Also helps with risk management by

detecting and combating fraud and money laundering in real time. Artificial intelligence can be applied in a variety of ways to improve the banking business. Banks can utilize AI to improve the customer experience by providing frictionless, 24/7 interactions.

Artificial Intelligence is typically described as the ability of a device to perform cognitive functions we companion with human minds, such as perceiving, reasoning, getting to know, interacting with the surroundings, hassle-solving, or even exercising creativity. However, Artificial Intelligence (AI) is truly a mixture of superior computational technologies in various tiers of maturity. Artificial intelligence is carried out in banking systems via algorithms with wonderful success in custom management services, Credit Information Services, Frequently Asked Questions (FAQ) services, Financial Assistance Services, and so forth.

To enhance client services, the patron doesn't need to go to a financial institution physically, he simply needs to visit the internet site, and the pre-defined Chatbot starts scraping the specified statistics. When the primary statistics are accumulated, the Chatbot starts thinking about the problems to check if meets the edibility standards and to recognize if must it retain to speak or prevent verbal exchange. If the hassle announcement is covered with the Chatbot

set of rules, then the Chatbot will continue and guide the customer in step with the written commands. But in another case, the Chatbot will manually the consumer to visit the nearby department bodily to get the trouble solved. Al-Araj, R., Haddad, H., Shehadeh, M., Hasan, E., & Nawaiseh, M. Y. (2022)

A Chatbot's advantage is that it will collect records from the statistics warehouse much faster than a human ever may want to, which leads to a lot higher performance. Performance is another vital factor of the statistics warehouse as it's far based totally on the right shape and top-notch query engines which can be completely optimized for studying and are helping various incremental changes in the records. Another vital function is usability as users might not be familiar with how to get information from source records, but with the analytical approach of the statistics warehouse, users can by way of remodeling, filtering, or reduce the data to discover the information they want.

## Review of literature and hypotheses development

This literature review discusses the impact of AI on customer satisfaction in the Indian banking sector. It begins by examining customer behavior and customer engagement in financial services, highlighting the role of traditional marketing and personalized services in fostering lasting relationships with customers. It then delves into the importance of trust and the human touch in banking services, emphasizing the need to balance tradition and innovation in the ever-evolving economic landscape. Shaikh, A. A., Kumar, A., Mishra, A., & Elahi, Y. A. (2024).

Customer satisfaction has become an important element in assessing organizational performance and is considered the baseline for the performance standard and a possible criterion of excellence for any business. Specifically, customer satisfaction can be evaluated in terms of interest, pleasure; empathy; surprise; trust; anger, readiness; and good choice, among others. This construct is crucial for the service sector because customer satisfaction has proven to be the key point in measuring service quality. Aguiar-costa, L. M., Cunha, C. A. X. C., Silva, W. K. M., & Abreu, N. R. (2022).

Hence, customer satisfaction is a critical factor in generating loyalty and future purchase behavior because customers satisfied with the service provider's service would increase future usage intentions. This is because the perceived quality of the service matches their expectations. Thus, there is evidence of a positive relationship between customer satisfaction and repurchase intention (Pham & Ahammad, 2017; Rita et al., 2019).

Artificial intelligence (AI) is a set of theories and algorithms that enables computers to perform tasks that typically require human intelligence (such as visual perception, voice recognition, or the interpretation of a text, taking its context into account) and that, in some cases, augments these abilities. Machine learning is a sub-field of AI that has recently been widely used. Al-Araj, R., Haddad, H., Shehadeh, M., Hasan, E., & Nawaiseh, M. Y. (2022).

AI implementation in banking can enhance personalized services, improve customer satisfaction, and promote digital financial inclusion, among other benefits. Studies indicate that banks are utilizing AI across various sectors, including data analytics and machine learning, to achieve significant efficiency gains, although

challenges in implementation remain. Buha, V., & Bjegović, M. (2023).

Mehdiabadi et al. (2022) suggested that the concept of banking 5.0 is based on the architecture of an industrial revolution generated by artificial intelligence. Moreover, Samartha et al. (2022) examined the impact of mobile banking applications and online transactions using the "Unified theory of acceptance and use of technology" (UTAUT) modified model based on a case study for India which is an emerging country.

Robo-advisory is a modern and rapidly developing area of implementing artificial intelligence to support customer decision-making. The current significance of robo-advisory to the financial sector is minor or marginal and boils down to formulating recommendations and implementing investment strategies. However, the ongoing digital transformation of the economy leads us to believe that shortly this technology will also be much more widely used with banking products. This makes it necessary for banks and other financial institutions to be prepared to offer this service to their customers. Piotrowski, D., & Orzeszko, W. (2023).

Pathak, N., & Singh, T. (2020). It reveals that AI enhances customer experience, credit assessment, and risk management, although its implementation is hindered by challenges including fraud risks. The research concludes that while AI is scalable, conventional banking practices remain prevalent due to security apprehensions. A notable limitation is the absence of empirical evidence.

Ramesh, W. (2020). This paper examines the economic advantages of democracy in Afghanistan and evaluates investment strategies such as SIPs. It concludes that democracy has not enhanced socio-economic

conditions, yet infrastructure development has spurred economic growth in specific areas of India. The study is exploratory, characterized by a limited framework and grammatical inaccuracies that hinder its clarity.

Thakur (2021): This paper examines the role of AI in Indian banking through systematic content analysis, emphasizing its capacity to improve efficiency and decision-making. Ameen, N., Tarhini, A., Reppel, A., & Anand, A. (2021). 114(September 2020) This study employs an online survey and PLS-SEM analysis to investigate AI-enabled customer experiences, revealing that trust and perceived sacrifice serve as mediators. The research is confined to a singular beauty brand's services, thus restricting its generalizability. Nevertheless, it offers valuable insights into the impact of AI on consumer experiences within customer-centric industries.

Barney et al. (2022): This study investigates the influence of AI on SMEs through survey data and structural equation modeling. AI enhances performance in finance, customer service, and internal processes, corroborating the Resource-Based View (RBV) theory. The study's limitations pertain to its geographic focus and insufficient qualitative research.

Shetty et al. (2022): This study examines AI's impact on personalized services and efficiency in India's private banking sector. It concludes that while AI offers a competitive advantage, empirical data is insufficient. Additionally, rapid technological advancements may render the findings obsolete.

**H1-CDL -> IAT** CDL (Customer Digital Literacy) has a positive impact and is also significant to IAT (Interaction with AI Technology)

**H2-CSI -> IAT** CSI (Customer Service Impact) has a positive impact and is also significant to IAT (Interaction with AI Technology)

**H3-CS -> IAT** CS (Customer Satisfaction) has a positive impact and is also significant to IAT (Interaction with AI Technology)

**H4- IAT -> IOB** IAT (Interaction with AI technology) has a positive impact and is also significant to IOB (Impact on Bank)

**H5- CDL -> IAT ->IOB** CDL has a positive impact on IAT (Interaction with AI Technology) and is also significant to IOB (Impact on Bank)

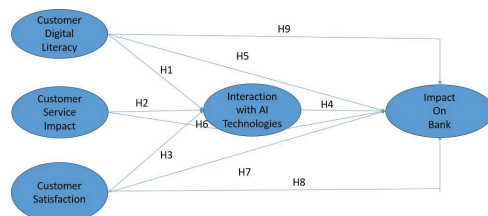
**H6- CS -> IAT -> IOB** CS (Customer Satisfaction) has a positive impact on IAT (Interaction with AI Technology) and is also significant to IOB (Impact on Bank)

**H7- CSI -> IAT ->IOB** CSI (Customer Service Impact) has a positive impact on IAT (Interaction with AI Technology) and is also significant to IOB (Impact on Bank)

**H8- CDL -> IOB** CDL (Customer Digital Literacy) has a positive impact and is also significant to IOB (Impact on Bank)

**H9- CSI -> IOB** Customer Service Impact) has a positive impact and is also significant to IOB (Impact on Bank)

**H10- CS -> IOB** CS (Customer Satisfaction) has a positive impact and is also significant to IOB (Impact on Bank)



**FIGURE 1:** Conceptual Model

## NEED FOR THE STUDY

The need for this study is whether the implementation of Artificial Intelligence in the banking sector has positively impacted the bank and the customer or the clients. AI impacted positively, then how it affected the bankers and the customers for their transactions. Chatbots solve the query of the customer immediately, they give details about the loan and what and all improvements are happening after the implementation of AI in banks. After the implementation of AI what and all problems happened to the customer and banks and what are the factors that positively improved the banking transactions?

## RESEARCH METHODOLOGY

A research approach was used to attain the project goal. To complete the project goal gathered information from the primary and secondary data. This is a descriptive study; it divided the large problem into smaller ones. More specific problems and stresses the discovery of fresh ideas and insights. Out of the 138-crore population in India, private bank customers and bankers, and based on that 385 samples were collected for the study.

Sample means the group of the population chosen for the study. Customers of Private Banks and the Bankers of Private Banking Sectors are included in the sample for the study. Sample Size

The Random sampling technique was adopted to select the respondents for the study purpose. The primary method was used to collect the data. There were two parts to the questionnaire Part A is

Demographic details and Part B will be Conceptual questions.

Sample Design Data presented with the help of pie charts, chi-square, correlation, and regression.

Primary data and secondary data were collected for this research. Questionnaires were used to collect primary data. There were both open-ended and closed-ended questions used in the questionnaire. Separate questionnaires were prepared for the customers and the bankers. Journals, magazines, internet websites, textbooks, and literature surveys are the secondary sources of data used for the completion of this project.

## Results & Discussions

To draw accurate conclusions, it is essential to examine the data collected from various respondents. Therefore, this has made efforts to evaluate and gather information using a questionnaire on the “Impact of Artificial Intelligence in the Banking Sector with a focus on Private Banks.” The data was collected first and then used to analyze percentages and create pie charts.

**Descriptive statistics** are used to summarize data in an organized manner by describing the relationship between variables in a sample or population. Calculating descriptive statistics represents a vital first step when conducting research and should always occur before making inferential statistical comparisons. Descriptive statistics include types of variables (nominal, ordinal, interval, and ratio) as well as measures of frequency, central tendency, dispersion/variation, and position. Since descriptive statistics condense data into a simpler summary, they enable healthcare decision-makers to assess specific populations in a

more manageable form. Pyzdek, T. (2021). Descriptive Statistics.

## Key Insights: -

All variables show a minimum value of 2 or higher, while the maximum is consistently 5 across all variables.

All variables have means above 3.9 on a 5-point scale, indicating a generally favorable trend across the metrics measured.

The results show a generally positive trend across all examined variables, with high mean scores and modest variability. However, the outliers or responders who are less involved or accept new ideas more slowly can require attention.

**TABLE 1** Descriptive Statistics

Descriptive Statistics								
	N Statistic	Range Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Error	Std. Deviation Statistic	Variance Statistic
CDL	402	2.25	2.75	5.00	4.2345	.03056	.61281	.376
IAT	402	3.20	1.80	5.00	3.9532	.04016	.80522	.648
CSI	402	3.00	2.00	5.00	4.0622	.03841	.77011	.593
CS	402	3.00	2.00	5.00	4.0229	.03889	.77984	.608
IOB	402	3.00	2.00	5.00	4.0763	.04008	.80366	.646
Valid N (listwise)	402							

## Collinearity Statistics (VIF)

Collinearity refers to the non-independence of predictor variables, usually in a regression-type analysis. It is a common feature of any descriptive ecological data set and can be a problem for parameter estimation because it inflates the variance of regression parameters and hence potentially leads to the wrong identification of relevant predictors in a statistical model. Collinearity is a severe problem when a model is trained on data from one region or time, and predicted to another with a different or unknown structure of collinearity. To demonstrate the reach of the problem of collinearity in ecology, we show how relationships among predictors differ between biomes, and change over spatial scales and through time. Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., Marquéz, J. R. G., Gruber, B.,

Lafourcade, B., Leitão, P. J., Münkemüller, T., McClean, C., Osborne, P. E., Reineking, B., Schröder, B., Skidmore, A. K., Zurell, D., & Lautenbach, S. (2013).

## Interpretation

The Variance Inflation Factor (VIF) values for the different variables indicate the level of multicollinearity among them. The VIF values range from 1.622 to 2.798, all well below the critical threshold of 5. This suggests that the independent variables in the model are not highly correlated, ensuring reliable and stable regression results.

**TABLE 2** Collinearity Statistics

Collinearity statistics (VIF)	VIF
CDL 2	1.622
CDL 3	1.928
CDL 4	1.636
CS 1	2.065

CS 2	1.732
CS 3	2.185
CS 4	2.117
CS 5	2.677
CSI 1	1.895
CSI 2	1.661
CSI 3	2.051
CSI 4	2.383
IAT 1	1.824
IAT 2	2.018
IAT 3	1.765
IAT 4	2.667
IAT 5	2.328
IOB 1	2.170
IOB 2	2.798
IOB 3	1.852

covariances and the actual observed sample covariances. Barrett, P. (2007).

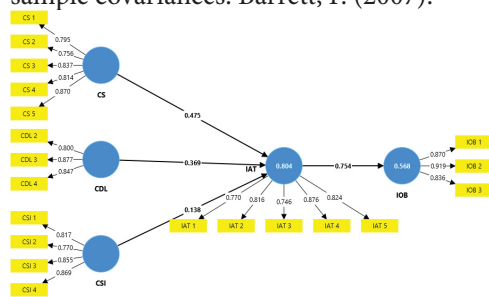


FIGURE 2 SEM Model

### Interpretation:-

CS, CDL, and CSI strongly influence IAT (interacting AI), but the largest influence comes from CS (0.475)

IAT is an intermediary latent variable linked strongly to the outcome IOB (0.754)

### Structural equation model fit (SEM Model):

Structural equation model (SEM) fit has recently become a confusing and contentious area of evaluative methodology. Proponents of two kinds of approaches to model fit can be identified: those who adhere strictly to the result from a null hypothesis significance test, and those who ignore this and instead index model fit as an approximation function. Both have principled reasons for their respective course of action. Barrett, P. (2007).

When modeling data using structural equation modeling (SEM), one or more models may be fit to the same covariance matrix. Statistically appraising the fit of a model to the covariance matrix is accomplished using a “goodness of fit” test referenced against the  $\chi^2$  distribution, which takes as its argument, the discrepancy between the model-implied population

### Bootstrapping Model

The bootstrap is a well-established early computer-age inferential method (Efron, 1979; Efron and Hastie, 2016; Efron and Tibshirani, 1994). The bootstrap is based on the idea that using only the data at hand can sometimes give better results than making unwarranted assumptions about the populations we’re trying to estimate. The core mechanism of the bootstrap is sampling with replacement from the data, which is a form of data-driven simulation. Thus, learning about the bootstrap is not only learning about an alternative to the standard parametric methods of statistical inference but is also a way to learn about simulations and to question our choices of methods. As we will see, bootstrap doesn’t provide a single alternative approach to classic problems such as group comparisons, but a large family of new approaches.

Having the bootstrap in your toolbox is like getting a powerful Swiss Army Knife, which offers great versatility—others have referred to the bootstrap as Meat Axe, Swan-Dive, Jack-Rabbit, and Shotgun (Efron, 1979). The bootstrap is a versatile technique that relies on data-driven simulations to make

statistical inferences. When combined with robust estimators, the bootstrap can afford much more powerful and flexible inferences than is possible with standard approaches such as T-tests on means. Rousselet, G., Pernet, C. R., & Wilcox, R. R. (2023).

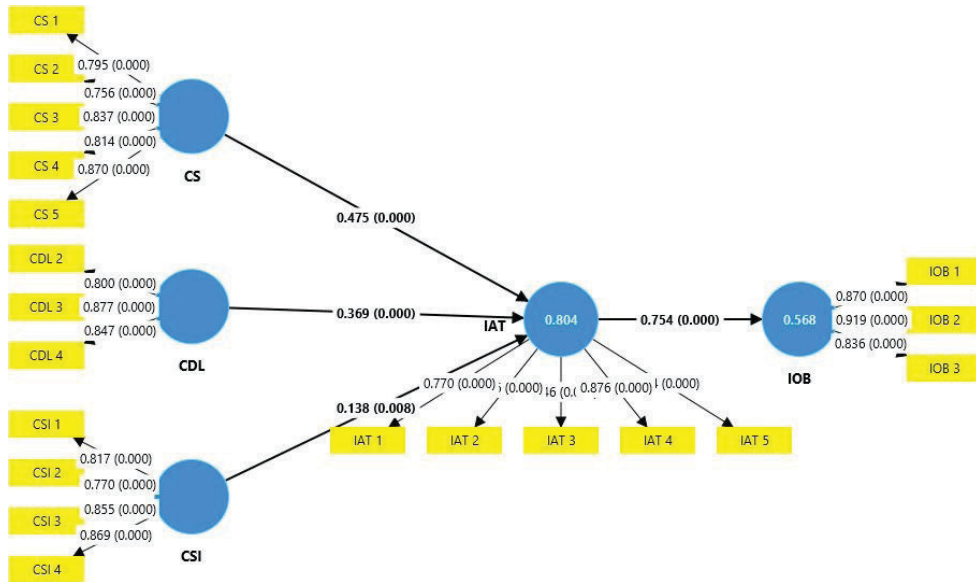


FIGURE 3 Bootstrapping Model

**Construct reliability and validity.**

When a number represents someone’s level of motivation, an aspect of their personality, or their mood at the moment, it is assumed that the number is meaningful: a person with a higher score is more motivated than a person with a lower score. The validity of that claim, just like the validity of any claim from any scientific study,

requires evidence. Construct validation is the process by which scientists generate evidence to support a claim that a score produced by an instrument holds a specific meaning (Cronbach & Meehl, 1955). If the numbers used in a study are not valid (e.g., the motivation scores do not reflect levels of motivation) then the conclusions of that study are also not valid.

**TABLE 3** Construct reliability and validity

Construct reliability and validity.	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CDL	0.794	0.805	0.879	0.708
CS	0.873	0.878	0.908	0.665
CSI	0.847	0.854	0.897	0.687
IAT	0.866	0.871	0.903	0.652
ROB	0.848	0.851	0.908	0.767

### Cronbach's Alpha:

All values are above 0.7, indicating good internal consistency and reliability

### Average Variance Extracted (AVE):

All AVE values are above 0.5, showing that the constructs explain sufficient variance in their observed variables, ensuring good convergent validity.

**TABLE 4** Direct Effect

Total effects	Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	Result	P values
CDL -> IAT	H1	0.369	0.367	0.032	11.426	Supported	0
CSI -> IAT	H2	0.138	0.142	0.052	2.641	Supported	0.008
CS -> IAT	H3	0.475	0.473	0.054	8.837	Supported	0
IAT -> IOB	H4	0.754	0.755	0.02	38.11	Supported	0
CDL -> IOB	H8	0.278	0.277	0.024	11.374	Supported	0
CSI -> IOB	H9	0.104	0.107	0.039	2.643	Supported	0.008

My study provides robust evidence that Customer Digital Literacy (CDL), Customer Satisfaction with AI (CSI), and Customer

Service (CS) significantly influence both the Intention to Adopt Technology (IAT) and the Intention to Use Overall Banking Services.

**TABLE 5** Indirect effect

(IOB). The Intention to Adopt Technology shows the strongest effect on the Intention to Use Overall Banking Services, indicating that banks should focus on improving customers' willingness and readiness to adopt digital technologies to drive broader service usage.

Specific indirect effects	Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	Result	P values
CDL -> IAT -> IOB	H5	0.278	0.277	0.024	11.374	Supported	0
CS -> IAT -> IOB	H6	0.358	0.357	0.043	8.374	Supported	0
CSI -> IAT -> IOB	H7	0.104	0.107	0.039	2.643	Supported	0.008

## Discriminant Validity

**TABLE 6**

Discriminant validity	CDL	CS	CSI	IAT	IOB
CS	0.840				
CSI	0.783	0.992			
IAT	0.946	0.976	0.910		
IOB	0.753	0.977	0.902	0.877	

Rönkkö, M., & Cho, E. (2022). Discriminant validity was originally presented as a set of empirical criteria that can be assessed from multitrait-multimethod (MTMM) matrices. Because datasets used by applied researchers rarely lend themselves to MTMM analysis, the need to assess discriminant validity in empirical research has led to the introduction of numerous techniques, some of which have been introduced in an ad hoc manner and without rigorous methodological support.

## Verification & Validation

### Interpretation

CDL, IAT, and IOB show good discriminant validity, as the square roots of their

AVE values are higher than their correlations with other constructs

CS, CSI, and IAT have potential discriminant validity issues, with some correlations (e.g., between CS and CSI) being higher than the AVE square roots, indicating overlap between these constructs

Thacker, B. H., Doebling, S. W., Hemez, F. M., Anderson, M. C., Pepin, J. E., & Rodriguez, E. a. (2004). Model verification and validation (VandV) is an enabling methodology for the development of computational models that can be used to make engineering predictions with quantified confidence. Model VandV procedures are needed by the government and industry to reduce the time, cost, and risk associated with full-scale testing of products, materials, and weapon systems. Quantifying the confidence and predictive accuracy of

model calculations provides the decision-maker with the information necessary for making high-consequence decisions.

**TABLE 7 Verification & Validation**

PLS predict LV summary	Q <sup>2</sup> predict	RMSE	MAE
IAT	0.799	0.451	0.307
IOB	0.649	0.595	0.449

## Findings

Customers have generally accepted AI-driven banking services, appreciating the speed, security, and personalization these tools offer.

AI positively influences customer satisfaction by improving the speed of transactions, enhancing personalized offers, and ensuring seamless digital interaction.

AI has a strong impact on operational efficiency. Banks have benefitted from AI in terms of cost savings, increased accuracy in fraud detection, and enhanced service personalization, leading to improved customer retention.

## Conclusions

AI has significantly improved customer experience and operational efficiency in the top 5 private banks, particularly in areas like fraud detection and personalized services

customer satisfaction has increased, but there remains a preference for human interaction in complex situations. Key challenges include the need for skilled manpower, integration with legacy systems, and data privacy concerns.

Enhancing customer digital literacy is crucial for successful AI adoption.

Balancing AI innovation with human support and addressing these challenges will be vital for sustained success.

AI is transforming the banking landscape, enabling modern banks to expand services and improve customer engagement through technology.

The study revealed that while AI implementation is costly, it significantly reduces workload and enhances customer satisfaction, particularly among younger demographics. The study's findings validate innovative financial processes, market share, and AI constructs, confirming their reliability and significance in the banking context.

The results indicate that innovative financial processes are crucial for enhancing market share, while AI's role remains underexplored in the Pakistani banking sector.

## Suggestions for future work

To make your results more generalizable, expand the scope of your data collection to cover a bigger variety of customer profiles or a wider range of institutions, including public sector banks.

Undertake a long-term investigation to track the development of the banking customer's AI experience. This will assist in capturing the long-term consequences of integrating AI.

Analyze the different AI deployment methodologies used by banks and compare their efficacy. This would give information about the best ways to use AI in customer care.

Examine the elements that influence consumer acceptance or opposition to AI in banking. Examining the psychological,

societal, and demographic elements affecting consumer acceptability may fall under this category.

Develop further on the link between client digital literacy and their experience with AI technology, presenting advice on how banks may improve customer education for improved service engagement.

## Limitations

Responses from customers may be biased depending on how experienced or unfamiliar they are with AI technology, which might result in an excessively favorable or unfavorable assessment of their experiences. This can distort the outcomes.

The long-term effects of AI on customer satisfaction could not have been taken into consideration by the study because customer expectations and AI capabilities change over time.

The methods in which various banks apply AI technology might imply that, depending on the complexity and implementation of these systems, the client experience can differ greatly. Findings can be difficult to generalize due to this diversity.

The results of the study could be fast out of date when new AI solutions for the banking sector arise because AI technology is developing so swiftly.

While the research concentrates on chatbots and customer support, it may miss other AI applications that can potentially have a big influence on the customer experience, such as fraud detection, tailored financial advice, or loan processing.

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