

# Role of Artificial Intelligence in Fraud Detection and Prevention in the Banking Sector in Tenkasi Taluk

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## 1. Abstract

*Artificial Intelligence (AI) has emerged as a transformative technology in the banking sector, particularly in enhancing fraud detection and prevention mechanisms. With the rapid growth of digital banking and online transactions, the risk of financial fraud has significantly increased, necessitating advanced technological solutions. This study focuses on the role of AI in detecting and preventing fraudulent activities in the banking sector in Tenkasi Taluk. The research examines how AI-based tools such as machine learning algorithms, predictive analytics, and automated monitoring systems help banks identify suspicious transactions in real time. It also analyzes customer awareness, perception, and trust towards AI-enabled fraud prevention systems. Primary data is collected through a structured questionnaire, and statistical tools such as mean and standard deviation are used for analysis. The findings of the study are expected to highlight the effectiveness of AI in minimizing fraud risks, improving transaction security, and enhancing customer confidence in digital banking services. The study concludes by suggesting that banks should invest more in AI technologies to strengthen their fraud detection systems and ensure safer financial transactions.*

**Keywords:** *Artificial Intelligence (AI), Fraud Detection, Banking Sector, Cyber security, Online Payment Systems, Financial Literacy Initiatives*

## 2. Introduction

Emerging Financial Scams in the Banking Sector Indian media reports highlight that cybercriminal increasingly target users of UPI platforms, mobile banking applications, and digital wallets, particularly first-time users and senior citizens. The ease of real-time fund transfers and widespread smartphone usage have further intensified exposure to digital fraud.

Phishing and Spoofing Attacks- Phishing and spoofing attacks continue to dominate digital banking fraud cases, with fraudsters using fake emails, SMS alerts, and spoofed caller IDs to impersonate banks. Such deceptive practices have significantly reduced users' ability to distinguish between genuine and fraudulent. OTP and UPI Frauds- OTP- and UPI-based frauds have increased sharply due to the real-time nature of instant payment systems. Several cases reported in the financial press indicate that users are often tricked into sharing OTPs or approving fraudulent collect requests, leading to immediate financial losses. Fake Banking Applications and Identity Theft- Cybercriminals have also developed counterfeit banking applications resembling official apps, resulting in identity theft and unauthorized transactions. Such incidents have been widely reported in the mainstream press, highlighting serious data security concerns. Social Engineering–Based Frauds-Social engineering–based frauds exploit emotional triggers such as fear, urgency, or trust. Fake customer-care calls and investment scams relying on psychological manipulation have been frequently reported in the Indian press. Role of Artificial Intelligence in Fraud Detection and Prevention Indian banks and fin-tech firms are increasingly deploying AI-driven fraud detection systems to counter the rising sophistication of cybercrime. Media reports indicate growing investment in machine learning, behavioral analytics, and real-time transaction monitoring to enhance fraud prevention capabilities. Machine learning algorithms analyze large volumes of transaction data to detect abnormal behavior, while Natural Language Processing (NLP) is used to identify phishing emails and scam messages by analyzing deceptive language patterns Real-Time Transaction Monitoring- AI-powered systems enable real-time monitoring of millions of transactions simultaneously. Suspicious transactions can be blocked or flagged instantly, preventing financial losses before they occur.

### 3. Review of Literature

Recent studies have highlighted the significant role of Artificial Intelligence (AI) in enhancing fraud detection and prevention in the banking sector. Yang, Shukur, and Sahran (2026) conducted a comprehensive review of AI techniques used in financial fraud detection and found that advanced methods such as deep learning, graph-based models, and hybrid approaches have greatly improved the accuracy of fraud identification. However, the study also pointed out challenges such as data imbalance and lack of interpretability in AI models, suggesting the need for more transparent and efficient systems.

Similarly, Yanto, Lisah, and Tandra (2024) examined various machine learning models to determine their effectiveness in detecting banking fraud. Their findings revealed that models like Random Forest, XGBoost, and hybrid techniques achieved high levels of accuracy, sometimes exceeding 98%. The study emphasized the importance of integrating real-time data and developing hybrid models for better fraud detection performance.

Faisal et al. (2024) focused on the role of AI in real-time fraud detection and prevention. The study concluded that AI significantly enhances detection speed, reduces false positives, and improves operational efficiency in banking systems. It also recommended the adoption of scalable AI frameworks and the integration of emerging technologies such as blockchain and federated learning to strengthen fraud prevention mechanisms.

Shen (2025) analyzed the application of AI and machine learning in modern banking systems and found that AI enables real-time monitoring, predictive analytics, and improved risk management. The study suggested that financial institutions should invest more in AI-driven technologies and continuously upgrade their fraud detection systems to keep pace with evolving cyber threats.

Alvarado Zabala, Martillo Alchundia, and Guzman Seraquive (2022) reviewed various machine learning techniques used in bank fraud detection, including Support Vector Machines, decision trees, and neural networks. The study highlighted that these techniques are effective in identifying fraudulent patterns but recommended combining supervised and unsupervised learning methods for improved performance.

#### **4. Objectives of the Study**

- To examine the role of Artificial Intelligence in fraud detection and prevention in the banking sector in Tenkasi Taluk.
- To analyze the effectiveness of AI in identifying and preventing fraudulent banking transactions.
- To study customer awareness of AI-based fraud detection systems in banking.
- To evaluate customer perception and trust towards AI-enabled banking security.

## 5. Research Methodology

This study adopts descriptive research design.

### 5.1 Sampling Technique

Convenience sampling was used to select 94 respondents from bank operating customers in Tenkasi taluk.

### 5.2 Data Sources

Primary Data: Structured questionnaire featuring Likert-scale items.

Secondary Data: Academic journals, books, RBI publications, and online databases.

### 5.3 Tools for Analysis

Percentage analysis

Weighted score analysis

Mean score analysis

Chi-Square Test

### 5.4 Hypothesis

H<sub>0</sub>: There is no significant association between demographic variables and opinion on AI in fraud detection.

H<sub>1</sub>: There is a significant association between demographic variables and opinion on AI in fraud detection.

## 6. Statistical Results

### 6.1 Percentage Analysis

**Table 1** Age Group of Respondents

S. No.	Age Group	No. of Respondents	Percentage (%)
1	Below 20 years	12	12.77
2	21–30 years	36	38.30
3	31–40 years	22	23.40
4	41-50 Years	14	14.89
5	Above 50 years	10	10.64
<b>Total</b>		<b>94</b>	<b>100</b>

**Source: Primary Data**

A total of 94 customers participated in the study. The majority 38.30% of the respondents fall in the age group of 21–30 years, indicating that young adults form the largest segment of the study. 23.40% of the respondents fall in the age group of 31–40 years, 14.89% of the respondents fall in the age group of 41–50 years, 12.77% of the respondents fall in the age group of below 20 years and 10.64% of the respondents fall in the age group of above 50 years.

**Table 2 Gender Distribution of Respondents**

S. No.	Gender	No. of Respondents	Percentage (%)
1	Male	52	55.32
2	Female	42	44.68
<b>Total</b>		<b>94</b>	<b>100</b>

**Source: Primary Data**

The above table presents the gender-wise distribution of the respondents. Among the 94 respondents, 55.32% of the respondents are male, while 44.68% of the respondents are female. This indicates that the majority of the respondents are male.

**Table 3 Educational Qualification of Respondents**

S. No.	Qualification	No. of Respondents	Percentage (%)
1	School Level	18	19.15
2	Graduate	34	36.17
3	Postgraduate	26	27.66
4	Professional	16	17.02
<b>Total</b>		<b>94</b>	<b>100</b>

**Source: Primary Data**

A total of 94 customers participated in the study. The majority 36.17% of the respondents have completed undergraduate (UG) education. 27.66% of the respondents have completed postgraduate (PG) education, 19.15% of the respondents have completed School-level education, and 17.02% of the respondents have completed professional qualifications.

**Table 4 Occupation of Respondents**

S. No.	Occupation	No. of Respondents	Percentage (%)
1	Student	30	31.91
2	Employees	28	29.79
3	Business	20	21.28
4	Professional	16	17.02
<b>Total</b>		<b>94</b>	<b>100</b>

**Source: Primary Data**

A total of 94 customers participated in the study. The majority 31.91% of the respondents are students, 29.79 % of the respondents are Employees 21.28% of the respondents are engaged in business activities, and 17.02% of the respondents are Professionals constitute.

**Table 5 Income Level of Respondents**

S. No.	Income Level	No. of Respondents	Percentage (%)
1	Below Rs. 25,000	28	29.79
2	Rs. 25,001 – Rs. 50,000	32	34.04
3	Rs. 50,001 – Rs. 75,000	20	21.28
4	Above Rs. 75,000	14	14.89
<b>Total</b>		<b>94</b>	<b>100</b>

**Source: Primary Data**

A total of 94 customers participated in the study. The majority 34.04% of the respondents fall within the income group of Rs. 25,001 – Rs. 50,000, 29.79% of the respondents fall within the income group of below Rs. 25,000, 21.28% of the respondents fall within the income group of Rs. 50,001 – Rs. 75,000, 14.89% of the respondents fall within the income group of above Rs. 75,000.

**Table 6 Type of Bank Account**

S. No.	Type of Bank Account	No. of Respondents	Percentage (%)
1	Public Sector Bank	30	31.91
2	Private Sector Bank	24	25.53
3	Both	40	42.56
<b>Total</b>		<b>94</b>	<b>100</b>

**Source: Primary Data**

The study included a total of 94 respondents with different types of bank accounts. 42.56 % maintained accounts in public and private sector banks, 31.91% held accounts in public sector banks, making it the most common type and 25.53% had accounts in private sector banks, showing significant usage of private banking services.

## 6.2 Weighted score analysis

**Table 7 Role of AI in Fraud Detection & Prevention**

S. No.	Role of AI in Fraud Detection & Prevention	1	2	3	4	5	Total Score	WAS
1	AI plays a crucial role in detecting banking fraud.	4	6	10	40	34	376	4.00
2	AI helps prevent fraudulent transactions effectively.	3	5	12	38	36	381	4.05
3	AI systems continuously monitor banking activities.	2	6	14	42	30	374	3.98
4	AI improves the overall security of banking operations.	3	4	11	44	32	380	4.04
5	AI reduces dependency on manual fraud detection methods.	5	7	15	39	28	360	3.83

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree, WAS- Weighted Average Score)

**Source: Primary Data**

The above table presents the weighted score analysis of respondents' opinions on the role of Artificial Intelligence in fraud detection and prevention in the banking sector. Has the highest mean score of 4.05, AI helps prevent fraudulent transactions effectively indicating that respondents strongly believe in the effectiveness of AI in preventing fraud. followed by 4.04 mean score at AI improves the overall security of banking operations, 4.00 mean score AI plays a crucial role in detecting banking fraud, 3.98 mean score AI systems continuously monitor banking activities but still reflects positive perception. The lowest mean score 3.83 is for AI reduces dependency on manual fraud detection methods indicating that while respondents agree, some still believe human involvement is necessary

**Table 8 Effectiveness of AI in Fraud Detection**

S. No.	Effectiveness of AI in Fraud Detection	1	2	3	4	5	Total Score	WAS
1	AI detects fraud faster than traditional systems.	3	5	12	40	34	379	4.03
2	AI improves accuracy in identifying fraudulent transactions.	2	4	10	42	36	388	4.13
3	AI reduces false fraud alerts in banking	4	6	15	38	31	368	3.91
4	AI enhances real-time fraud detection capabilities.	2	5	11	43	33	382	4.06
5	AI systems effectively analyze large volumes of transaction data.	3	4	9	41	37	387	4.12

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree, WAS- Weighted Average Score)

**Source: Primary Data**

The above table presents the weighted score analysis of respondents' opinions regarding the effectiveness of Artificial Intelligence in fraud detection. Has the highest mean score 4.13 AI improves accuracy in identifying fraudulent transactions showing that respondents strongly agree that AI enhances accuracy in fraud detection. This is closely

followed by 4.12 AI systems effectively analyze large volumes of transaction data, 4.06 AI enhances real-time fraud detection capabilities indicating confidence in AI's ability to process data and provide timely detection. 4.03 AI detects fraud faster than traditional systems and 3.91 AI reduces false fraud alerts in banking.

### 6.3 Mean score analysis

**Table 9 Customer Awareness of AI Systems**

S. No.	Awareness	1	2	3	4	5	Total Score	Mean Score
1	I am aware of AI-based fraud detection systems in banks.	4	6	14	38	32	370	3.94
2	Banks provide adequate information about AI security features.	6	8	18	36	26	350	3.72
3	I understand how AI helps prevent banking fraud.	5	7	16	37	29	360	3.83
4	I have noticed AI-based alerts (SMS/email) from my bank.	3	5	12	40	34	379	4.03
5	Awareness programs about AI banking services are sufficient.	7	9	20	34	24	341	3.63

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

#### Score: Primary Data

The above table shows the mean score analysis of respondents' awareness regarding AI-based fraud detection systems in banking. Has the highest mean score 4.03 I have noticed AI-based alerts (SMS/email) from my bank showing that most respondents are familiar with AI-generated alerts and notifications. This is followed by 3.94 score I am aware of AI-based fraud detection systems in banks, 3.83 score I understand how AI helps prevent banking fraud, 3.72 score Banks provide adequate information about AI security features and 3.63 Awareness programs about AI banking services are sufficient have comparatively lower mean scores. This suggests that respondents feel banks are not providing enough information and awareness programs regarding AI security.

**Table 10 Customer Perception & Trust**

S. No.	Customer Perception & Trust	1	2	3	4	5	Total Score	Mean Score
1	I trust AI systems in ensuring banking security.	3	6	15	40	30	370	3.94
2	AI makes banking transactions safer.	2	5	12	42	33	381	4.05
3	I feel confident using AI-enabled banking services.	3	7	14	39	31	370	3.94
4	AI increases my trust in digital banking.	2	6	13	41	32	377	4.01
5	AI reduces my fear of financial fraud.	4	8	16	38	28	360	3.83

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

### Score: Primary Data

The above table presents the mean score analysis of customer perception and trust towards Artificial Intelligence in banking. Has the highest mean score 4.05 AI makes banking transactions safer showing that respondents strongly believe that AI enhances transaction safety. Followed by 4.01 AI increases my trust in digital banking also reflects a high level of confidence in AI technologies, 3.94 score I trust AI systems in ensuring banking security and I feel confident using AI-enabled banking services indicating a good level of trust and confidence among respondents and has the lowest mean score 3.83 score AI reduces my fear of financial fraud.

### 6.4 Chi-Square Test

**Table 11 Consolidated Chi-Square Results**

S. No.	Demographic Variable	$\chi^2$ Calculated Value	Degree of Freedom	Table Value (5%)	Result
1	Gender	0.72	2	5.991	Not Significant

2	Age	3.85	8	15.507	Not Significant
3	Education	4.12	6	12.592	Not Significant
4	Occupation	5.06	6	12.592	Not Significant
5	Monthly Income	6.21	6	12.592	Not Significant
6	Type of Bank Used	2.94	4	9.488	Not Significant

From the above table, it is clear that for all demographic variables, the calculated Chi-square values are less than the table values at the 5% level of significance. Therefore, the null hypothesis ( $H_0$ ) is accepted for all variables.

This indicates that respondents across different demographic backgrounds share similar perceptions and positive attitudes towards AI in banking security. The acceptance and awareness of AI technologies in fraud detection appear to be widespread and not influenced by demographic differences.

## 7. Findings

- The majority 38.30% of the respondents fall in the age group of 21–30 years.
- The majority 55.32% of the respondents are male
- The majority 36.17% of the respondents have completed undergraduate (UG) education.
- The majority 31.91% of the respondents are students,
- The majority 34.04% of the respondents fall within the income group of Rs. 25,001 – Rs. 50,000,
- The majority 42.56 % maintained accounts in public and private sector banks,
- The highest mean score of 4.05, AI helps prevent fraudulent transactions effectively indicating that respondents strongly believe in the effectiveness of AI in preventing fraud.

- The highest mean score 4.13 AI improves accuracy in identifying fraudulent transactions showing that respondents strongly agree that AI enhances accuracy in fraud detection.
- The highest mean score 4.03 i have noticed AI-based alerts (SMS/email) from my bank showing that most respondents are familiar with AI-generated alerts and notifications.
- The highest mean score 4.05 AI makes banking transactions safer showing that respondents strongly believe that AI enhances transaction safety.
- The calculated Chi-square values are less than the table values at the 5% level of significance. Therefore, the null hypothesis ( $H_0$ ) is accepted for all variables.

## 8. Suggestions

- Banks should enhance awareness programs about AI-based fraud detection systems, as some respondents indicated limited understanding of AI security features.
- Financial institutions should provide clear and transparent information regarding how AI works in fraud detection to build greater customer trust.
- Since respondents strongly believe that AI improves fraud detection accuracy, banks should invest more in advanced AI technologies to further strengthen security systems.
- Banks should focus on reducing false alerts, as this area received comparatively lower agreement among respondents.
- Special efforts should be taken to educate customers from different demographic backgrounds, even though the study shows no significant difference, to ensure inclusive awareness.
- Banks should improve real-time monitoring systems and continuously upgrade AI models to handle emerging fraud patterns.
- Training programs should be conducted for bank staff to ensure effective implementation and management of AI systems.
- Collaboration with technology experts and regulatory bodies can help in developing secure and standardized AI frameworks in the banking sector.

## 9. Conclusion

The study concludes that Artificial Intelligence plays a significant role in fraud detection and prevention in the banking sector. The majority of respondents, particularly from the younger age group, show a high level of acceptance and awareness of AI-based banking services. The findings reveal that respondents strongly agree that AI helps prevent fraudulent transactions, improves accuracy, enhances transaction safety, and provides timely alerts.

The mean score analysis clearly indicates a positive perception and trust towards AI technologies, especially in terms of improving security and efficiency in banking operations. Furthermore, the Chi-square test results show that there is no significant association between demographic variables and respondents' opinions, implying that acceptance of AI is consistent across different groups.

AI has emerged as a powerful and reliable tool in combating banking fraud. However, to maximize its effectiveness, banks must focus on increasing awareness, improving transparency, and continuously upgrading their AI systems. With proper implementation, AI can significantly enhance the security, reliability, and efficiency of the banking sector.

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