# Impact of AI-Enabled Digital Banking Services on Customer Satisfaction and Loyalty

*1 **Dr Mohan Krishna** Assistant professor, klbs, KLEF,

irrinki_mk@kluniversity.in

*2 **Ms. B Dikshita**, research scholar, klbs, department of KLEF,

dikshitabellana@gmail.com

## 1.Abstract

With the growing adoption of artificial intelligence (AI) in the financial sector, including the use of chatbots, customised recommendations, fraud detection, and automated financial advice, it is essential to align these AI-driven tools with the specific context of India to assess their impact on customer satisfaction and loyalty.As banks increasingly turn to AI for services such as chatbots, personalised recommendations, fraud detection, and automated financial advice, it is crucial to evaluate how these tools relate to Indian customer satisfaction and loyalty. This study explores four AI-powered digital banking services and their impact on customer satisfaction and loyalty, as well as verifying whether the satisfaction serves as a mediator between AI services and loyalty. A structured questionnaire with a five-point Likert scale was used to gather primary data from 132 bank customers, which were analysed using Cronbach's alpha, test of association (chi-square), one-way ANOVA, Pearson correlation, multiple linear regression and simple linear regression and bootstrapped mediation analysis. Chi-square results show that the level of perceived AI service quality is significantly associated with satisfaction ($\chi^2 = 62.20$, df = 4, $p < .001$, V = .49) and loyalty ($\chi^2 = 68.22$, df = 4, $p < .001$, V = .51). ANOVA indicates that there were significant differences between bank type, age group and gender for satisfaction. The four AI services together accounted for 47.2% of variance in satisfaction ($R^2 = .472$, $p < .001$), with AI financial advice ($\beta = .59$) and AI chatbots ($\beta = .32$) as significant predictors, while personalisation and fraud detection did not prove to be significant predictors after controlling for the other AI services. Satisfaction is a strong predictor of loyalty ($\beta = .66$, $R^2 = .438$), and serves as a partial mediator between AI and loyalty (indirect effect = .223, 95% bootstrap CI [.098, .499] accounting for approximately 41% of the total effect). The results indicate that banks should focus on incorporating conversational and advisory AI capabilities and actively working on satisfaction. Data quality issues such as student sampling and high percentage of similar response patterns are discussed.

## 2.Introduction

Digital transformation has transformed how consumers are accessing service, opening accounts, transferring funds, getting help, and dealing with their finances. The branch is no longer the sole access point as a result of the mobile app, internet banking and payment platforms. The latest generation of this transformation is represented by the inclusion of AI within bank services for direct use by consumers: chatbots that can respond to inquiries at any hour, customised offerings and product recommendations, algorithms that track transactions for fraud alerts and automated financial advice.

The two promises of these technologies to banks are the following. First, they can reduce the cost of the services and response time. Second – and more important for long-term competitiveness – they can enhance the customer experience in ways that increase their satisfaction and, by increasing their satisfaction, their loyalty, as demonstrated by their willingness to recommend, their unwillingness to switch and their continued use. Customer loyalty is commercially valuable as acquisition is more expensive than retention and loyal customers are more likely to use more of a product.

The advantages of AI are not self-evident, though. Chatbots can be ineffective, personalisation can be too much or too generic, customers may not trust the automated advice or assume that they are being protected from fraud. The

satisfaction and loyalty that AI powered services bring is therefore an empirical conclusion and an issue which has not been explored as much as the broader adoption of digital banking in India.

This paper attempts to answer that question. It measures customers' perceptions of four AI-enabled services (chatbots, personalisation, fraud detection and financial advice), satisfaction with digital banking and customer loyalty towards their bank, and tests a set of hypotheses via chi-square, ANOVA, regression and mediation analysis.

**3.Review of Literature**

**Lolemo & Pandya (2024)**The research revealed that digital banking enhances customer satisfaction and customer loyalty. It was largely based on previous studies, however, and had no country-specific empirical evidence. The technology of banking services was not formally explored. Hence, there is a need for more research within Indian bankers customers.

**Nischitha & Rashmi (2025)**The aspects of convenience, security, service quality, personalization and trust were analysed. It, however, paid scant regard to the use of AI in banking services and public sector banks in India. There was a lack of a direct correlation between customer satisfaction and customer loyalty with emerging technologies. There is a need to conduct more in-depth studies in Indian banking.

**Saleem & Rashid (2011)**Security, reliability, innovation and trust were the factors influencing satisfaction identified in the study. It, however, was limited to the adoption of mobile banking in the country of Pakistan. The modern banking technologies which used Artificial Intelligence were not taken into account. Further research is needed in India.

**Musiime & Ramadhan (2011)**The study concluded that there was a positive correlation between internet banking and customer satisfaction. But it was carried out in Uganda and did not take into account AI or modern mobile banking services. The results may not be representative of banking practice today. More studies are required in the Indian customers.

**Mbama (2018)**The study revealed that digital banking is beneficial for the customer experience, customer loyalty, and financial performance. It did not, however, specifically look at AI-powered services, but just the UK banking sector. The results of its findings need to be replicated in India. More studies need to be conducted to investigate how AI affects satisfaction and loyalty**.**

**Shahani et al. (2025)**The study concluded that security has an impact on customer satisfaction of e-banking customers. However, it was restricted to Pakistani customers, and considered only a few explanatory factors. There is a lack of in-depth analysis of the potential of AI-driven personalisation and intelligent customer support. There is a need for further studies on the banking customers in India.

**Dharsono & Arifin (2023)**The study revealed a positive relationship between customer experience and satisfaction and financial performance. However, it examined customer loyalty or customer trust was not sufficiently explored by focusing on Indonesia. Economic services using AI were not taken into account. Further research should be conducted on satisfaction and loyalty in India.

**Sihotang et al. (2025)**The study highlighted the role of digital banking and fintech in improving financial inclusion. But it was not about customer satisfaction and customer loyalty, it was about access to financial services. Banking services were not looked at specifically with AI. There is need for further research in India.

**Rhanoui (2022).** Amongst the factors identified in the study are trust and satisfaction, which have an impact on fintech adoption. It was, however, limited to one country and lacked a good focus on customer loyalty. The subject of banking services using AI was not addressed to any particular extent. There is a need for further research in Indian banking customers.

**Kurniawan et al. (2025).** This study explored digital banking's effects on millennials' financial behaviour. However, it was based on secondary empirical research. It was also centered on millennials as an audience, not around a variety of customer groups. There is a need for further research on AI-based banking and satisfaction and loyalty in India.

**4.Problem statement**

Digital banking has revolutionized customer interactions with their financial institutions. While AI services are becoming more common in banking to enhance the customer experience, their impact on customer satisfaction and loyalty remains largely unexplored, especially in the Indian context. While existing research has focused on traditional digital services, on a single country or on a single channel, very few studies have analysed multiple AI-enabled services in combination and whether satisfaction is correlated with AI services and loyalty. The influence of AI-based Digital Banking Services on customer satisfaction and loyalty, and the role of satisfaction on loyalty, is explored given that customers may have different perceptions of the value of the AI services depending on their perceived usefulness, security, personalisation and convenience.

**5.Research questions**

•RQ1. What impact do AI in digital banking services (AI chatbots, personalisation, fraud detection, financial advice) have on customer satisfaction?

•RQ2. How is the relationship between customer satisfaction and customer loyalty in the context of the banks?

•RQ3. Are digital banking services with AI actually helping to drive customer loyalty?

•RQ4. Does customer satisfaction have a mediating effect between Customer satisfaction and customer loyalty?

**6.Research objectives**

•To grasp the impact of AI chatbots, personalisation, fraud prevention and financial guidance on customer satisfaction.

•To analyze the relationship between customer satisfaction and customer loyalty towards the bank.

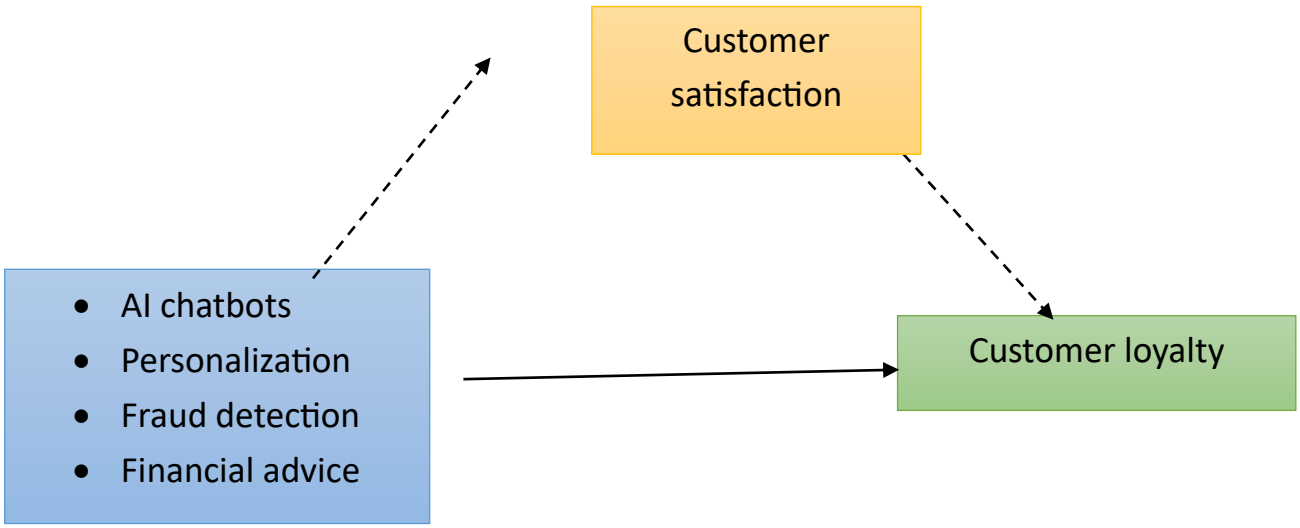
To determine if there is a direct correlation between AI-powered banking services and customer loyalty.

To investigate the mediating role of customer satisfaction between AI powered banking services and customer loyalty.

To determine which AI-powered financial tool will most impact customer satisfaction and loyalty.

**7.Conceptual framework**

The framework treats the four AI-enabled services as independent variables, customer satisfaction as the mediating variable and customer loyalty as the dependent variable (Figure 1).




**8.Hypotheses**

**$H_{01}$:** AI-enabled banking services do not have a significant effect on customer satisfaction.

**$H_1$:** AI-enabled banking services have a significant effect on customer satisfaction.

**$H_{02}$:** Customer satisfaction does not have a significant effect on customer loyalty.

**$H_{12}$:** Customer satisfaction has a significant positive effect on customer loyalty, as satisfied customers are more likely to continue using banking services.

**$H_{03}$:** AI-enabled banking services do not have a significant direct effect on customer loyalty.

**$H_{13}$:** AI-enabled banking services have a significant direct effect on customer loyalty.

**$H_{04}$:** Customer satisfaction does not significantly mediate the relationship between AI-enabled banking services and customer loyalty.

**$H_{14}$:** Customer satisfaction significantly mediates the relationship between AI-enabled banking services and customer loyalty.

These hypotheses aim to understand whether AI-enabled banking services improve customer satisfaction, whether satisfied customers are more likely to remain loyal to their banks, and whether customer satisfaction acts as a link between AI-enabled banking services and customer loyalty.

**9.Research Methodology**

**Data collection and research design**.

The type of the study is quantitative, cross sectional, and survey approach with secondary literature. The primary data were gathered by using a structured, self-administered online questionnaire from 2 to 12 September 2026. The questionnaire comprised of five demographic questions (age group, gender, educational qualification, occupational status, main bank type) followed by 25 questions rated on a 5 point Likert scale ranging from 1 (strongly disagree/not at all) to 5 (strongly agree/to a very great extent). Before administering the instrument it was checked for clarity and content validity.

132 complete responses were obtained and analysed. There were no missing values.

Pre-submission check: The earlier draft stated that it was a stratified random sampling of employees and managers of AI enabled IT companies in Andhra Pradesh with 200 distributed and 133 retained samples. The uploaded dataset has 132 responses of which 88.6% are students and includes customers of public, private and foreign banks. The description above is read from the data set. Please match the description of the sampling to the way the sampling was done.

**Variables and measurement**

**Table 2. Constructs and questionnaire items**

| Construct | Items | Description |
|---|---|---|
| AI chatbots (CHAT) | Q6 | Quick and useful chatbot responses |
| AI personalization (PERS) | Q7 | Personalized services meet banking needs |
| AI fraud detection (FRAUD) | Q8 | Fraud detection creates a feeling of security |
| AI financial advice (ADV) | Q9 | Advice helps better financial decisions |
| AI services composite (AI) | Q6–Q9 | Mean of the four AI service items |
| Customer satisfaction (SAT) | Q10–Q12 | Overall satisfaction with AI banking, satisfaction with and expectations met by digital services |
| Customer loyalty (LOY) | Q13–Q15 | Intention to continue, willingness to recommend, preference to remain a customer |
| Supplementary items | Q16–Q30 | AI-to-loyalty links (Q16–20), satisfaction-to-loyalty links (Q21–25) and perceived influence of each AI service (Q26–30); reported in Appendix A and used for reliability checks |

**Reliability**

**Table 3. Reliability analysis (Cronbach's alpha)**

| Scale | Items | Cronbach's α | Interpretation |
|---|---|---|---|
| AI services (Q6-9) | 4 | 0.837 | Good |
| Satisfaction (Q10-12) | 3 | 0.585 | Weak / questionable |
| Loyalty (Q13-15) | 3 | 0.809 | Good |
| AI-loyalty (Q16-20) | 5 | 0.951 | Excellent |
| Satisfaction-loyalty (Q21-25) | 5 | 0.893 | Good |

| Scale | Items | Cronbach's α | Interpretation |
|---|---|---|---|
| Influence (Q26-30) | 5 | 0.918 | Excellent |
| All 25 items | 25 | 0.968 | Excellent |

The convention of .70 is satisfied by all scales except customer satisfaction (Q10–Q12). The alpha for the three item satisfaction scale is weak (.585), as the first item is specific to AI-enabled services, while the other two are general in regard to digital banking. Therefore, caution needs to be applied to the results of the satisfaction composite.

**Statistical tools**

The sample and the constructs were summarised using descriptive statistics in Python (SciPy, statsmodels, pingouin) which are identical in SPSS and/or in Excel, and equivalent SPSS syntax is provided in Appendix B. Associations between categorical variables were explored using chi-square tests of independence. The composite scores were categorized into three groups (low: mean ≤ 2.5; moderate: 2.5 < mean ≤ 3.5; high: mean > 3.5) and categories for sparse variables were merged as appropriate (business/self employed and government employees; foreign and other banks; post-graduate and professional qualifications). For many cells, expected cell counts were less than 5, so Monte Carlo permutation p-values (5,000 permutations) are also reported. The Kruskal–Wallis test was used as a non-parametric test of the means of satisfaction, loyalty and AI-service by demographic groups, followed by one-way ANOVA with Tukey HSD post hoc tests. H1 – H3 were tested with multiple and simple linear regression. The Baron and Kenny steps, a Sobel test and a percentile bootstrap (5,000 resamples) were tested for mediation. The significance level used was 5%.

**10.Data analysis and results**

**Respondent profile**

**Table 4. Demographic profile of respondents (N = 132)**

| Variable | Category | Frequency | % |
|---|---|---|---|
| Age | Below 18 | 10 | 7.6 |
| | 18–25 | 112 | 84.8 |
| | 26–35 | 10 | 7.6 |
| Gender | Female | 84 | 63.6 |
| | Male | 43 | 32.6 |
| | Prefer not to say | 5 | 3.8 |
| Education | Higher Secondary | 14 | 10.6 |
| | Undergraduate | 108 | 81.8 |
| | Postgraduate | 5 | 3.8 |
| | Professional Qualification | 5 | 3.8 |

| Variable | Category | Frequency | % |
|---|---|---|---|
| Occupation | Student | 117 | 88.6 |
| | Business/Self-employed | 10 | 7.6 |
| | Government Employee | 5 | 3.8 |
| Main bank | Public Sector Bank | 68 | 51.5 |
| | Private Sector Bank | 55 | 41.7 |
| | Foreign Bank | 5 | 3.8 |
| | Other | 4 | 3.0 |

There is an overwhelming age bias as 84.8% of the sample is aged 18-25, 88.6% are students and 81.8% are undergraduates. 63.6% of those who responded are women. Twenty-three percent of respondents said that their main bank is a public sector bank while 41.7% indicated that it is a private sector bank.

**Descriptive statistics**

**Table 5. Descriptive statistics of the study constructs**

| Construct | Mean | SD | Level |
|---|---|---|---|
| AI chatbots | 3.37 | 0.84 | Moderate |
| AI personalisation | 3.23 | 0.89 | Moderate |
| AI fraud detection | 3.60 | 1.00 | High |
| AI financial advice | 3.43 | 1.17 | Moderate |
| AI services (composite) | 3.41 | 0.81 | Moderate |
| Customer satisfaction | 3.68 | 0.76 | High |
| Customer loyalty | 3.78 | 0.68 | High |

***Scale: 1–5. Level: "High" if mean > 3.5, otherwise "Moderate".***

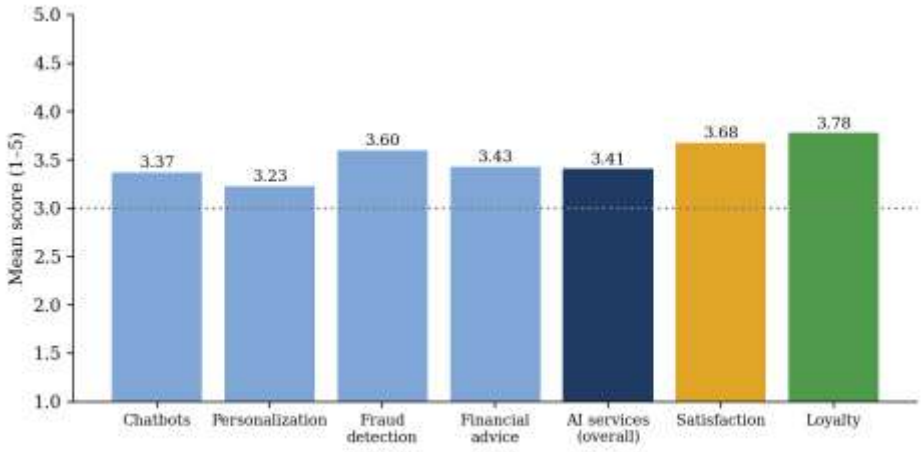



**Figure 2. Mean scores of AI services, satisfaction and loyalty**

The 'fraud detection' service was given the highest rating by respondents (M = 3.60), whilst 'personalisation' was given the lowest rating (M = 3.23). Loyalty (M = 3.78) and satisfaction (M = 3.68) were both above the AI-services composite (M = 3.41). In terms of AI services, 76 (57.6%) described their overall satisfaction as moderate, while 42 (31.8%) described their overall satisfaction as high, and 84 (63.6%) described their overall loyalty as high.When it comes to AI services, 76 (57.6%) described their overall satisfaction as moderate, 42 (31.8%) described their overall satisfaction as high, and 84 (63.6%) described their overall loyalty as high.

**Chi-square tests of association**

Ten chi-square tests of independence were run (Table 6). Cramér's V indicates strength of association (about .10 small, .30 medium, .50 large).

| Variables | $\chi^2$ | df | p (asymptotic) | p (Monte Carlo) | Cramér's V | Cells E<5 | Decision (α = .05) |
|---|---|---|---|---|---|---|---|
| Gender × Bank type | 100.99 | 4 | <.001 | <.001 | .618 | 44% | Reject $H_0$ |
| Age group × Bank type | 2.01 | 4 | .734 | .745 | .087 | 44% | Fail to reject $H_0$ |
| Bank type × Satisfaction level | 14.03 | 4 | .007 | .014 | .231 | 56% | Reject $H_0$ |
| Bank type × Loyalty level | 8.18 | 4 | .085 | .077 | .176 | 44% | Fail to reject $H_0$ |
| Gender × Satisfaction level | 32.54 | 4 | <.001 | <.001 | .351 | 56% | Reject $H_0$ |
| Education × Loyalty level | 2.17 | 4 | .704 | .746 | .091 | 56% | Fail to reject $H_0$ |
| Occupation × Satisfaction level | 1.54 | 2 | .463 | .445 | .108 | 33% | Fail to reject $H_0$ |
| AI-services level × Satisfaction level | 62.20 | 4 | <.001 | <.001 | .485 | 33% | Reject $H_0$ |

| Variables | $\chi^2$ | df | p (asymptotic) | p (Monte Carlo) | Cramér's V | Cells E<5 | Decision (α = .05) |
|---|---|---|---|---|---|---|---|
| Satisfaction level × Loyalty level | 31.91 | 4 | <.001 | .003 | .348 | 56% | Reject $H_0$ |
| AI-services level × Loyalty level | 68.22 | 4 | <.001 | <.001 | .508 | 44% | Reject $H_0$ |

*E<5 = share of cells with expected count below 5, indicating that asymptotic p-values should be read together with the Monte Carlo p-values.*

**Table 7. Cross-tabulation of AI-services level and satisfaction level (counts)**

| AI level \ Satisfaction | Low | Moderate | High | Total |
|---|---|---|---|---|
| Low | 0 | 5 | 9 | 14 |
| Moderate | 4 | 53 | 19 | 76 |
| High | 0 | 0 | 42 | 42 |
| Total | 4 | 58 | 70 | 132 |

**Table 8. Cross-tabulation of satisfaction level and loyalty level (counts)**

| Satisfaction \ Loyalty | Low | Moderate | High | Total |
|---|---|---|---|---|
| Low | 0 | 0 | 4 | 4 |
| Moderate | 0 | 34 | 24 | 58 |
| High | 4 | 10 | 56 | 70 |
| Total | 4 | 44 | 84 | 132 |

**Table 9. Cross-tabulation of AI-services level and loyalty level (counts)**

| AI level \ Loyalty | Low | Moderate | High | Total |
|---|---|---|---|---|
| Low | 4 | 5 | 5 | 14 |
| Moderate | 0 | 39 | 37 | 76 |
| High | 0 | 0 | 42 | 42 |
| Total | 4 | 44 | 84 | 132 |

Interpretation. All three tests that focus on the key hypotheses are at a medium-to-large effect size. The perceived level of AI services is significantly associated with satisfaction ($\chi^2(4) = 62.20$, $p < .001$, $V = .49$) and with loyalty ($\chi^2(4) = 68.22$, $p < .001$, $V = .51$), and satisfaction level is significantly associated with loyalty level ($\chi^2(4) = 31.91$, $p < .001$, V

= .35). As shown in Table 7, all 42 respondents who rated AI services highly were also highly satisfied, while all 4 respondents who were measured as being low on satisfaction were measured as being only moderately satisfied with AI services. Table 8 reveals that of the 56 respondents who were highly satisfied, 56 were also highly loyal, while 4 of the low satisfaction respondents were also highly loyal, reminding us that there are other factors besides satisfaction that contribute to loyalty. These results support H1, H2 and H3 at the level of association.

There is significant association between bank type and satisfaction level ($\chi^2(4) = 14.03$, $p = .007$, $V = .23$; Monte Carlo $p = .014$) but not with loyalty level ($p = .085$). The results are statistically significant for gender with bank type and satisfaction level, but must be interpreted with care as gender is confounded with bank type in this sample, 58 of the 68 public-sector-bank customers are women and the five respondents who answered "prefer not to say" are all satisfied with their banks and all bank with a foreign bank or other bank. There is no significant difference between the ages groups × bank type, education × loyalty, or occupation × satisfaction.

**One-way ANOVA**

To compare the mean satisfaction (SAT), loyalty (LOY) and AI-services scores between the age group, gender, education, occupation and bank type, one-way ANOVA was used (Table 10). The Kruskal–Wallis p-value is presented as a robustness check because the variances were unequal for some comparisons and the number of data points is unbalanced.

**Table 10. One-way ANOVA results**

| Dependent variable | Factor | F | p | $\eta^2$ | Levene p | Kruskal–Wallis p | Decision |
|---|---|---|---|---|---|---|---|
| Satisfaction | Age group | F(2, 129) = 5.17 | .007 | .074 | <.001 | .003 | Significant |
| | Gender | F(2, 129) = 20.07 | <.001 | .237 | <.001 | <.001 | Significant |
| | Education | F(2, 129) = 0.70 | .500 | .011 | <.001 | .840 | Not significant |
| | Occupation | F(1, 130) = 0.45 | .504 | .003 | <.001 | .985 | Not significant |
| | Bank type | F(2, 129) = 6.14 | .003 | .087 | <.001 | .021 | Significant |
| Loyalty | Age group | F(2, 129) = 3.64 | .029 | .053 | .200 | .016 | Significant |
| | Gender | F(2, 129) = 4.34 | .015 | .063 | .001 | .017 | Significant |
| | Education | F(2, 129) = 1.34 | .264 | .020 | .037 | .296 | Not significant |
| | Occupation | F(1, 130) = 4.20 | .043 | .031 | .075 | .038 | Significant |
| | Bank type | F(2, 129) = 4.18 | .017 | .061 | .022 | .171 | Significant |
| AI services | Age group | F(2, 129) = 1.42 | .245 | .022 | <.001 | .061 | Not significant |

| Dependent variable | Factor | F | p | η² | Levene p | Kruskal–Wallis p | Decision |
|---|---|---|---|---|---|---|---|
| | Gender | F(2, 129) = 13.95 | <.001 | .178 | <.001 | <.001 | Significant |
| | Education | F(2, 129) = 3.59 | .030 | .053 | .012 | .003 | Significant |
| | Occupation | F(1, 130) = 2.77 | .098 | .021 | .169 | .218 | Not significant |
| | Bank type | F(2, 129) = 10.70 | <.001 | .142 | .002 | <.001 | Significant |

*η²: about .01 small, .06 medium, .14 large. Education pooled to three groups; occupation to two groups; bank type to three groups (public, private, foreign/other).*

**Table 11. Group means for selected significant ANOVA results (mean ± SD)**

| Comparison | Group | n | Mean ± SD |
|---|---|---|---|
| Satisfaction by Bank type | Foreign/Other | 9 | 4.26 ± 0.70 |
| | Private Sector Bank | 55 | 3.46 ± 0.54 |
| | Public Sector Bank | 68 | 3.78 ± 0.86 |
| Satisfaction by Age group | 18–25 | 112 | 3.76 ± 0.79 |
| | 26–35 | 10 | 3.50 ± 0.18 |
| | Below 18 | 10 | 3.00 ± 0.00 |
| Satisfaction by Gender | Female | 84 | 3.95 ± 0.78 |
| | Male | 43 | 3.15 ± 0.41 |
| | Prefer not to say | 5 | 3.67 ± 0.00 |
| Loyalty by Bank type | Foreign/Other | 9 | 4.07 ± 0.88 |
| | Private Sector Bank | 55 | 3.59 ± 0.54 |
| | Public Sector Bank | 68 | 3.89 ± 0.72 |
| Loyalty by Occupation | Employed/Business | 15 | 3.44 ± 0.43 |
| | Student | 117 | 3.82 ± 0.69 |
| AI services by Bank type | Foreign/Other | 9 | 3.47 ± 1.45 |
| | Private Sector Bank | 55 | 3.06 ± 0.62 |

| Comparison | Group | n | Mean ± SD |
|---|---|---|---|
| | Public Sector Bank | 68 | 3.68 ± 0.73 |

Interpretation. Satisfaction differs significantly by bank type ($F(2, 129) = 6.14$, $p = .003$, $\eta^2 = .09$). The Tukey tests results indicate that customers of private sector banks ($M = 3.46$) have lower satisfaction than customers of public sector banks ($M = 3.78$, $p = .037$) and foreign/other banks ($M = 4.26$, $p = .008$). Also, loyalty varies by bank type ($F(2, 129) = 4.18$, $p = .017$), with private-bank customers being less loyal than public-bank customers ($p = .033$), although this is not confirmed by the Kruskal–Wallis test ($p = .171$), so should be treated as tentative. AI-services ratings are markedly lower among private-bank customers ($M = 3.06$) than public-bank customers ($M = 3.68$; $F(2, 129) = 10.70$, $p < .001$, $\eta^2 = .14$).

Satisfaction differs by age group ($F(2, 129) = 5.17$, $p = .007$), mainly because respondents below 18 ($M = 3.00$) are less satisfied than those aged 18–25 ($M = 3.76$, $p = .006$). Women report higher satisfaction ($M = 3.95$) than men ($M = 3.16$; $F(2, 129) = 20.08$, $p < .001$, $\eta^2 = .24$) and higher loyalty (3.90 vs 3.59, $p = .035$), and students report higher loyalty than employed respondents (3.82 vs 3.44; $F(1, 130) = 4.20$, $p = .043$). As mentioned above, it is difficult to tease out the gender effect from differences in bank type, and the below-18 and "prefer not to say" groups are small, so these differences should be considered exploratory. Education has not been found to be significantly related with satisfaction or loyalty ($p > .05$).

**Correlation analysis**

**Table 12. Pearson correlation matrix**

| | CHAT | PERS | FRAUD | ADV | AI | SAT | LOY |
|---|---|---|---|---|---|---|---|
| CHAT | 1 | .724 | .558 | .263 | .730 | .411 | .654 |
| PERS | .724 | 1 | .669 | .531 | .866 | .449 | .499 |
| FRAUD | .558 | .669 | 1 | .717 | .901 | .559 | .602 |
| ADV | .263 | .531 | .717 | 1 | .801 | .635 | .425 |
| AI | .730 | .866 | .901 | .801 | 1 | .635 | .650 |
| SAT | .411 | .449 | .559 | .635 | .635 | 1 | .662 |
| LOY | .654 | .499 | .602 | .425 | .650 | .662 | 1 |

*All correlations are significant at $p < .001$ (two-tailed), $N = 132$.*

Each of the variables is positively and significantly correlated. Financial advice ($r = .64$) and the AI composite ($r = .64$) are the two strongest variables that correlate with satisfaction; satisfaction is the strongest correlate with loyalty ($r = .66$), the AI composite ($r = .65$) and chatbots ($r = .65$).

**Regression analysis**

**Effect of AI services on satisfaction (H1)**

**Table 13. Multiple regression: AI services predicting customer satisfaction**

| Predictor | B | SE | β | t | p |
|---|---|---|---|---|---|
| Constant | 1.618 | 0.224 | — | 7.22 | <.001 |
| AI chatbots | 0.292 | 0.091 | 0.324 | 3.20 | .002 |
| AI personalisation | -0.106 | 0.094 | -0.124 | -1.12 | .264 |
| AI fraud detection | 0.031 | 0.085 | 0.041 | 0.36 | .718 |
| AI financial advice | 0.381 | 0.065 | 0.586 | 5.89 | <.001 |

*$R = 0.687$, $R^2 = 0.472$, adjusted $R^2 = 0.455$, $F(4, 127) = 28.39$, $p < .001$; Durbin–Watson = 1.88; VIF range 2.38–3.03.*

The model is important and accounts for 47.2% of the variance in satisfaction. AI financial advice ($\beta = .59$, $p < .001$) is the strongest predictor, followed by AI chatbots ($\beta = .32$, $p = .002$). When the other services are controlled, the results for personalisation ($\beta = -.12$, $p = .264$) and fraud detection ($\beta = .04$, $p = .718$) are neither significant nor different from their positive correlation with satisfaction when analysed separately (Table 12) since these are highly correlated with the other services ($r = .53–.72$). There is no multicollinearity (all VIF values are < 3.1), and independence of residuals (Durban Watson ≈ 1.9). On the single composite, AI services alone predict satisfaction ($B = .598$, $\beta = .635$, $R^2 = .403$, $F(1, 130) = 87.84$, $p < .001$). AI services have a significant impact on satisfaction, primarily through financial advice and chatbots, so that $H_{01}$ is rejected.

**Satisfaction will have an impact on loyalty (H2).**

**Table 14. Simple regression: satisfaction predicting loyalty**

| Predictor | B | SE | β | t | p |
|---|---|---|---|---|---|
| Constant | 1.602 | 0.220 | — | 7.27 | <.001 |
| Customer satisfaction | 0.591 | 0.059 | .662 | 10.07 | <.001 |

*$R^2 = 0.438$, adjusted $R^2 = 0.434$, $F(1, 130) = 101.45$, $p < .001$; Durbin–Watson = 1.96.*

Satisfaction is a strong positive predictor of the loyalty construct: Satisfaction has a β coefficient of .66 with $p < .001$ and the model accounts for 43.8% of the variance in the loyalty construct. The $H_{02}$ is rejected and the $H_2$ is accepted.

**Loyalty's direct impact due to AI services (H3)**

**Table 15. Regression: AI services predicting loyalty**

| Model | Predictor | B | β | t | p | $R^2$ |
|---|---|---|---|---|---|---|
| Composite | AI services | 0.547 | .650 | 9.75 | <.001 | .422 |
| By service | AI chatbots | 0.499 | 0.620 | 6.54 | <.001 | .536 |

| Model | Predictor | B | β | t | p | $R^2$ |
|---|---|---|---|---|---|---|
| | AI personalisation | -0.181 | -0.236 | -2.29 | .024 | |
| | AI fraud detection | 0.190 | 0.281 | 2.67 | .009 | |
| | AI financial advice | 0.108 | 0.186 | 1.99 | .049 | |

*Composite model: $F(1, 130) = 95.03$, $p < .001$. Service-level model: adjusted $R^2 = 0.521$, $F(4, 127) = 36.62$, $p < .001$.*

The AI composite significantly predicts loyalty (B = .547, β = .65, $R^2$ = .422), supporting $H_3$. On the service level, the chatbot is the best predictor of loyalty (β = .62, p < .001), followed by the fraud detection service (β = .28, p = .009) and the financial advice service (β = .19, p = .049). Personalisation is negatively associated with the outcome and has a significant beta (β = −.24, p = .024). It is therefore important to note that this negative correlation is most likely due to statistical suppression, as evidenced by the high correlation between this and chatbots (r = .72) and the high correlation between this and fraud detection (r = .67) and should not be over-interpreted.

**Mediation analysis (H4)**

**Table 16. Mediation of the AI–loyalty relationship by satisfaction**

| Path | Coefficient | Result |
|---|---|---|
| Total effect of AI on loyalty (c) | 0.547 | p < .001 |
| AI → Satisfaction (a) | 0.598 | p < .001 |
| Satisfaction → Loyalty, controlling for AI (b) | 0.373 | p < .001 |
| Direct effect of AI on loyalty (c′) | 0.324 | p < .001 |
| Indirect effect (a × b) | 0.223 | 95% bootstrap CI [0.098, 0.499] |
| Sobel test | z = 4.63 | p < .001 |
| Proportion mediated | 40.8% | Partial mediation |



Adding satisfaction to the model reduces the impact of AI services on loyalty to .324 ($F(2, 129) = 71.73$, $p < .001$) while $R^2$ for loyalty increases to .527 ($F(2, 129) = 71.73$, $p < .001$). The indirect effect via satisfaction is .223, it does not contain zero and the Sobel test is significant. Satisfaction, therefore, acts as a partial mediator as about 41% of the total effect is accounted for by satisfaction. $H_4$ is accepted, $H_{04}$ is rejected.

**Summary of hypothesis testing**

**Table 17. Hypothesis summary**

| Hypothesis | Test | Key result | Decision |
|---|---|---|---|
| $H_1$: AI services → satisfaction | Chi-square; multiple regression | $\chi^2 = 62.20$, $V = .49$; $R^2 = .472$; advice $\beta = .59$, chatbots $\beta = .32$ | Supported |
| $H_2$: Satisfaction → loyalty | Chi-square; simple regression | $\chi^2 = 31.91$, $V = .35$; $B = .591$, $\beta = .66$, $R^2 = .438$ | Supported |
| $H_3$: AI services → loyalty (direct) | Chi-square; regression; regression controlling for satisfaction | $\chi^2 = 68.22$, $V = .51$; $B = .547$; $c' = .324$, $p < .001$ | Supported |
| $H_4$: Satisfaction mediates AI → loyalty | Baron–Kenny; Sobel; bootstrap | Indirect = .223, CI [.098, .499] | Supported (partial mediation) |

**Robustness and data-quality checks**

The results are subject to three checks. First, the residuals of the satisfaction model are not normally distributed (Shapiro–Wilk $p < .001$) and there are differences in variance between satisfaction and some of the ANOVA comparisons; the Kruskal–Wallis results were consistent with the main ANOVA results for satisfaction, but not for loyalty by bank type. Second, there were numerous repeated response patterns in the data set, with 23 of the 132 respondents giving identical responses to all 25 attitude questions, and 105 of the 132 respondents having the same response pattern on all 30 questions. Corresponding submissions can lead to overestimation of correlations and significance. This analysis has little power, as the number of cases is small (only 27) but the satisfaction–loyalty relationship remains significant ($B = 0.553$, $R^2 = 0.389$, $p < .001$) and financial advice is the only significant predictor of satisfaction ($p = .019$), but chatbots are not significant anymore ($p = .233$). Third, the scale for satisfaction is not very reliable ($\alpha = .585$). The direction of all the major findings is consistent, but the magnitude of the findings must be considered in caution until verified with a larger and cleaner sample.

**11.Discussion**

The findings show that AI-driven banking services are significantly connected with customer satisfaction and loyalty. The results of the chi-square tests indicate that highly rated customers are far more likely to be highly satisfied and highly loyal, with these relationships remaining even after modelling using the regressions. This aligns with the previous studies that showed that quality of digital banking enhances satisfaction and satisfaction improves loyalty (Saibil, 2020; Mbama, 2018; Shabani et al., 2022) and further extends it to specific services that are facilitated by AI.

Financial Advice is the most important service for satisfaction, and chatbots is the most important service for loyalty, among the 4 services. The reasonable interpretation of these is the services that customers receive and have to do over

and over: an answer is provided, or a recommendation, and customers are able to make their own immediate assessment of usefulness. It's the one service that customers value, while not ranking it particularly high in their satisfaction rating, once other services are factored in (it has the highest mean rating). The mean rating for personalisation was the lowest and it did not show an independent positive effect which means that the personalisation of the banks could not yet be seen as having a positive effect by the customers.

The mediation results indicate that satisfaction is a key but not unique pathway between AI services and loyalty. Some 41% of the impact comes via satisfaction, others via perceived security, convenience or switching costs of the AI-supported services. This is in line with the framework put forth in this paper and similar to Saibil (2020) who argued that satisfaction acts as a mediator in the case of internet banking.

Lastly, the demographic characteristics indicate that the AI experience varied among different types of banks, with private-sector-bank customers in this sample experiencing lower satisfaction, AI usage, and (potentially) customer loyalty than public-sector-bank customers. These differences among subgroups should be confirmed in a more balanced sample prior to making conclusions since the sample is young and student oriented, and the bank type and gender overlap.

## 12.Implications

### Managerial implications

Focus on quality of chatbots and AI advisory tools as they are the most correlated with satisfaction and loyalty. Consider resolution rate and helpfulness as well as usage.

Make fraud detection a base of trust and share with customers (e.g., via alerts that describe actions to take) in order to make its worth apparent.

Personalised offers and services are clearly relevant – the average rating indicates there is scope for improvement.

Handle customer satisfaction proactively, as it represents a significant portion of the impact of AI on loyalty. After a chatbot and advisory interaction, feedback loops can help to pinpoint gaps.

It would be worth for the private sector banks to consider why their customers are not as satisfied with AI services as public-sector-bank customers.

### Theoretical implications

The study provides a combined test of four types of AI-based services in the satisfaction–loyalty model, indicating that services vary in their contribution and that satisfaction serves as a partial mediator. It thus contributes to the existing body of digital banking literature that predominantly conceptualizes digital services as a uniform entity, and introduces AI-enabled services in an Indian context.

## 13.Restrictions and future work.

The sample size (N = 132) is small, non-probability and skewed towards young students, and this reduces the generalisability of the results to the wider banking population, including older and salaried customers.

The responses are also very similar with a large proportion of the responses being exactly the same as other responses (including 23 responses straight lined – this should be audited in future waves, e.g. by checking that there are no duplicate responses).

Only one item was used to assess each AI service and the three-item satisfaction scale was not shown to be reliably measured. It is recommended for future studies to employ validated multiple item scales.

Design is cross sectional and self-reported; causal claims are tentative, common method bias is a possibility.

The number of respondents under 18 is small (10) and some of the demographic subgroups were small, so they are included in the exploration of subgroup comparisons.

Future research might use structural equation modelling, incorporate trust, perceived security and privacy concerns, employ balanced samples of public and private banks, and employ longitudinal data.

## 14.Conclusion

This study explored the links between AI-powered digital banking and satisfaction and loyalty. Customer satisfaction is partially mediated by the effect of the AI services on loyalty, with AI financial advice and AI chatbots being the most influential services for satisfaction and AI chatbots being the most influential service for loyalty; Customers who feel positive about the AI services are more satisfied and more loyal. The takeaway for banks is to focus on using conversational and advisory AI tools that consumers are using and can directly assess themselves, add more personalisation, and listen to customer satisfaction as the metric for how AI investments translate to loyalty. Because of limitations of the sample and data quality, the findings should be interpreted as preliminary evidence in need of further validation with a larger and more representative sample.

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