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AI-Powered Customer Personalization in Banking: A Study of Predictive Analytics and User Experience

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Abstract:
Background: The use of Artificial Intelligence (AI) in banking has changed the way customer care is delivered by providing tools for predictive analytics and personalised engagement. AI-driven personalisation has become a crucial way for banks to improve the user experience as they try to keep up with changing client expectations in the digital age.
Objective: This study looks at how AI-powered predictive analytics may help personalise the experience for customers and how it affects their experience in digital banking settings.
Methods: We used a quantitative study design and a structured questionnaire to ask 200 banking clients who use AI-based digital services. We used SPSS to look at the data. We used reliability testing (Cronbach's Alpha), Pearson correlation, and regression analysis to figure out how predictive analytics, personalisation, and user experience are related.
Findings: With a Cronbach's Alpha of 0.908, we could be sure that the instrument was reliable. The findings of a simple linear regression showed that predictive analytics has a big effect on consumer personalisation ($R^2 = 0.737$, $p < 0.001$). The Pearson correlation study showed that there is a strong positive link between personalisation and user experience ($r = 0.850$, $p < 0.01$). Also, multiple regression analysis showed that predictive analytics and personalisation together account for 75.9% of the differences in user experience ($R^2 = 0.759$, $F = 310.264$, $p < 0.001$), which supports all three research hypotheses.
Conclusion: The results show how important it is for banks to incorporate predictive analytics in their services to improve customer interactions and satisfaction. Personalisation powered by AI not only makes service better, but it also develops trust and long-term relationships with customers. This study adds to both academic literature and banking practice by showing how important AI is for determining the future of digital consumer interactions.
Keywords: Artificial Intelligence, Predictive Analytics, Customer Personalization, User Experience, Digital Banking, SPSS, Regression Analysis, Customer Engagement

INTRODUCTION:

The banking industry's move to digital has changed the way people get and use financial services in big ways. One of the most important new ideas in the last few years is using artificial intelligence (AI) in customer-facing operations. Banks have been able to move away from traditional service models and towards personalised, data-driven customer experiences thanks to AI-powered technologies like chatbots, recommendation systems, and behavior-driven warnings. This change is not only changing how businesses work, but it's also changing what customers expect from the financial world.

Predictive analytics is one of the most important things that AI can do. It uses historical data, machine learning algorithms, and behavioural insights to guess what customers will need and do. In banking, predictive analytics helps banks guess what customers want, give them personalised financial products, and improve service delivery in real time. Banks that want to stay competitive and get customers more involved need to use this kind of hyper-personalization.

There has been a lot of talk about how AI could change financial services, but there is a rising demand for real-world research that connects these new technologies to how people actually use them and what they think about them. There isn't enough research on the link between predictive analytics, perceived personalisation, and overall customer pleasure, especially in the fast-changing world of digital banking.

This study wants to bridge this gap by looking into how AI-powered predictive analytics helps personalise consumer experiences and how this affects the user experience. The study will use SPSS to look at the strength of these correlations by looking at the results of a quantitative survey of banking clients. The

study also checks the constructs' reliability and validity to make sure the results are strong and can be acted on.

Research Objectives

The study is guided by the following objectives:

1. To examine the impact of predictive analytics on customer personalization.
2. To determine the relationship between customer personalization and user experience in banking.
3. To assess the combined effect of predictive analytics and personalization on user experience.

REVIEW OF LITERATURE:

Author(s) and Year	Topic	Key Findings
Korada, L. (2023)	5G & Edge Computing	Explores the integration of 5G and edge computing in Industry 4.0, enhancing real-time data processing.
Ganesan & Sanodia (2023)	AI with DevOps	Discusses AI integration with DevOps for efficient cloud-native infrastructure management.
Siddharth K et al. (2023)	Network Intrusion Detection	Compares various ML techniques for improving network intrusion detection systems.
Vankayalapati et al. (2023)	Edge & Cloud AI	Proposes a unified framework for distributed AI using edge and cloud computing.
Sikha et al. (2023)	Prompt Engineering	Focuses on optimizing interaction with generative AI through prompt engineering techniques.
Challa, S. R. (2023)	AI in Wealth Advisory	Analyses how AI enhances personalized investment strategies through data-driven insights.
Burugulla, J. K. R. (2022)	Cloud in Banking	Case study on American Express as cloud adoption for digital financial services.
Janardhana Rao et al. (2023)	Medical Image Analysis	Evaluates image segmentation and deep learning in medical image diagnostics.
Kalisetty et al. (2023)	AI in Supply Chain	Studies predictive analytics and AI for enhancing supply chain resilience.
Annapareddy & Seenu (2023)	Generative AI in Maintenance	Explores generative AI applications in predictive maintenance of solar battery systems.
Kannan, S. (2023)	AI in Agriculture	Highlights AI, ML, and neural networks transforming precision agriculture.
Patra et al. (2023)	E-Commerce Sentiment Analysis	Utilizes ML to analyse customer sentiment from product reviews in e-commerce.
Sondinti et al. (2023)	Quantum-Enhanced Cloud	Investigates the fusion of classical and quantum computing in future cloud platforms.

Methodology:

Research Design

This study employs a quantitative, cross-sectional research design to investigate the role of AI-powered predictive analytics in shaping customer personalization and user experience in the banking sector. A structured survey approach is used to collect quantifiable data suitable for statistical analysis using SPSS software.

Population and Sampling

- *Target Population:* Banking customers who use AI-based digital services such as chatbots, recommendation engines, and transaction alerts.
- *Sampling Technique:* Stratified random sampling based on customer demographics (age, bank type, usage of digital services).

- *Sample Size:* A minimum of 200 respondents, sufficient for regression analysis and generalizability in social science research.

Data Collection Method

Data was collected using a self-administered structured questionnaire, distributed via online platforms. The questionnaire used a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to capture respondent perceptions of predictive analytics, personalization, and user experience.

Variables

Variables	Type	Description
Predictive Analytics	Independent (IV)	Extent of use of data-driven insights by banks
Customer Personalization	Independent (IV)	Tailored products/services based on user data
User Experience	Dependent (DV)	Overall customer experience with AI services

Data Analysis Techniques

Data will be analyzed using IBM SPSS (Version 26), following these statistical techniques:

Descriptive Statistics

- Frequency, and percentages to summarize demographic data and survey responses.

Reliability Testing

- Cronbach's Alpha will be computed to test the internal consistency of each scale. Values above 0.70 will be considered acceptable.

Correlation Analysis

- Pearson's Correlation Coefficient will be used to assess the strength and direction of relationships among the key variables.

Regression Analysis

- Multiple Linear Regression will be conducted in SPSS to assess the predictive power of independent variables on the dependent variable.

Hypotheses

- *H1*: Predictive analytics significantly influences customer personalization.
- *H2*: Customer personalization has a significant impact on user experience.
- *H3*: Predictive analytics directly influences user experience in banking.

Research Framework:

Objective	Corresponding Hypothesis	Appropriate Statistical Test (SPSS)	Purpose
1. To examine the impact of predictive analytics on customer personalization.	H1: Predictive analytics significantly influences customer personalization.	Simple Linear Regression	To test if predictive analytics (IV) predicts personalization (DV).
2. To determine the relationship between customer personalization and user experience.	H2: Customer personalization has a significant impact on user experience.	Correlation Analysis	To check how personalization affects user experience.

3. To assess the combined effect of predictive analytics and personalization on user experience.	H3: Predictive analytics directly influences user experience in banking.	Multiple Linear Regression	To analyze how both IVs together affect user experience (DV).

Reliability Analysis:

Case Processing Summary		
		N
Cases	Valid	200
	Excluded[a]	0
	Total	200
Reliability Statistics		
Cronbach's Alpha		N of Items
0.908		20

To assess the internal consistency of the questionnaire used in the study, a Cronbach's Alpha reliability test was conducted for all 20 items, which include statements related to Predictive Analytics, Customer Personalization, and User Experience.
As shown in the table, the Cronbach's Alpha coefficient is 0.908, indicating excellent internal consistency among the items. According to generally accepted standards, a Cronbach's Alpha value above 0.70 is considered acceptable, while values above 0.90 reflect outstanding reliability.
This result confirms that the instrument used for data collection is highly reliable and suitable for further statistical analysis such as correlation and regression.

Data Analysis:

Demographics

Variables		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Age	18 - 25	57	28.5	28.5	28.5
	26 - 35	76	38.0	38.0	66.5
	36 - 45	39	19.5	19.5	86.0
	46 - 55	18	9.0	9.0	95.0
	56+	10	5.0	5.0	100.0
Gender	Male	101	50.5	50.5	50.5
	Female	97	48.5	48.5	99.0
	Other / Prefer not to Say	2	1.0	1.0	100.0
Bank Type	Public Sector	80	40.0	40.0	40.0
	Private Sector	120	60.0	60.0	100.0
Usage Frequency	Daily	39	19.5	19.5	19.5
	Weekly	77	38.5	38.5	58.0
	Monthly	66	33.0	33.0	91.0
	Rarely	18	9.0	9.0	100.0
AI Services Used	Chatbots	48	24.0	24.0	24.0
	Recommendation System	37	18.5	18.5	42.5
	Alerts / Notifications	29	14.5	14.5	57.0
	All of the Above	86	43.0	43.0	100.0

The study surveyed a total of 200 banking customers who use AI-based digital services. In terms of age distribution, the majority of respondents (38%) were between 26 to 35 years, followed by 28.5% in the

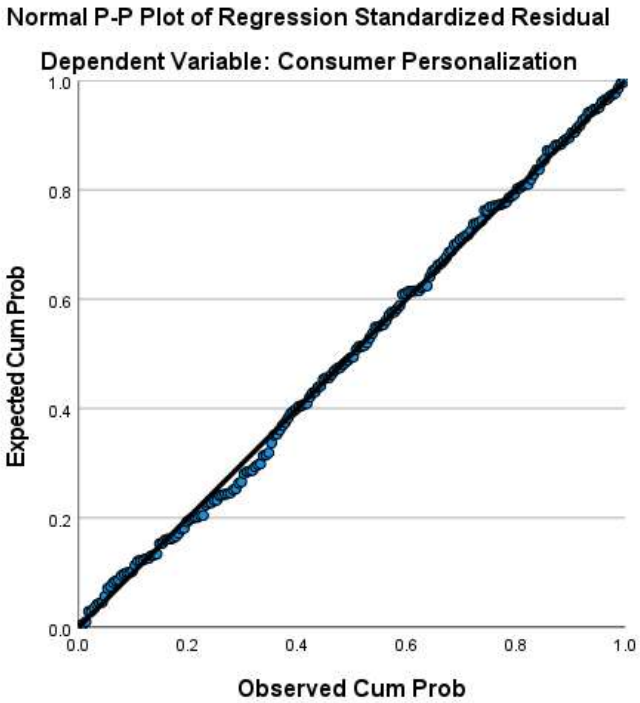
18 to 25 years age group. Respondents aged 36 to 45 years accounted for 19.5%, while 9% were between 46 and 55 years, and only 5% were aged 56 and above.
Regarding gender, the sample was fairly balanced, with 50.5% identifying as male and 48.5% as female. A small fraction, 1%, chose not to disclose their gender or identified as 'Other'.
When asked about the type of banking institution they used, 60% of the respondents were associated with private sector banks, while 40% reported using services from public sector banks.
In terms of how frequently they used AI-enabled banking services, 38.5% of participants used them on a weekly basis, 33% on a monthly basis, and 19.5% daily. Only 9% indicated that they used these services rarely.
As for the types of AI services utilized, 43% of the respondents reported using all available AI features, such as chatbots, recommendation systems, and alerts. Among individual services, 24% used chatbots, 18.5% used recommendation systems, and 14.5% utilized alerts and notifications.

Regression Analysis: Impact of Predictive Analytics on Customer Personalization

Model Summary [b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.858[a]	0.737	0.735	0.31051
a. Predictors: (Constant), Predictive Analysis				
b. Dependent Variable: Consumer Personalization				

ANOVA [a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53.432	1	53.432	554.157	.000[b]
	Residual	19.091	198	0.096		
	Total	72.523	199			
a. Dependent Variable: Consumer Personalization						
b. Predictors: (Constant), Predictive Analysis						

To address the first research objective — *"To examine the impact of predictive analytics on customer personalization"* — and to test Hypothesis H1 (*"Predictive analytics significantly influences customer personalization"*), a simple linear regression was conducted using SPSS. In this model, Predictive Analytics served as the independent variable, while Customer Personalization was the dependent variable.
The Model Summary table indicates a strong positive relationship between the variables, with a correlation coefficient (R) of 0.858, which signifies a high degree of linear association. The R Square value is 0.737, indicating that approximately 73.7% of the variance in Customer Personalization can be explained by Predictive Analytics alone. The Adjusted R Square value of 0.735 confirms the model's robustness after adjusting for the sample size. The standard error of the estimate is 0.31051, which reflects a reasonably low level of prediction error.
The ANOVA table shows that the regression model is statistically significant. The F-statistic is 554.157 with a p-value of .000, which is well below the 0.05 significance threshold. This confirms that the model as a whole significantly predicts the outcome variable.



Correlation Analysis: Relationship Between Customer Personalization and User Experience

Correlations			
		Consumer Personalization	User Experience
Consumer Personalization	Pearson Correlation	--	
	N	200	
User Experience	Pearson Correlation	.850**	--
	Sig. (2-tailed)	0.000	
	N	200	200
**. Correlation is significant at the 0.01 level (2-tailed).			

To address the second research objective — *"To determine the relationship between customer personalization and user experience in banking"* — and test Hypothesis H2 ("*Customer personalization has a significant impact on user experience*"), a Pearson correlation analysis was conducted.

The results indicate a strong positive correlation between Customer Personalization and User Experience, with a Pearson correlation coefficient (r) of 0.850, which is statistically significant at the 0.01 level (2-tailed). This suggests that higher levels of perceived personalization in banking services are strongly associated with enhanced user experience.

The analysis confirms a strong and significant relationship between customer personalization and user experience. The p-value of 0.000 is below the 0.01 threshold, indicating that the result is highly statistically significant. As such, Hypothesis H2 is accepted.

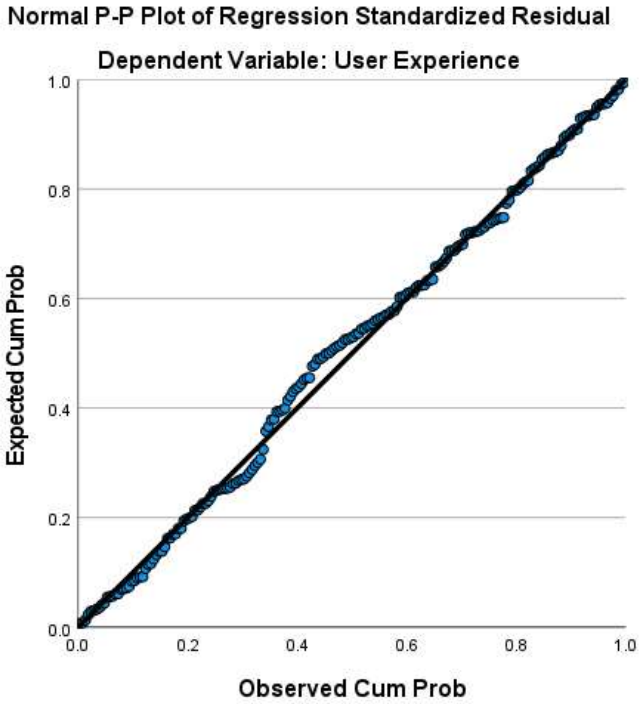
This finding reinforces the role of personalized banking services in shaping a more engaging and satisfying customer experience, highlighting the importance of AI-driven personalization strategies in digital banking environments.

Multiple Regression Analysis: Impact of Predictive Analytics and Customer Personalization on User Experience

Model Summary [b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

1		.871[a]	0.759	0.757	0.31761	
a. Predictors: (Constant), Consumer Personalization, Predictive Analysis						
b. Dependent Variable: User Experience						
ANOVA [a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62.596	2	31.298	310.264	.000[b]
	Residual	19.873	197	0.101		
	Total	82.469	199			
a. Dependent Variable: User Experience						
b. Predictors: (Constant), Consumer Personalization, Predictive Analysis						

To fulfil the third research objective — *"To assess the combined effect of predictive analytics and personalization on user experience"* — and test Hypothesis H3 (*"Predictive analytics directly influences user experience"*), a multiple linear regression analysis was performed in SPSS. In this model, User Experience is the dependent variable, and both Predictive Analytics and Customer Personalization are independent variables.
The model summary shows a multiple correlation coefficient (R) of 0.871, indicating a strong relationship between the independent variables and the dependent variable. The R Square value of 0.759 implies that 75.9% of the variance in User Experience can be explained collectively by Predictive Analytics and Customer Personalization. The Adjusted R Square value is 0.757, confirming that the model is a good fit after adjusting for the number of predictors and sample size. The standard error of the estimate is 0.31761, suggesting relatively low error in the model's predictions.
The ANOVA table supports the statistical significance of the overall regression model. The model yields an F-value of 310.264 with a significance level (p-value) of .000, which is well below the 0.05 threshold. This confirms that the combined predictors significantly explain the variation in user experience.



DISCUSSION:
This study set out to explore the role of predictive analytics in delivering personalized experiences within the context of AI-driven banking, with a focus on understanding its implications for overall user experience. Drawing on responses from 200 banking customers across demographic profiles, the results

offer compelling evidence on the significant influence of predictive analytics and customer personalization on digital banking experiences.

The demographic analysis revealed that the majority of respondents were young to middle-aged adults, with 66.5% falling between the ages of 18 and 35. This reinforces existing literature which suggests that younger consumers are more receptive to digital innovations, including AI-enabled banking tools. The near-even gender distribution, and higher representation from private sector bank users (60%), reflects a diverse sample in terms of service exposure and user expectations.

The instrument used in this research demonstrated excellent internal consistency, with a Cronbach's Alpha value of 0.908 for the entire scale. This affirms the reliability of the constructs used to measure predictive analytics, customer personalization, and user experience.

In alignment with the first research objective, the findings from the simple linear regression analysis confirmed that predictive analytics significantly impacts customer personalization. The model yielded an R^2 value of 0.737, indicating that 73.7% of the variance in personalization can be attributed to the use of predictive analytics. This strongly supports Hypothesis H1, and aligns with previous studies that emphasize the value of data-driven personalization in financial services. AI tools that leverage user behavior and transaction history evidently enhance the bank's ability to tailor services to individual needs.

The second objective aimed to explore the relationship between customer personalization and user experience. A Pearson correlation coefficient of 0.850 ($p < 0.01$) revealed a strong positive and statistically significant relationship between these two constructs, supporting Hypothesis H2. This finding is consistent with existing literature suggesting that personalization is a key driver of satisfaction and digital engagement. Personalized services likely foster a sense of recognition and relevance, which translates into improved overall experience with the bank's digital platforms.

To address the third objective, a multiple linear regression analysis was conducted to assess the combined impact of predictive analytics and customer personalization on user experience. The results showed a strong model fit, with an R^2 of 0.759 and a significant F-statistic ($F = 310.264$, $p < 0.001$), indicating that 75.9% of the variance in user experience could be explained by the two predictors. This supports Hypothesis H3 and underscores the synergistic effect of AI-driven insights and personalization in shaping high-quality user experiences. The findings affirm that banks can substantially enhance user satisfaction by simultaneously focusing on predictive technologies and customized services.

Together, these results offer clear empirical support for the proposition that AI-powered predictive analytics not only enables but significantly enhances personalized banking services, which in turn leads to improved user experiences. The positive relationships among these variables suggest a virtuous cycle — as banks implement more intelligent and anticipatory systems, users experience greater personalization, which further enhances their satisfaction and trust in digital banking platforms.

CONCLUSION:

This research set out to examine the impact of AI-powered predictive analytics on customer personalization and the resultant user experience in the banking sector. Through a quantitative analysis of survey data from 200 respondents, the study has provided strong empirical evidence of the integral role that predictive analytics plays in enhancing personalized digital banking services and improving overall customer experience.

The results affirmed that predictive analytics significantly influences customer personalization, and that personalized banking experiences strongly correlate with higher user satisfaction. Moreover, the combined effect of predictive analytics and personalization was found to be a significant predictor of user experience, with over 75% of the variance in user experience explained by these two factors. These findings validate all three research hypotheses and emphasize the importance of integrating AI capabilities within digital banking strategies.

From a practical perspective, the study highlights that financial institutions must go beyond generic AI deployment and focus on developing systems that intelligently interpret customer behavior, anticipate individual needs, and deliver tailored experiences. Such approaches not only improve operational efficiency but also build customer trust, engagement, and loyalty in an increasingly digital financial ecosystem.

As banks continue to navigate rapid technological change, the strategic implementation of predictive analytics and personalization tools emerges not just as a technological upgrade but as a core value proposition in enhancing digital customer experience. This study serves as a timely contribution to both academic literature and industry best practices, underscoring the transformative potential of AI in reshaping the future of banking.

Implications of the Study:
These insights have significant implications for both academic research and industry practice. From a theoretical perspective, the study contributes to the growing body of literature at the intersection of AI, marketing personalization, and consumer behavior in digital finance. From a managerial standpoint, the findings highlight the critical importance for banks to invest in robust AI infrastructure and data-driven personalization strategies. Financial institutions that leverage predictive analytics effectively can not only enhance user experience but also improve customer retention, brand loyalty, and long-term value creation.

Limitations

- The study relies on self-reported data, which may involve social desirability or recall bias.
- The cross-sectional nature of the research limits the ability to establish causality.

Conflict of Interest Statement
The author declares that there are no conflicts of interest regarding the publication of this research article. The study was conducted independently, and no financial, personal, or institutional relationships influenced the research design, data collection, analysis, or interpretation of results.

Ethical Considerations
- Participation was voluntary and based on informed consent.
- Data was collected anonymously and stored securely, ensuring participant privacy.
- The study complied with ethical standards of academic research and institutional guidelines.

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