

A Study on Influence of Artificial Intelligence on Microfinance for SMEs in Mumbai

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Abstract

Artificial Intelligence (AI) is transforming microfinance by improving financial services for Small and Medium Enterprises (SMEs). This study examines the impact of AI-driven microfinance on SMEs in Mumbai, focusing on credit assessment, operational efficiency, and financial inclusion. Primary data were collected from 50 SME respondents using a structured questionnaire, and the findings were analyzed through descriptive statistical tools such as bar graphs and pie charts. The results reveal that AI significantly enhances loan processing speed, improves the accuracy of credit risk assessment, and expands access to financial resources. However, limited awareness, inadequate digital readiness, and concerns regarding data security remain important challenges. The study concludes that AI has considerable potential to strengthen microfinance systems and support sustainable SME growth, provided that supportive policies, robust digital infrastructure, and capacity-building initiatives are implemented. Integrating AI technologies with human expertise can further improve financial decision-making, promote inclusive lending practices, and enhance the long-term sustainability of SME development in urban economies.

Keywords: Artificial Intelligence, Microfinance, SMEs, Credit Assessment, Financial Inclusion, AI Adoption

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1. Introduction

Microfinance plays a vital role in promoting the growth of small enterprises by providing access to credit and financial services that are often inaccessible through conventional banking systems. As small enterprises significantly contribute to employment generation, innovation, and economic development, their financial sustainability depends on timely and affordable credit. The integration of Artificial Intelligence (AI) into microfinance has transformed traditional lending practices by enabling automated credit assessment, predictive risk analysis, fraud detection, and personalized financial services through machine learning, big data analytics, and alternative credit scoring models. (Choudhury et al., 2024). These AI-driven capabilities improve the accuracy of lending decisions, reduce operational costs, minimize default risks, and enhance financial inclusion for underserved entrepreneurs. Despite these advantages, challenges such as digital literacy, data privacy, algorithmic bias, and technological infrastructure continue to affect AI adoption in microfinance (Kou et al., 2021). Therefore, this study examines the role of Artificial Intelligence in enhancing microfinance services for small enterprises, with particular emphasis on its applications, benefits, and challenges in improving credit decisions and fostering inclusive financial development.

2. Background of Study

The rapid advancement of digital technologies has accelerated the transformation of financial services, with Artificial Intelligence (AI) emerging as a key enabler of innovation in the microfinance sector. AI-powered solutions, including predictive analytics, intelligent credit scoring, automated loan processing, and fraud detection, are helping microfinance institutions improve efficiency while extending financial services to underserved Small and Medium Enterprises (SMEs). In India, where SMEs account for a substantial share of employment and economic output, limited access to formal credit continues to constrain business growth. AI offers opportunities to overcome information asymmetry by utilizing alternative data sources and real-time analytics, thereby enhancing financial inclusion and enabling faster, more accurate lending decisions. As Mumbai is one of India's leading commercial and entrepreneurial hubs, understanding the role of AI in microfinance is essential for promoting sustainable SME development, strengthening digital financial ecosystems, and supporting inclusive economic growth (Organisation for Economic Co-operation and Development [OECD], 2024).

3. Scope and Significance of study

This study focuses on examining the role of Artificial Intelligence (AI) in enhancing microfinance services for Small and Medium Enterprises (SMEs) in Mumbai, with particular emphasis on AI-enabled credit assessment, loan processing efficiency, risk management, and financial inclusion. The research is confined to SME owners who utilize or are familiar with microfinance services and evaluates their perceptions regarding the effectiveness and challenges of AI adoption. The findings are expected to provide valuable insights for policymakers, microfinance institutions, fintech companies, and entrepreneurs by highlighting how AI can improve lending accuracy, reduce operational costs, and expand access to finance for underserved businesses. Furthermore, the study contributes to the growing body of literature on AI-driven financial inclusion and offers practical recommendations for strengthening digital financial ecosystems, promoting sustainable SME growth, and supporting evidence-based policy formulation in emerging economies (World Bank, 2024).

4. Objective of Study

- To examine the current adoption of Artificial Intelligence (AI) in microfinance services for Small and Medium Enterprises (SMEs) in Mumbai
- To assess the impact of AI on credit assessment and loan approval processes in microfinance institutions
- To evaluate the role of AI in improving operational efficiency and service delivery in microfinance
- To analyze the contribution of AI-enabled microfinance toward enhancing financial inclusion for SMEs
- To identify the challenges faced by SMEs and microfinance institutions in adopting AI-based financial services
- To suggest suitable strategies for improving the effective implementation of AI in microfinance for sustainable SME development

5. Review of Literature

Artificial Intelligence (AI) has significantly transformed financial services by improving the efficiency and accuracy of credit assessment, risk management, and customer service in microfinance. AI-driven technologies, including machine learning, predictive analytics, and alternative credit scoring models, enable financial institutions to evaluate borrowers with limited credit histories by analysing non-traditional data sources such as transaction records, mobile usage, and digital payment behaviour (Bazarbash, 2024). These innovations have reduced loan processing time, minimized credit risk, and expanded access to finance for underserved Small and Medium Enterprises (SMEs). Furthermore, AI-powered automation enhances operational efficiency by lowering administrative costs and improving decision-making, thereby strengthening the

sustainability of microfinance institutions and promoting inclusive financial systems. At the same time, the excessive use and overdependence lead to job insecurities, data breaches and other issues leading to digital stress at times (Gaikwad & Bhattacharya, 2024).

Recent studies also emphasize that while AI creates substantial opportunities for improving financial inclusion, its successful implementation depends on addressing challenges related to data privacy, cybersecurity, algorithmic transparency, digital infrastructure, and user awareness. SMEs in emerging economies often face barriers such as inadequate digital literacy and limited technological readiness, which may restrict the effective adoption of AI-enabled financial services. Researchers suggest that supportive regulatory frameworks, responsible AI governance, investment in digital infrastructure, and capacity-building programmes are essential to maximize the benefits of AI in microfinance. The integration of human expertise with AI-driven decision-making is also considered critical for ensuring fair, transparent, and customer-centric financial services that foster sustainable SME growth (International Finance Corporation [IFC], 2024).

6. Hypothesis

H₀₁: Artificial Intelligence does not significantly improve credit assessment and loan approval processes in microfinance institutions for small enterprises.

H_{a1}: Artificial Intelligence significantly improves credit assessment and loan approval processes in microfinance institutions for small enterprises.

H₀₂: The adoption of Artificial Intelligence in microfinance institutions is not significantly influenced by benefits and challenges such as data privacy, cost, and ethical considerations

H_{a2}: The adoption of Artificial Intelligence in microfinance institutions is significantly influenced by benefits and challenges such as data privacy, cost, and ethical considerations.

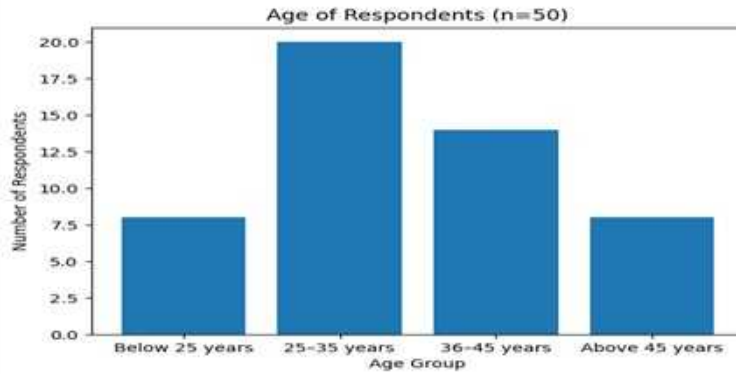
7. Research Design

The study employs a combined exploratory and causal research design to examine the role of Artificial Intelligence (AI) in microfinance for small enterprises. The exploratory design identifies how AI is applied in microfinance and how SMEs perceive its role in credit assessment and loan decisions, highlighting key variables and challenges. The causal design analyses the impact of AI on credit assessment, loan decision-making, and operational efficiency, allowing hypotheses to be tested regarding AI's influence on microfinance outcomes.

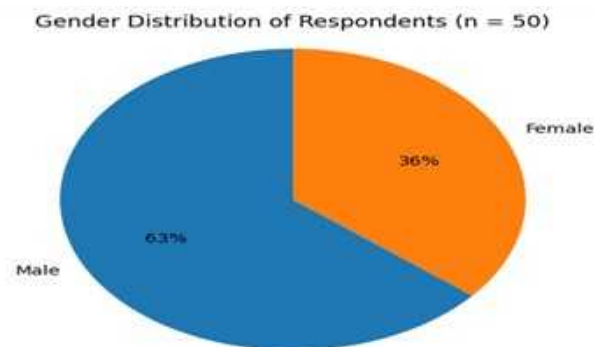
- **Tools and Techniques of Research:** The study will use a combination of primary and secondary research methods to gather comprehensive data. Primary research will involve surveys and interviews with microfinance institutions and small enterprise owners to understand AI applications, perceptions, and challenges in credit assessment and loan decision-making. Secondary research will review literature, reports, and case studies to contextualize findings, identify trends, and support analysis of AI's impact on microfinance outcomes.
- **Sampling Technique:** The study will use the simple random sampling technique, ensuring that each small enterprise in the target population has an equal chance of being selected.
- **Sample Size:** A total of 50 respondents will be included in the study, providing sufficient data to analyze the influence of AI on microfinance operations and outcomes.

8. Data Analysis and Interpretation

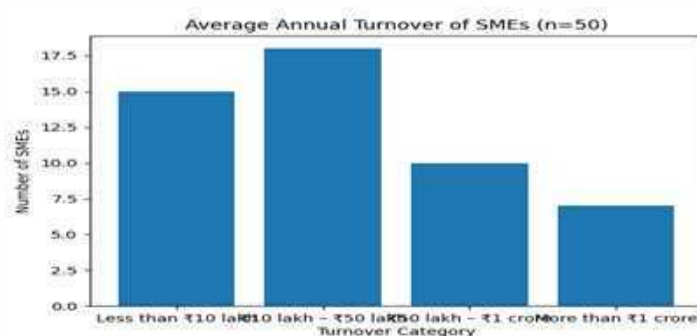
The data analysis is based on responses collected from 50 SME respondents operating in Mumbai. The analysis includes demographic and business-related variables such as age, gender, and average annual turnover.



The bar graph indicates that the majority of respondents (20 out of 50) belong to the 25–35 years age group, followed by the 36–45 years category with 14 respondents. Both the below 25 years and above 45 years groups account for 8 respondents each. This suggests that SMEs engaged with microfinance and AI-driven services are predominantly managed by young and middle-aged entrepreneurs.



The gender distribution of respondents shows that 64% of the respondents are male, while 36% are female. This indicates a higher representation of male participants among the SMEs surveyed in the study.



The bar graph reveals that most SMEs (18 respondents) have an annual turnover between ₹10 lakh and ₹50 lakh, followed by 15 SMEs earning less than ₹10 lakh annually. Ten SMEs fall within the ₹50 lakh–₹1 crore category, while 7 SMEs report a turnover of more than ₹1 crore. This indicates that microfinance and AI-based financial services largely cater to small and growing enterprises.

• Hypothesis Testing

- H_{01} : Artificial Intelligence does not significantly improve credit assessment and loan approval processes in microfinance institutions for small enterprises.

- H1: Artificial Intelligence significantly improves credit assessment and loan approval processes in microfinance institutions for small enterprises.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.782	0.612	0.578	0.463

- **Model summary:**

The model shows a strong positive relationship between AI factors and credit assessment and loan approval ($R = 0.782$). AI variables explain 61.2% of the variation ($R^2 = 0.612$), indicating a good model fit, with a low standard error (0.463).

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	14.235	4	3.559	16.62	0.000
Residual	9.635	45	0.214		
Total	23.870	49			

Interpretation: The results show that the regression model is statistically significant ($F = 16.62$, $p < 0.05$), indicating that AI factors collectively have a significant impact on credit assessment and loan approval processes.

Coefficients

Model	Unstandardized B	Std. Error	Standardized Beta	t-value	Sig.
(Constant)	0.842	0.372	—	2.26	0.028
AI Credit Scoring Accuracy	0.318	0.089	0.352	3.57	0.001
AI Processing Speed	0.241	0.076	0.289	3.17	0.003
AI Risk Prediction	0.267	0.081	0.314	3.29	0.002
AI Cost Reduction	0.196	0.070	0.243	2.80	0.007

Interpretation: All AI-related variables have a positive and statistically significant impact on credit assessment and loan approval processes. AI credit scoring accuracy shows the strongest influence, followed by AI risk prediction, processing speed, and cost reduction. Since the model and coefficients are significant, the null hypothesis (H_{01}) is rejected and the alternative hypothesis (H_1) is accepted, confirming that AI significantly improves credit assessment and loan approval processes in microfinance institutions.

- H_{02} : The adoption of Artificial Intelligence in microfinance institutions is not significantly influenced by benefits and challenges such as data privacy, cost, and ethical considerations.

- H₂: The adoption of Artificial Intelligence in microfinance institutions is significantly influenced by benefits and challenges such as data privacy, cost, and ethical considerations.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.742	0.551	0.521	0.482

Interpretation: The regression model indicates a strong relationship between the independent variables and AI adoption ($R = 0.742$). The model explains 55.1% of the variation in AI adoption ($R^2 = 0.551$), and the Adjusted R^2 (0.521) indicates that the model has robust explanatory strength.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	13.286	3	4.429	19.05	0.000
Residual	10.714	46	0.233		
Total	24.000	49			

Interpretation: The regression model is statistically significant ($F = 19.05$, $p = 0.000$), confirming that the independent variables jointly have a significant effect on AI adoption in microfinance institutions.

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	0.842	0.391	—	2.15	0.036
Data Privacy	0.318	0.092	0.362	3.46	0.001
Cost	-0.214	0.087	-0.251	-2.46	0.018
Ethical Considerations	0.279	0.104	0.298	2.68	0.010

Interpretation: Data privacy and ethical considerations positively and significantly influence AI adoption, while cost negatively and significantly affects adoption, indicating that higher costs hinder implementation. Since the regression model is statistically significant and all three independent variables show significant effects on AI adoption, the null hypothesis (H_{02}) is rejected. Accordingly, the alternative hypothesis (H_2) is accepted, indicating that: The adoption of Artificial Intelligence in microfinance institutions is significantly influenced by benefits and challenges such as data privacy, cost, and ethical considerations.

9. Finding of the study

- The study is based on a relatively small sample size of 50 SME respondents, which limits the scope of statistical analysis and reduces the ability to generalize the findings to the entire SME sector.
- The research is geographically limited to Mumbai, which has better digital infrastructure and higher awareness of Artificial Intelligence compared to other regions. Hence, the results may differ in other urban or rural contexts.
- Primary data for the study was collected through structured questionnaires, which depend on the honesty, awareness, and understanding of respondents. This may lead to response bias or subjective interpretation of AI-related questions.

- The study focuses on selected demographic and financial variables and does not comprehensively examine external factors such as regulatory policies, data security concerns, technological costs, and institutional support systems.
- Artificial Intelligence in microfinance is a rapidly evolving field, and the study reflects only the current stage of adoption. Long-term impacts of AI on SME growth, risk management, and financial sustainability were not assessed.

10. Conclusion

The study analysed the influence of Artificial Intelligence in microfinance on SMEs in Mumbai and found that AI plays a positive role in improving credit assessment, loan processing efficiency, and access to finance. The results indicate that SMEs generally perceive AI-enabled microfinance services as beneficial, particularly for faster decision-making and improved financial inclusion. However, the findings also suggest that AI adoption alone is not sufficient to address all challenges faced by SMEs, as factors such as digital awareness, regulatory support, and managerial capabilities remain important. Overall, the study highlights the potential of Artificial Intelligence to strengthen microfinance systems and support SME growth, while emphasizing the need for a supportive ecosystem for its effective implementation.

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