

A STUDY ON CONSUMER AWARENESS ON E-BANKING SERVICE AT UNION BANK

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ABSTRACT

The rapid adoption of electronic banking (e-banking) services has transformed the banking sector, providing customers with convenient, efficient, and secure ways to conduct financial transactions. However, the level of consumer awareness and the factors influencing the adoption of these digital services vary significantly across different demographic groups. This study leverages Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) techniques to analyze consumer awareness, behavior, and satisfaction regarding e-banking services offered by Union Bank. Using survey data combined with transactional and interaction logs, machine learning models such as decision trees and support vector machines are employed to classify consumers based on their awareness levels and usage patterns. Deep learning models, particularly neural networks, analyze complex behavioral data to uncover latent factors that influence e-banking adoption and usage. Additionally, Natural Language Processing (NLP) techniques are applied to customer feedback and social media to gauge sentiment and identify common concerns or barriers faced by

consumers. The insights generated from this study aim to help Union Bank tailor its marketing strategies, enhance user education, and improve e-banking services to increase adoption rates and customer satisfaction. Moreover, the research demonstrates the potential of AI-driven analytics in understanding consumer behavior in the rapidly evolving digital banking landscape.

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I. INTRODUCTION

The proliferation of digital technologies has revolutionized the banking industry, with electronic banking (e-banking) emerging as a key channel for delivering financial services. E-banking offers customers the convenience of conducting transactions anytime and anywhere, reducing the need for physical branch visits. Despite these advantages, the degree of consumer awareness and acceptance of e-banking services remains uneven, influenced by factors such as age, education, income, and technological literacy. Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) have become essential tools for analyzing complex consumer behavior data and extracting actionable insights. By applying these technologies, banks can better understand customer awareness levels, identify usage patterns, and predict adoption trends. This study focuses on Union Bank's e-banking services, employing AI-driven

techniques to evaluate consumer awareness, usage behavior, and satisfaction. The findings aim to support the bank in optimizing service delivery, designing targeted awareness campaigns, and enhancing overall customer experience in the digital banking environment.

Definition:

Electronic Banking (e-banking) involves the delivery of banking services through electronic channels such as the internet, mobile applications, and ATMs. It enables customers to perform financial transactions like fund transfers, bill payments, account monitoring, and other banking operations remotely, reducing the need to visit physical branches. E-banking enhances convenience, accessibility, and efficiency, making it a critical component of modern banking. Consumer awareness refers to how well customers understand and recognize the availability, benefits,

features, and security measures of e-banking services. Artificial Intelligence (AI) encompasses technologies that simulate human intelligence to perform tasks like learning and decision-making. Machine Learning (ML), a subset of AI, allows systems to learn from data patterns and make predictions or classifications without explicit programming. Deep Learning (DL), an advanced ML technique, uses multi-layered neural networks to analyze complex and large datasets, including text and behavioral data, to uncover insights about consumer behavior and preferences in e-banking.

Research Methodology:

This study adopts a mixed-method approach, combining quantitative data analysis with AI-driven techniques to evaluate consumer awareness and behavior toward e-banking services at Union Bank. Primary data is collected through structured surveys targeting diverse customer demographics to assess their knowledge, usage patterns, and satisfaction levels regarding e-banking. Secondary data includes transactional logs, usage frequency, and customer feedback obtained from the bank's databases. The data preprocessing phase involves cleaning, normalization, and feature engineering to prepare the

dataset for analysis. Machine learning algorithms such as Decision Trees, Random Forest, and Support Vector Machines (SVM) are implemented to classify customers based on their awareness levels and predict their likelihood of adopting e-banking services. Deep learning models, particularly neural networks, analyze complex patterns in consumer behavior data to identify latent factors influencing e-banking adoption. Additionally, Natural Language Processing (NLP) techniques are employed to analyze textual data from customer feedback and social media to gauge sentiment and detect common issues or concerns. The models are evaluated using accuracy, precision, recall, and F1-score metrics, and insights are visualized through graphs and charts for clear interpretation.

II.LITERATURE REVIEW

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III.DATA ANALYSIS AND INTERPRETATION

INTERPRETATION:

The findings of this study reveal that consumer awareness of e-banking services at Union Bank is significantly influenced by factors such as age, education level, digital literacy, and previous exposure to online financial tools. Analysis using machine learning models like Decision Trees and Support Vector Machines showed that younger, tech-savvy individuals are more likely to adopt and actively use e-banking platforms. Conversely, older customers or those with limited digital skills tend to rely more on traditional banking

channels, indicating a gap in awareness and comfort with digital tools.

INTERPRETATION:

Deep learning techniques, particularly neural networks, provided deeper insights into hidden patterns in customer behavior and feedback. These models helped uncover subtle correlations between user satisfaction, service accessibility, and platform usability. NLP-based sentiment analysis of customer reviews and social media feedback indicated that while most users appreciate the speed and convenience of e-banking, concerns around cybersecurity, transaction failures, and lack of personalized support still affect trust and adoption levels. Overall, the AI-driven interpretation underscores the importance of targeted digital literacy campaigns, personalized user support, and secure infrastructure to enhance consumer awareness and engagement with e-banking services at Union Bank.

IV.FINDINGS

The study revealed that younger consumers (particularly those between 18 and 35 years of age) demonstrated higher levels of awareness and engagement with Union Bank's e-banking services. Their familiarity with smartphones, mobile apps, and digital interfaces contributed significantly to this trend. Machine learning models

identified digital literacy and past exposure to online banking tools as strong predictors of adoption, suggesting that comfort with technology plays a pivotal role in e-banking behavior. On the other hand, older customers and those from semi-urban or rural backgrounds exhibited lower usage rates, primarily due to concerns about online security, unfamiliarity with digital platforms, and a preference for traditional banking. Sentiment analysis using NLP revealed that while many users appreciated the convenience and speed of e-banking, common frustrations included technical glitches, limited customer support, and fear of fraud. Interestingly, deep learning models proved effective in identifying patterns associated with satisfaction and dissatisfaction, offering actionable insights into customer behavior. The results suggest a strong need for personalized services, secure digital infrastructure, and targeted awareness campaigns to close the digital divide and enhance overall adoption of e-banking at Union Bank.

V.CONCLUSION

This study provides deep insights into consumer awareness and behavior toward e-banking services at Union Bank, using the power of Artificial Intelligence, Machine Learning, and

Deep Learning techniques. The findings clearly indicate that while awareness and usage of e-banking are rising, there remains a noticeable digital divide influenced by age, education, and technological exposure. Younger and digitally literate consumers are adopting e-banking rapidly, whereas older individuals and those in less-connected regions often exhibit hesitation due to lack of digital skills or trust in online systems.

The use of AI and ML helped identify critical behavioral patterns, and sentiment analysis of customer feedback using NLP revealed recurring pain points, including concerns about security, lack of personalization, and technical issues with mobile apps. Deep learning models provided reliable predictions of user satisfaction, offering Union Bank valuable tools to design better services and improve user engagement. These results emphasize the importance of continuous customer education, the enhancement of cybersecurity measures, and the development of intuitive, user-friendly platforms tailored to diverse user groups. In conclusion, integrating intelligent technologies not only improves the analytical depth of customer studies but also helps banks like Union Bank take proactive steps in

delivering more inclusive, accessible, and efficient e-banking services. Future efforts should focus on bridging the awareness gap, especially among older and rural users, and leveraging AI to create more personalized, trustworthy, and seamless.

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