Buy Now, Pay Later: An AI and Machine Learning-Based Analysis of Its Influence on Youth Spending Behaviour and Financial Decision-Making

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***Abstract*—The rapid growth of digital financial technologies has increased the adoption of Buy Now, Pay Later (BNPL) services, particularly among young consumers. BNPL offers flexible payment options and convenient access to short-term credit, but it also raises concerns regarding impulsive purchasing, excessive spending, financial literacy, and responsible financial decision-making. This research aims to analyze the influence of BNPL services on youth spending behaviour and financial decision-making through Artificial Intelligence (AI) and Machine Learning (ML) techniques. The study focuses on young consumers aged 18–30 years and examines key factors such as BNPL usage frequency, purchasing patterns, financial awareness, affordability, and perceived financial risk. Primary data is collected through a structured questionnaire, while secondary data is obtained from existing research literature and financial reports. The proposed methodology involves data preprocessing, exploratory data analysis, and the application of machine learning algorithms to identify behavioural patterns and predict spending-related risks. The study seeks to investigate the relationship between BNPL usage and financial behaviour while exploring the potential of AI-driven predictive analytics to support responsible financial decisions. The research is expected to contribute to a better understanding of BNPL-related financial behaviour among youth and demonstrate the potential of machine learning in promoting financial awareness and informed decision-making.**

***Keywords*—Buy Now, Pay Later (BNPL), Artificial Intelligence (AI), Machine Learning (ML), Youth Spending Behaviour, Financial Decision-Making, Financial Literacy, Predictive Analytics**

I. INTRODUCTION

The rapid advancement of financial technology (FinTech) has significantly transformed digital payment systems and consumer purchasing behaviour. Among emerging financial services, Buy Now, Pay Later (BNPL) has gained considerable attention as an alternative payment method that enables consumers to purchase products immediately and repay the amount through scheduled instalments. The increasing integration of BNPL services into e-commerce platforms and digital payment applications has improved access to short-term credit, particularly among young consumers. Its convenience, flexible repayment options, and simplified transaction processes have contributed to its growing adoption.

Young consumers are increasingly attracted to BNPL services due to their accessibility, payment flexibility, and ability to make purchases without immediate full payment. However, frequent BNPL usage may encourage impulsive purchasing, increased consumption, & inadequate financial planning. Limited financial literacy, poor budgeting practices, and insufficient awareness of repayment obligations may further increase financial vulnerability among young users. Therefore, understanding the relationship between BNPL adoption, spending behaviour, and financial decision-making has become an important area of research.

Artificial Intelligence (AI) and Machine Learning (ML) offer advanced analytical approaches for examining consumer financial behaviour and identifying complex patterns within financial datasets. Machine learning algorithms can analyze factors such as BNPL usage frequency, purchasing habits, financial awareness, affordability, and perceived financial risks to identify behavioural relationships and potentially predict spending-related risks. Integrating AI and ML techniques into financial behaviour analysis may provide data driven insights that support responsible credit usage and informed financial decision-making.

Existing research has primarily focused on BNPL adoption, consumer attitudes, financial literacy, and impulsive purchasing behaviour. Although previous studies have provided valuable insights into the financial implications of BNPL services, further investigation is needed into the integration of AI and ML techniques for analysing multiple behavioural factors among young consumers. Developing data-driven analytical models may improve the understanding of spending patterns and financial decision-making associated with BNPL usage.

This study aims to analyze the relationship between BNPL services, youth spending behaviour, and financial decision-making using AI and ML-based analytical techniques. The research focuses on young consumers aged 18–30 years and examines factors such as BNPL awareness, usage frequency, purchasing behaviour, and financial attitudes. Primary data is being collected through a structured questionnaire, supported by secondary information from academic research publications and financial reports. The proposed methodology incorporates data preprocessing, exploratory data analysis, and machine learning algorithms to identify behavioural patterns and examine potential spending-related risks.

The study seeks to contribute to AI-driven financial analytics by exploring the application of machine learning techniques in understanding youth financial behaviour. The anticipated findings may provide insights into responsible BNPL usage,

financial awareness, and informed financial decision-making among young consumers.

II. PROBLEM STATEMENT

The increasing adoption of Buy Now, Pay Later (BNPL) services among young consumers has raised concerns regarding impulsive purchasing, excessive spending, and poor financial decision-making. Although BNPL offers convenience and flexible payment options, its frequent use may increase financial risks. Existing studies provide limited insights into the integrated application of Artificial Intelligence (AI) and Machine Learning (ML) for analysing BNPL-related spending behaviour. Therefore, this study aims to examine BNPL usage patterns and identify potential spending-related risks among young consumers using AI and ML-based analytical techniques.

III. OBJECTIVES

- To analyse the influence of Buy Now, Pay Later (BNPL) services on youth spending behaviour and financial decision-making.
- To examine the relationship between BNPL usage, impulsive purchasing, spending frequency, and financial awareness.
- To identify key behavioural and financial factors associated with BNPL adoption among young consumers.
- To apply Artificial Intelligence (AI) and Machine Learning (ML) techniques to analyse spending patterns and identify potential financial risks.
- To explore predictive models that support responsible BNPL usage and informed financial decision-making.

IV. LITERATURE REVIEW

Existing research on Buy Now, Pay Later (BNPL) services highlight their growing influence on consumer purchasing behaviour and financial decision-making. Studies suggest that BNPL services provide convenient payment options and flexible instalment facilities, which may encourage increased purchase frequency, impulsive buying, and higher consumer spending [1], [2]. Maesen and Ang [3] examined the impact of instalment payments on customer purchases, while Aidala et al. [4] investigated consumer demand for BNPL, particularly among younger and financially constrained individuals. Research focusing on young consumers has explored the relationship between BNPL usage, financial literacy, and spending behaviour. Sangeetha et al. [5] applied machine learning techniques to examiGeneration Z spending behaviour and financial well-being. Other studies identified affordability, perceived risk, convenience, and financial awareness as important factors influencing BNPL adoption [6] [7] [8]. Singh and Sahni [9] further explored psychological factors affecting BNPL usage through machine learning algorithms, including Logistic Regression, Random Forest, and XGBoost. Recent studies have also examined how deferred payment options influence consumer spending decisions and price sensitivity [10], [11]. Behera et al. [12] discussed the role of Artificial Intelligence (AI) in BNPL services, particularly in credit assessment and risk management. Research conducted in the Indian context has investigated BNPL adoption, consumer payment preferences, and financial risks among young users [13], [14]. Financial literacy and financial vulnerability have also emerged as significant areas of investigation. Wang and Wong [15] examined the relationship between financial literacy, financial vulnerability, and BNPL usage, while Das [16] explored the association between BNPL usage and financial well-being. Although existing studies provide valuable insights into BNPL adoption and consumer spending behaviour, opportunities remain for integrating multiple behavioural and financial factors using AI and Machine Learning (ML). Therefore, the present study aims to analyse BNPL usage patterns, impulsive purchasing, spending behaviour, and financial decision-making among young consumers aged 18–30 years through a data-driven analytical approach.

V. METHODOLOGY

A. Data Sources

This study uses primary and secondary data to analyse the influence of Buy Now, Pay Later (BNPL) services on youth spending behaviour and financial decision-making.

- **Primary Data:** Survey responses collected through Google Forms from 110 respondents aged 18–30 using convenience sampling.
- **Secondary Data:** Research papers and literature related to BNPL, consumer behaviour, financial literacy, and AI-based financial analysis.

B. Data Preprocessing

The collected survey data were processed using Python. The following steps were performed:

1. **Data Cleaning:** Checked missing values, duplicate records, and inconsistencies in BNPL usage responses.
2. **Data Encoding:** Converted Yes/No and Agree/Disagree responses into numerical values. Applied One-Hot Encoding to demographic variables and purchasing reasons.
3. **Application Encoding:** Converted multiple BNPL application selections into separate numerical features.
4. **Feature Selection:** Selected 19 input features related to demographics, BNPL awareness, usage frequency, and purchasing motivations.
5. **Dataset Preparation:** Selected 73 respondents who reported previous BNPL usage. The target variable was defined as whether BNPL increased overall spending. The dataset was divided into 80% training and 20% testing data using stratified sampling.

C. Algorithms Applied

The following classification algorithms were implemented:

1. **Logistic Regression:** Used to predict whether BNPL increased overall spending, with class weighting to address class imbalance.
2. **Decision Tree:** Used to identify patterns in consumer spending behaviour, with a maximum tree depth of 3.
3. **Random Forest:** Used an ensemble of 100 decision trees for classification and feature importance analysis.
4. **Majority-Class Baseline:** A Most Frequent Dummy Classifier was used as a benchmark for model comparison.

D. Model Evaluation

The models were evaluated using Accuracy, Precision, Recall, F1-Score, and Confusion Matrix. Stratified 5-Fold Cross-Validation was also performed to compare the mean accuracy and F1-score of the models while maintaining class proportions.

E. Feature Importance Analysis

Random Forest feature importance was used to identify the variables contributing most to model predictions. BNPL usage frequency was identified as the most important feature, followed by occupation, gender, age group, and purchasing motivations. Matplotlib was used to visualize the top 10 features.

F. Tools and Technologies Used

- **Google Forms:** Primary data collection.
- **Google Colab:** Python code execution.
- **Python:** Data processing and machine learning implementation.
- **Pandas:** Data cleaning, manipulation, and analysis.
- **Scikit-learn:** Data encoding, classification algorithms, and model evaluation.
- **Matplotlib:** Feature importance visualization.
- **CSV and Excel:** Dataset handling and saving model comparison and feature importance results.

VI. RESULT AND DISCUSSION

A. Machine Learning Model Performance

Three machine learning algorithms, namely Logistic Regression, Decision Tree, and Random Forest, were implemented to analyse self-reported BNPL spending behaviour. From 110 survey responses, 73 respondents who reported previous BNPL usage were selected for predictive modelling. A total of 19 input features were used, including age, gender, occupation, BNPL usage frequency, awareness, and reasons for using BNPL services.

Five-fold stratified cross-validation was employed to evaluate model performance using accuracy and F1score.

TABLE I. COMPARATIVE PERFORMANCE OF MACHINE LEARNING MODELS

Algorithm	Accuracy (%)	F1-Score (%)
Majority-Class Baseline	82.29	90.26
Logistic Regression	59.05	71.86
Decision Tree	68.67	76.69
Random Forest	72.76	84.12

Among the three machine learning algorithms, Random Forest achieved the highest mean accuracy of 72.76% and F1-score of 84.12%. However, the majority-class baseline achieved higher accuracy and F1score than all three machine learning models. These findings indicate that the evaluated algorithms did not demonstrate predictive improvement over the baseline on the available dataset.

B. Feature Importance Analysis

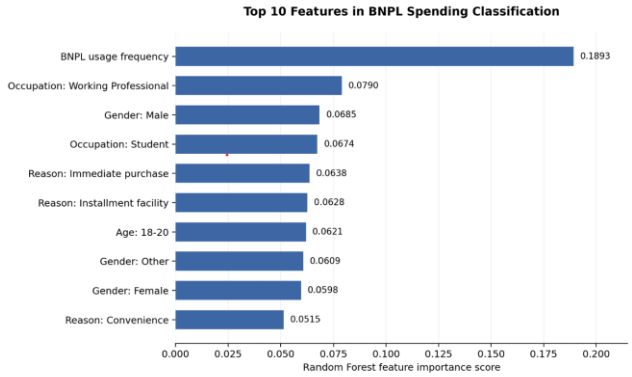


Fig. 1. Top ten feature importance scores obtained from the Random Forest classifier.

Random Forest feature importance analysis was performed to identify the input variables most frequently used by the fitted model for predicting self-reported increases in BNPL spending. BNPL usage frequency received the highest importance score (0.1893), followed by working professional occupation (0.0790), male gender (0.0685), student occupation (0.0674), and immediate purchase motivation (0.0638).

These findings suggest that usage frequency, demographic characteristics, and purchasing motivations contributed to the model's predictions. However, feature importance scores do not establish causal relationships, and their stability is limited by the small dataset.

VII. CONCLUSION

This study investigated the influence of Buy Now, Pay Later (BNPL) services on youth spending behaviour and financial

decision-making using survey-based analysis and machine learning techniques. Primary data were collected from 110 respondents, of whom 73 reported previous BNPL usage. The survey findings indicated that a substantial proportion of respondents perceived BNPL services as contributing to impulsive purchases, increased spending, and changes in purchasing behaviour.

Three machine learning algorithms, namely Logistic Regression, Decision Tree, and Random Forest, were implemented to predict self-reported increases in spending. Among these algorithms, Random Forest achieved the highest mean cross-validation accuracy of 72.76% and F1-score of 84.12%. However, the majority-class baseline achieved higher performance, highlighting the limitations of predictive modelling on a small and imbalanced dataset.

Feature importance analysis identified BNPL usage frequency as the highest-ranked variable in the Random Forest model. Overall, the study demonstrates the application of AI and machine learning techniques to analysing BNPL-related consumer behaviour while emphasizing the need for larger datasets and more reliable predictive models.

VIII. REFERENCES

[1] S. Maesen and D. Ang, “Buy Now, Pay Later: Impact of Installment Payments on Customer Purchases,” 2024/2025.

[2] F. Aidala, G. Kosar, D. Mangrum, and W. van der Klaauw, “Understanding Consumer Demand for Buy Now, Pay Later,” 2024/2025.

[3] S. Sangeetha, A. Latha, and M. Jayadev, “Buy Now, Pay Later (BNPL) and Generation Z: A Machine Learning Approach to Spending Behavior and Financial Well-Being,” 2025.

[4] S. Kumar and J. K. Nayak, “Exploring Buy-Now-Pay-Later Adoption Among E-Retail Consumers: A User's Gratification Perspective,” 2025.

[5] M. Pareek, R. Soni, S. Sharma, V. Gupta, and S. Bhadauria, “Designing Responsible Credit: Insights from Buy Now Pay Later Usage in India,” 2025.

[6] N. Singh and S. Sahni, “The Psychological Drivers Behind BNPL Usage: Strategic Insights for Retail Marketing and Customer Retention,” 2025.

[7] R. Ashby et al., “The Influence of the Buy-Now-Pay-Later Payment Mode on Consumer Spending Decisions,” 2025.

[8] Y. Jiang, R. Liu, R. Ma, and Y. Ming, “To What Extent Does BNPL Usage Promote Irrational Purchase and Reduce Price Sensitivity among Young Online Consumers?,” 2025.

[9] C. K. Behera, V. Astvansh, and P. K. Kopalle, “Buy Now, Pay Later: AI, Inherent Tensions, and Implications,” 2025.

[10] A. Udayakumar, “Consumer Payment Behavior in India: A Comparative Study of BNPL and UPI in Metropolitan South India,” 2026.

[11] G. Gopinath and K. Jayaprakasam, “Beyond the Checkout: What Shapes the BNPL Narrative for Young Consumers in India?,” 2026.

[12] M. Wang and M. C. S. Wong, “Financial Literacy, Financial Vulnerability, and Buy Now, Pay Later Use,” 2026.

[13] V. Das, “Buy Now, Pay Later Use and Financial Well-Being: Does Financial Literacy Matter?,” 2026.

[14] M. A. Al-Sharafi et al., “A Longitudinal Consumer Feedback Analytics Approach for Theory Building and Testing: Examining Consumer Satisfaction and Loyalty in BNPL Platforms,” 2026.

[15] S. Bahadori and A. Hassanzadeh, “A Comprehensive Literature Review on AI-Based Credit Assessment in Digital Lending,” 2026.

[16] A. Goyal, P. Khamar, and S. Shah, “The Impact of Buy-Now-Pay-Later Schemes on Young Consumers' Spending Patterns: An Economic Perspective,” 2026.

[17] E. M. Cervellati, U. Filotto, D. Sgrulletti, and G. P. Stella, “Buy Now Pay Later Consumer Credit Behavior: Impacts on Financing Decisions,” 2026.

[18] D. S. Kanaujia, “The Impact of Buy-Now-Pay-Later Services on Young Adults’ Spending Behavior,” 2026. Xu H .Practical Analysis of Information-based Teaching Methods in Ecommerce Courses.Journal of Educational Research and Policies, 2025,7(10):110-113.