

AI-POWERED EXPENDITURE PREDICTION PLATFORM  
BASED ON PERSONALIZED CONSUMER BEHAVIOR USING  
M-PESA TRANSACTIONS.

# OUTLINE



- Project Overview
- Business Problem
- Objectives & Research Questions
- Data
- Visualizations & Model Incorporated
- Recommendations
- Next Steps

# PROJECT OVERVIEW



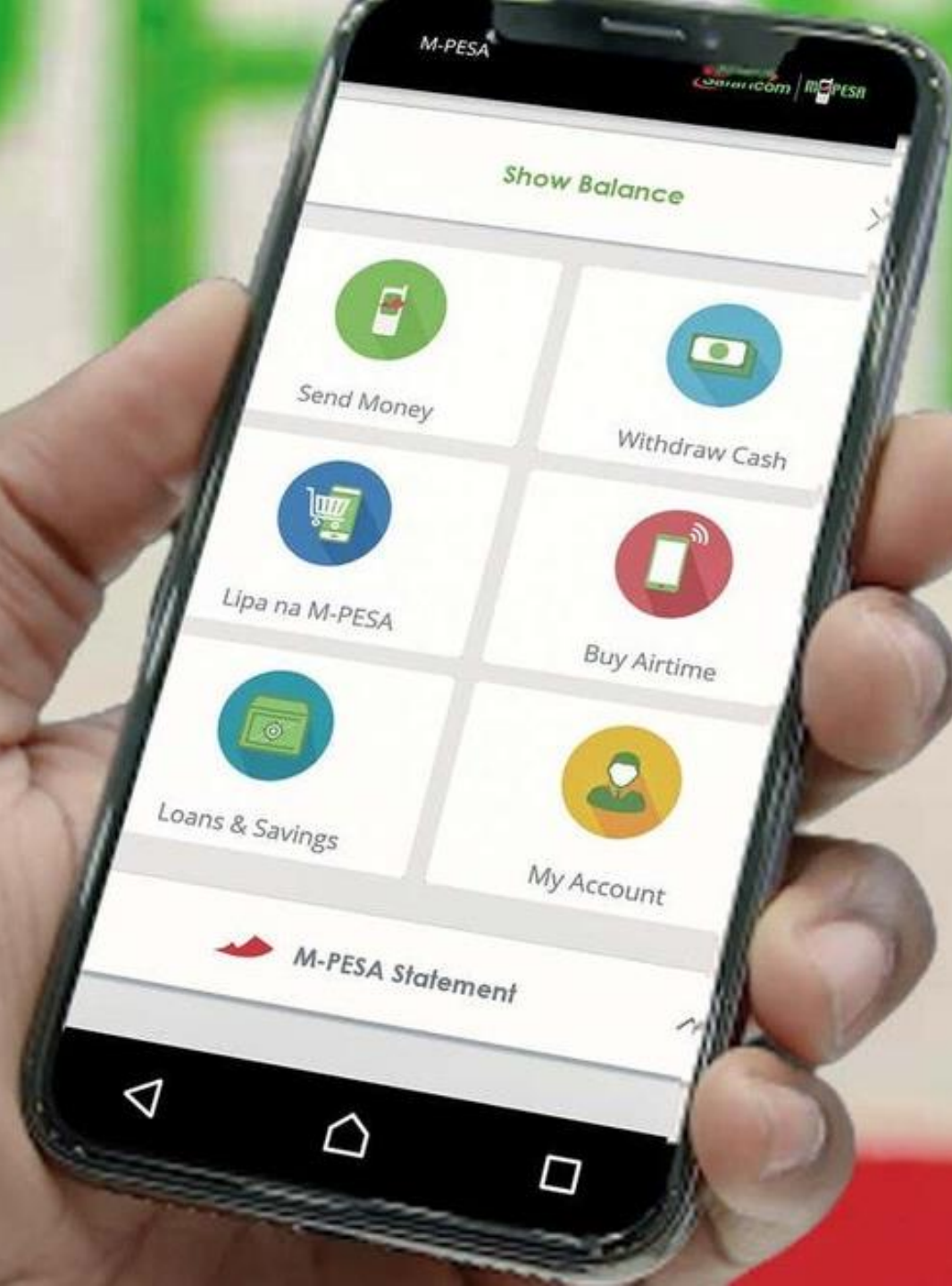
The primary goal of this project is to use **M-PESA transaction data** to analyze consumer expenditure patterns and predict future spending behavior. Leveraging on predictive models, such as ARIMA and deliver personalized insights that can inform business strategies. The goal is to help Safaricom understand **how** and **why** consumers spend, to improve services and marketing.



The analysis extracts insights regarding consumer behavior from M-PESA transactions. These insights include **monthly spending trends, top spending categories**, and **predictions** of future behavior, allowing Safaricom to tailor services, improve marketing efforts, and offer personalized financial planning tools for consumers.

# BUSINESS PROBLEM

- Safaricom has access to a large volumes of **M-PESA transaction data** and might not be fully utilizing this data to personalize services and enhance customer engagement.
- Without using **predictive** analytics, Safaricom risks offering generic marketing, missing customer spending trends, and losing opportunities for targeted advertising, customer retention, and revenue growth through cross-selling and upselling.



## Specific Objectives

## Research Questions



**Analyze Spending Patterns:** Identify & understand key trends in monthly spending and expenditure categories from M-PESA transaction data.

What are the **top categories** of consumer expenditure based on M-PESA transaction data?



**Predict Future Expenditures:** Forecast future spending behavior using time series models (such as ARIMA) for personalized financial planning.

How do monthly income and expenditure trends fluctuate for different consumers, and what factors influence these trends?



**Enhance Targeted Marketing:** Leverage consumer behavior insights to deliver personalized and relevant marketing content, improving customer engagement and retention.

Can predictive models accurately forecast future consumer spending, and how can these predictions be used to enhance Safaricom's **targeted advertising**?

# DATA

## Data Source

- **Platform:** Mpesa Statements.
- **Timeframe of Data Collection:** 6 months.

## Data Volume

- **Data Analyzed:** 6 months worth of transactions.

## Data Features

- **Columns Featured:** Receipt Number, Completion Time, Details, Paid In, Paid Out (Withdrawn) & Balance.



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Customer Name: WANZA KALELI  
Mobile Number: 0716357188  
Statement Period: 1st January 2020 - 31st December 2022  
Request Date: 10th January 2023

### SUMMARY

TRANSACTION TYPE	PAID IN	PAID OUT
Send Money	0.00	502,614.00
Received Money	540,516.64	0.00
Agent Deposit	242,295.00	0.00
Agent Withdrawal	0.00	171,527.00
Lipa na Mpesa (PAYBILL)	472.47	92,462.00
Lipa na Mpesa (Buy Goods)	0.00	24,615.00
Others	84,097.00	96,861.51
Total	887,381.31	888,081.51

### DETAILED STATEMENT

Total Transactions: 1,713

Receipt No.	Completion Time	Details	Transaction Status	Paid In	Withdrawn	Balance
QLU8C02WES	2022-12-30 15:32:09	Airtime Purchase	Completed	0.00	32.00	300.80
QLQ82BG77A	2022-12-26 11:01:31	Airtime Purchase	Completed	0.00	100.00	332.80
QLQ821LMGG	2022-12-26 09:30:03	Pay Bill Charge	Completed	0.00	17.00	432.80
QLQ821LMGG	2022-12-26 09:30:03	Pay Bill to 804040 - M-GAS LIMITED Acc. 4768919	Completed	0.00	200.00	449.80
QLQ81YWW7M	2022-12-26 08:50:16	Pay Bill to 247247 - Equity Payroll Account Acc. 0*****3735	Completed	0.00	140.00	649.80
QLG51XKHB7	2022-12-26 08:30:00	Term Loan Repayment for HFund	Completed	0.00	211.55	789.80
QLP92YMTOP	2022-12-25 17:31:59	Funds received from 254*****1516 - PAULINE ABED	Completed	1,000.00	0.00	1,001.35

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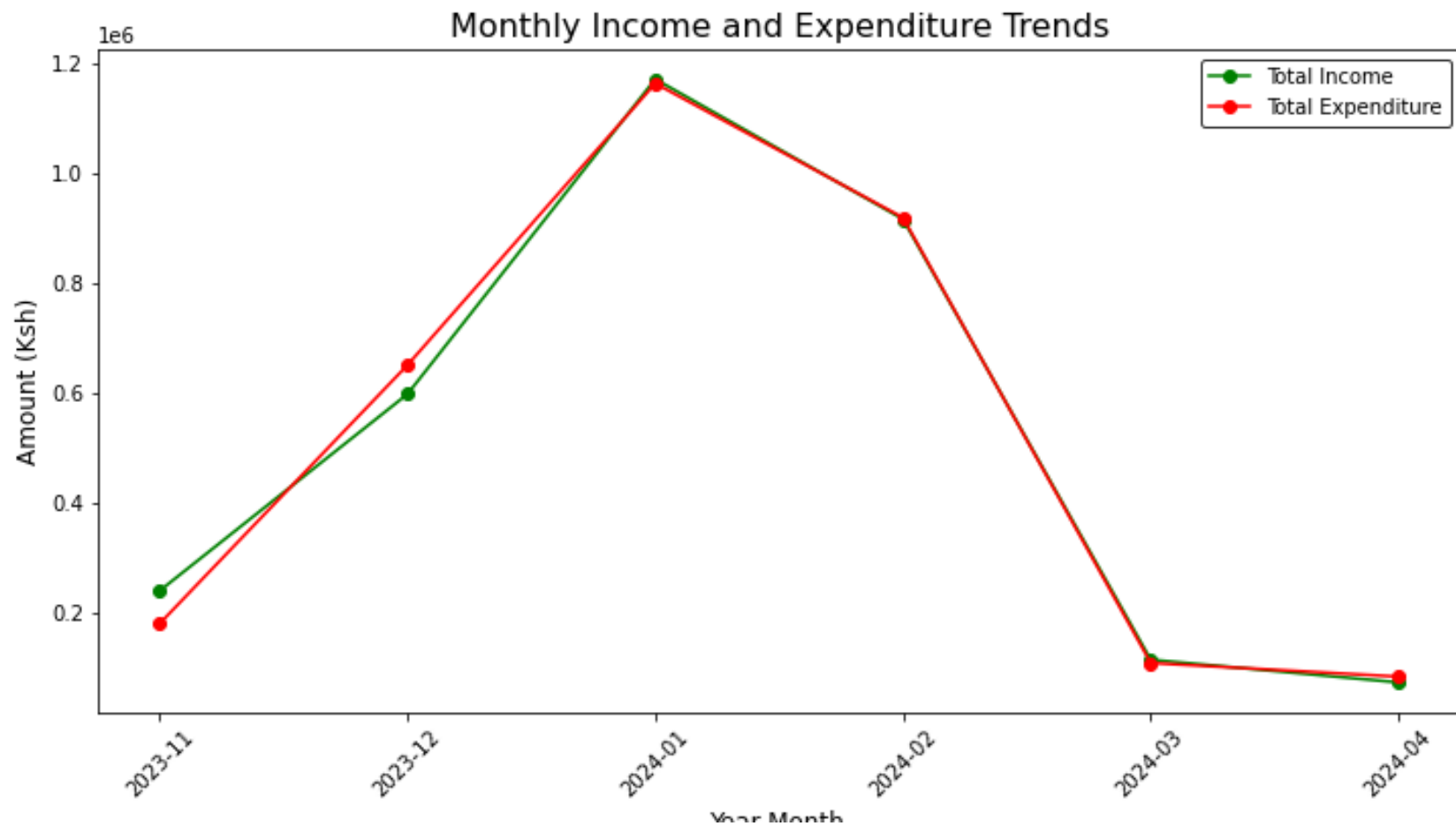
Statement Verification Code  
**6RRUTFTA**

To verify the validity of this M-PESA statement dial \*334#, select My Account and follow prompts to enter the code

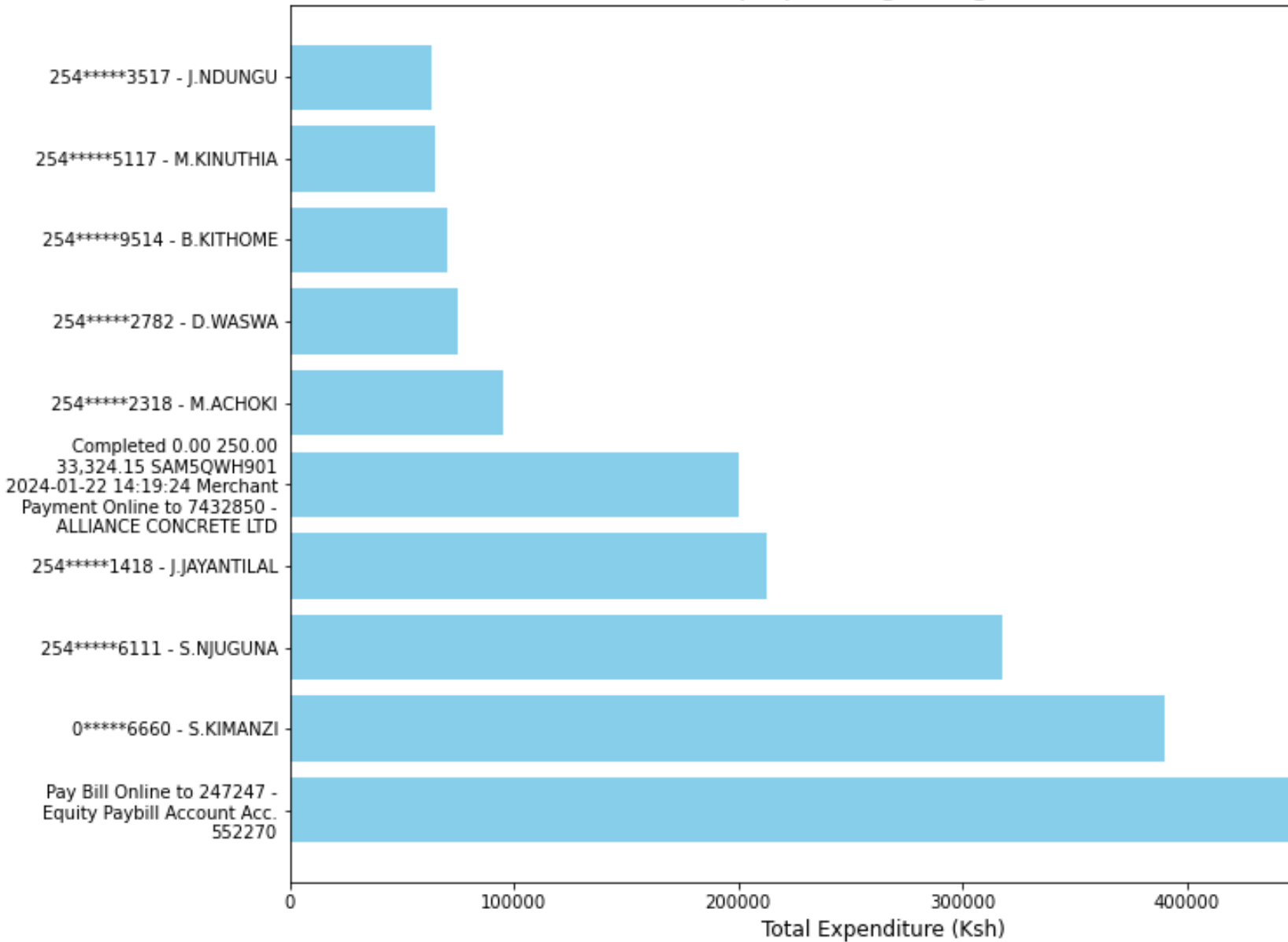


For self-help dial \*334# | Web: [www.safaricom.co.ke](http://www.safaricom.co.ke) | Twitter: @SafaricomPLC | Facebook: Safaricom PLC | Terms and conditions apply

# MONTHLY INCOME & EXPENDITURE TRENDS

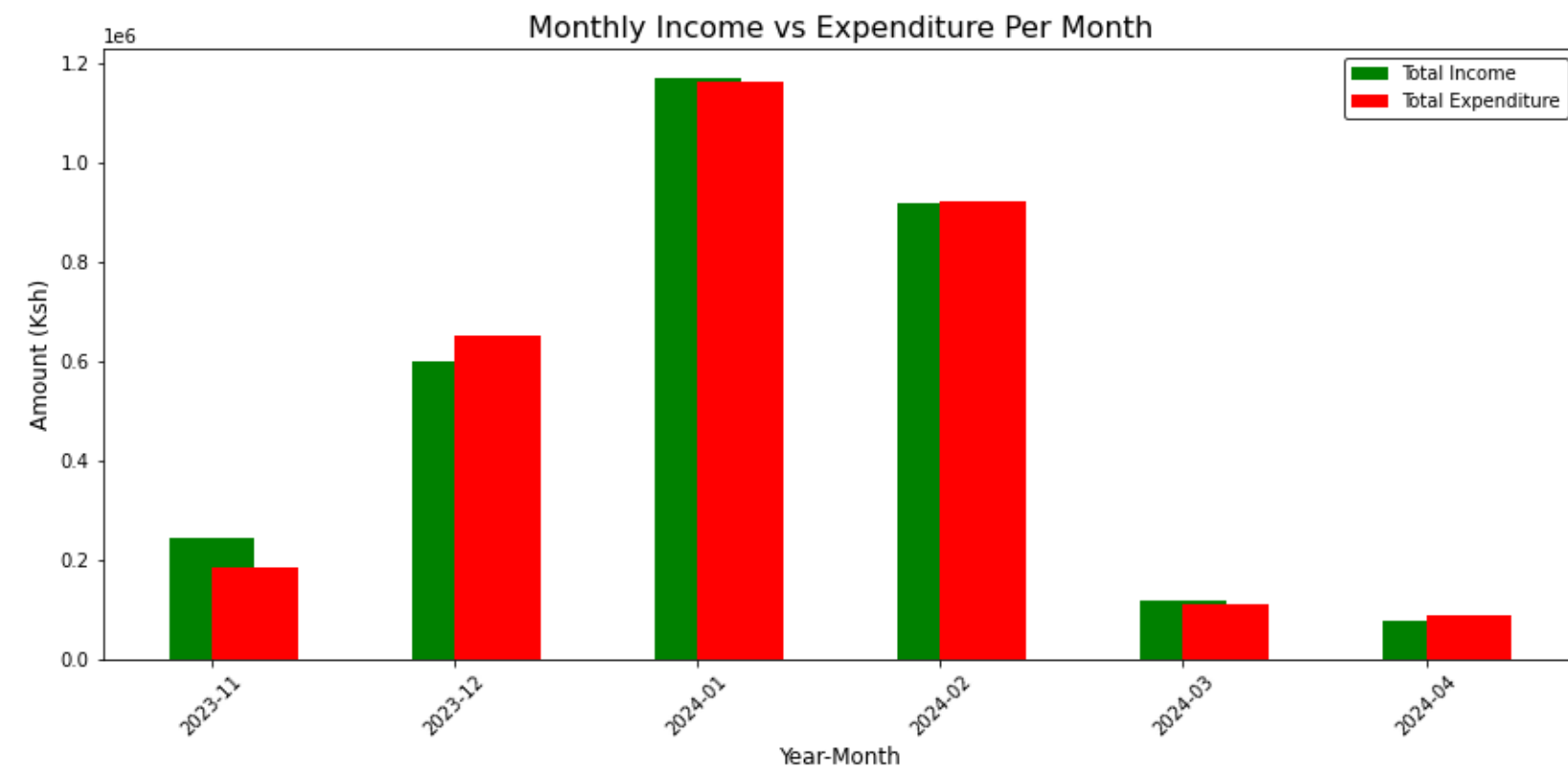


Top Spending Categories

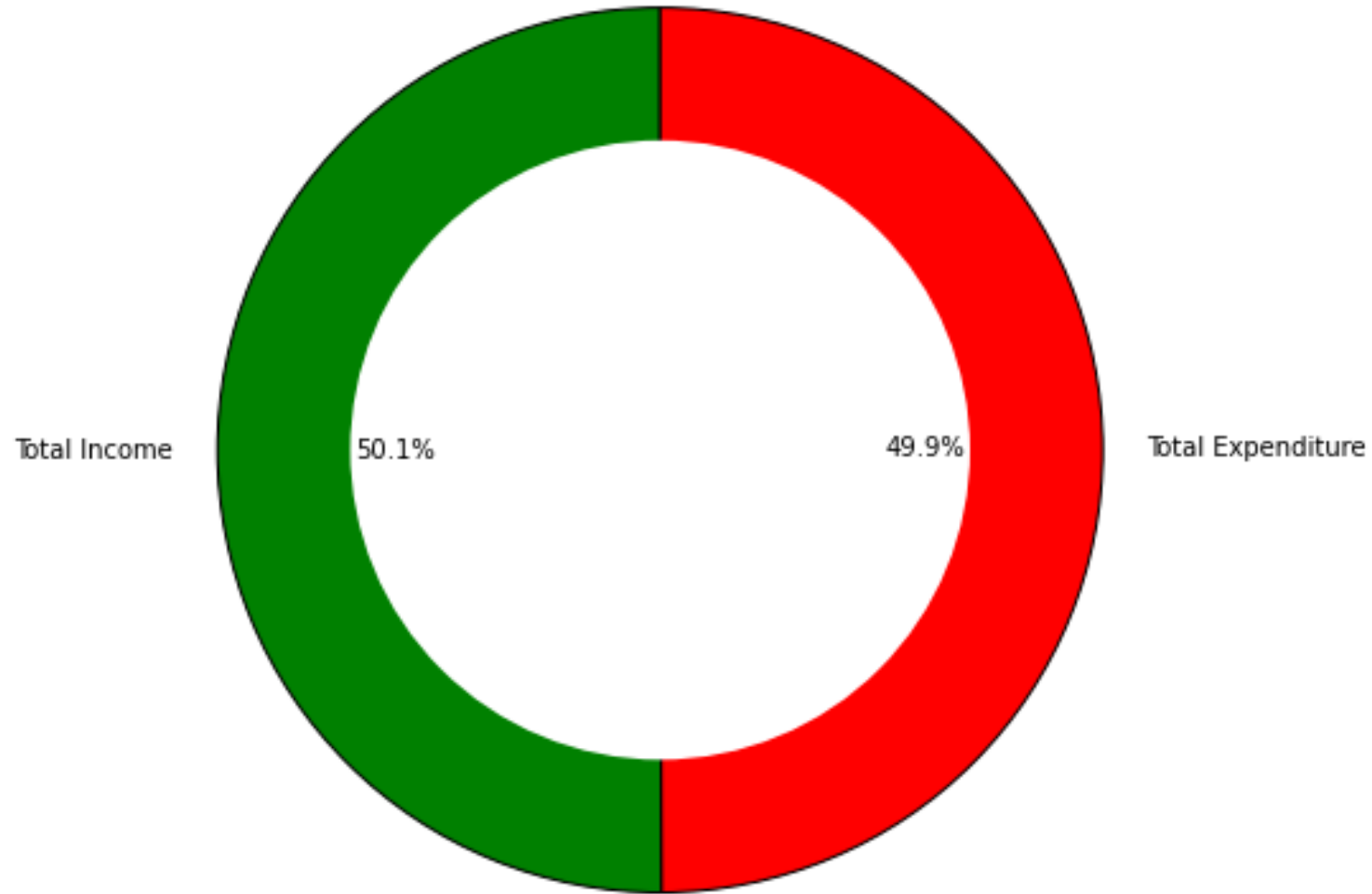


TOP  
SPENDING  
CATEGORIES

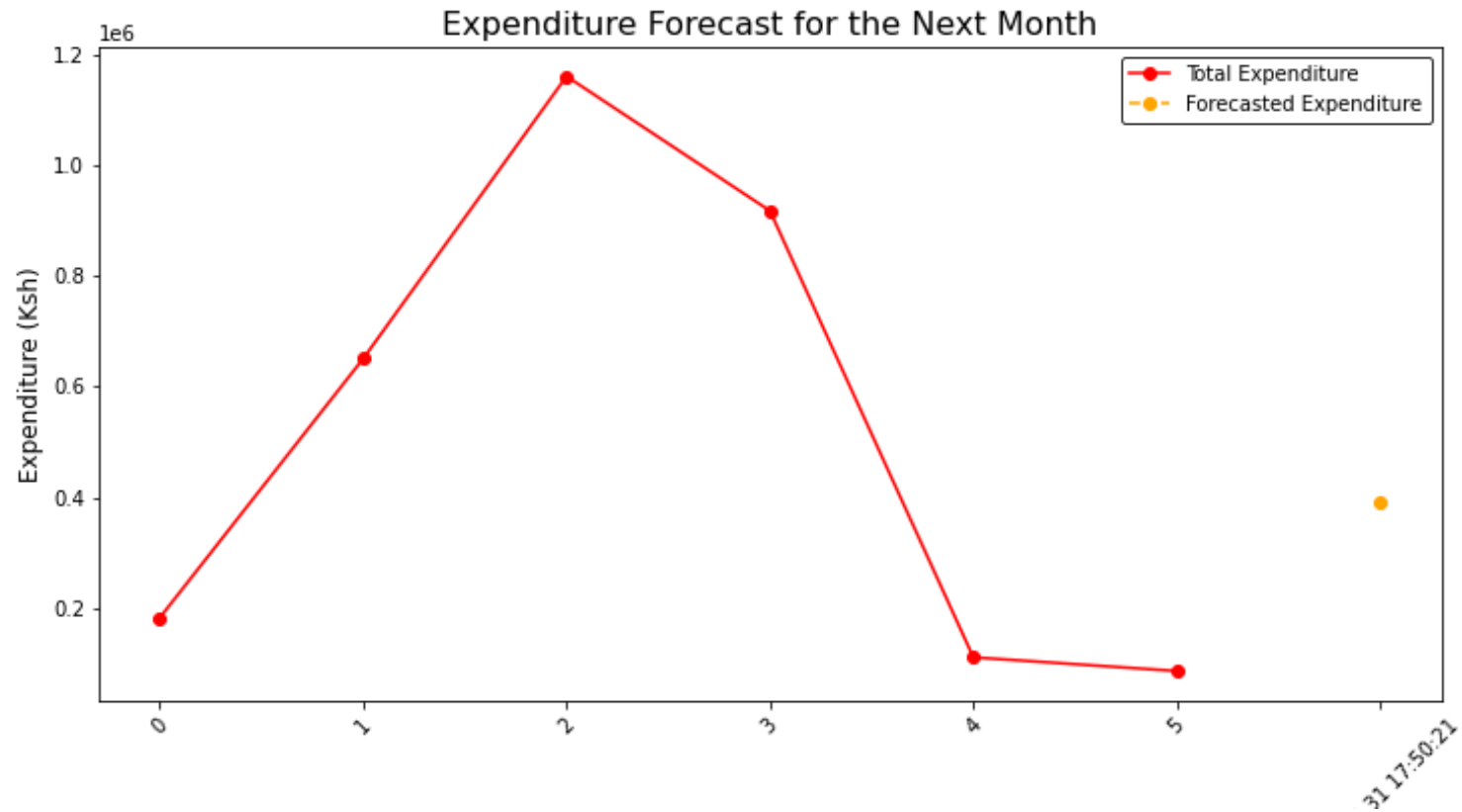




MONTHLY  
INCOME  
VS  
EXPENDITURE  
PER MONTH




DONUT CHART  
FOR  
INCOME VS  
EXPENDITURE (%)




# ARIMA PREDICTION MODEL

# RECOMMENDATIONS

Safaricom should segment consumers into Thinkers (25%), Drivers (30%), Expressives (20%), and Feelers (25%) based on transaction data. Thinkers get logic-based content, Drivers get convenience-focused offers, Expressives get lifestyle content, and Feelers get emotional appeals. This targeted approach increases engagement and conversion rates.

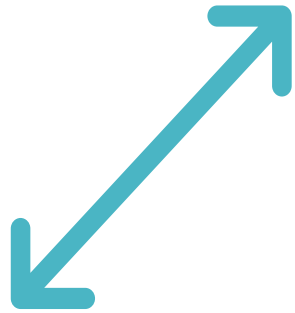


Use ARIMA/SARIMA models to predict spending with **80% accuracy**. This can be used while **incorporating & training A.I** to increase customer engagement by **10%** through personalized offers. Offering financial services like micro-loans during spending spikes could raise revenue by **5%**. Forecast-driven marketing boosts retention and revenue growth.



Focus on high-spending categories like utilities and retail to drive personalized cross-selling and upselling, which could increase revenue by 10-30%. Offering targeted discounts and loyalty programs could boost customer engagement by 15-25%. Partnerships with merchants in top categories could raise transaction volumes by 20-35%, encouraging more spending.

## NEXT STEPS



### **Expand Training Data**

Expanding the training data from 6 months to a full year could improve expenditure prediction accuracy by 10-20%. Currently, the model predicts one month with high accuracy, and with more data, it could reliably forecast 3, 6, or 12 months. This would greatly enhance long-term financial insights.



### **Integrate Feedback Mechanism**

Continuously collect new transaction data to refine and improve the predictive model's accuracy over time. This will ensure that the model adapts to changing consumer behaviors and market conditions, increasing prediction reliability.



THANK YOU



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## CONTACT DETAILS



- [Lorrah N - lorrah.ngine@student.moringaschool.com](mailto:lorrah.ngine@student.moringaschool.com)