BITATHON - 2025

Enhancing Digital Payment Adoption to Drive Financial Inclusion

MAVERICKS

Problem Statement

Despite the rapid expansion of digital financial services, a significant portion of the global population—particularly low-income groups, women, and rural communities—remains financially excluded. Lack of access to digital payment infrastructure, financial literacy, and trust in digital transactions prevents these populations from fully participating in the formal financial system

Objective

To develop data-driven insights and predictive models that identify key barriers and enablers of digital payment adoption, enabling policymakers, financial institutions, and fintech companies to design inclusive, scalable, and sustainable digital financial solutions

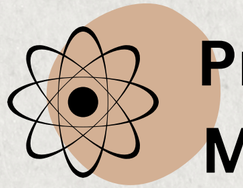
Methodology

Data Preparation & Cleaning

- Importing dataset
- Selection of relevant variables
- Handling data issues

Descriptive Analytics & Correlation

- Correlation matrix
- Variable interdependency
- Visualizations



Predictive Modelling

- Predicting likelihood of adoption

Data Preparation & Cleaning

Importing Datasets

Importing dataset and stroing as country_agg_data & country_databank

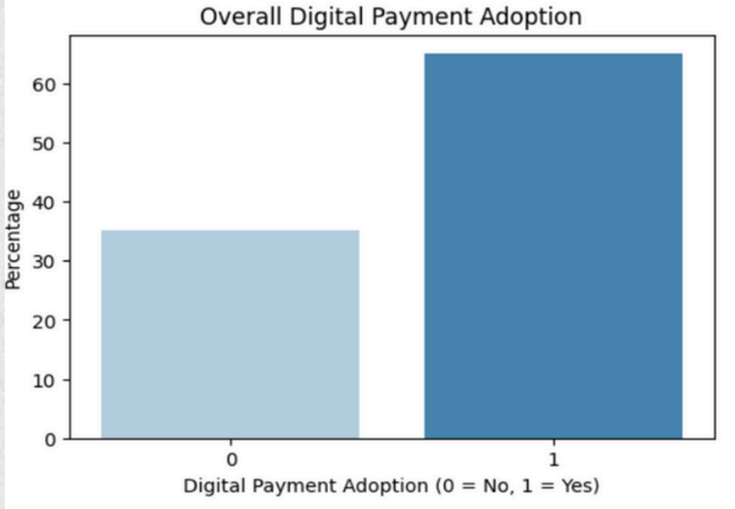
Selection of relevant variables

1. Demographic data (economy, regionwb, age, female, inc_q, edu),
2. Digital payment adoption indicators (anydigpayment, pay_utilities),
3. Enabling factors (internetaccess, mobileowner),
4. Time (Year)

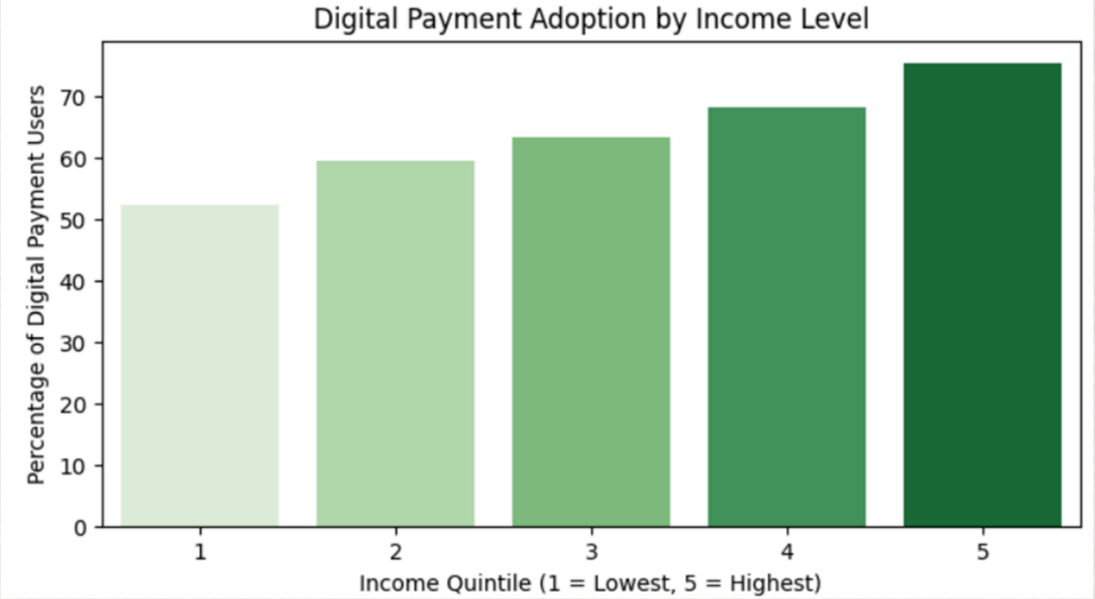
Handling data issues

1. Convert categorical columns to binary values for gender, internetaccess, mobileowner
2. Removal of entries with edu values of 4 and 5
3. Random Forest Regressor to impute missing values of age. Model trained on 80% of data with features gender, inc_q, edu, internetaccess, mobileowner, anydigpayment
4. Bucketing of age allows easier interpretation

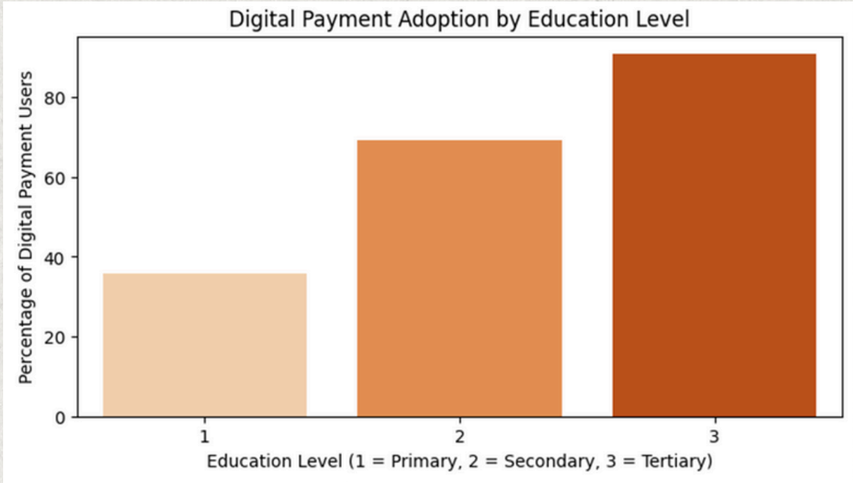
Descriptive Analytics



76% of individuals in the dataset reported using digital payments indicating a 76% digital payment **adoption rate**

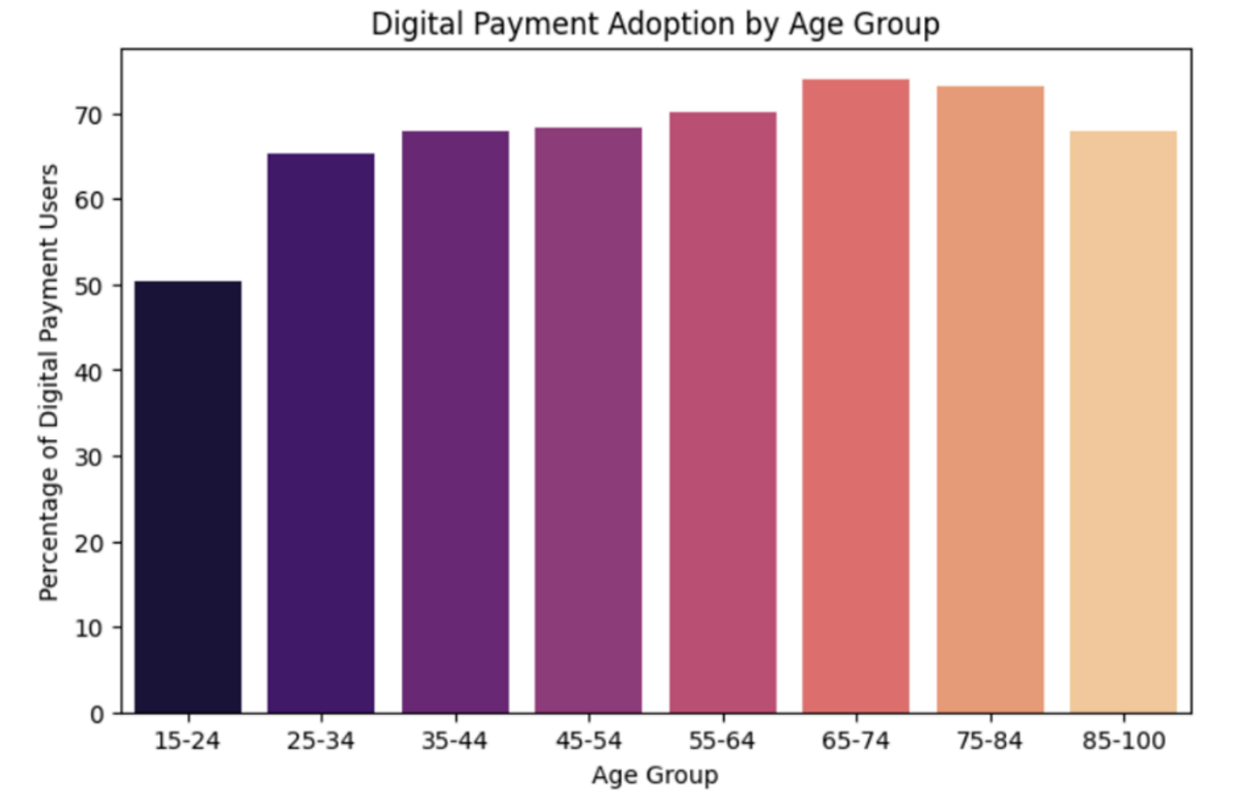


Education level is a significant predicator of the digital payment adoption rate



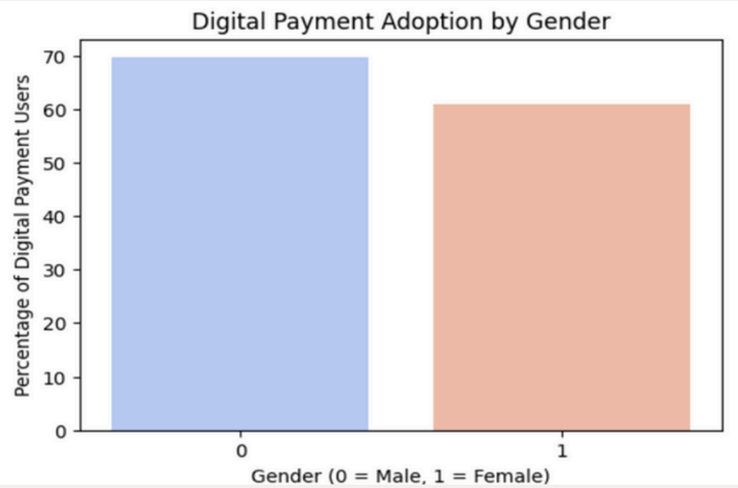
Higher-income individuals had significantly higher adoption rates. While low adoption levels were expected in the lower income groups, among those in the highest quintile of income the adoption level is still only around 73%, which indicates **reluctance to adopt digital payment methods** even among those earning the most

Descriptive Analytics

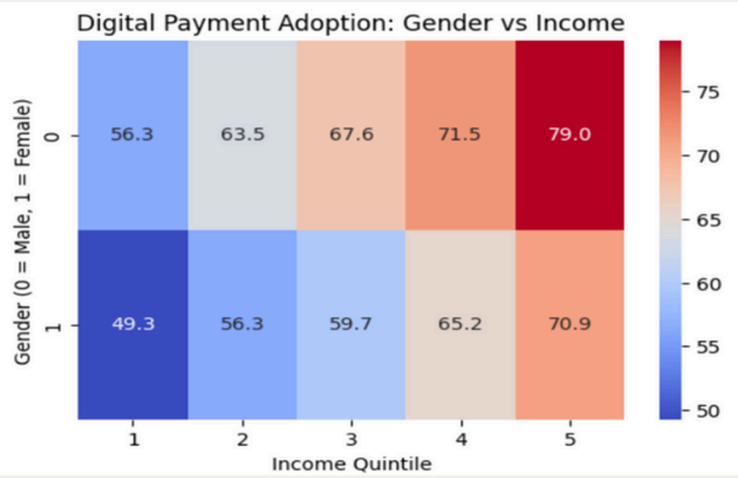


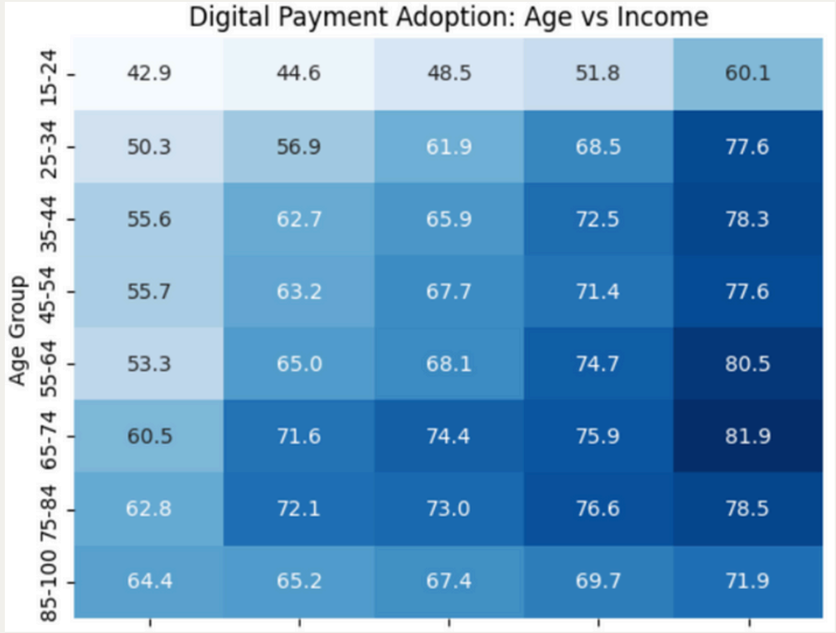
Adoption of digital payments rises from the 15–24 age group (about 50%) to the 65–74 and 75–84 age groups (over 70%), according to the bar chart that depicts this trend. There is a modest **reduction** in the **85–100** age range, which could be caused by technological hurdles. This implies that younger users are not the only ones driving the growth of digital payments, underscoring the need for financial technology solutions that are age-inclusive

Descriptive Analytics

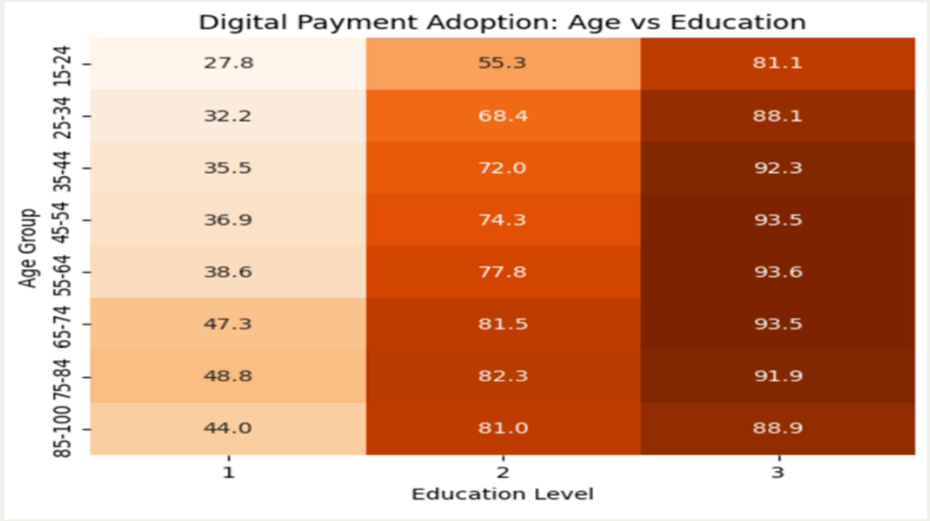


Males showed a higher adoption rates of about 70% compared to females at 60%.





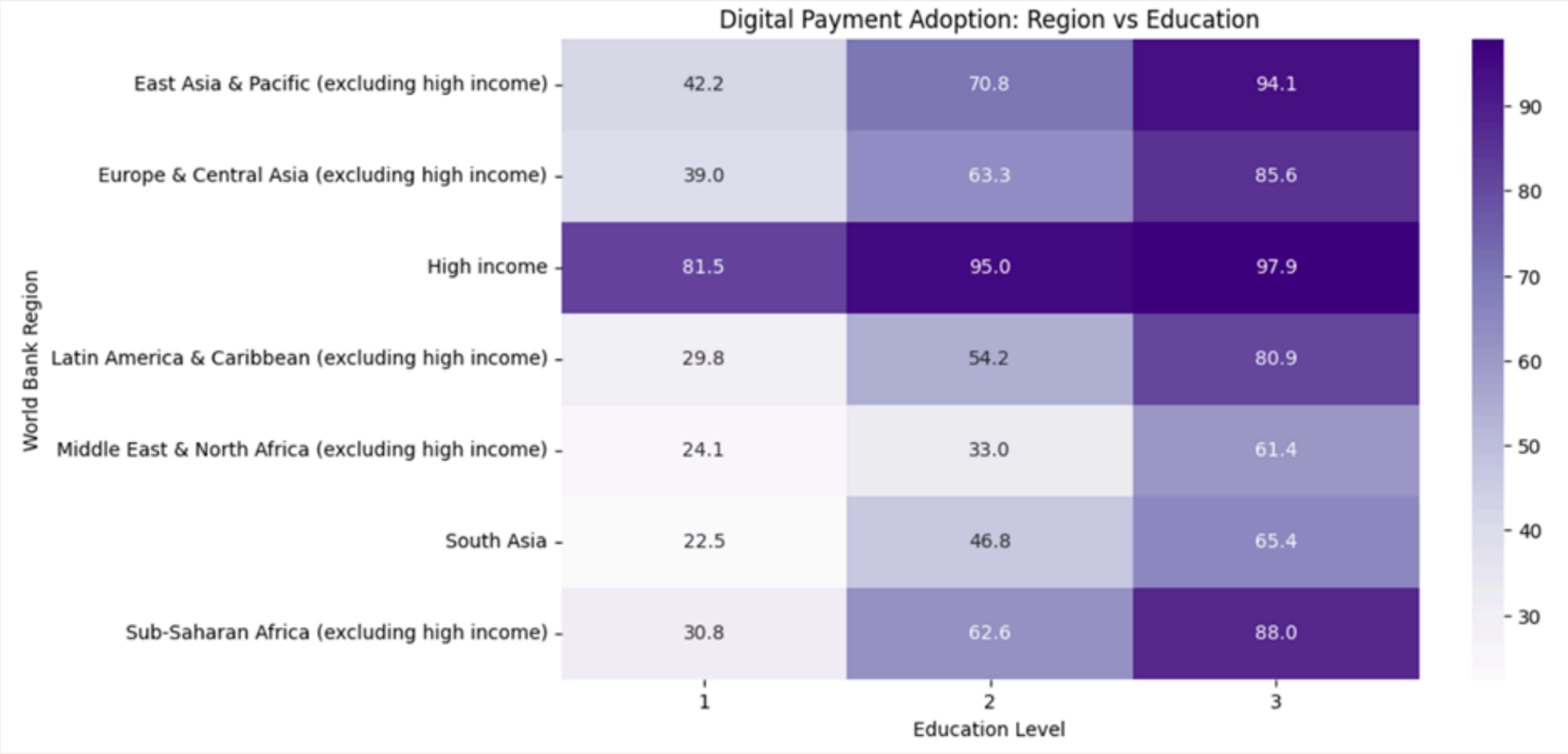
Across all age categories, **adoption rates often rise with income**, suggesting a close relationship between financial capability and the use of digital payments



Adoption is substantially lower among those with the **least amount of education**, especially in the younger and older age groups

Descriptive Analytics

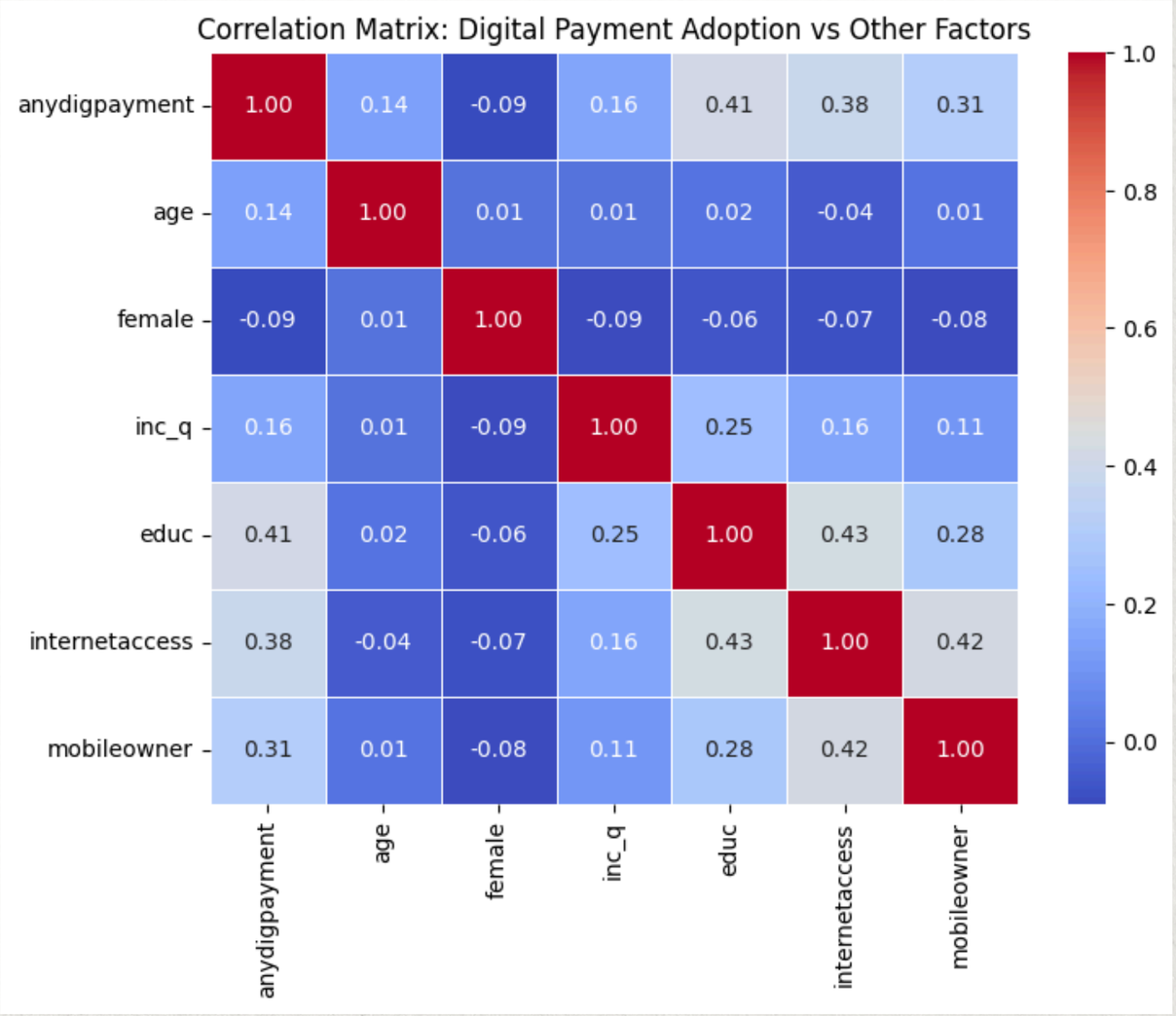
- **High-Income Countries** show the **highest adoption rates**
- Developing Regions (e.g., South Asia, Sub-Saharan Africa, and the Middle East & North Africa) exhibit lower adoption rates
- Bridging the digital payment gap in lower-income regions may require targeted interventions in financial literacy, digital infrastructure, and access to banking services, particularly for those with lower education levels



Descriptive Analytics

Education (0.41) and **internet access (0.38)** show the **highest positive correlation** with digital payment adoption, suggesting that higher education levels and internet connectivity significantly enhance digital payment usage

While higher income levels generally promote digital payment use, the impact is less pronounced compared to education and internet access



Predictive Modelling

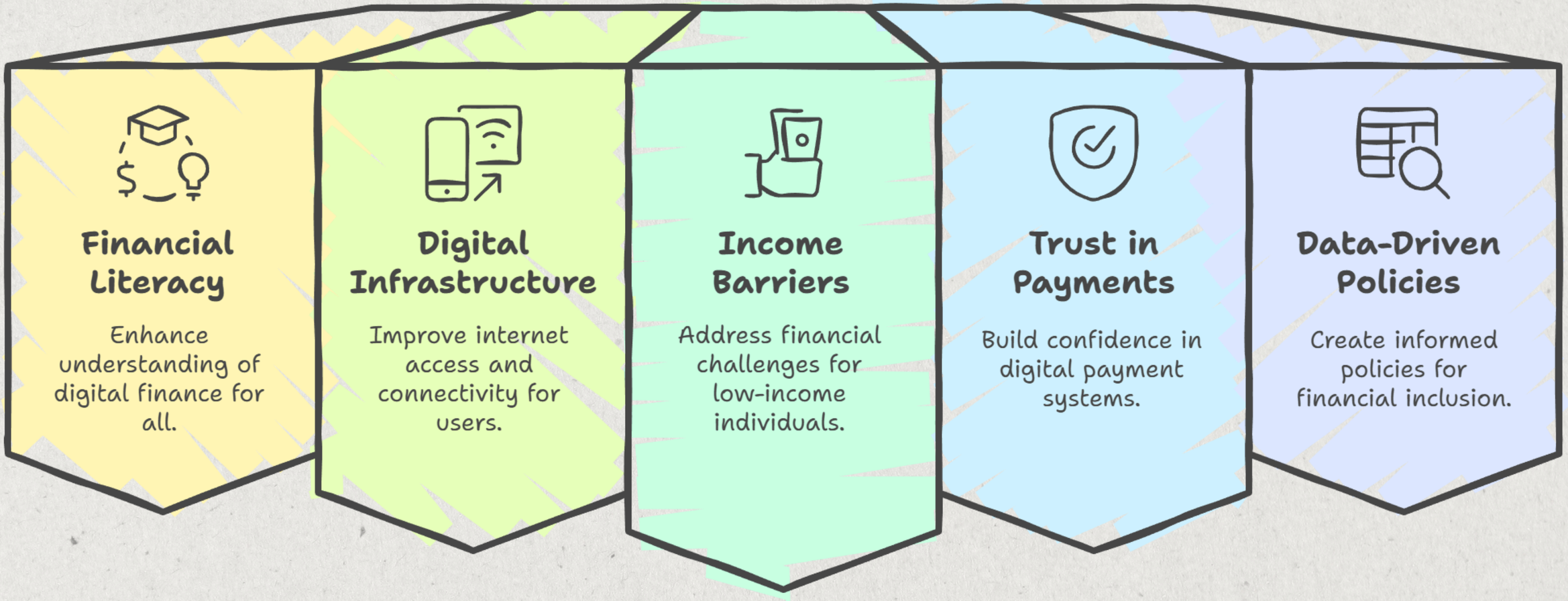
Allows for the estimation of the likelihood of an individual adopting digital payments based on key demographic and financial indicators.

Independent variables: age, gender, income level, education, internetaccess, mobileowner
Target variable: anydigpayment (Utilized for adoption pattern)

Decision tree is selected due to higher accuracy (76%), higher Recall for 0-class (62%) ensuring that people who truly don't use digital payments are correctly identified.

Model	Accuracy	Precision (0)	Precision (1)	Recall (0)	Recall (1)	F1-score (0)	F1-score (1)
Logistic Regression	0.7584	0.70	0.78	0.54	0.87	0.61	0.82
Decision Tree	0.7599	0.67	0.80	0.62	0.83	0.64	0.82
Random Forest	0.7548	0.68	0.79	0.57	0.85	0.62	0.82
XGBoost	0.7628	0.69	0.80	0.59	0.86	0.64	0.82

Recommendation Strategy



Recommendation Strategy

Financial Literacy and Digital Education

- Collaborate with educational institutions to integrate digital finance modules into curriculums
- Targeted financial literacy campaigns among lower-income and less-educated populations

Digital Infrastructure & Internet Access

- Encourage affordable smartphone access and digital banking solutions
- Governments investing in internet connectivity, particularly in underserved rural and low-income regions

Overcome Income-Related Barriers

- Design financial products with minimal transaction fees to encourage adoption

Strengthen Trust in Digital Payments

- Increase awareness and transparency about data security and digital transactions
- Implement robust consumer protection policies to safeguard users from fraud

Data-Driven Financial Inclusion Policies

- Encourage regulatory frameworks that promote digital payment adoption while ensuring security and accessibility
- Develop region-specific policies based on adoption trends and barriers identified in the study
- Utilize machine learning insights from the study to create targeted policy interventions

Thank you very much!