Future of Payments and Fintech Analytics in Africa (2011–2030). *Analyzing the evolution of cash and digital payment systems, customer retention, and fraud risk across key African markets.*

Despite the rapid digital transformation across Africa, millions still rely on cash for daily transactions. Meanwhile, mobile money, online banking, and fintech apps are reshaping how people pay, save, and transfer money. However, with innovation comes new challenges, including fraud exposure, digital inequality, and customer retention issues for countries South Africa, Ghana, Kenya, Tanzania and Nigeria.

This analysis explores the evolution and projected future of digital financial services across these five African countries. It focuses on the growth of digital payment adoption, fraud risk trends, and user retention to help decision makers understand where the greatest opportunities and risks lie in the transition toward a cashless economy.

We sought to explore the following:

1. How payment systems have evolved from 2011 to 2030 (historical + forecasted trends).
2. Which countries are leading or lagging in digital payment adoption.
3. The relationship between fraud, risk exposure, and retention rates.
4. Insights that can help policymakers, fintech startups, and investors build safer, more inclusive financial ecosystems.

This project simulates real-world datasets commonly collected from:

- World Bank Global Findex Database
- GSMA Mobile Connectivity Index
- IMF & World Bank GDP Indicators
- Industry Reports from African Fintech Hubs

(Some synthetic data was generated to demonstrate analytical and visualization techniques using Excel, Power BI, and MySQL for portfolio purposes.)

Expected Outcomes

- *Identify key trends in digital adoption from 2011–2030*
- *Assess fraud and risk exposure patterns*
- *Evaluate fintech customer retention dynamics*
- *Provide actionable insights for stakeholders*

For this project, some data was simulated based on real-world trends from global financial inclusion and fintech sources (World Bank, IMF, GSMA). To protect real fintech data I have

worked with and since real open APIs for African payment datasets are limited, we generated a synthetic dataset that mirrors realistic growth, fraud, and retention patterns.

Data used and steps executed:

1. *Identified and collected raw data (CSV)*
2. *Consolidated data from multiple sources (GDP, digital usage, fraud stats).*
3. *Cleaned, validated, and stored data for analysis.*
4. *Exported dataset into Excel.*

- *Year*
- *Country*
- *GDP Growth (%)*
- *Account ownership (%)*
- *Mobile subscriptions (%)*
- *Internet use (%)*
- *Fraud rate (%)*
- *Risk score*
- *Retention rate (%)*
- *Cohort year*
- *Year*
- *Cohort size*
- *Retention (%)*
- *Churn (%)*

We then created a MYSQL database where we would store the excel sheet data in as following:

```
CREATE DATABASE fintech_africa;


USE fintech_africa;


CREATE TABLE fintech_main (

    Country VARCHAR(50),
```

```
    Year INT,
    GDP_Growth FLOAT,
    Account_Ownership FLOAT,
    Mobile_Subscriptions FLOAT,
    Internet_Use FLOAT,
    Fraud_Rate FLOAT,
    Risk_Score FLOAT,
    Retention_Rate FLOAT,
    Cohort_Year INT
);


CREATE TABLE retention_cohorts (
    Country VARCHAR(50),
    Cohort_Year INT,
    Year INT,
    Cohort_Size FLOAT,
    Retention FLOAT,
    Churn FLOAT
);
```

Before analyzing or visualizing anything, I ensure that the dataset is accurate, consistent, and analysis-ready by the following:

1. *Checked for missing, duplicate, or invalid values.*
    - *=COUNTBLANK(A2:Z500)*
    - *Result: No missing values were found in the generated dataset (all fields populated).*
2. *Ensured correct data types (numbers as numbers, years as integers, etc.).*

    - *Select the dataset → Data → Remove Duplicates.*
      Ensured duplicates are removed across "Country" + "Year".
    - *Result: Each country-year combination is unique.*
3. *Standardized formats*
    - *Year column is a number (not text).*
    - *Percentages are formatted as numeric with 2 decimals (e.g., 75.00%).*
    - *Country names are consistent — e.g., "Tanzania" not "United Republic of Tanzania".*
    - *Result: Consistent data types for seamless Power BI integration.*
4. *Created derived metrics that strengthen the analysis.*
    - *= (Fraud_Rate * 100) / (Retention_Rate / 100) (risk score)*
    - *= (C3 - B3) / B3 -(growth rate)*

In the "Retention_Cohorts" sheet:

- *Ensured that Cohort_Year and Year are numeric.*
- *Confirmed that Retention_% + Churn_% = 100.*
- *Result: Data behaves logically (retention decreases as churn increases).*

After cleaning, now the dataset is ready for visualization.All key metrics are consistent and comparable, risk, fraud, and retention relationships can now be analyzed confidently.

Let's examine account ownership from the different countries to understand how financial inclusion improved since 2011 using excel.

= (LastYearValue - FirstYearValue) / FirstYearValue

- *South Africa grew from ~55% (2011) → 89% (2023) = +61% growth*
- *Kenya: 40% → 87% = +118% growth*
- *Ghana: 32% → 80% = +150% growth*

Financial inclusion is accelerating fastest in emerging mobile money markets like Kenya and Ghana ,countries where fintech innovation filled banking gaps.

In mobile subscriptions,Kenya and Nigeria show mobile saturation above 100% (users often have 2 SIMs), Tanzania lags slightly but maintains steady growth. Digital infrastructure directly supports fintech adoption, strong correlation expected with account ownership and internet use.

Analyzing Internet Use (%) in these countries we found that

- *2011: Most countries <40%*
- *2023: Kenya & South Africa >80%*
- *2030 (forecast): Nigeria approaching 90%*

Improved internet connectivity is likely driving mobile banking and app-based transactions reducing reliance on cash.

Observing the fraud rate (%)

=AVERAGEIF(CountryRange, "Kenya", Fraud_RateRange)

Kenya's mobile ecosystem is advanced but more exposed to mobile money fraud.
South Africa's strong regulations keep rates moderate.
Nigeria faces higher systemic risk from online scams.

We then derived the risk score from fraud and retention

*= (Fraud_Rate * 100) / (Retention_Rate / 100)*

- *Higher fraud + low retention = high risk.*
- *Kenya & Nigeria show higher risk due to fraud exposure.*
- *South Africa remains stable due to stronger banking structure.*

Looking at the Retention Rate (%) we observed that Retention decreases slightly over time, a normal lifecycle trend.

Kenya and Ghana show the highest retention, linked to strong mobile money ecosystems.

In an economic context GDP Growth (%)

- Nigeria: volatile but strong peaks (driven by oil & digital growth).
- Ghana & Kenya: stable mid-range growth (4–6%).
- South Africa: slow but steady growth (~2–3%).

Economic stability + digital adoption = stronger fintech expansion and trust.Economically growing countries invest more in fintech ecosystems.

Using growth rate projections (based on 2011–2023 trends):

- Digital adoption is expected to grow 10–20% per year.
- Fraud rates are expected to decline slightly with stronger security.
- Retention expected to improve with customer trust and loyalty programs.
- Risk scores likely stabilize as fintech regulation improves.
- Financial inclusion is expanding rapidly — fintechs are closing the access gap

In summary:

- Kenya and Ghana are innovation leaders; South Africa is more formally banked.
- Nigeria faces the biggest fraud-related risk.
- Retention remains a key growth challenge across all markets.
- By 2030, most African adults will have access to digital payment systems.

Also wanted to observe digital adoption over time,

Used the following formula in sql

= (0.5 * [Account_Ownership_%]) + (0.3 * [Mobile_Subscriptions_%]) + (0.2 * [GDP_per_Capita] / MAX(GDP_per_Capita)) * 100

Kenya:

= (0.5 * 83) + (0.3 * 108) + (0.2 * (2300 / 7500) * 100)

= 41.5 + 32.4 + 6.1 = 80.0%

Kenya's digital payment adoption = 80%

Now moving on to create our dashboard and report

Our goal is to help stakeholders see the future of payments, who's leading, where risks lie, and how Africa's digital journey unfolds to 2030.

Our dashboard and report will come together in 4 parts, Each page telling one part of the story, from growth to risk and retention.

On page 1 of our dashboard,

Stakeholders can instantly see that by 2030, all five countries have achieved near-universal mobile and financial access, a clear signal of progress.

On Page 2 of our dashboard, the data tells us that

- South Africa = low risk, formal systems
- Kenya = innovative, but higher mobile fraud
- Nigeria = largest gap between fraud and trust

On Page 3 of our dashboard,

Retention defines sustainable fintech acquiring users is easy, keeping them is where the real growth lies.

- Cohorts fade slowly in Kenya and Ghana (strong trust).
- Nigeria shows faster churn (fraud and economic instability).
- Retention correlates with digital maturity and regulation strength.

Page 4 of dashboard,

Our report will be partly done on PowerBi and Excel, since we are currently on the standard version of PowerBi and do not yet have access to forecasting tools on Powerbi. However we will proceed to use a linear trendline formula to in excel to forecast values from 2025 to 2030 using the actuals from 2011 - 2024

=FORECAST.LINEAR(year, known_y's, known_x's)

```
=FORECAST.LINEAR(2025, $F$2:$F$81, $B$2:$B$81)
```

where F = internet use %, B = year.

Once the forecast values were calculated, I downloaded the dataset into PowerBi for visualizations supporting page 4 or our report and dashboard.

I observed the following from the visuals:

Kenya and Ghana show early acceleration (thanks to mobile money). South Africa's growth is steadier but rooted in established formal systems, Nigeria and Tanzania show late but rapid adoption post-2020.

Countries with stronger regulation (South Africa, Kenya) show steady decline.High early fraud in Nigeria indicates onboarding risk but gradual improvement.

All five countries move from risk scores above 70 (2011) to below 40 (2030), signaling stronger governance and fintech stability. Kenya shows strongest retention consistent M-PESA usage. South Africa's retention stabilizes post-2020 as digital banking grows. Nigeria's early churn rate improves after 2025 with fintech consolidation.

1. How payment systems have evolved from 2011 to 2030 (historical + forecasted trends)

- From 2011 to 2018, adoption growth was slow to moderate in most countries. Infrastructure (mobile subscriptions & internet use) was building up.
- After 2018, with smartphone penetration, better internet, and fintech innovations (mobile money, more apps), adoption accelerates steeply. Forecasts show Digital Payment Adoption (%) reaching **70-90%** in many countries by 2030.
- Fraud Rate tends to increase somewhat initially, as digital payment volume rises, but then declines in later years as systems mature, regulations tighten, and user trust improves.
- Retention rates follow a decay curve for new cohorts, but overall retention improves over time (people stay with digital payments longer in later years) as ecosystems mature.

2. Which countries are leading or lagging in digital payment adoption

Leading:

- Kenya stands out ,early mover with mobile money; highest adoption rate forecasted, strong retention, relatively declining risk & fraud.
- Ghana also performs very well, though somewhat behind Kenya, but catching up post-2020, thanks to increasing infrastructure and regulatory improvements.

Lagging:

- Nigeria shows promise but has more volatility,higher fraud risk and lower retention relative to leading countries.
- Tanzania lags in mobile & internet penetration early on; its growth curve is steeper in forecast, but starts from a lower base.
- South Africa has strong formal banking and stable adoption, but the digital payment adoption pace is more gradual (because it already started from higher levels and its market dynamics are different).

3. The relationship between fraud, risk exposure, and retention rates

- Fraud rate and risk exposure are positively related: higher fraud correlates with higher risk scores. Countries with high initial adoption + weaker regulatory or infrastructure contexts have higher fraud, which increases the risk score.
- As digital adoption increases, there is often a temporary increase in risk/fraud, but over time, risk tends to decrease due to better detection, regulation, security, and user awareness.
- Retention is inversely affected by high fraud and risk: cohorts in countries with high fraud/risk show faster decay in retention rates. Where risk is managed (lower fraud), retention remains higher over time.
- Therefore, trust (low fraud, low risk) is a key enabler for retention; adoption alone is not sufficient.

4. Insights that can help policymakers, fintech startups, and investors build safer, more inclusive financial ecosystems

- Digital adoption, when accompanied by improving fraud controls and trust-building, yields strong retention. That makes the financial ecosystem more sustainable.
- Early investment in infrastructure (mobile, internet) pays off: countries that did so saw faster adoption, reduced fraud over time, and better retention.
- Regulatory oversight and consumer protection are critical levers. Countries with more robust regulations tend to see risk scores fall faster.
- Education and awareness campaigns are part of retention, users who trust that their money is safe are more likely to stay with digital providers.

- Forecasted trends show that lagging countries have high growth potential. Focused support can enable them to jump further in adoption, but only if risk is managed.

Recommendations

To Policymakers:

- Strengthen regulatory frameworks and standards for fraud detection, data protection and consumer rights.
    - Implement standards for transaction monitoring, KYC (Know Your Customer), and authentication.
    - Enforce penalties/ incentives to fintechs for fraud reduction.
    - Support regulatory sandboxes to allow safe innovation with oversight.

To the government and Infrastructure agencies:

- Invest in digital infrastructure, especially internet access and mobile penetration.
    - Expand broadband and mobile internet into rural / underserved areas.
    - Subsidize or incentivize low-cost internet and devices.
    - Ensure reliable power & connectivity to support fintech use.

To Fintech Startups & Service Providers:

- Build trust and customer retention through security, transparency, and service quality.
    - Prioritize user experience, low fees, good customer support.
    - Incorporate fraud protection, encryption, and transparent privacy policies.
    - Use growth stages to invest in retention initiatives (loyalty programs, user education).

To all stakeholders:

- Promote data collection, transparency, and benchmarking
    - Share datasets, transparency on fraud statistics.
    - Benchmark performance by country and over time (fraud rates, risk, retention).
    - Use standard metrics so comparisons are meaningful.

Africa’s future of payments depends not only on how fast we adopt digital systems — but how safely and sustainably we retain the trust of every user.

Africa’s fintech growth is unstoppable but long-term sustainability depends on security, trust, and innovation.Between 2011 and 2030, Africa’s fintech landscape undergoes a transformation.Digital payment adoption rises above 80%, while fraud and risk decline sharply.The next decade isn’t about access it’s about trust, retention, and resilience.

Across Africa, the future of payments is digital, secure, and customer-centric.By 2030, over 80% of adults in our five focus countries are expected to use digital payment methods, while fraud rates decline by nearly 30%. This signals not just technological change but a fundamental shift in trust, retention, and economic inclusion.