Banking Data Storytelling: Customer, Loan, and Transaction Insights with Power BI

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Tool Used: Microsoft Power BI

1. Executive Summary

This report presents detailed analysis and insights derived from a banking dataset using Power BI. It includes four dashboards that explore customer demographics, loan distributions, transaction patterns, and account performance. Key findings highlight the behavioral and financial characteristics of the bank's customer base, with specific insights into loan risk, transaction timing, and account trends that support strategic decision-making.

2. Objectives

- Understand customer demographics.
- Analyze loan distributions across customer segments.
- Uncover transaction trends across time and demographics.
- Profile account types and balances.

3. Dataset Overview

The dataset includes transactional, customer, account, and loan records structured across four tables:

- Customer Table: Contains data on age, gender, occupation, city, and deposit amounts.
- Loan Table: Contains information on bank loan amounts and is merged with customer deposit data for ease of analysis.
- Transaction Table: Includes transaction type and dates, merged with time metadata.
- Account Table: Contains account opening balances, dates, and account types.

4. Data Preparation

- Cleaned text and numerical fields.
- Changed null values of Bank Deposit in Customer table to "0".
- Merged tables using Account Number to get additional columns and calculate metrics, like Loan-to-Deposit ratios.
- Standardized and cleaned monetary values (converted to decimal, formatted as ₦).
- Created calculated columns (Age Group, Occupation (without hierarchy), Loan Risk Tier).
- Formatted numeric display units using DAX and format strings.
- Joined tables where necessary.
- Filtered date ranges for visual clarity.

5. Dashboard Breakdown

Customer Profile Dashboard

- **KPIs**: Average Customer Age, Total Customers, Common Customer City, Common Customer Occupation.
- **Visuals**:
  - Bar chart of Customers Age Distribution
  - Donut chart of Customer Age Group and Gender distribution.
  - Top Customer Occupations bar chart .
  - Bar chart of top customer cities.

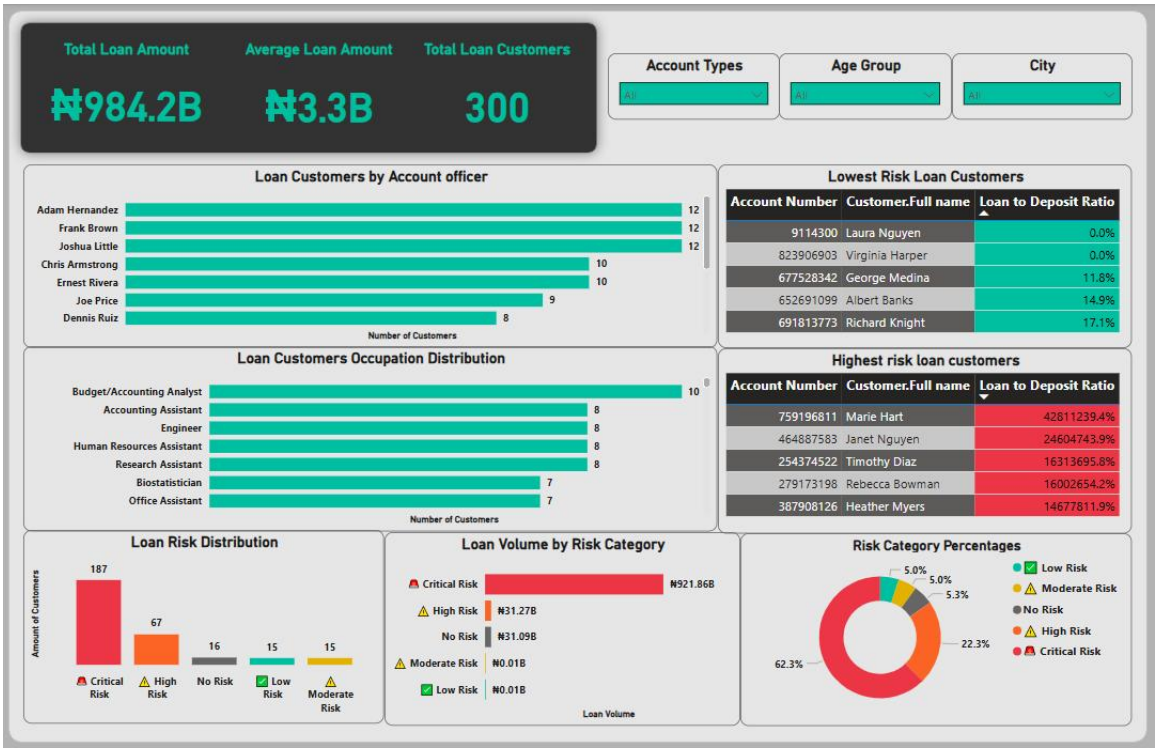


- **Insights**:
  - The bank's customer base is dominated by senior citizens aged 60 and above.
  - Gender distribution is nearly even, slightly skewed toward males.
  - Top occupations include Structural Analysis Engineer, Professor, Recruiter etc.
  - Lagos house the largest concentrations of customers followed -but not closely- by Abuja.

Loan Analytics Dashboard

- **KPIs**: Total Loan Amount, Average Loan, Total Loan Customers.
- **Visuals**:
  - Account Type, Age Group and City slicers.
  - Bar charts showing Loan Customers by Account Officers, Loan Customers Occupation Distribution, Loan Risk Distribution and Loan Volume by Risk Category.

- Loan-to-Deposit Ratio per customer, displayed in top 5 / bottom 5 visuals.
- Donut chart showing Risk Category Percentages.

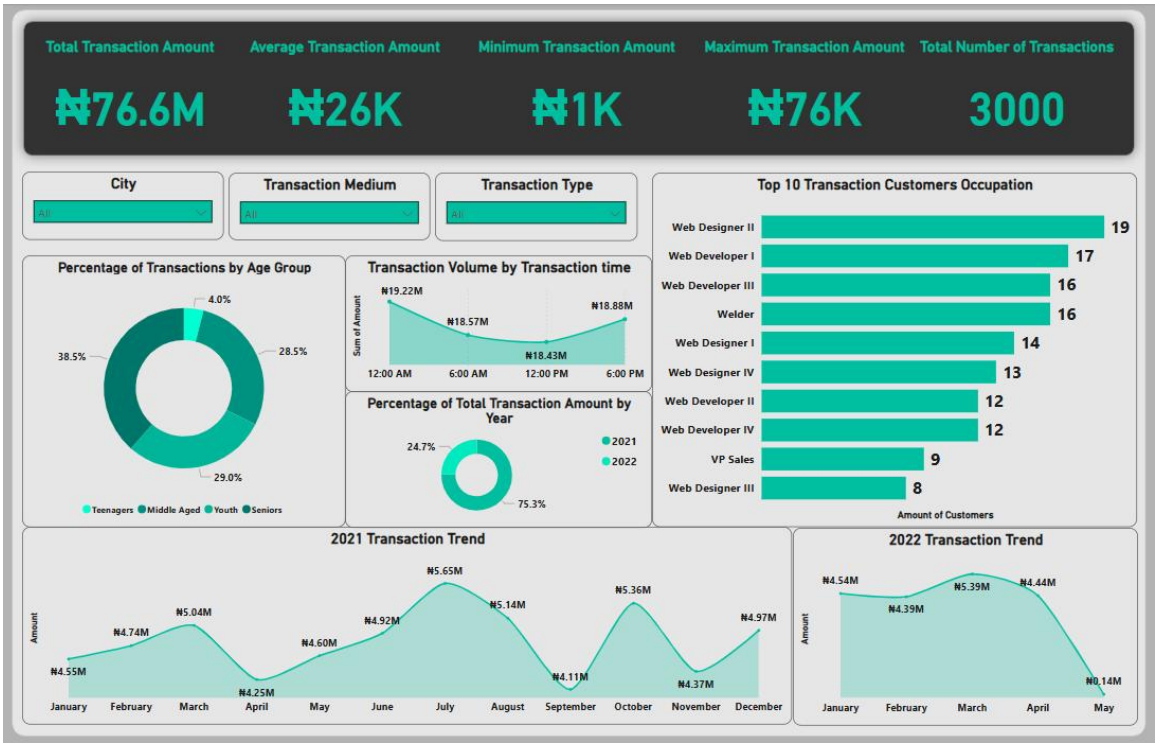


- **Insights**:
  - Senior citizens are the largest borrowers.
  - Domiciliary accounts borrowed the largest volume in loans followed by Current accounts.
  - Majority of borrowers are from Lagos followed -but not closely- by Abuja.
  - Top Account Officers for loan customers are Adam Hernandez, Frank Brown and Joshua little.
  - Top Occupation for Loan Customers are Accounting Analyst, Accounting Assistant and Engineer.
  - Majority of loan customers are high risk loan takers, indicating aggressive borrowing and might suggest difficulty with repayment.
  - Customers with the highest risk include Marie Hart, Janet Nguyen and Timothy Diaz.
  - Bottom 5 customers maintain conservative financial positions (ratios < 50%).

Transaction Trends Dashboard

- **KPIs**: Total Transaction Amount, Average Transaction Amount, Minimum Transaction Amount, Maximum Transaction Amount and Total Number of Transactions.
- **Visuals**:
  - City, Transaction Medium and Transaction Type slicers.

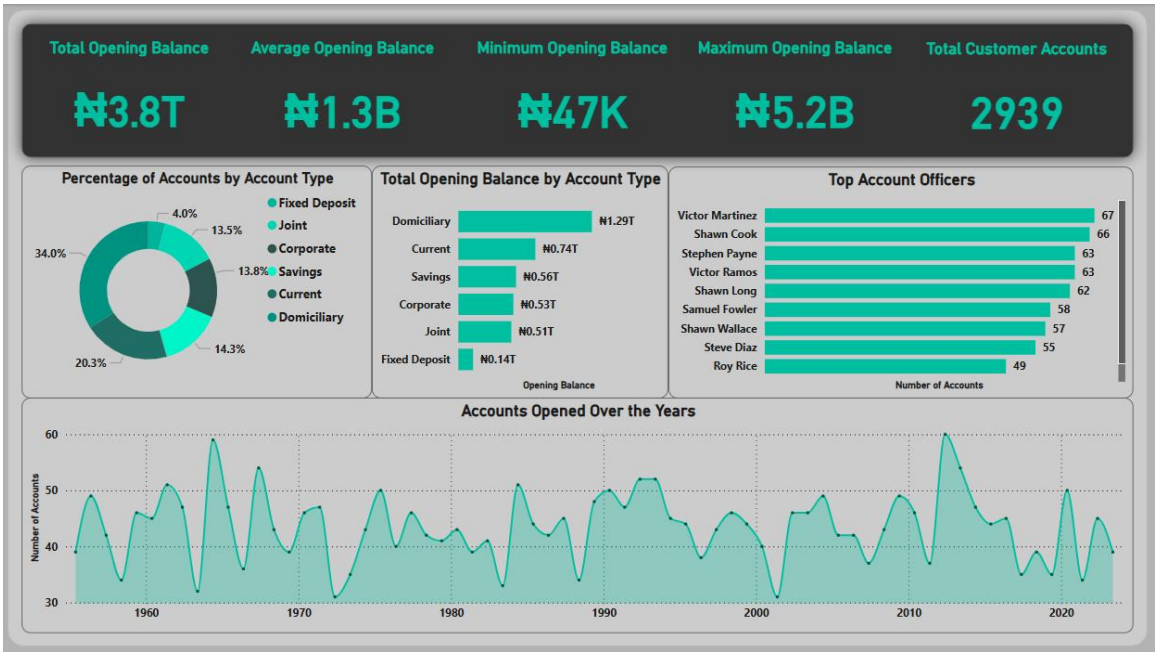
- Line chart of Transaction Volume by Transaction Time.
- Donut charts showing percentage of transactions by year and age group.
- Bar chart showing top 10 customer occupation.
- Line chart of Monthly Transactions from Jan 2021 to May 2022.



- **Insights**:
  - Most volume of transaction occurred in Lagos.
  - Most volume of transaction happened in the bank, followed by Mobile banking and ATM.
  - Most volume of transaction are Money transfer and Money deposit.
  - Most common transaction type is 'Money Transfer' followed by 'Cash Withdrawal'.
  - Peak transaction volume happens between 6PM and 12AM.
  - Transaction activity peaks In almost three months interval, suggesting cyclical behavior.
  - Web developers conduct the most transactions.

Account Overview Dashboard

- **KPIs**: Total Opening Balance, Average Opening Balance, Minimum Opening Balance, Maximum Opening Balance, Total Accounts.
- **Visuals**:
  - Donut chart of Account type percentages.
  - Bar chart of Opening Balances by type and top account officers.
  - Line chart showing account opening trend over the years.



- **Insights**:

- Domiciliary accounts dominate account types followed by current accounts, both in number of accounts and opening balance.

- Top account officers include Victor Martinez, Shawn Cook and Stephen Payne.

- Account openings peaked in 1964 and 2012, with notable dips in late 1972 and 2001.

- Account type preferences show operational focus on business vs. individual banking.

6. Recommendations

- Target marketing towards high-borrowing age groups with financial literacy programs.
- Improve deposit strategies to reduce critical Loan-to-Deposit ratios among key occupations.
- Offer specialized products to customers in high-transaction time windows (6PM/12AM).
- Expand business account services in cities with high opening balances.
- Continuously monitor occupation-based loan risk tiers for better underwriting policies.

7. Limitations

- Loan repayment data was not available; risk was estimated using loan-to-deposit ratios.
- Time of day in transactions was limited to only 4 time slots (6AM, 12PM, 6PM, 12AM).
- Occupation levels were cleaned, but categorization may not reflect precise job roles.

8. Conclusion

The Power BI dashboards provided actionable insights into customer behavior, loan distribution patterns, transactional trends, and account portfolio performance. These visualizations enable strategic decision-making for marketing, lending, and operations. Despite some data limitations, this report reflects a strong foundation for future data-driven analysis within the bank.

9. DAX Formulas Used

1. Customer Loan to Deposit Ratio:

```
= DIVIDE(Loan[Bank Loans], Loan[Bank Deposit])
```

2. Loan Risk Tier:

```
VAR Ratio = DIVIDE(Loan[Bank Loans], Loan[Bank Deposit])
RETURN
SWITCH(
    TRUE(),
    Ratio > 1000, "   Critical Risk",
    Ratio > 5,    "   High Risk",
    Ratio > 1,    "   Moderate Risk",
    Ratio > 0,    "✓ Low Risk",
    "No Risk"
)
```

3. Dynamic Loan Display:

```
VAR amt = SUM(Loan[Bank Loans])
RETURN
SWITCH(
    TRUE(),
    amt >= 1_000_000_000_000, FORMAT(amt / 1_000_000_000_000, "₦#,0.00") & "T",
    amt >= 1_000_000_000,     FORMAT(amt / 1_000_000_000, "₦#,0.00") & "B",
    amt >= 1_000_000,         FORMAT(amt / 1_000_000, "₦#,0.00") & "M",
    amt >= 1_000,             FORMAT(amt / 1_000, "₦#,0.00") & "K",
    FORMAT(amt, "₦#,0.00")
)
```