# IS525: Data Warehousing and Business Intelligence

# Analyzing Customer Complaints in Banking and Credit Card Services

Group Members:
Ankit Rajesh Sawant, Neil Mehta, Pranav Rajesh Charakondala, Shobha Rani Ganapati Bhat

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# 1 Abstract

This project provides a comprehensive analysis of customer complaints related to banking and credit card services, spanning multiple years. Using datasets sourced from the Consumer Financial Protection Bureau (CFPB) and advanced analytics in Power BI, the report identifies trends, geographic hotspots, resolution times, and key areas of improvement. Key findings reveal systemic inefficiencies, company-specific patterns, and demographic influences on financial behaviors. Correlating insights from both dashboards demonstrates the value of interactive analytics in uncovering root causes and proposing actionable solutions. This analysis empowers stakeholders with data-driven recommendations for enhancing service quality, operational efficiency, and customer engagement.

# 2 Objective

The primary objective of this project is to conduct an in-depth analysis of customer complaints in the banking and credit card sectors. The study aims to:

- Identify recurring trends in customer dissatisfaction.
- Highlight inefficiencies in complaint resolution processes.
- Assess demographic influences on financial behaviors and complaint volumes.
- Provide actionable recommendations to enhance customer experience.
- Equip financial service providers with tools for proactive decision-making.

# 3 Introduction

Financial institutions face significant challenges in managing customer complaints, especially as service expectations rise and digital channels increase reporting accessibility. The rapid growth of online banking, mobile applications, and automated customer service systems has made it easier than ever for customers to report grievances. However, this accessibility has also led to an overwhelming volume of complaints, ranging from transaction delays to disputes over fraud and billing errors. These issues not only undermine customer trust but also expose institutions to reputational risks and regulatory scrutiny. Regulators increasingly demand transparency and accountability in complaint resolution, pushing financial institutions to adopt more robust mechanisms for handling and addressing these concerns effectively. Additionally, poor management of complaints can lead to churn, with dissatisfied customers switching to competitors offering better service. This report leverages consumer complaint data to uncover systemic pain points, identify root causes, and propose targeted solutions to streamline operational processes and foster better customer engagement. By doing so, it aims to help institutions build trust, improve compliance, and ultimately enhance customer loyalty in a competitive market.

# 4 Data Sources and Methodology

## 4.1 Datasets

- **Bank Account or Service Complaints Dataset:**
  - **Description:** Captures customer complaints related to account management, deposit delays, and other banking issues.
  - **Fields:** Complaint type, resolution status, company, submission channel, and resolution time.
  - **Focus Areas:** Understanding the root causes of account-related complaints and assessing the resolution process.
- **Credit Card Complaints Dataset:** Contains grievances concerning billing disputes, fraud, and other credit card-specific issues.
  - **Description:** Contains grievances concerning billing disputes, fraud, and other credit card-specific issues.
  - **Fields:**Issue type, company, state, resolution details, and submission methods.
  - **Focus Areas:** Analyzing fraud patterns and evaluating company response times.
- **Demographic and Credit Data:** Provides demographic profiles and credit-related information of customers.
  - **Description:** Provides demographic profiles and credit-related information of customers.
  - **Fields:** Age, housing status, credit amount, and loan purposes.
  - **Focus Areas:** Identifying correlations between customer demographics and complaint trends.

## 4.2 Methodology

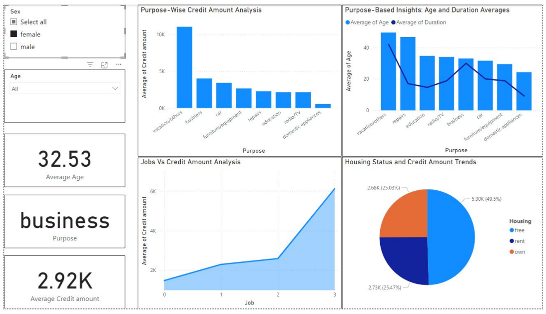
- Data was cleaned, standardized, and merged to ensure consistency.
- Exploratory Data Analysis (EDA) was conducted to identify patterns and trends.
- Power BI dashboards were created for interactive exploration of complaint types, geographic trends, resolution times and credit data.

# 5 Visualizations and Analysis

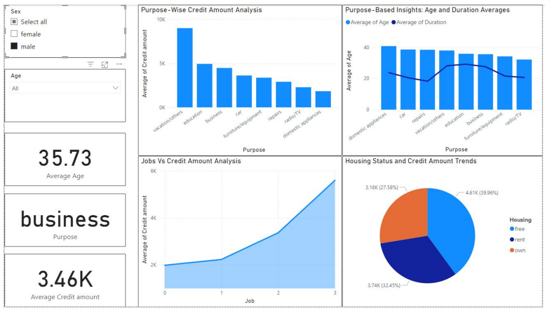
## 5.1 Key Metrics Summary

Table 1: Key Metrics Summary for Gender-Based Analysis

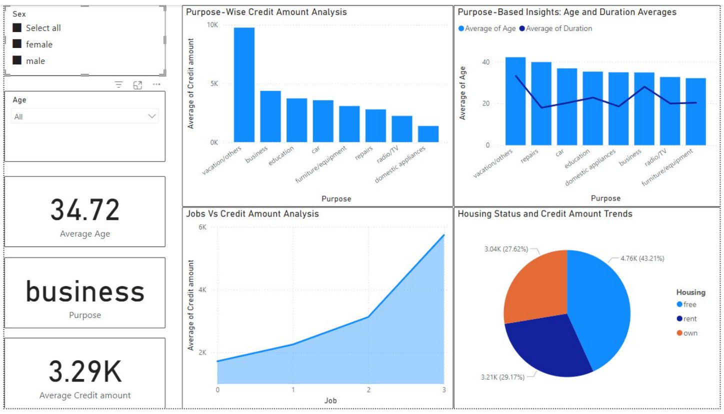
| Metric | All (Both Genders) | Male | Female |
|---|---|---|---|
| Average Age | 34.72 | 35.73 | 32.53 |
| Median of Job | 2 | 2 | 2 |
| Average Credit Amount | 3.29K | 3.46K | 2.92K |



(a) Female



(b) Male



(c) Both Genders

Figure 1: Credit Behaviour Analysis

## 5.2 Purpose-Wise Credit Amount Analysis

- **Both Genders:**
  - **Vacation/Others** dominates credit demand, significantly higher than all other categories. This indicates a strong tendency for borrowing for personal or discretionary needs, possibly lifestyle or leisure-related.
  - **Business and Education** are prominent mid-tier categories, showing that individuals prioritize both professional growth and education loans to enhance skills or careers.
  - **Domestic Appliances** receive the least allocation, suggesting minimal reliance on credit for household purchases.
- **Males:**

  - Males show a more **balanced credit distribution** compared to females, with significant borrowing in Education (4.9K) and Business (4.4K). This highlights a focus on **professional investment**.
  - **Vacation/Others** remains dominant, but with a lower average compared to females, indicating controlled borrowing for discretionary purposes.
  - **Domestic Appliances** credit (1.8K) is higher than in females, suggesting some reliance on credit for home improvement among males.

- **Females:**
  - Females allocate substantially more credit to Vacation/Others (11K), indicating a higher tendency to borrow for lifestyle, leisure, or personal reasons.
  - **Business** ranks second, highlighting entrepreneurial aspirations.
  - **Education loans** are significantly lower ( 2.1K) compared to males, suggesting a potential need for greater focus on improving financial access for education.
  - **Domestic Appliances** sees minimal credit allocation (532), showing almost no reliance on loans for household items among females.

## 5.3 Purpose-Based Insights: Age and Duration

- **Both Genders:**
  - Borrowers for **Vacation/Others** are older ( 42 years) and take longer repayment terms ( 33 months), indicating a preference for large loans with extended repayment schedules.
  - **Repairs** has a higher average age ( 39.9 years) but a much shorter repayment term ( 18 months), suggesting quick, necessity-based borrowing.
  - **Education** is accessed by younger borrowers ( 35 years), with moderately long repayment terms ( 23 months), reflecting the investment for skill-building and long-term growth.

- **Males:**
  - Males borrowing for **Domestic Appliances** are the oldest ( 40.7 years), with longer repayment terms (23.7 months), indicating that home-related expenses are delayed until later stages of life.
  - **Vacation/Others** shows older borrowers ( 37.9 years) opting for slightly shorter durations ( 28 months) compared to females.
  - **Education** loans show longer durations ( 29 months), reflecting a strategic approach to finance higher studies over a stretched timeline.

- **Females:**
  - Females borrowing for **Vacation/Others** are notably older ( 49.6 years) and take the longest repayment terms( 41.9 months). This signifies that women are more likely to borrow large sums for non-essential purposes later in life.

- **Borrowers** for Repairs are also older ( 46.7 years), with very short durations ( 17 months), reflecting emergency-driven loans.
- **Education** loans are accessed by younger females ( 34.6 years), but repayment terms are shorter ( 14.6 months), indicating financial constraints or quicker repayment preferences.

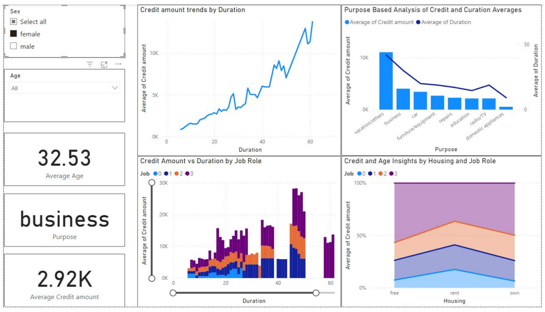
## 5.4 Jobs vs Credit Amount Analysis

- **Both Genders:**
  - Credit increases with job level, reflecting the strong correlation between income stability and loan eligibility.
  - Job 3 borrowers receive 3.4x more credit than Job 0, indicating a preference for higher credit allocation to individuals with better job profiles and incomes.
- **Males:**
  - The credit trend is consistent, with Job 3 receiving the highest allocation ( 5.6K), showing a steep and predictable increase across job levels.
  - Males in Job 2 also receive significant credit ( 3.3K), reinforcing the financial stability associated with higher job levels.
- **Females:**
  - Females in Job 3 receive higher credit ( 6.1K) compared to males, indicating stronger credit allocation for women at higher job levels.
  - However, females in Job 0 receive much lower credit ( 1.4K), showcasing a larger disparity between low and high job levels. This suggests a need to support credit access for women in lower job profiles.

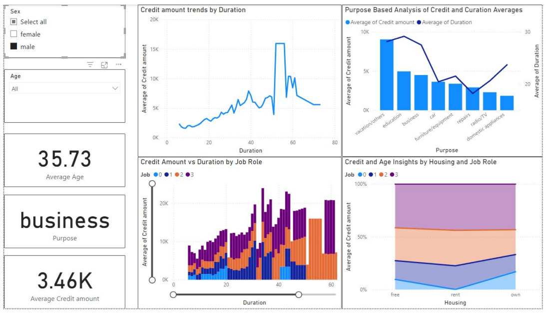
## 5.5 Housing vs Credit Amount Trends

- **Both Genders:**
  - Borrowers with **Free Housing** receive the highest credit allocation ( 4.7K), likely due to reduced living expenses, increasing loan eligibility.
  - **Renters** receive mid-tier credit ( 3.2K), reflecting their ability to balance housing costs with borrowing.
  - **Own Housing** has the lowest allocation ( 3K), possibly due to already existing financial commitments like mortgages or property ownership.
- **Males:**
  - **Renters** among males receive notably higher credit ( 3.7K), indicating financial independence despite rental expenses.
  - **Free Housing** males receive slightly lower credit ( 4.6K) than females, showing balanced borrowing habits.
- **Females:**

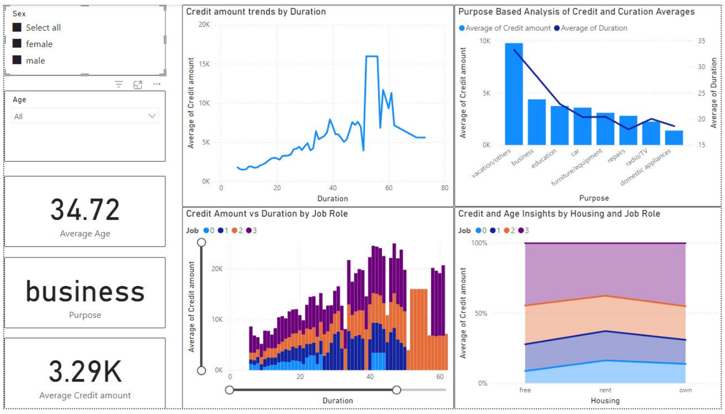
- Females with **Free Housing** receive the highest credit allocation ( 5.3K), indicating reliance on loans to meet personal or professional needs while avoiding housing expenses.
- Borrowers in **Own Housing and Rent Housing** have significantly lower allocations ( 2.7K), reflecting cautious borrowing behavior or limited credit access.




(a) Female




(b) Male




(c) Both Genders

Figure 2: Credit Patterns and Consumer Profiles

## 5.6 Overall Trends

1. **Credit Trends by Duration:**
   - **Males** tend to hold higher credit values across durations, especially for long-term loans (52–56 months).
   - **Females** peak later (45–61 months), showing more
2. **Purpose-Based Credit:**
   - Both genders prioritize Vacation/Others with females having a higher average ( 11K vs 9K).
   - Domestic Appliances remain the lowest purpose for credit, more noticeable for females.
3. **Job Role Impact:**

- Job 3 dominates credit values, especially for males. Females see significant peaks in Job 3 during longer durations.

4. **Housing and Credit:**

   - **Free housing** correlates with the highest average credit amounts, especially for females in **Job 3**.
   - **Rent housing** remains moderate across genders, while **own housing** lags slightly.

## 5.7 Bank Complaints Analysis

- **Issues Resolved Over Time:**
  - The number of resolved issues steadily increased from **2012 to 2016**, peaking in 2016, followed by a sharp decline in 2017.
  - Most issues were resolved without escalation, while disputed cases showed minor fluctuations.
- **Issue Distribution:**
  - **Transaction issues** accounted for over 54% of complaints, making it the most common category.
  - Other notable issues included **sale of accounts** and **unsolicited issuance of credit products**.
- **State and Submission Channel Trends:**
  - **States like California (CA), New York (NY), and Florida (FL)** reported the highest complaint volumes.
  - **Web submissions** dominated, followed by **Phone** and **Postal Mail**, highlighting the increasing reliance on digital channels for raising complaints.
- **Company-Specific Analysis (Top 3 Banks):**
  1. **Bank of America:** High volumes of complaints, primarily related to transaction issues and account openings. Web was the dominant submission channel, aligning with nationwide trends.
  2. **JPMorgan Chase & Co.:** Steady increase in issues resolved over time. Major complaints included transaction problems, with relatively higher dispute rates compared to competitors.
  3. **CitiBank:** Complaints peaked in 2016, primarily focusing on account-related concerns and unauthorized credit issuance. Slower response rates and a higher proportion of unresolved issues were noted.


(a) Bank of America


(b) Citibank


(c) JPMorgan Chase & Co.

Figure 3: Bank Complaints Analysis - Top 3 Banks

- **Key Insights:** The dominance of transaction issues and web submissions indicates a need for improved transparency in account processes and optimization of digital support systems. Leading banks must focus on reducing resolution times and addressing recurring customer concerns.

  1. **Bank of America** leads in complaint volume, particularly for transaction issues.
  2. **JPMorgan Chase & Co.** shows better dispute management but struggles with maintaining lower complaint volumes.
  3. **CitiBank** faces challenges in timely response, particularly for account-related complaints.

- **Recommendations**

- Automate and optimize transaction processes to reduce recurring complaints.

- Implement faster complaint handling mechanisms, especially for Citibank, to improve response times.

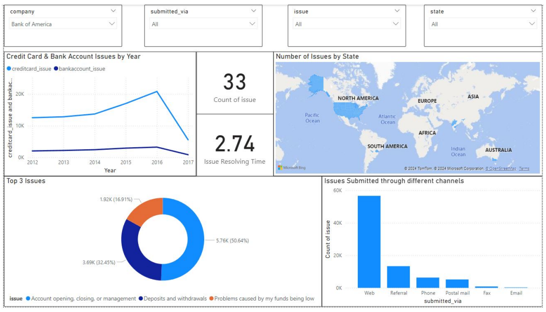
- Improve web submission platforms and integrate AI tools for efficient complaint intake and tracking.

- Focus on California, New York, and Florida with localized support initiatives.

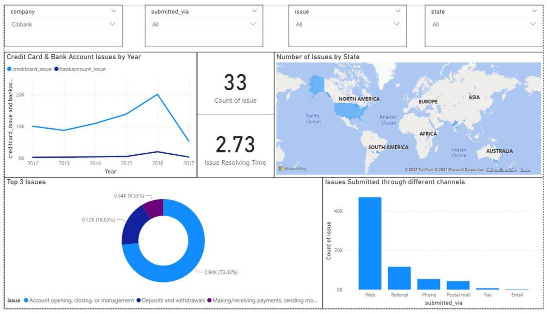
- JPMorgan Chase should enhance dispute resolution processes to lower escalation rates.

## 5.8 Credit Card Complaints Analysis

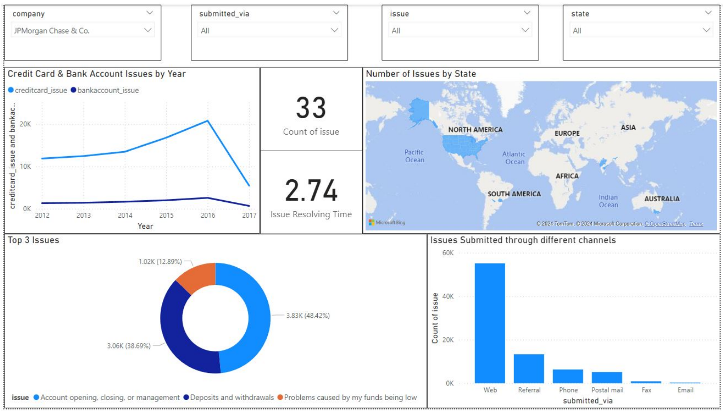
- **Trends in Complaints:**
  - Credit card issues saw a significant rise between **2012 to 2016**, mirroring trends observed in banking complaints.
  - A sharp decline occurred in 2017, possibly due to changes in reporting systems or service improvements.
- **Top Issues:**
  - **Account opening/closing** accounted for the majority of complaints, representing 50%–73% across companies.
  - Other critical issues include deposit/payment problems and low fund-related concerns.
- **Submission Channels:**
  - Similar to bank complaints, **Web submissions** were the most common channel, contributing over 60% of complaints.
  - Other significant channels include **Referral and Phone**, while traditional methods like Fax and Email saw minimal usage.
- **Company-Specific Analysis (Top 3 Banks):**
  1. **Bank of America:** Significant complaints related to **billing disputes** and **fraud concerns**. Average resolution time was 2.74 days, aligning with overall industry trends.
  2. **JPMorgan Chase & Co.:** Top complaints included **fraud issues** and **account problems**. Demonstrated better performance in closing disputes within 24 hours, leading to improved customer satisfaction.
  3. **CitiBank:** Dominated by **account opening issues** and **unauthorized charges**. Resolution efficiency lagged slightly, with prolonged response times impacting satisfaction.
- **Key Insights:** Billing disputes (30%) and fraud (17%) dominate complaint types, emphasizing the need for better billing systems and fraud detection mechanisms. Faster resolutions within 24 hours consistently led to higher customer satisfaction rates.
  1. **Bank of America** handles billing disputes and fraud with industry-average resolution times.
  2. **JPMorgan Chase & Co.** shows superior resolution efficiency, often closing issues quickly and improving satisfaction.
  3. **CitiBank** struggles primarily with account-related complaints, indicating process inefficiencies.




(a) Bank of America




(b) Citibank




(c) JPMorgan Chase & Co.

Figure 4: Credit Card Complaints Analysis - Top 3 Banks

- **Recommendations**
- Streamline and automate billing processes to reduce disputes, which account for 30% of complaints.
- Invest in advanced AI tools to address fraud concerns, which constitute 17% of complaints.
- Citibank should optimize workflows to reduce delays in resolving account-related complaints.
- Adopt quick dispute resolution strategies to improve customer satisfaction across banks.
- Enhance web platforms to ensure faster processing and better user experience for complaint submissions.
- **Overall Common Trends**
  1. **Submission Channels:** Web submissions dominate across all banks for both banking and credit card complaints. This highlights the increasing shift to digital platforms and the need for optimized online issue management systems.
  2. **Geographic Hotspots:** States like California, New York, Florida, and Texas consistently report the highest complaint volumes, reflecting their population density and financial activity.

3. **Top Complaint Types:** Transaction issues dominate banking complaints. Billing disputes and fraud are key areas for credit card services, requiring better fraud prevention and billing systems.
4. **Resolution Time:** JPMorgan Chase outperforms its competitors with faster resolution times (24 hours).Citibank lags in both sectors, indicating opportunities for process improvements to enhance efficiency.

# 6 Challenges Encountered

The project faced challenges such as data standardization issues due to inconsistent formats and field names, large dataset sizes causing Power BI performance bottlenecks, and insufficient granularity in some complaint categories. These were addressed using Python-based ETL pipelines for preprocessing, optimized Power BI models for smoother interactivity, and augmented datasets with derived fields to improve analytical depth.

# 7 Conclusion

This project demonstrates the value of data-driven insights in addressing customer complaints in the banking and credit card sectors. By identifying trends, inefficiencies, and demographic influences, financial institutions can implement targeted strategies to:

- Improve resolution efficiency.
- Enhance customer satisfaction.
- Foster trust and loyalty among customers.

The insights and tools developed in this project offer a robust foundation for continuous improvement and strategic decision-making in customer service management.