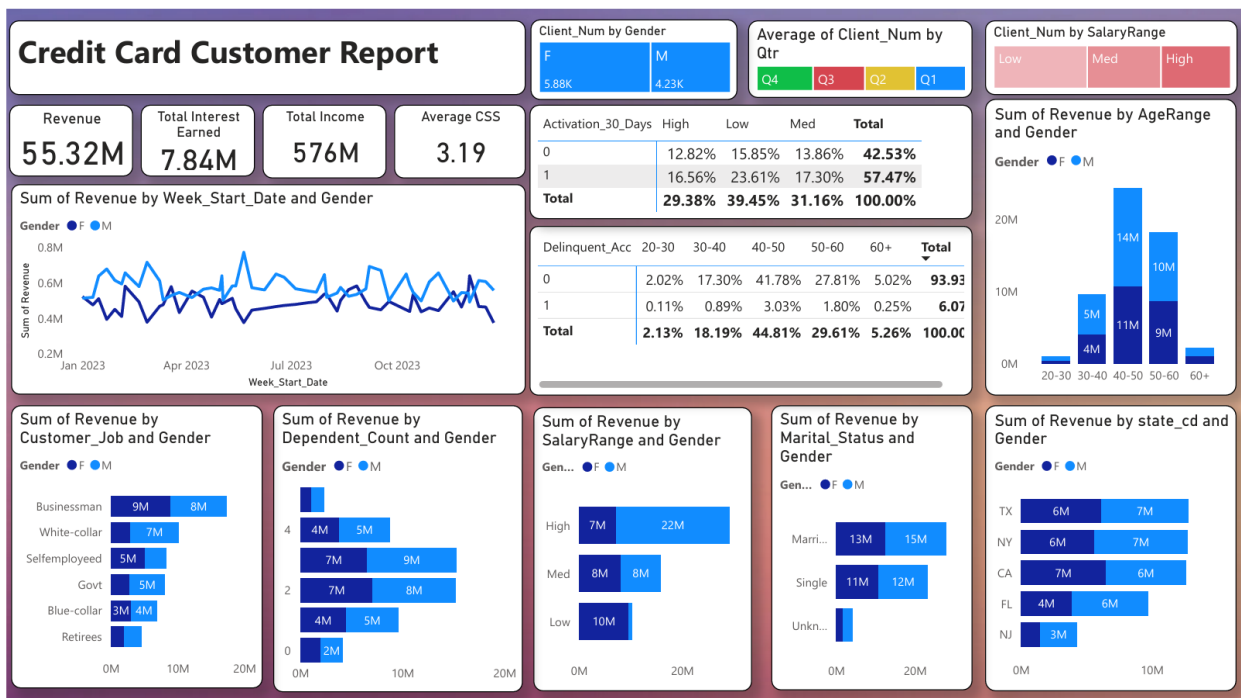
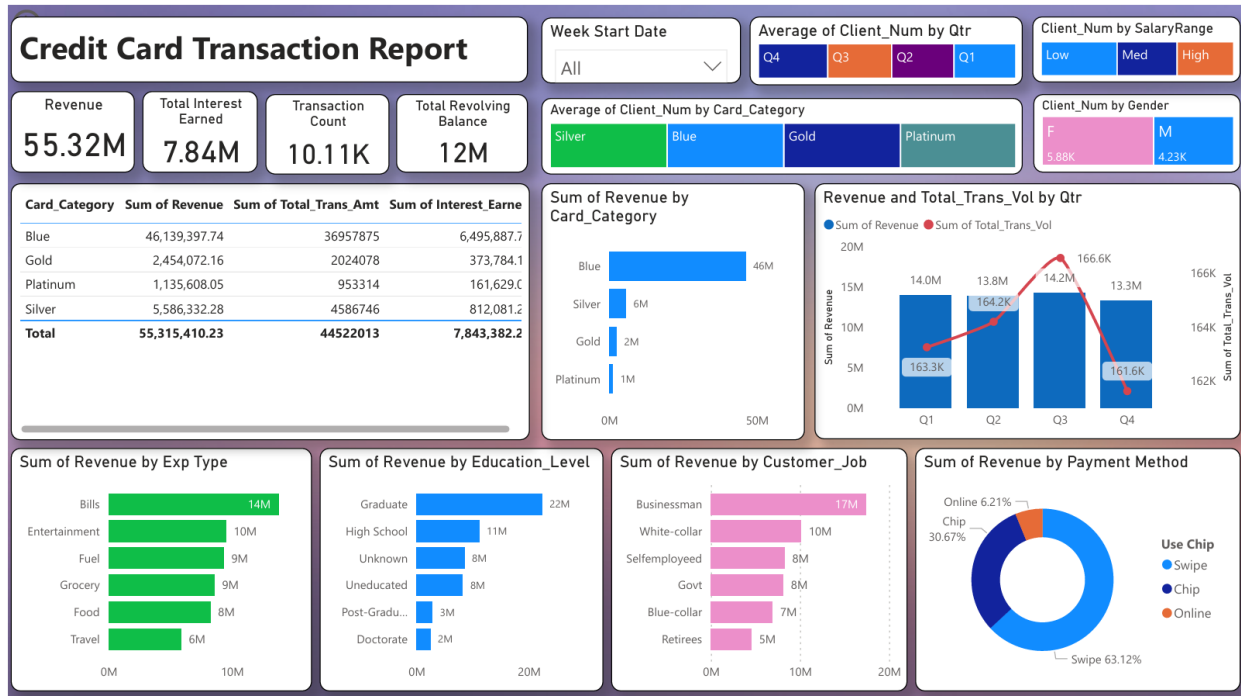


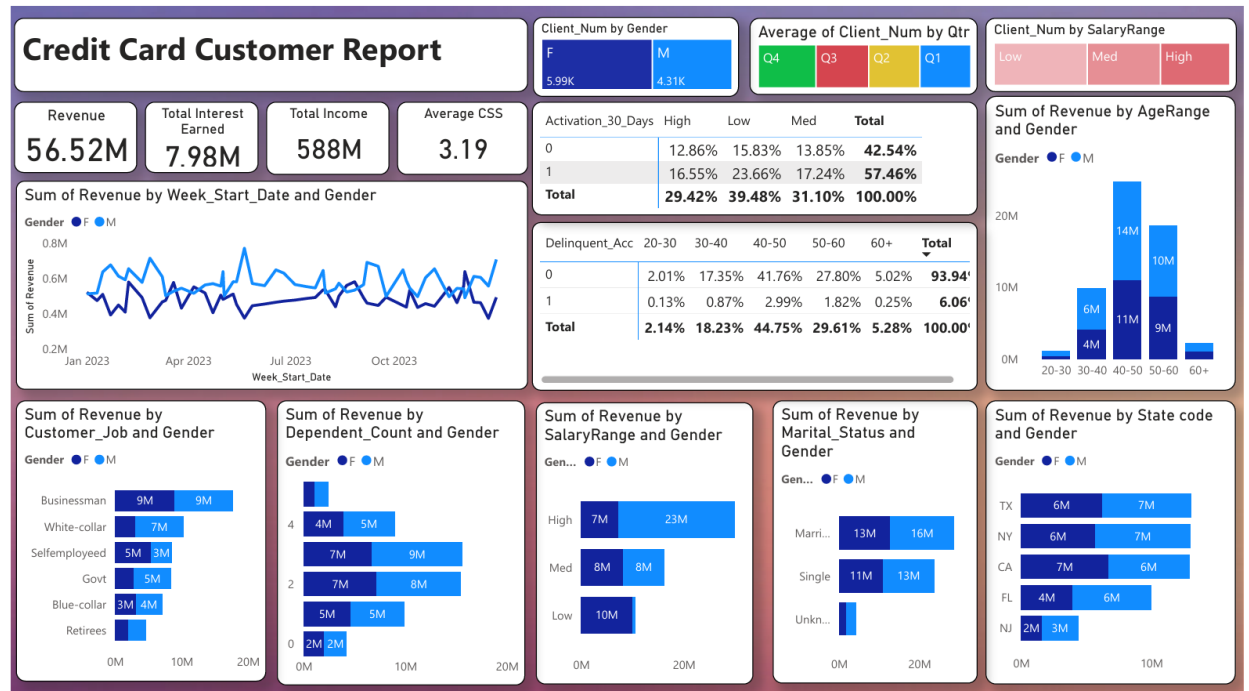
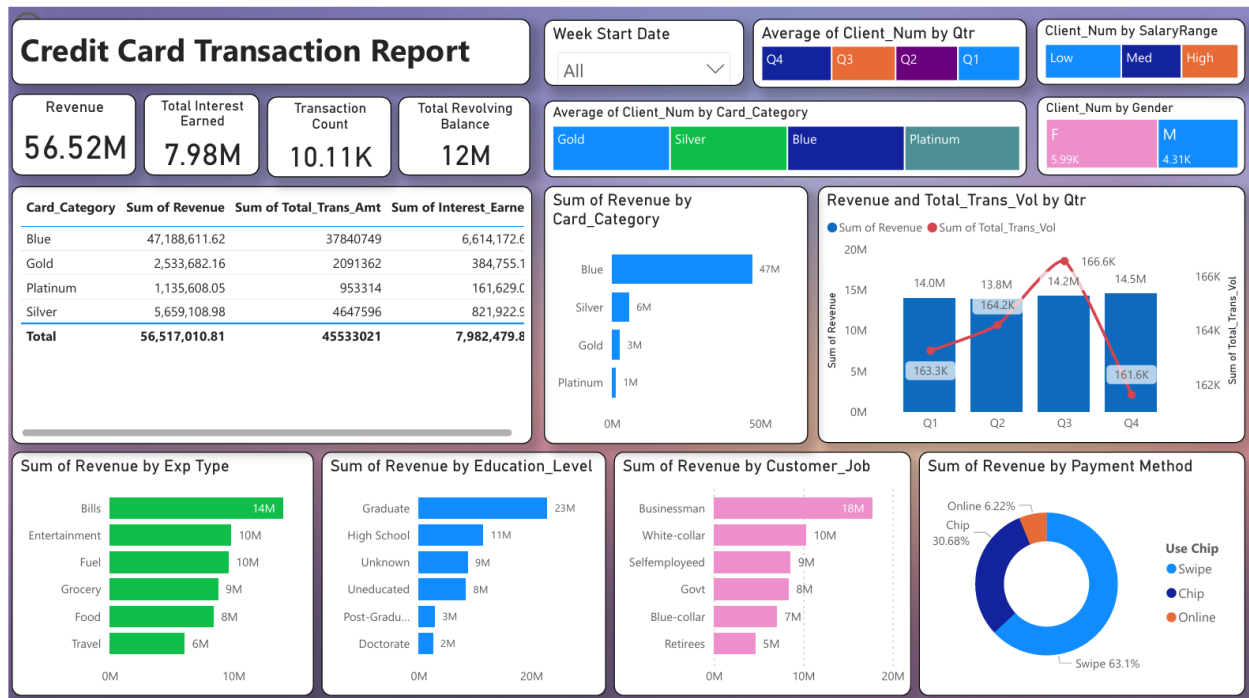
## Power BI Project

### Credit Card and Customer Behavior Analysis

*Before Data Update on MySQL:*



## After Data Update on MySQL:



## **Project Description:**

Analytics of credit card transactions and customer behavior play a pivotal role in shaping the modern financial landscape. Through meticulous analysis of transactional data, businesses gain deep insights into consumer spending habits, preferences, and market trends. This invaluable information not only aids in understanding customer behavior but also empowers financial institutions to detect and prevent fraudulent activities, ultimately safeguarding both the financial integrity of businesses and the trust of their customers.

By identifying irregular spending patterns, these analytics enable swift intervention, mitigating potential financial risks such as identity theft or unauthorized transactions. Moreover, they facilitate the customization of offers and recommendations, fostering stronger customer relationships and loyalty.

Furthermore, leveraging credit card transaction analytics enables businesses to optimize various aspects of their operations. From refining pricing strategies to tailoring marketing campaigns, these insights inform data-driven decisions that drive revenue growth and enhance competitiveness in dynamic markets. Additionally, by assessing credit risk more accurately, financial institutions can make informed lending decisions, reducing default rates and fostering a healthier financial ecosystem. In essence, the analytics of credit card transactions and customer behavior serve as a cornerstone for financial security, business agility, and delivering unparalleled customer experiences in today's fast-paced and interconnected economy.

## **MySQL Database and Schema Creation and File Upload:**

### **SQL Code for Table Creation for Credit Card and Customer Table:**

```

-- 0. Create a database
CREATE DATABASE ccdb;

-- Consider following database
USE ccdb;

-- 1. Create cc_detail table

CREATE TABLE cc_detail (
  Client_Num VARCHAR(20),
  Card_Category VARCHAR(20),
  Annual_Fees INT,
  Activation_30_Days INT,
  Customer_Acq_Cost INT,
  Week_Start_Date DATE,
  Week_Num VARCHAR(20),
  Qtr VARCHAR(10),
  current_year INT,
  Credit_Limit DECIMAL(10,2),
  Total_Revolving_Bal INT,
  Total_Trans_Amt INT,
  Total_Trans_Ct INT,
  Avg_Utilization_Ratio DECIMAL(10,3),
  Use_Chip VARCHAR(10),
  Exp_Type VARCHAR(50),
  Interest_Earned DECIMAL(10,3),
  Delinquent_Acc VARCHAR(5)
);

-- 2. Create cust_detail table

CREATE TABLE cust_detail (
  Client_Num VARCHAR(20),
  Customer_Age INT,
  Gender VARCHAR(5),
  Dependent_Count INT,
  Education_Level VARCHAR(50),
  Marital_Status VARCHAR(20),
  State_cd VARCHAR(50),
  Zipcode VARCHAR(20),
  Car_Owner VARCHAR(5),
  House_Owner VARCHAR(5),
  Personal_Loan VARCHAR(5),
  Contact VARCHAR(50),
  Customer_Job VARCHAR(50),
  Income INT,
  Cust_Satisfaction_Score INT
);

```

```
SHOW VARIABLES LIKE 'secure_file_priv';  
SHOW VARIABLES LIKE 'local_infile';
```

```
-- 3. Copy csv data into SQL  
-- Load credit card dataset
```

```
LOAD DATA INFILE 'credit_card.csv'  
INTO TABLE cc_detail  
FIELDS TERMINATED BY ','  
ENCLOSED BY ''''  
LINES TERMINATED BY '\r\n'  
IGNORE 1 LINES; -- Skip the header row
```

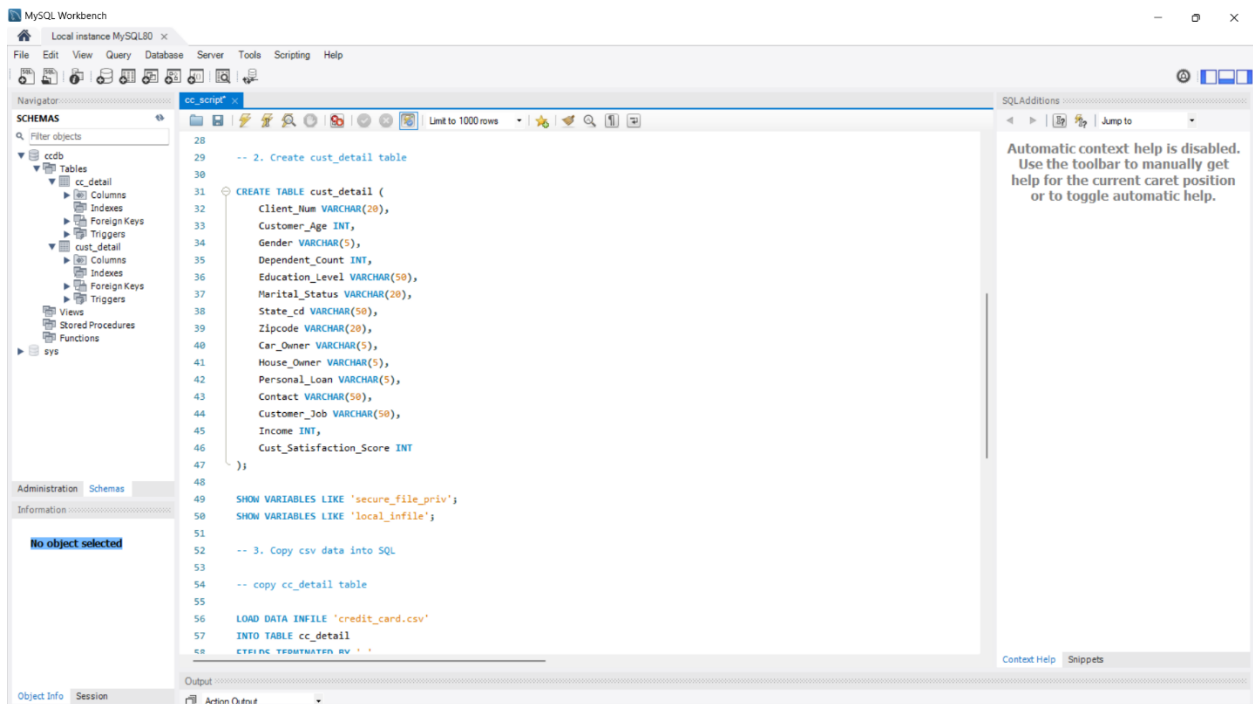
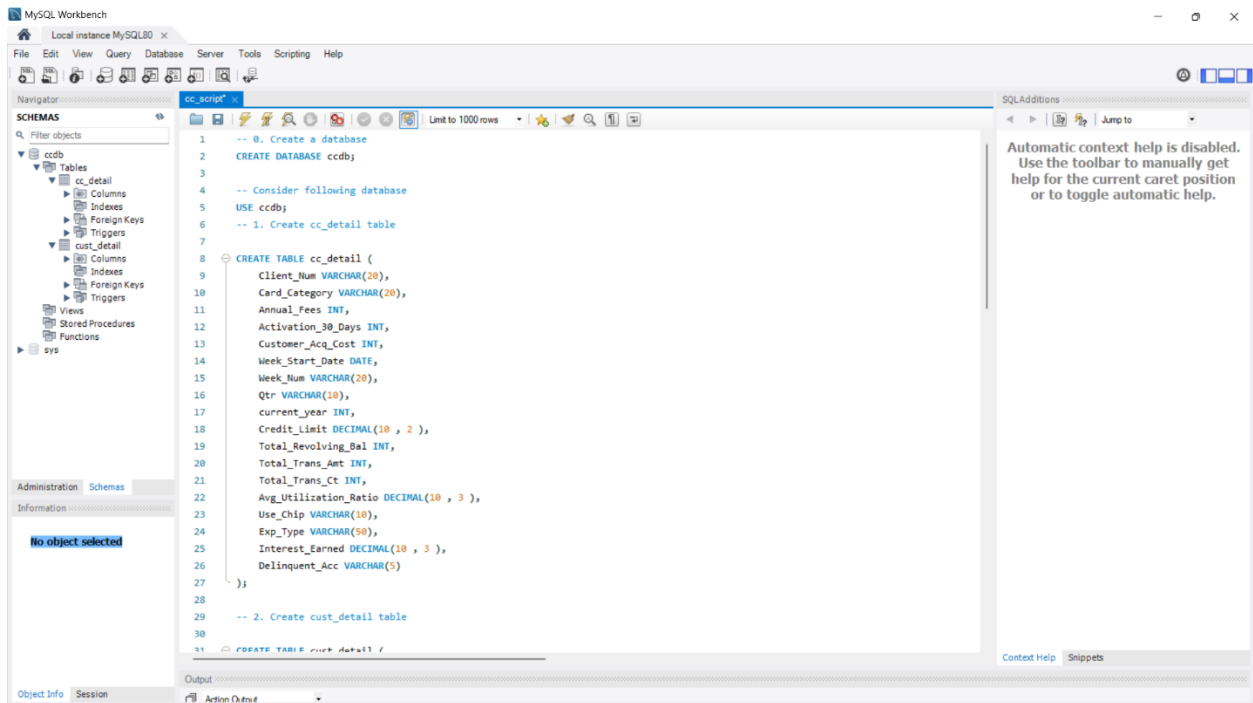
```
-- Load customer dataset
```

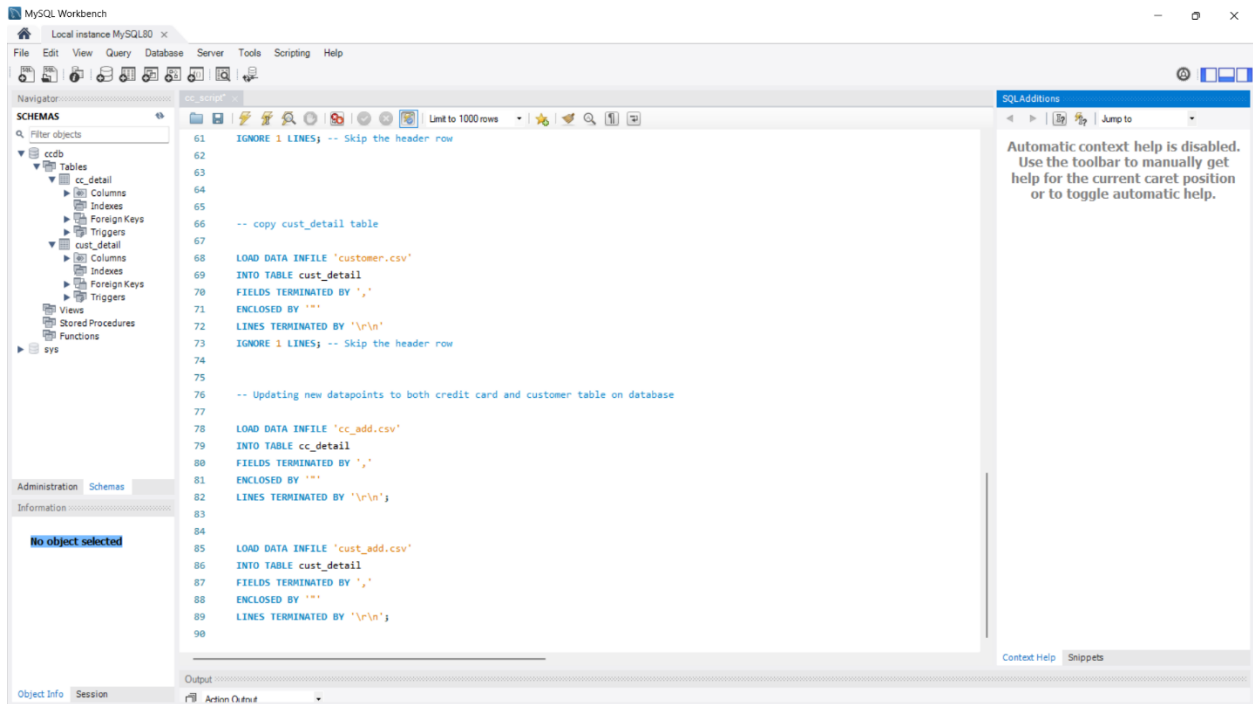
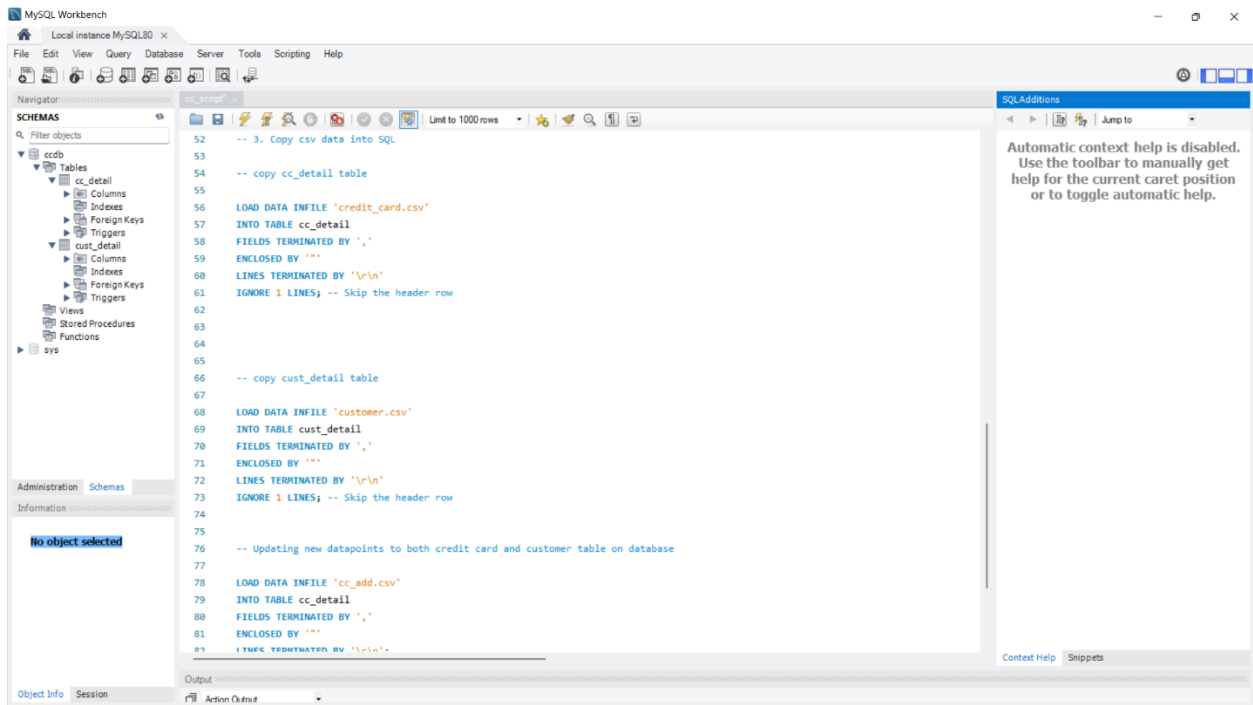
```
LOAD DATA INFILE 'customer.csv'  
INTO TABLE cust_detail  
FIELDS TERMINATED BY ','  
ENCLOSED BY ''''  
LINES TERMINATED BY '\r\n'  
IGNORE 1 LINES; -- Skip the header row
```

```
--Updating new datapoints to both credit card and customer table on database
```

```
LOAD DATA INFILE 'cc_add.csv'  
INTO TABLE cc_detail  
FIELDS TERMINATED BY ','  
ENCLOSED BY ''''  
LINES TERMINATED BY '\r\n';
```

```
LOAD DATA INFILE 'cust_add.csv'  
INTO TABLE cust_detail  
FIELDS TERMINATED BY ','  
ENCLOSED BY ''''  
LINES TERMINATED BY '\r\n';
```





## Power BI Integration and Data Pre-processing:

We have two datasets which are related to transactions on weekly basis and customers' background.

- Duplicate Rows were removed from both the datasets entirely.
- Data type of all numerical and character columns were also verified.

### *In Customer Dataset:*

- *Age* column in customer dataset was modified to make age ranges like 20-30, 30-40, 40-50, 50-60 and 60-70 and 60+ in a new column as *AgeRange*.

DAX:

```
AgeRange = SWITCH(
    TRUE(),
    customer[Customer_Age] < 30, "20-30",
    customer[Customer_Age] >= 30 && customer[Customer_Age] < 40, "30-40",
    customer[Customer_Age] >= 40 && customer[Customer_Age] < 50, "40-50",
    customer[Customer_Age] >= 50 && customer[Customer_Age] < 60, "50-60",
    customer[Customer_Age] >= 60, "60+",
    "Unknown"
)
```

- *MonthlyIncome* column was also altered to make salary ranges as 35k, 35k-70K and 70k+ in a new column namely *SalaryRange*.

DAX:

```
SalaryRange = SWITCH(
    TRUE(),
    customer[Income] < 35000, "Low",
    customer[Income] >= 35000 && customer[Income] < 70000, "Med",
    customer[Income] > 70000, "High",
    "Unknown")
```

### *In Transaction Dataset:*

- Revenue Column was added by adding following column values: *Annual fees*, *Total Transaction Amount*, and *Interest Earned*.



DAX:

```
Revenue =  
credit_card[Annual_Fees]+credit_card[Total_Trans_Amt]+credit_card[Interest_Earned]
```

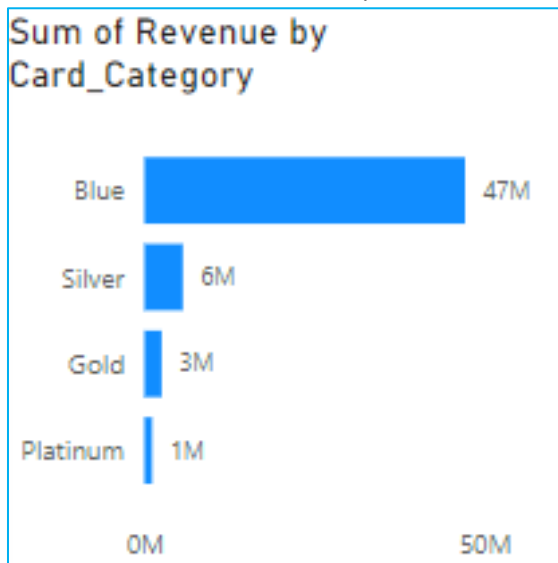
## Approaches and Methods:

### Credit Card Transaction Report:

#### 1. Revenue VS Card Category:

Analyzing revenue by credit card type can reveal spending patterns and customer preferences, enabling businesses to tailor marketing strategies and optimize payment options. This data-driven approach can also help identify the most profitable customer segments and improve financial forecasting.

Method: Plot a horizontal bar plot between Revenue VS Card Category.

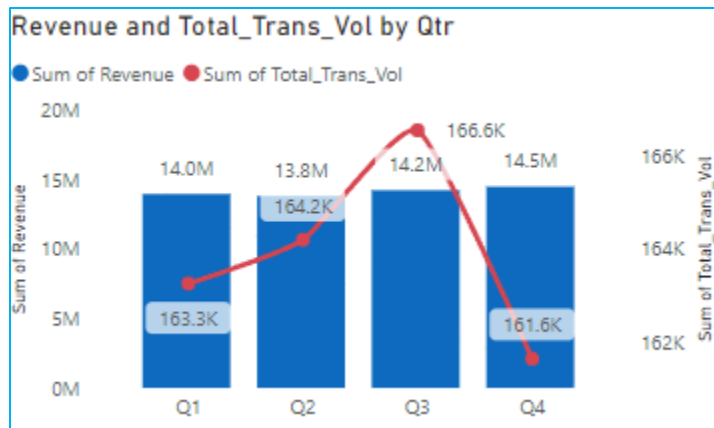


**Result:** Blue and Silver Credit Cards receive high revenue around \$47M and \$6M, respectively.

#### 2. Revenue and Total Transaction Volume by Quarter:

Analyzing revenue and total transaction volume by quarter provides insights into seasonal trends and business performance, allowing companies to adjust their strategies accordingly. This helps in identifying growth patterns and potential issues, facilitating more informed decision-making and financial planning.

**Method:** Plot combined bar and line chart.

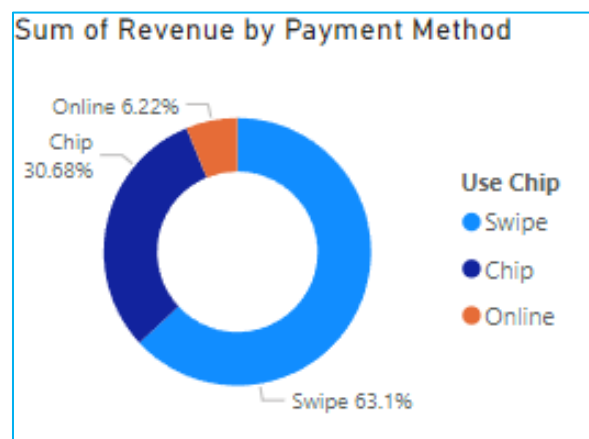


**Result:** In quarter 3 revenue remains high with value \$14.2 M and total transaction amount was also during this time period with value at \$166.6k.

### 3. Revenue by Payment Method:

Analyzing revenue by payment method—online, swipe, or chip—can highlight customer preferences and transaction security trends, enabling businesses to optimize their payment processing systems. This analysis can also help identify potential areas for reducing transaction costs and improving customer experience.

Method: Plot a pie chart between revenue and payment method.

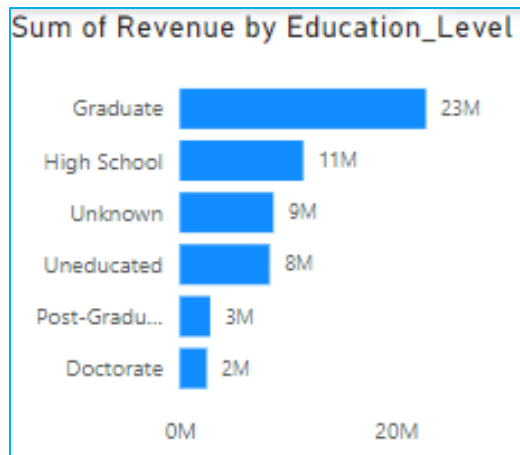


**Result:** Swipe payment method was seen popular among the users contributing 63.1 %.

### 4. Revenue by Education Type:

Analyzing revenue by education level can help businesses understand the correlation between customers' educational backgrounds and their purchasing power or spending behavior. This insight allows for more targeted marketing strategies and product offerings tailored to different educational demographics, enhancing overall business performance.

Method: Use Bar plot to show the variation.



**Result:** Graduate customers were active users to contribute more to revenue earned through credit card related transactions with amount \$23M.

#### 5. Total Transactions and Interest Earned by Card Type:

Analyzing total transactions and interest earned by card type provides valuable insights into customer behavior and the profitability of different card categories. This data helps in identifying which card types generate the most transactions and interest, guiding financial institutions in optimizing their product offerings and interest rate structures.

Method: Show numbers with card type in matrix.

Card_Category	Sum of Revenue	Sum of Total_Trans_Amt	Sum of Interest_Earne
Blue	47,188,611.62	37840749	6,614,172.6
Gold	2,533,682.16	2091362	384,755.1
Platinum	1,135,608.05	953314	161,629.0
Silver	5,659,108.98	4647596	821,922.9
<b>Total</b>	<b>56,517,010.81</b>	<b>45533021</b>	<b>7,982,479.8</b>

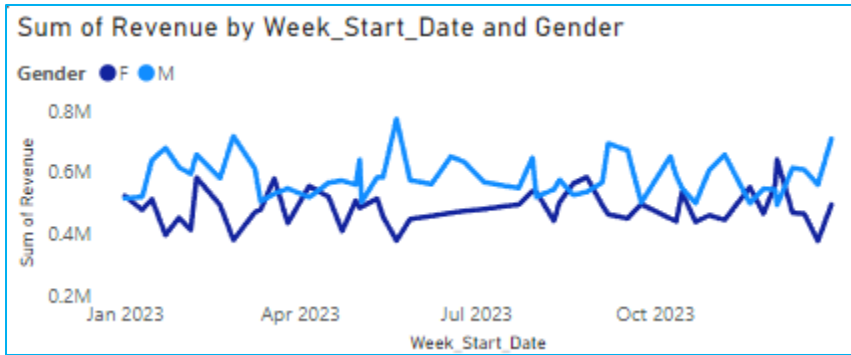
**Result:** Total transaction amount and interest earned were high from blue and silver card users.

### Customer Behavior Report

#### 1. Revenue by Gender on Every Start of Week:

Analyzing revenue by gender at the start of each week can uncover gender-specific purchasing trends and preferences, helping businesses tailor their marketing and inventory strategies. This data enables targeted promotions and personalized experiences, ultimately driving sales and customer satisfaction.

Method: Plot Line Chart to visualize the gender based revenue.

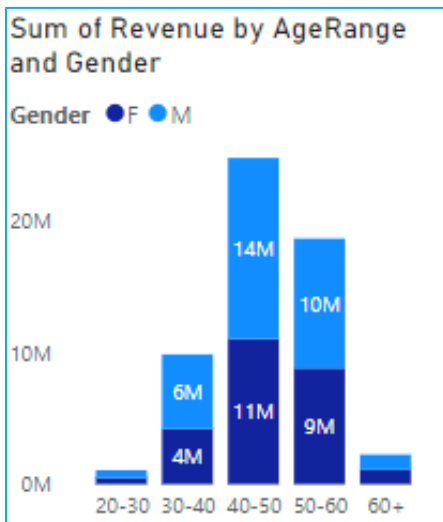


**Result:** Revenue earned from Male customers was higher compared to women in most of all quarters in a year.

## 2. Revenue by Age Range and Gender:

Analyzing revenue by age range and gender provides a comprehensive view of customer demographics, highlighting the spending habits and preferences of different groups. This information allows businesses to create more effective, targeted marketing campaigns and optimize product offerings to meet the specific needs of their diverse customer base.

Method: Plot a stacked bar chart to visualize the gender and age based revenue earn.



**Result:** Revenue from users between age 40-50 was big compared to other age group with values \$14M for M and \$11M for female.

## 3. Delinquent account and Age Group:

Analyzing delinquent accounts by age group can help financial institutions identify which age demographics are more prone to payment issues, enabling targeted interventions and support programs. This data can guide the development of tailored financial products and educational initiatives aimed at reducing delinquency rates and improving overall financial health within specific age groups.

Method: Plot a matrix to show the defaults of customers.

Delinquent_Acc	20-30	30-40	40-50	50-60	60+	Total
0	2.01%	17.35%	41.76%	27.80%	5.02%	93.94%
1	0.13%	0.87%	2.99%	1.82%	0.25%	6.06%
Total	2.14%	18.23%	44.75%	29.61%	5.28%	100.00%

**Result:** Payments on billing cycle is due for age group 40-50. The age group also contains the customers who keep their payments up to date.

#### 4. Activation in 30 Days VS Income Level:

Analyzing credit card activation within 30 days versus income level can reveal how quickly different income groups start using their new cards. This insight helps financial institutions tailor their marketing and onboarding strategies to encourage faster activation among various income segments, enhancing card usage and profitability.

Method: Use a matrix to show the distribution

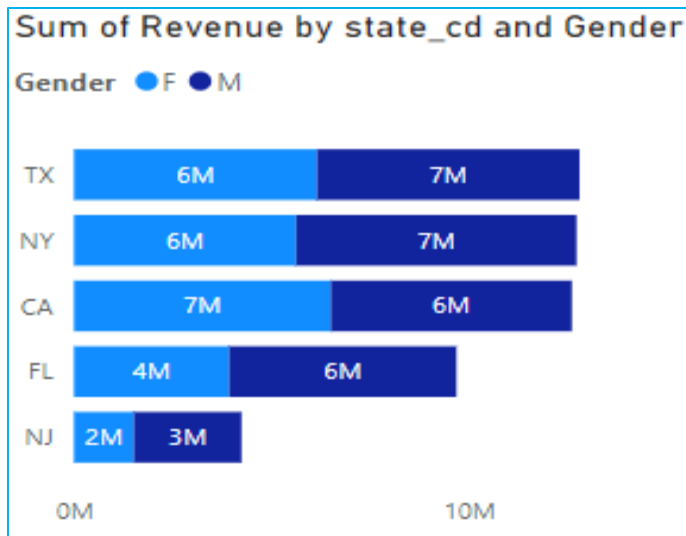
Activation_30_Days	High	Low	Med	Total
0	12.86%	15.83%	13.85%	42.54%
1	16.55%	23.66%	17.24%	57.46%
Total	29.42%	39.48%	31.10%	100.00%

**Result:** Low-income category customers having monthly income less than 35000 were found to activate their account sooner than the rest.

#### 5. Revenue by State and Gender:

Analyzing revenue by state and gender in credit card usage helps identify regional and gender-specific spending patterns, allowing businesses to customize their marketing and product offerings to suit different demographics. This targeted approach can improve customer engagement, optimize sales strategies, and maximize revenue across diverse markets.

Method: Stacked Bar plot.



**Result:** Texas, New York and California contribute to high revenue with equal contribution from both the gender in former two states.

#### Future Recommendations:

##### Transaction Report:

#### 1. Focus on High-Performing Card Types

- *Enhance Benefits for Blue and Silver Card Users:* Given that these card types contribute significantly to revenue (\$48M from Blue and \$6M from Silver), consider enhancing their benefits. This could include increased rewards, exclusive offers, and better interest rates to retain and attract more users.
- *Targeted Promotions:* Launch targeted marketing campaigns highlighting the advantages of Blue and Silver cards to encourage more customers to upgrade or apply for these cards.

#### 2. Engage Graduate Customers

- *Tailored Offers for Graduates:* Since graduate customers are active and contribute significantly to credit card revenue, design special offers, rewards programs, and loyalty benefits tailored to their preferences and needs.
- *Financial Education Programs:* Offer financial management workshops and resources specifically for graduates to help them manage their credit and finances better, fostering long-term loyalty.

#### 3. Leverage Popular Payment Methods

- *Optimize Swipe Payment Experience:* With swipe payments being the most popular method (63.12%), ensure that the swipe payment process is seamless, secure, and efficient. Invest in the latest POS technology and customer support for troubleshooting.
- *Promote Swipe Benefits:* Highlight the convenience and benefits of using swipe payments through marketing campaigns to encourage continued usage.

#### 4. Capitalize on High Revenue Quarter

- *Seasonal Campaigns:* With Quarter 3 showing the highest revenue (\$14.2M) and total transaction amounts (\$166.6k), plan special promotions and offers during this period to maximize revenue. This could include back-to-school offers, end-of-summer sales, and holiday season promotions.
- *Quarterly Performance Analysis:* Regularly analyze quarterly performance to identify trends and opportunities. Use this data to plan future marketing and sales strategies that align with high-performing periods.

## **5. Interest and Transaction Management**

- *Maximize Interest Earnings:* Since high transaction amounts and interest earned are significant from Blue and Silver card users, offer incentives for higher spending and longer credit periods where feasible. This could include tiered interest rates or bonus points for reaching certain spending thresholds.
- *Monitor and Adjust Interest Rates:* Regularly review and adjust interest rates to stay competitive while ensuring profitability from high-transaction users.

## **6. Customer Retention and Loyalty Programs**

- *Enhance Loyalty Programs:* Strengthen loyalty programs for frequent users, especially those with blue and silver cards. Offer exclusive rewards, early access to sales, and personalized deals to maintain high user engagement.
- *Feedback and Improvement:* Gather customer feedback on card features and transaction experiences to continuously improve services and address any pain points

## **Customer Report:**

### **1. Target Marketing Campaigns by Age and Income**

- *Focus on Age Group 40-50:* This age group generates significant revenue (\$14M from males and \$11M from females). Tailored marketing campaigns can further enhance engagement and revenue from this demographic.
- *Low-Income Category Engagement:* Since customers with monthly incomes less than \$35,000 activate their accounts sooner, develop targeted promotions and incentives for this segment to encourage early activation and sustained usage.

### **2. Enhance Payment Experience for Ages 40-50**

- *Billing Cycle Awareness:* Given that the age group 40-50 has payment due concerns but also contains prompt payers, introduce flexible payment options, reminders, and financial planning tools specifically for them to minimize late payments and enhance customer satisfaction.

### **3. Gender-Specific Marketing Strategies**

- *Equal Engagement in Texas and New York:* As both genders contribute equally to revenue in these states, ensure marketing materials and offers are inclusive and cater to the preferences of both males and females.
- *Boost Female Engagement Nationwide:* Since revenue from male customers is higher in most quarters, implement initiatives to boost engagement and spending among female customers across other states.

### **4. State-Specific Strategies**

- *California, New York, and Texas Focus:* These states are key revenue drivers. Customize marketing strategies to address state-specific preferences and trends, ensuring that initiatives in these regions are maximized for impact.

#### **5. Loyalty and Reward Programs**

- *Age and Income-Based Rewards:* Develop loyalty programs that offer rewards based on age and income brackets to encourage continued engagement and timely payments. For example, special discounts for customers aged 40-50 or bonuses for low-income users who maintain regular account activity.

#### **6. Customer Education and Support**

- *Financial Literacy Programs:* Offer educational resources and support services to help customers, particularly in the 40-50 age group, manage their finances better and avoid late payments. This can include webinars, online resources, and one-on-one financial advice.

#### **7. Technology and User Experience Improvements**

- *Mobile and Online Experience:* Enhance the digital experience, focusing on ease of use and accessibility for older customers who may prefer straightforward and intuitive interfaces.
- *Account Activation Process:* Simplify and expedite the account activation process for all income groups, taking cues from the quick activation observed in the low-income segment.