DASHBOARD PROJECT REPORT

CASH FLOW MANAGEMENT DASHBOARD

Submitted By:

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1. PROJECT TITLE

Title: Cash Flow Management Dashboard

This project aims to help businesses make data-driven decisions, improve liquidity management, enhance operational efficiency, and ensure long-term financial stability.

The challenge of Cash flow, the movement of money in and out of businesses or individuals, is vital for effective financial management.

Businesses struggle with effectively monitoring cash inflows and outflows, leading to liquidity issues and inefficiencies in financial decision-making.

This project aims to help businesses make data-driven decisions, improve liquidity management, enhance operational efficiency, and ensure long-term financial stability.

2. OBJECTIVES AND GOALS

The objective of this project is to develop an interactive data visualisation solution using Power BI to:

1. Provide a complete view of cash inflows, outflows, and net cash flow.
2. Enable cash flow forecasting and predictive analysis.
3. Compare actual vs. budgeted cash flows and optimise working capital.
4. Provide a blueprint of how the bank can improve its cash flow.
5. Ensure accessibility, to easen cash flow management for everyone.

This project aims to help businesses:

1. Make data-driven decisions,
2. Improve liquidity management,
3. Enhance operational efficiency, and
4. Ensure long-term financial stability.

3. DATASET DESCRIPTION

a) Use-Case Domain: Finance

The dataset contains detailed records of bank loan transactions, as well as additional fields to support cash flow management analysis.

The data includes both financial information about loans, and attributes that provide information regarding cash flow transactions.

The dataset can be used for cash flow analysis, including inflow/outflow tracking, cash forecasting, and loan repayment analysis.

It includes transaction timestamps, categories, payment methods, vendor names, and unique transaction IDs.

Number of Rows= 38,577

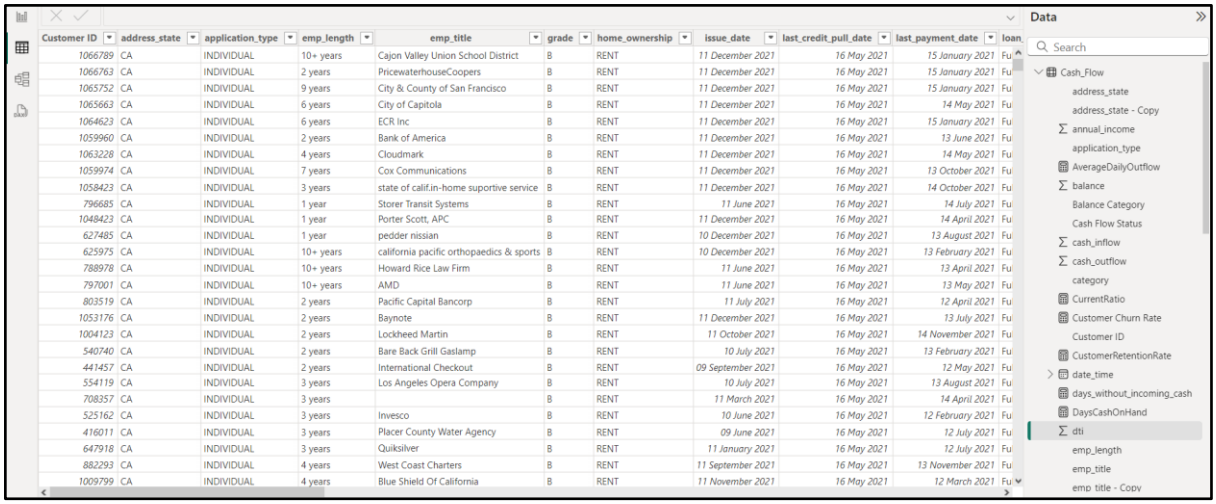
Number of Columns= 32

Region Covered: USA

Data-Types: Date, Date-Time, Whole Number, String

Important Fields / Attributes:

1. loan_amount: The principal amount of the loan issued.
2. instalment: Monthly instalment amount to be paid by the borrower.
3. issue_date: Date when the loan was issued.
4. total_payment: Total amount the borrower is expected to pay, including interest.
5. cash_inflow: Represents cash received by the bank (e.g., loan disbursements, payments).
6. cash_outflow: Represents cash paid out by the bank (e.g., loan disbursements, repayments, fees).
7. Additional fields related to loan terms, borrower details, and financial background.



Customer ID	address_state	application_type	emp_length	emp_title	grade	home_ownership	issue_date	last_credit_pull_date	last_payment_date	loan
1066789	CA	INDIVIDUAL	10+ years	Cajon Valley Union School District	B	RENT	11 December 2021	16 May 2021	15 January 2021	Fu
1066763	CA	INDIVIDUAL	2 years	PricewaterhouseCoopers	B	RENT	11 December 2021	16 May 2021	15 January 2021	Fu
1065752	CA	INDIVIDUAL	9 years	City & County of San Francisco	B	RENT	11 December 2021	16 May 2021	15 January 2021	Fu
1065663	CA	INDIVIDUAL	6 years	City of Capitola	B	RENT	11 December 2021	16 May 2021	14 May 2021	Fu
1064623	CA	INDIVIDUAL	6 years	ECR Inc	B	RENT	11 December 2021	16 May 2021	15 January 2021	Fu
1059960	CA	INDIVIDUAL	2 years	Bank of America	B	RENT	11 December 2021	16 May 2021	13 June 2021	Fu
1063228	CA	INDIVIDUAL	4 years	Cloudmark	B	RENT	11 December 2021	16 May 2021	14 May 2021	Fu
1059974	CA	INDIVIDUAL	7 years	Cox Communications	B	RENT	11 December 2021	16 May 2021	13 October 2021	Fu
1058423	CA	INDIVIDUAL	3 years	state of calif.in-home suportive service	B	RENT	11 December 2021	16 May 2021	14 October 2021	Fu
796685	CA	INDIVIDUAL	1 year	Storer Transit Systems	B	RENT	11 June 2021	16 May 2021	14 July 2021	Fu
1048423	CA	INDIVIDUAL	1 year	Porter Scott, APC	B	RENT	11 December 2021	16 May 2021	14 April 2021	Fu
627485	CA	INDIVIDUAL	1 year	pedder nissian	B	RENT	10 December 2021	16 May 2021	13 August 2021	Fu
625975	CA	INDIVIDUAL	10+ years	california pacific orthopaedics & sports	B	RENT	10 December 2021	16 May 2021	13 February 2021	Fu
788978	CA	INDIVIDUAL	10+ years	Howard Rice Law Firm	B	RENT	11 June 2021	16 May 2021	13 April 2021	Fu
797001	CA	INDIVIDUAL	10+ years	AMD	B	RENT	11 June 2021	16 May 2021	13 May 2021	Fu
803519	CA	INDIVIDUAL	2 years	Pacific Capital Bancorp	B	RENT	11 July 2021	16 May 2021	12 April 2021	Fu
1053176	CA	INDIVIDUAL	2 years	Baynote	B	RENT	11 December 2021	16 May 2021	13 July 2021	Fu
1004123	CA	INDIVIDUAL	2 years	Lockheed Martin	B	RENT	11 October 2021	16 May 2021	14 November 2021	Fu
540740	CA	INDIVIDUAL	2 years	Bare Back Grill Gaslamp	B	RENT	10 July 2021	16 May 2021	13 February 2021	Fu
441457	CA	INDIVIDUAL	2 years	International Checkout	B	RENT	09 September 2021	16 May 2021	12 May 2021	Fu
554119	CA	INDIVIDUAL	3 years	Los Angeles Opera Company	B	RENT	10 July 2021	16 May 2021	13 August 2021	Fu
708357	CA	INDIVIDUAL	3 years		B	RENT	11 March 2021	16 May 2021	14 April 2021	Fu
525162	CA	INDIVIDUAL	3 years	Invesco	B	RENT	10 June 2021	16 May 2021	12 February 2021	Fu
416011	CA	INDIVIDUAL	3 years	Placer County Water Agency	B	RENT	09 June 2021	16 May 2021	12 July 2021	Fu
647918	CA	INDIVIDUAL	3 years	Quiksilver	B	RENT	11 January 2021	16 May 2021	12 July 2021	Fu
882293	CA	INDIVIDUAL	4 years	West Coast Charters	B	RENT	11 September 2021	16 May 2021	13 November 2021	Fu
1009799	CA	INDIVIDUAL	4 years	Blue Shield Of California	B	RENT	11 November 2021	16 May 2021	12 March 2021	Fu

Figure.(1) Cash_Flow Dataset after Data Transformation and Loading in Power BI Desktop

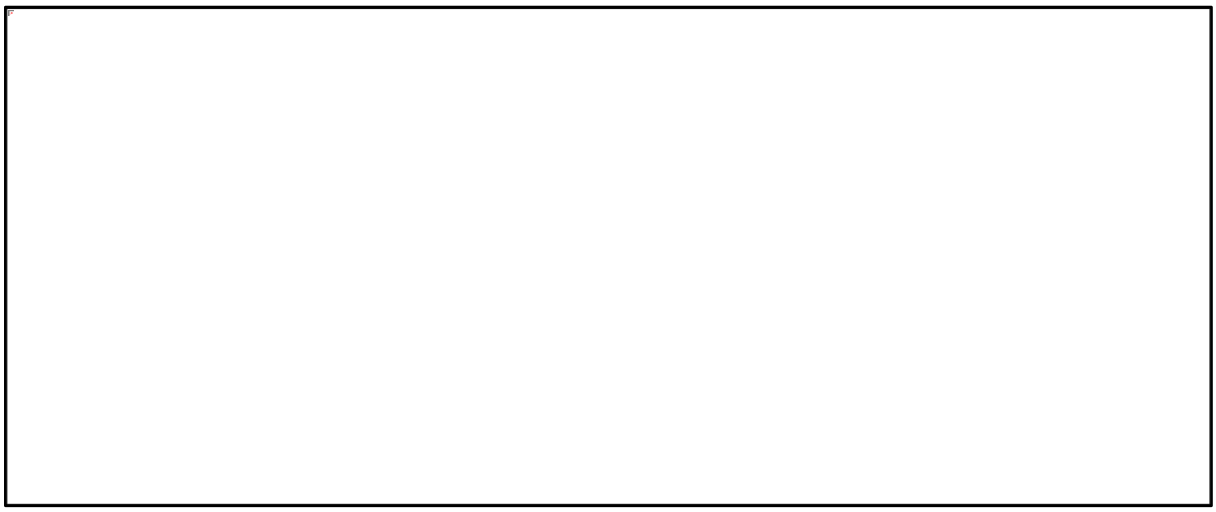


Figure.(2) ash_Flow Dataset after Data Transformation and Loading in Power BI Desktop

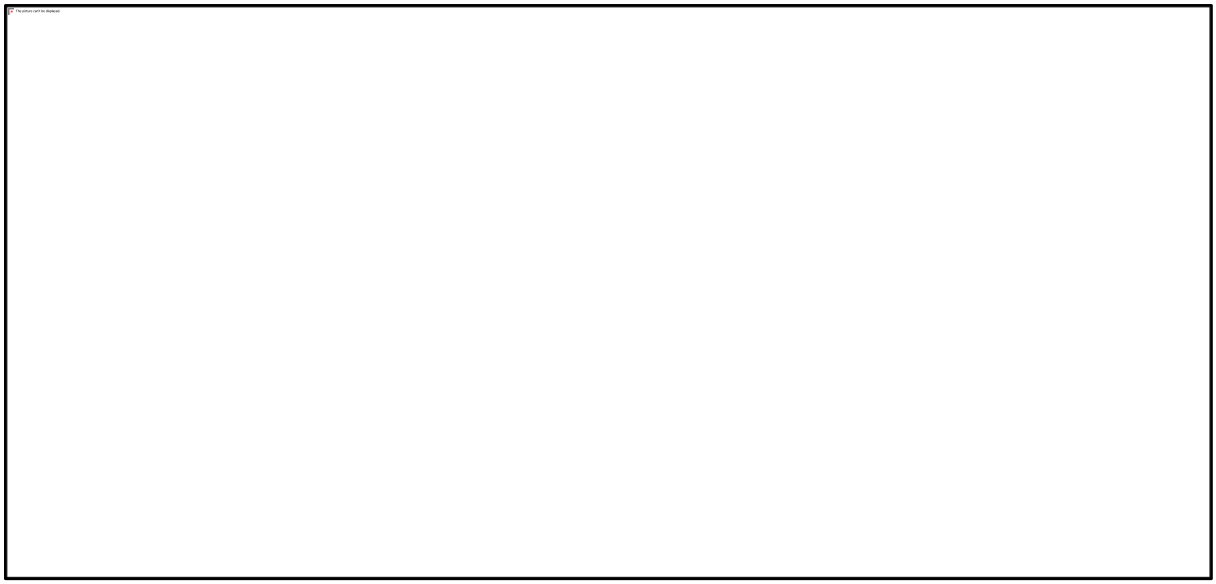


Figure. (3): Cash_Flow Dataset after Data Extraction, Transformation and Loading (ETL) in Power BI Desktop

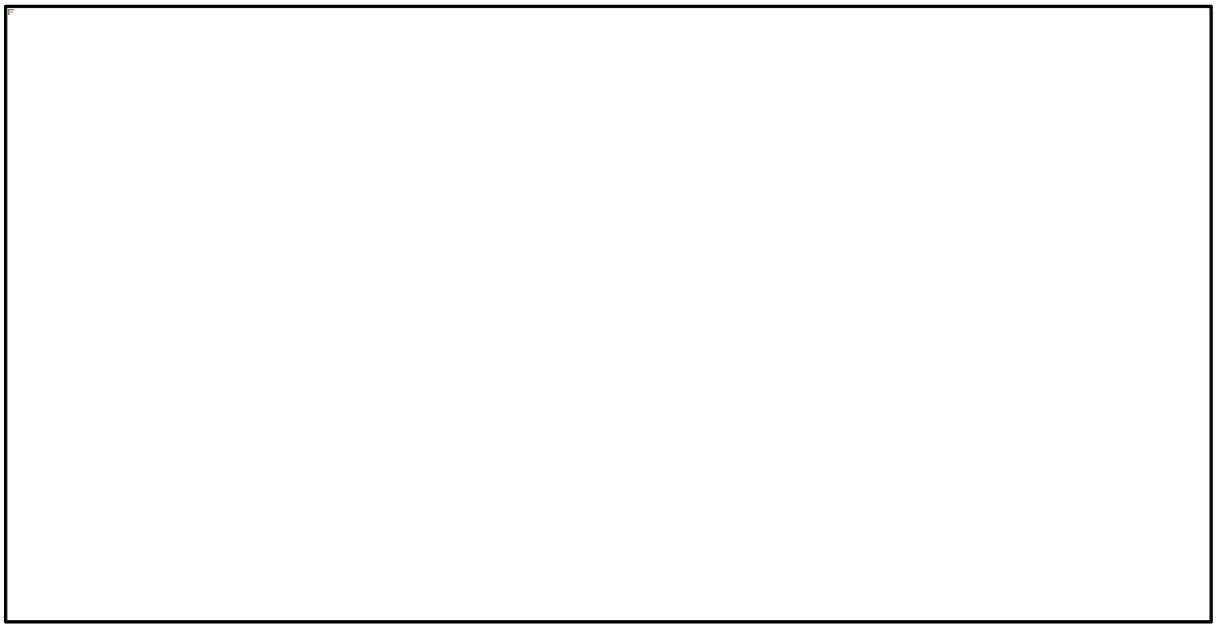


Figure. (4): Cash_Flow Dataset after Data Transformation and Loading in Power BI Desktop

b) **Modality of Data:** Multimodal (Numeric- Categorical and Continuous Columns, as well as Text Fields such as State Address, Vendor Name, Transaction ID)

c) **Type of Dataset File:** The Source Data was in the form of a **.CSV File** which is indicated below:

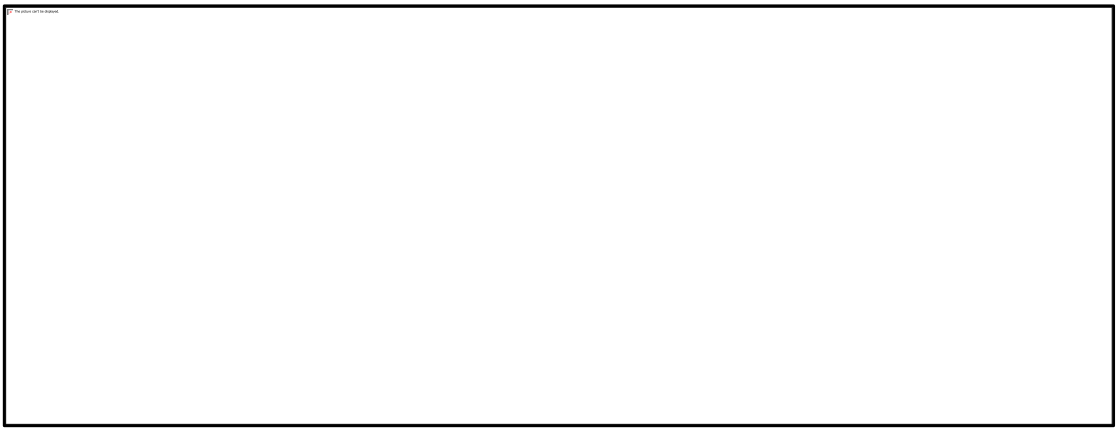


Figure. (5): Bank Loan Cash Flow Data: Source Dataset File (.csv File)

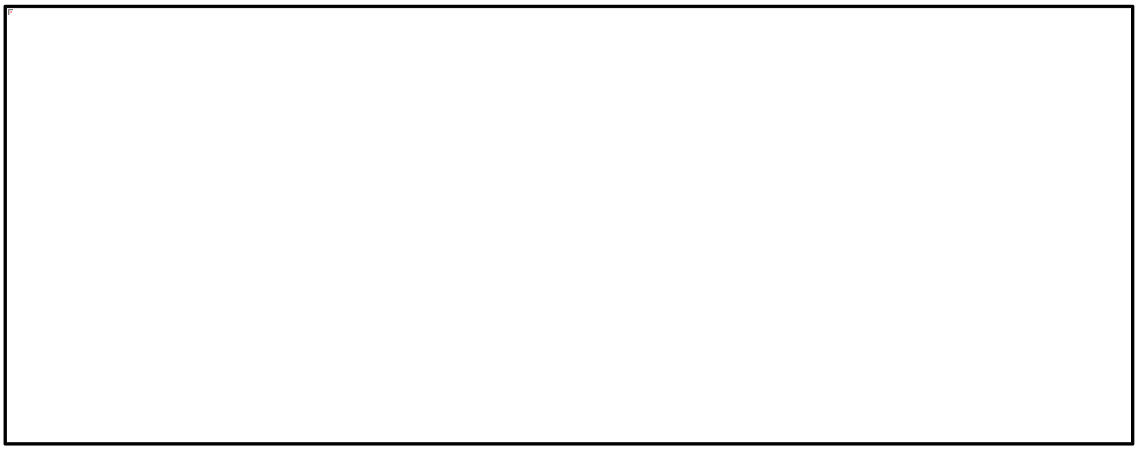


Figure. (6): Bank Loan Cash Flow Data: Source Dataset File (.csv File)

4. MEASURES AND KPIs

REPORT 1: BANK CASH FLOW REPORT:-

A) Key Performance Indicators (KPIs) and Measures:

- **KPIs (Key Performance Indicators):**

1. Total Loan Applications (Count)
2. Funded Amount (Sum of funded loans)
3. Amount Received (Sum of principal repayments)
4. Average Interest Rate (Average of interest rates)
5. Average Debt-to-Income (DTI) Ratio (Average of DTI ratios)

- **Measures:**

1. Good Loan Percentage (Percentage of total loans classified as "Good")
2. Bad Loan Percentage (Percentage of total loans classified as "Bad")
3. Funded Amount by Loan Quality (Separate funded amounts for Good and Bad loans)
4. Received Amount by Loan Quality (Separate received amounts for Good and Bad loans)

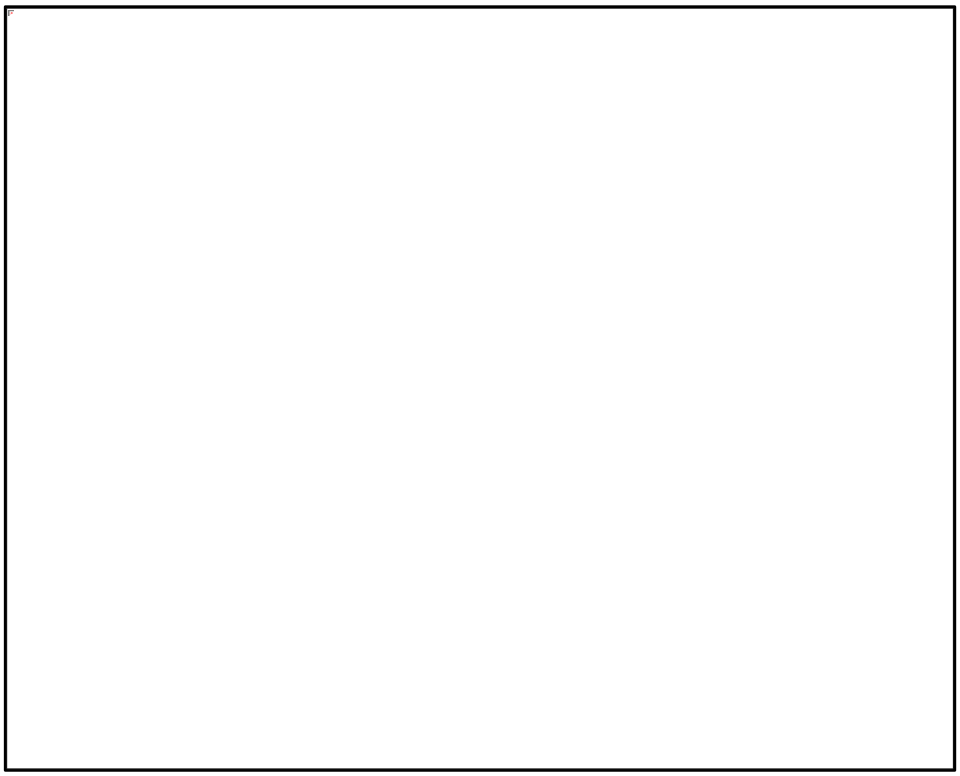
1.Total Loan Applications: We need to calculate the total number of loan applications received during a specified period. Additionally, it is essential to monitor the Month-to-Date (MTD) Loan Applications and track changes Month-over-Month (MoM).

2.Total Funded Amount: Understanding the total amount of funds disbursed as loans is crucial. We also want to keep an eye on the MTD Total Funded Amount and analyse the Month-over-Month (MoM) changes in this metric.

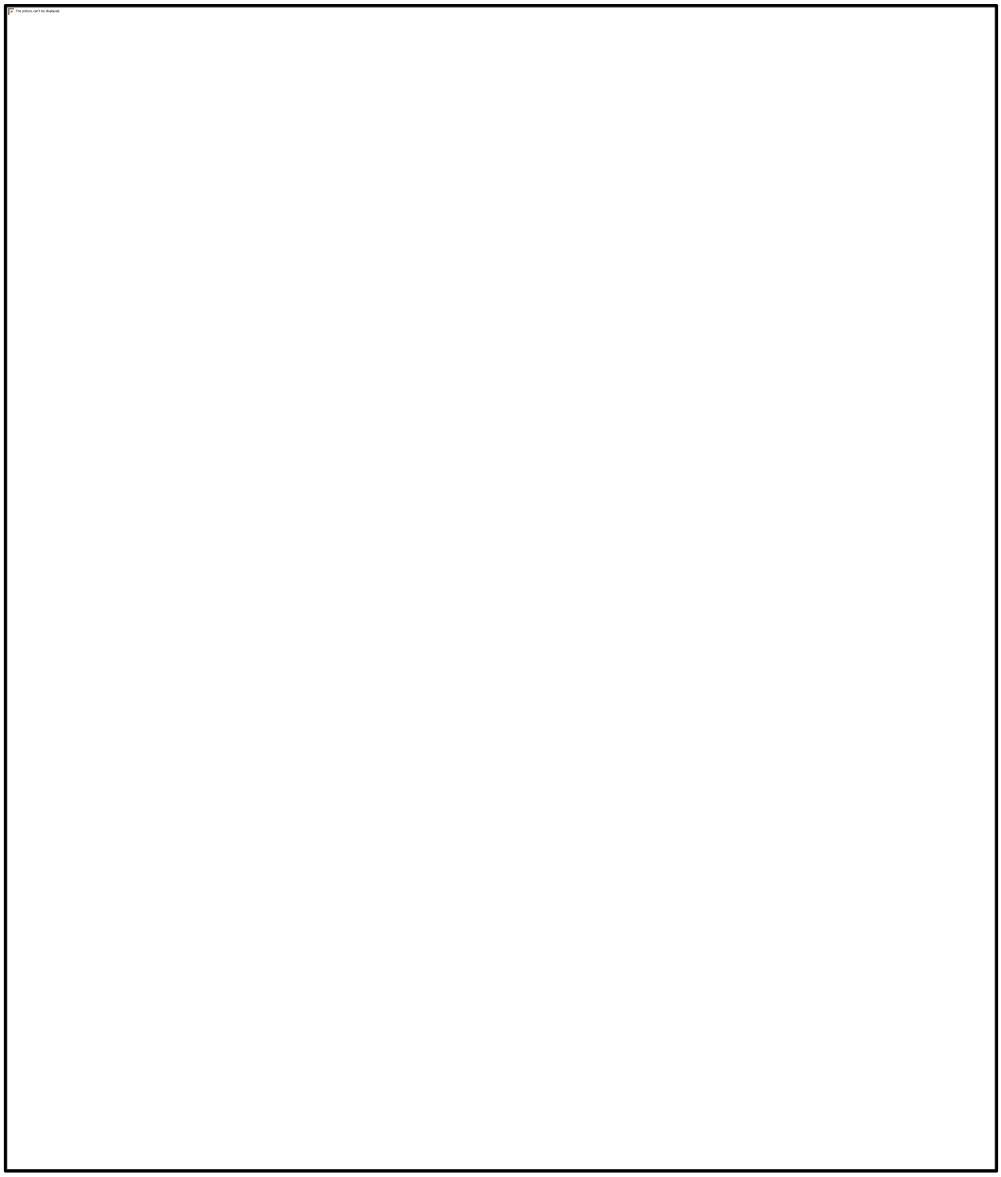
3.Total Amount Received: Tracking the total amount received from borrowers is essential for assessing the bank's cash flow and loan repayment. We should analyse the Month-to-Date (MTD) Total Amount Received and observe the Month-over-Month (MoM) changes.

4.Average Interest Rate: Calculating the average interest rate across all loans, MTD, and monitoring the Month-over-Month (MoM) variations in interest rates will provide insights into our lending portfolio's overall cost.

5.Average Debt-to-Income Ratio (DTI): Evaluating the average DTI for our borrowers helps us gauge their financial health. We need to compute the average DTI for all loans, MTD, and track Month-over-Month (MoM) fluctuations.



SQL Queries for creation of Measures



SQL Queries for creation of Measures

- **Good Loan v Bad Loan KPI's:**

Sr.No.	**Good Loan**	**Bad Loan**
1.	Good Loan amount Application Percentage	Bad Loan amount Application Percentage
2.	Good Loan Applications	Bad Loan Applications
3.	Good Loan Funded Amount	Bad Loan Funded Amount

4.	Good Loan Total Received Amount	Bad Loan Total Received Amount

- **Loan Status Grid View:**

In order to gain a comprehensive overview of our lending operations and monitor the performance of loans, we aim to create a grid view report categorised by 'Loan Status.'

By providing insights into metrics such as 'Total Loan Applications,' 'Total Funded Amount,' 'Total Amount Received,' 'Month-to-Date (MTD) Funded Amount,' 'MTD Amount Received,' 'Average Interest Rate,' and 'Average Debt-to-Income Ratio (DTI),' this grid view will empower us to make data-driven decisions and assess the health of our loan portfolio.

REPORT 2: CASH FLOW REPORT:-

- **KPIs (Key Performance Indicators):**

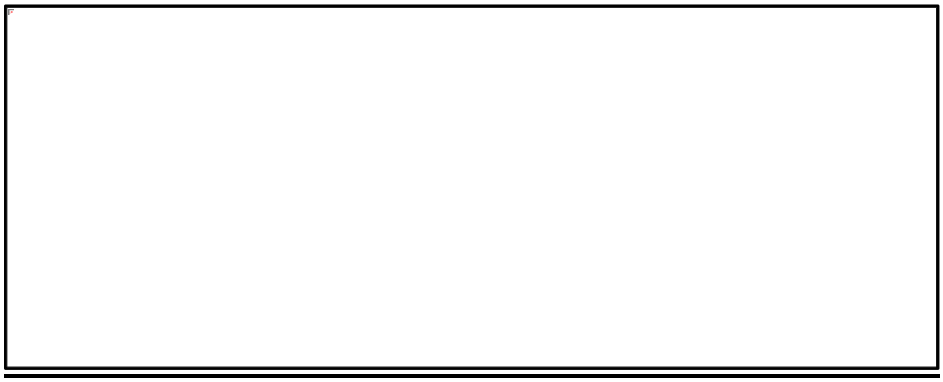
1. Average DTI by Grade
2. Average DTI by Home Ownership
3. Current Ratio

- **Measures:**

1. Total Absolute Cash Flow
2. Total Positive Cash Inflow
3. Total Cash Outflow
4. Total Positive Balance

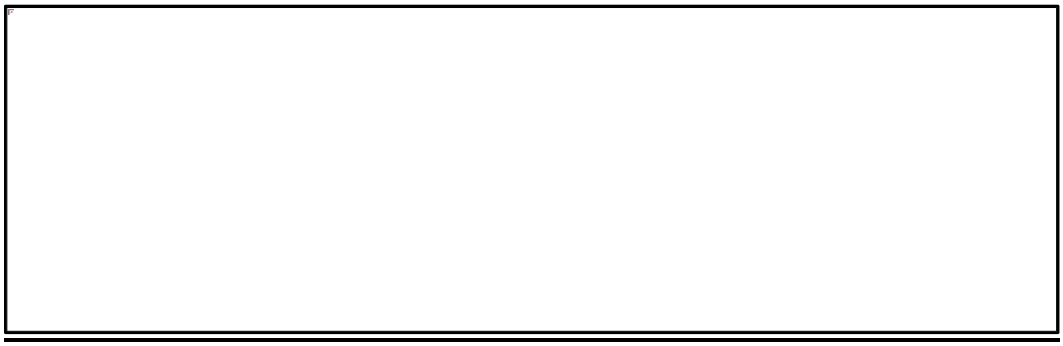
A) KPIs:

1. **Average Debt-to-Income (DTI) by Credit Grade**: Measures the average proportion of a customer's debt payments to their income, grouped by credit rating. This helps understand how different customer segments manage debt.



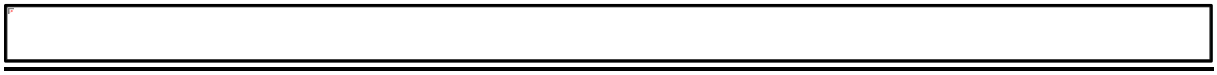
DAX Measure for Average DTI by Grade

2. **Average Debt-to-Income (DTI) by Home Ownership**: Tracks the average debt-to-income ratio for customers based on whether they own or rent their homes, helping to assess financial stability across different living situations.



DAX Measure for Average DTI by Home Ownership

3. **Current Ratio**: Compares a bank's short-term assets to its short-term liabilities, providing a quick view of its ability to pay off debts due within a year.



DAX Measure for Current Ratio

B) Measures:

1. **Total Absolute Cash Flow**: The overall movement of money in and out, showing the net change in cash over a set period.

DAX Measure for Total Absolute Cash Outflow

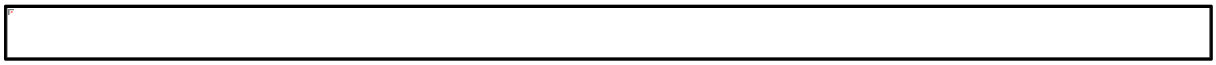
2. **Total Positive Cash Inflow**: The total amount of money received, highlighting all income or funds coming in.

DAX Measure for Total Positive Cash Inflow

3. **Total Cash Outflow**: The complete sum of all expenses and payments made, giving a clear picture of spending.

DAX Measure for Total Cash Outflow

4. **Total Positive Balance**: The cumulative total of all cash that remains after expenses, indicating periods of surplus funds.



DAX Measure for Total Positive Balance

REPORT 3: CASH FLOW TRENDS REPORT:-

5. DASHBOARD VISUALS AND GRAPHS

Graphs, Charts and Visuals:

1.Monthly Trends by Issue Date (Line Chart): To identify seasonality and long-term trends in lending activities

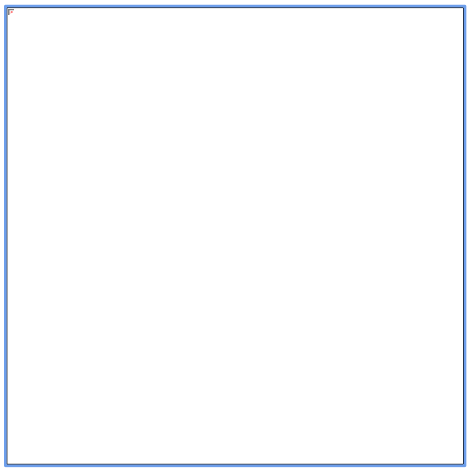
2.Regional Analysis by State (Filled Map): To identify regions with significant lending activity and assess regional disparities.

3.Loan Term Analysis (Donut Chart): To allow the client to understand the distribution of loans across various term lengths.

4.Employee Length Analysis (Bar Chart): How lending metrics are distributed among borrowers with different employment lengths, helping us assess the impact of employment history on loan applications.

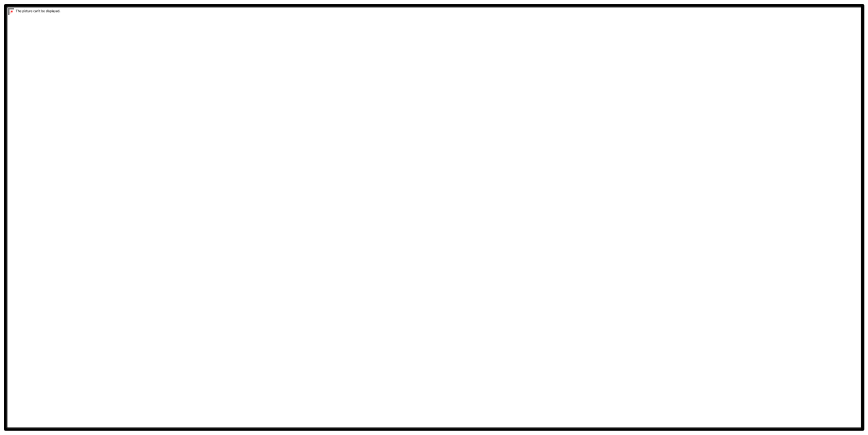
5.Loan Purpose Breakdown (Bar Graph): Will provide a visual breakdown of loan metrics based on the stated purposes of loans, aiding in the understanding of the primary reasons borrowers seek financing.

6. Home Ownership Analysis (Tree Map): For a hierarchical view of how home ownership impacts loan applications and disbursements.

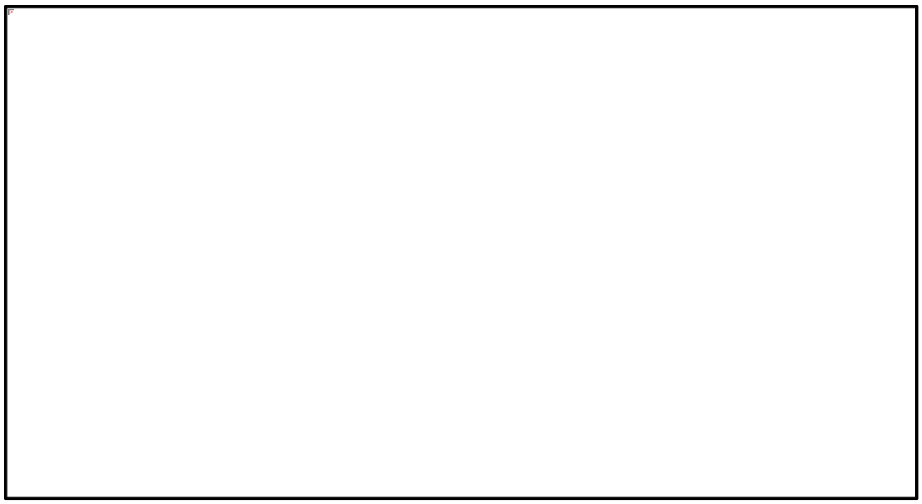


Metrics shown: 'Total Loan Applications,' 'Total Funded Amount,' and 'Total Amount Received'

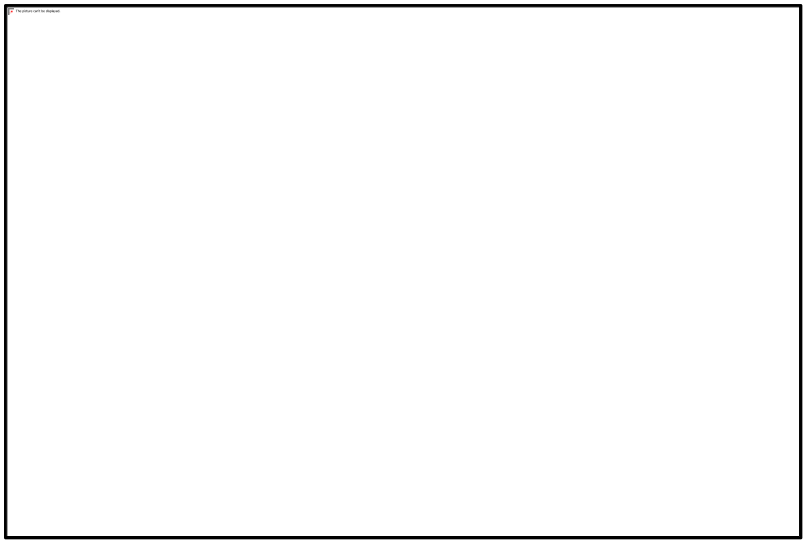
7. Total Transaction Amount by Loan Category (Pie Chart): Visualizes the share of total transactions across different loan categories to understand which types are most common.



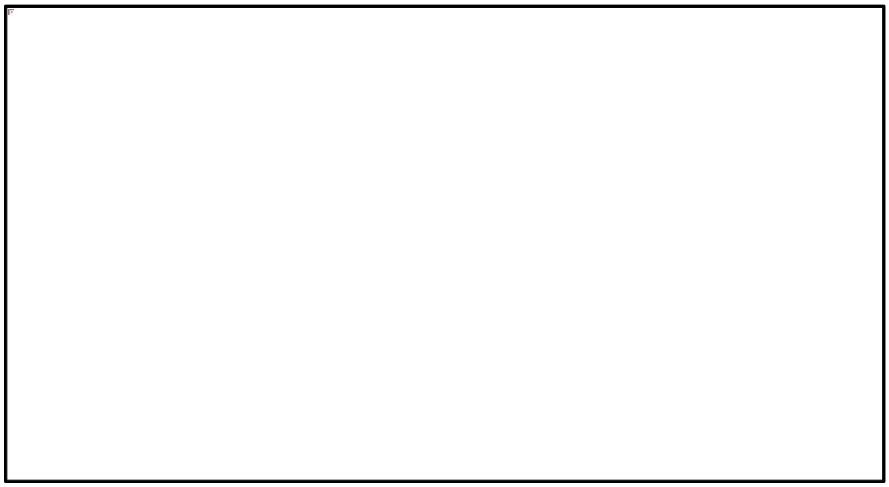
8. Total Transaction Amount by Home Ownership (Funnel Chart): Highlights the distribution of transaction amounts based on whether customers own or rent their homes, illustrating financial behavior patterns.



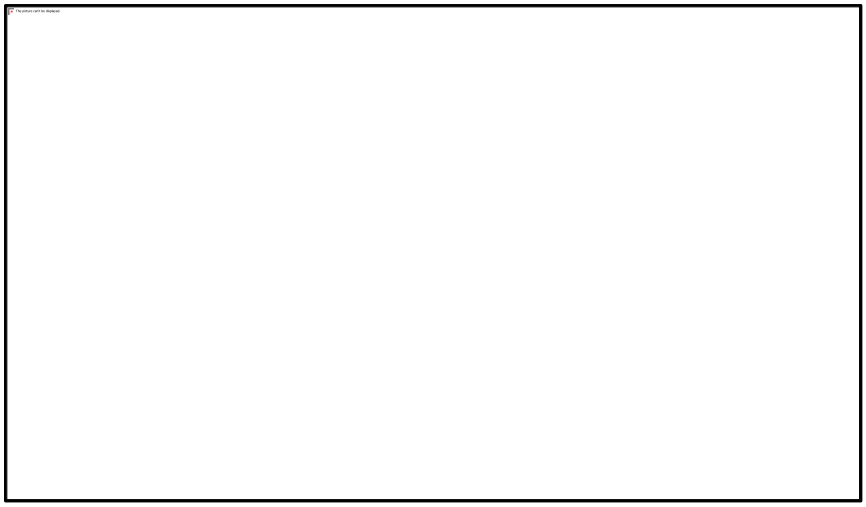
9. Monthwise Cumulative Cash Inflow and Outflow (Stacked Bar Chart): Shows a monthly comparison of cash coming in versus cash going out, helping track liquidity trends over time.



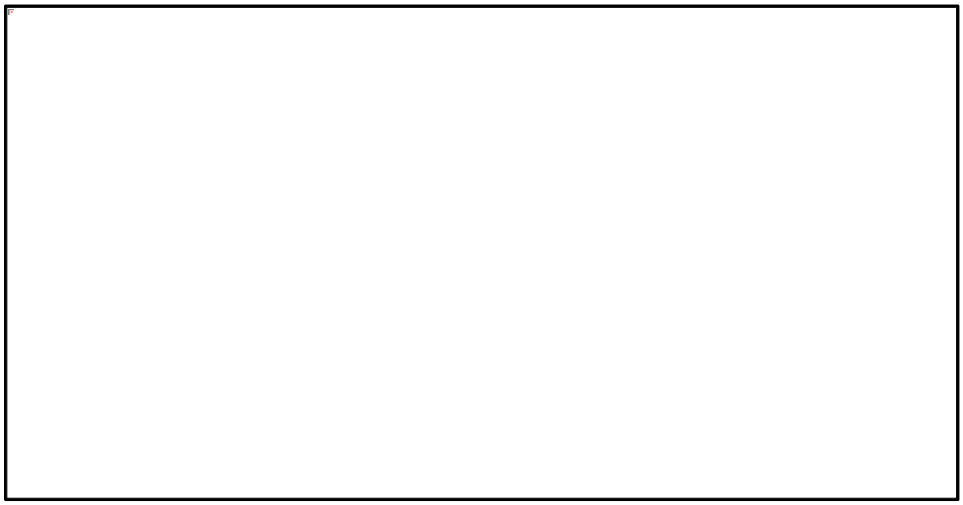
10. Loan Grade-wise Total Transaction Amount (Bar Chart): Displays the total transaction value for each loan grade, offering insights into the distribution of funds based on credit ratings.



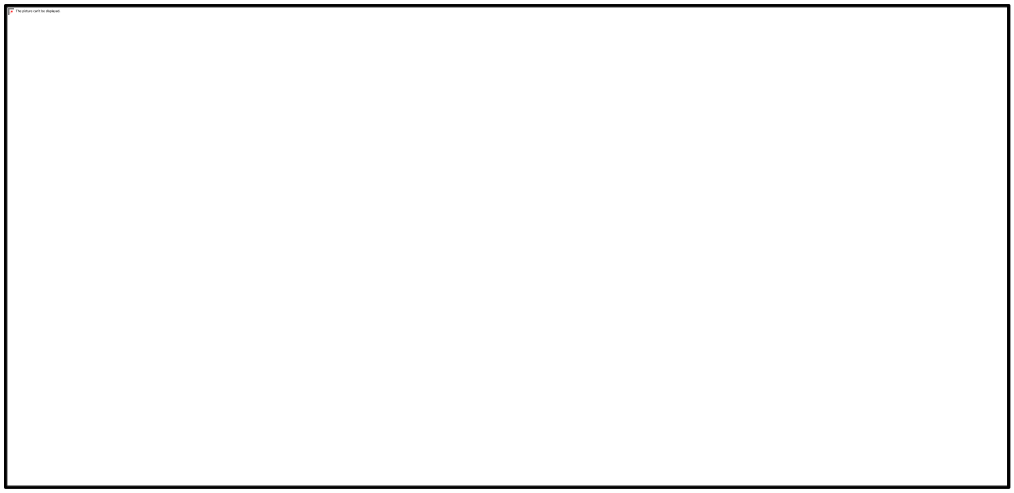
11. Cumulative Loan Payment Amount by Loan Purpose (Donut Chart): Illustrates the cumulative payments made for different loan purposes, giving a breakdown of where loan repayments are allocated.



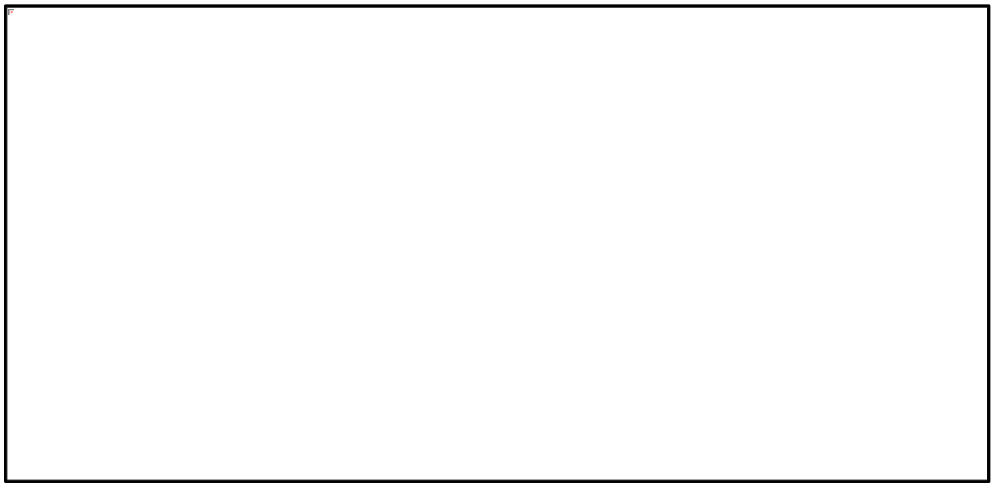
12. Monthwise Cumulative Cash Inflow and Cash Outflow (Stacked Column Chart): Compares month-over-month cash inflow and outflow to assess overall cash management performance.



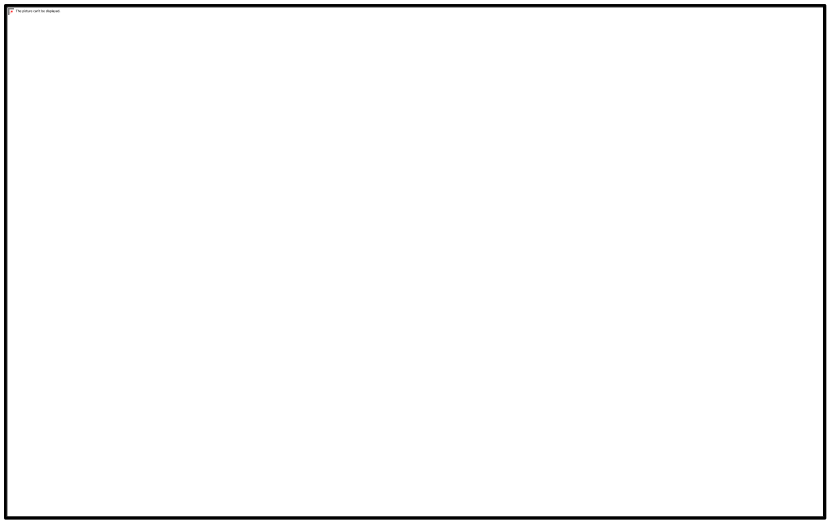
13. Month Wise Total Cash Inflow (Line Chart): Tracks the total cash received each month, highlighting seasonal or periodic fluctuations in income.



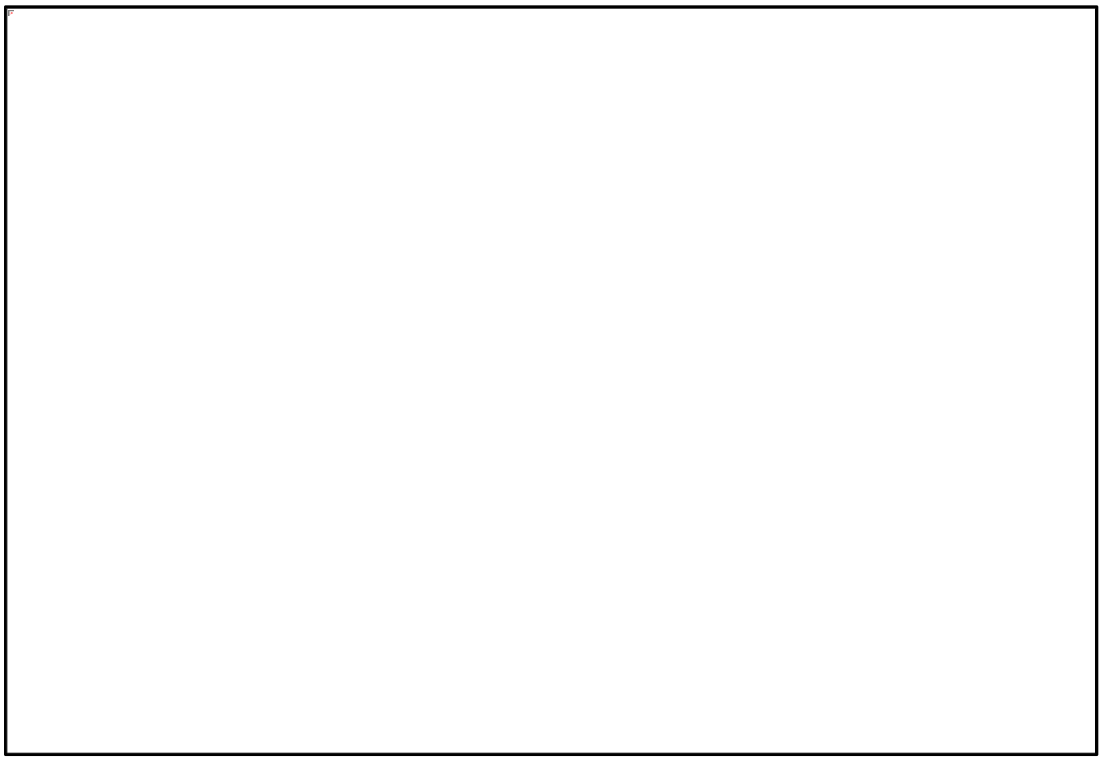
14. Monthwise Net Cash Flow (Bar Chart): Shows the difference between cash inflow and outflow each month to analyse profitability or liquidity status.



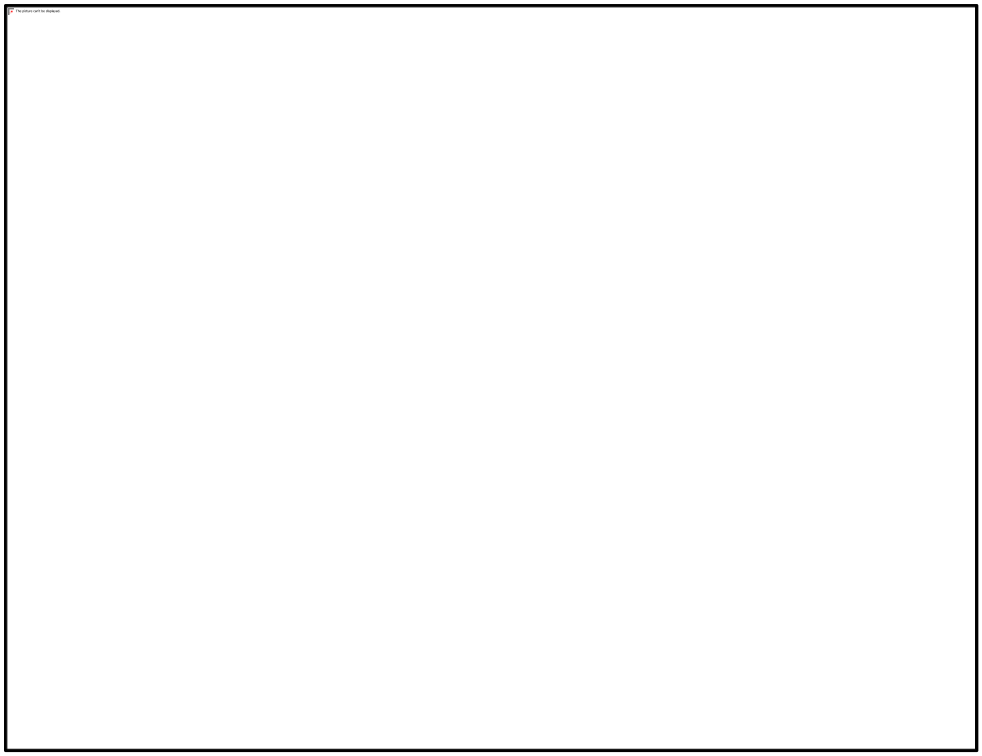
15. Target Vs. Achieved Net Cash Flow (Gauge Visual): Displays the progress of actual net cash flow against set targets, indicating financial performance at a glance.



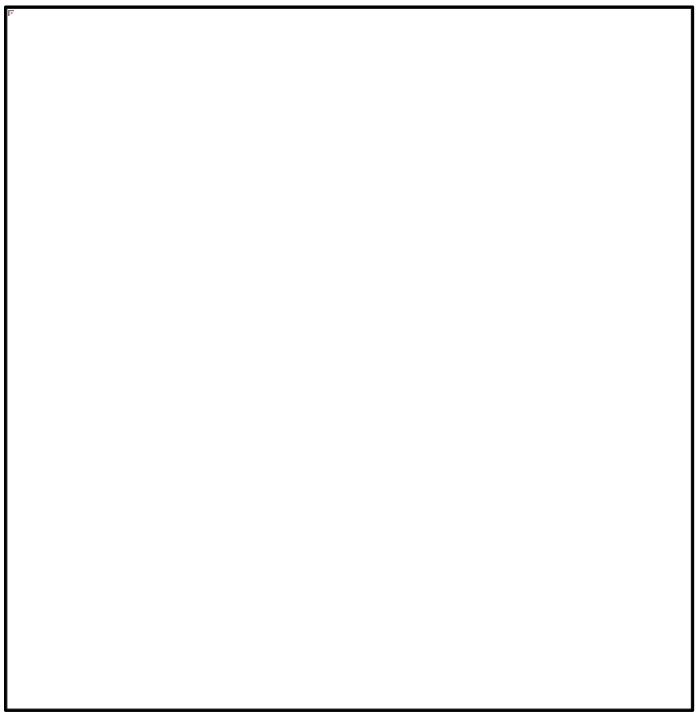
16. Target Vs. Achieved Current Ratio (KPI Visual): Highlights whether the bank's short-term liquidity ratio meets or exceeds the expected benchmark, showing financial health.



17. Month-wise Cumulative Cash Inflow: Tracks the accumulation of cash received month by month, helping monitor growth in cash reserves.



18. State-Wise Cumulative Loan Amount: Provides a geographic breakdown of total loan disbursements, highlighting regional lending trends.



6. PICTORIAL PLAN OF DASHBOARD

(a) Overview:

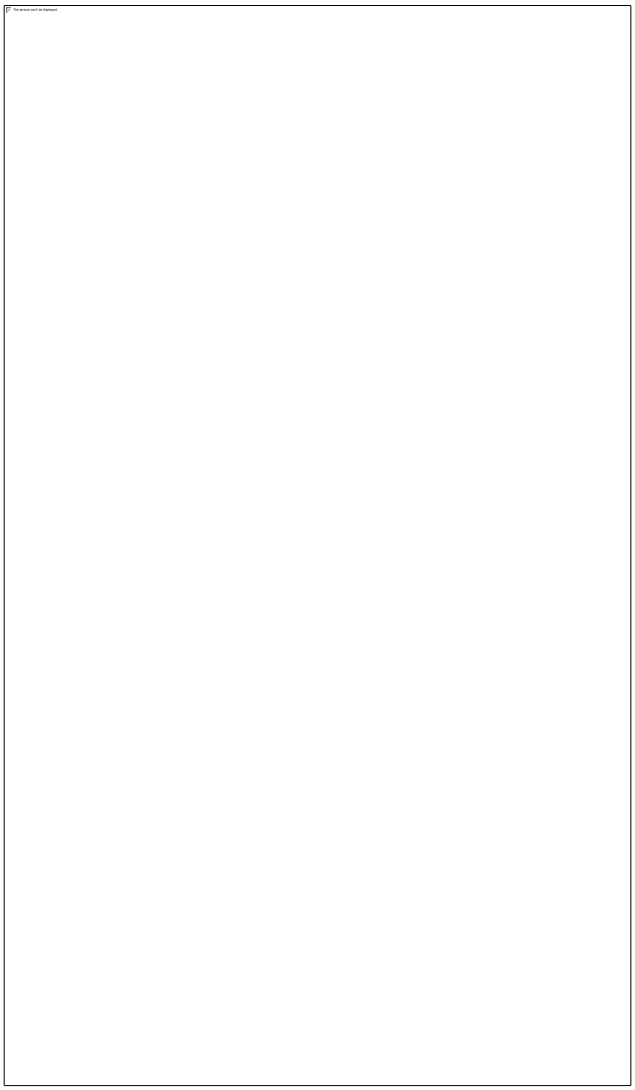


Figure.(1) Layout Diagram for Cash Flow Analytics Dashboard

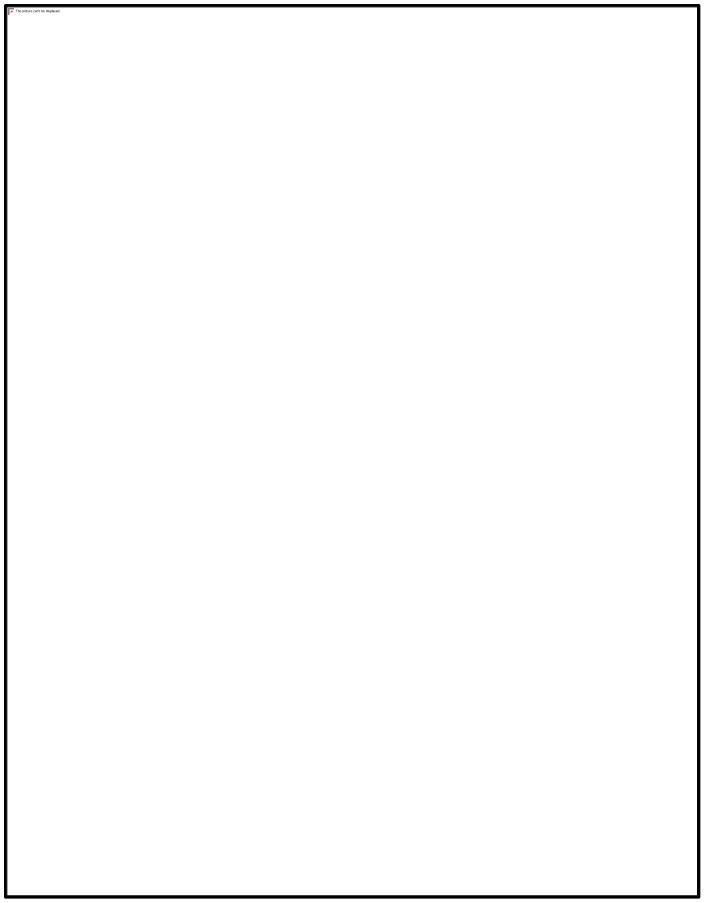


Figure.(2) Layout Diagram for Bank Cash Flow Report

(b) Reports for Building the Dashboard:

The dashboard for Cash Flow Analytics titled, 'Cashflow Analytics Dashboard' was created from the following 3 reports:

1. Bank Cash Flow Report
2. Cash Flow Report
3. Cash Flow Trends Report

1. Bank Cash Flow Report:

1.1.: Bank Cash Flow Report- Summary Page:

Figure.(1) Bank Cash Flow Summary

- Calculated and visualised key performance indicators (KPIs) such as total loan applications, funded amount, amount received, average interest rate, and average debt-to-income ratio.

- Segregated loan applications into 'Good Loan' and 'Bad Loan' categories, highlighting their respective percentages, counts, funded amounts, and received amounts.

- Presented a loan status grid view to categorise loans based on their status and provide insights into various metrics.

1.2. Bank Cashflow Report- Overview Page:

Figure.(2) Bank Cash Flow Overview

- Analysed monthly trends in loan applications using a line chart to identify seasonality and long-term patterns.

- Conducted a regional analysis by state using a filled map to identify areas with significant lending activity and regional disparities.

- Visualised the distribution of loans across different term lengths and employment lengths using donut charts and bar charts.

- Examined the breakdown of loan purposes and home ownership status to understand borrower preferences and behaviours.

1.3. Bank Cash Flow Report: Details Page:

Figure.(3) Bank Cash Flow Details

- Created a comprehensive grid table providing a consolidated view of all essential loan-related metrics and data points.

- Aimed to offer users a user-friendly interface for accessing detailed insights into the loan portfolio, borrower profiles, and loan performance.

2. Cash Flow Report:

2.1. Cash Flow Report: Cash Flow Overview

- Analysed Total Loan Amount by Category of Cash Flow (i.e.: Loan Disbursement, Interest Payment, Loan Repayment).
- Provided an overview of Total Transaction Amount by Home Ownership. (As home ownership is an indicator of the repayment capacity of the borrower, it affects Bank Transaction Amount significantly.)
- Presented month-wise aggregate Cash Inflow and Cash Outflow.
- Visualised and compared month-wise Cumulative Cash Inflow and Cash Outflow.
- Aimed to provide an overview of Cash Inflows and Outflows for the bank.

Figure.(4) Cash Flow Overview

2.2. Cash Flow Report: Cash Flow Composition

- Compared Total Transaction Amount by Loan Grade.
- Visualised the distribution of Total Payment Amount by Loan Purpose.
- Presented average DTI (Debt-to-Income) Ratio by Loan Grade and Home Ownership.

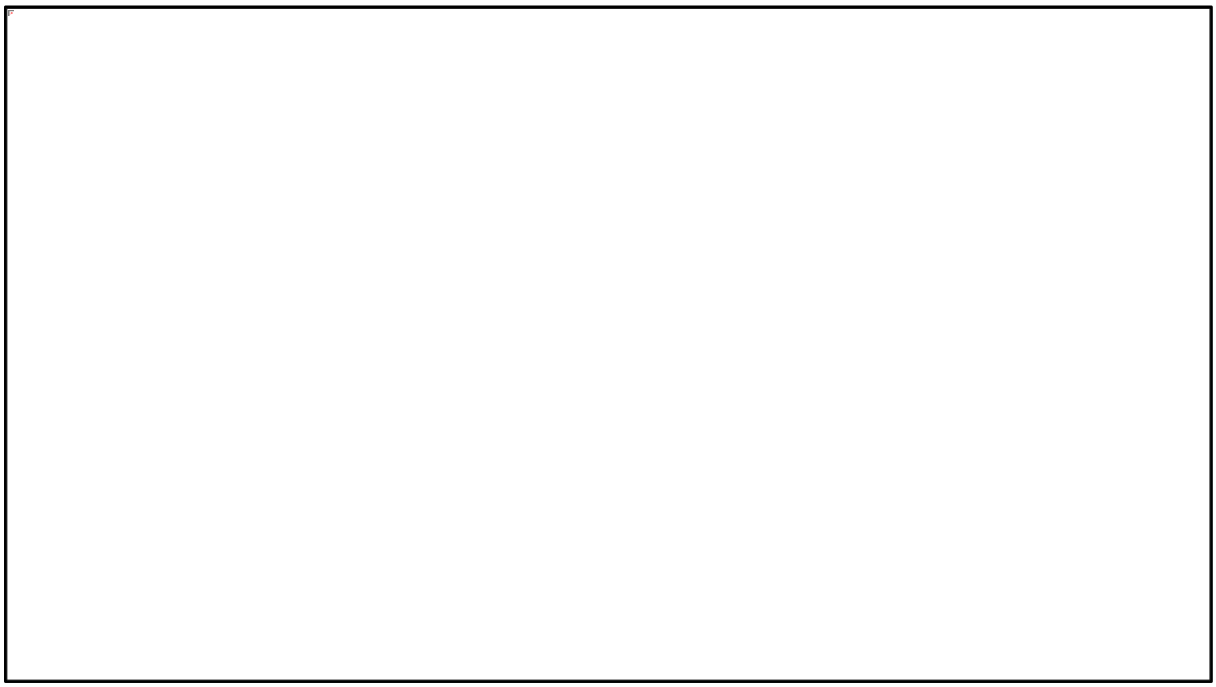


Figure.(5) Cash Flow Composition

3. Cash Flow Trends Report

3.1. Cash Flow Trends Report: Cash Flow Trends and Forecasting

- Visualised and compared Month-Wise Cash Inflow and Cash Outflow over the period of a year using a Stacked Column Chart.
- Visualised the monthly trend of Total Cash Inflow over a year using a Line Chart.
- Visualised the month-wise Net Cash Flow (negative) over a year using a Column Chart.

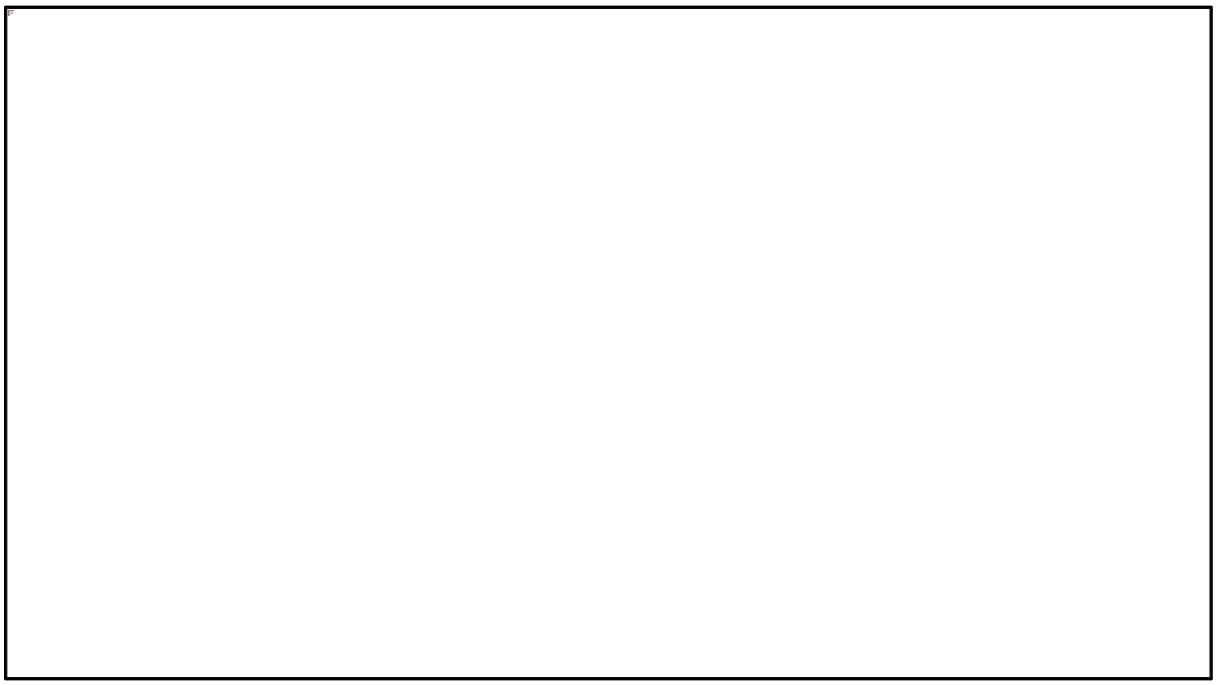
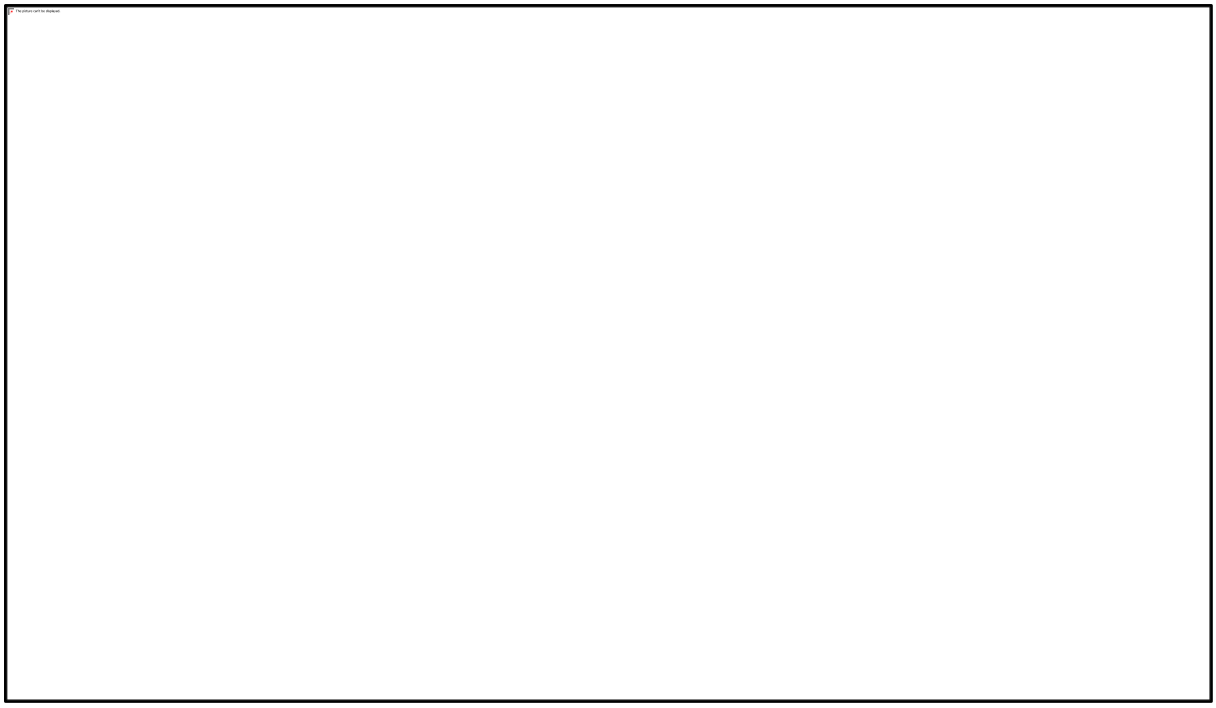
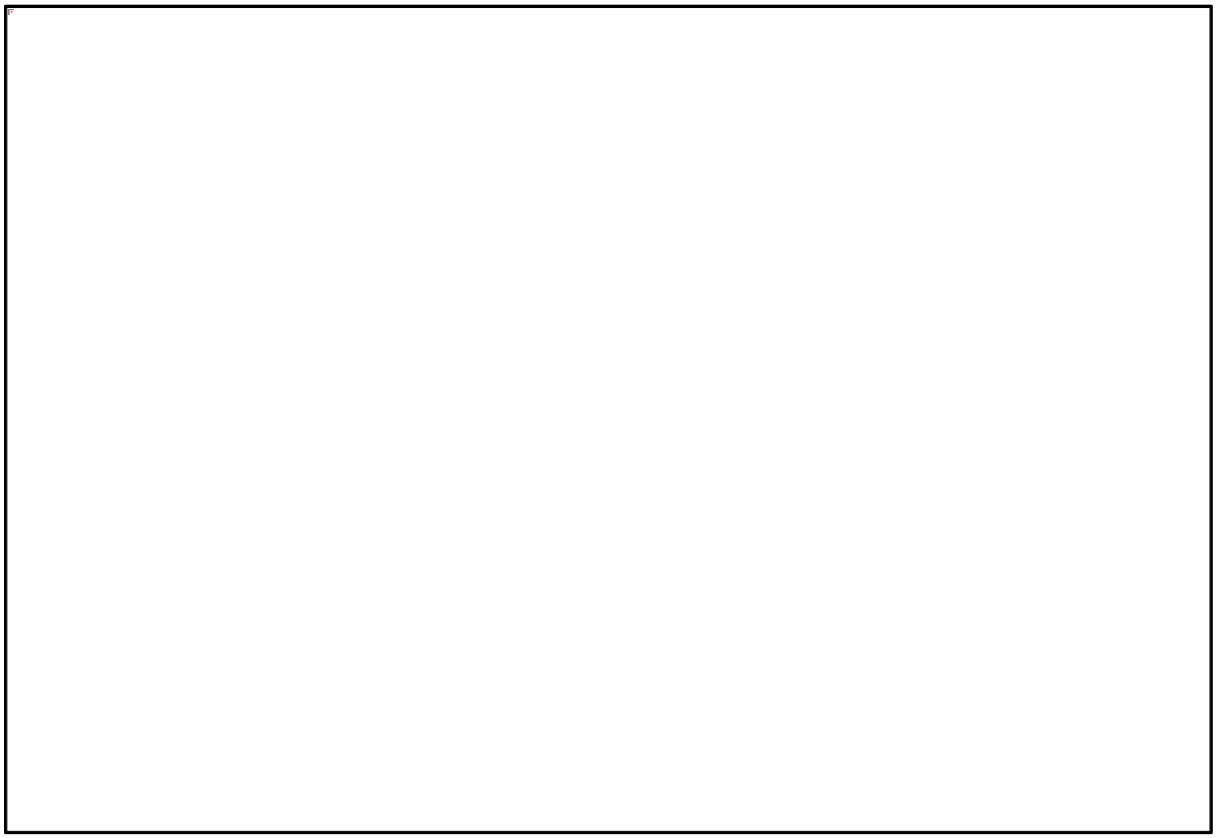


Figure.(6) Cash Flow Trends

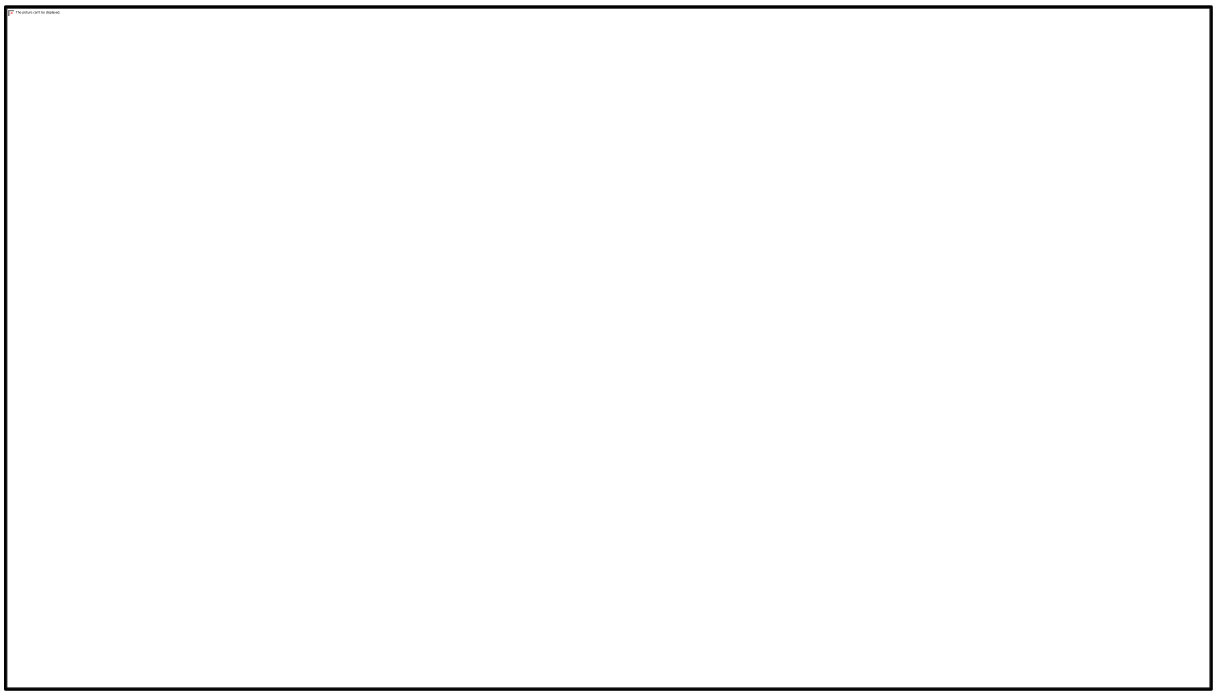
3.2. Cash Flow Trends Report: Cash Flow KPIs

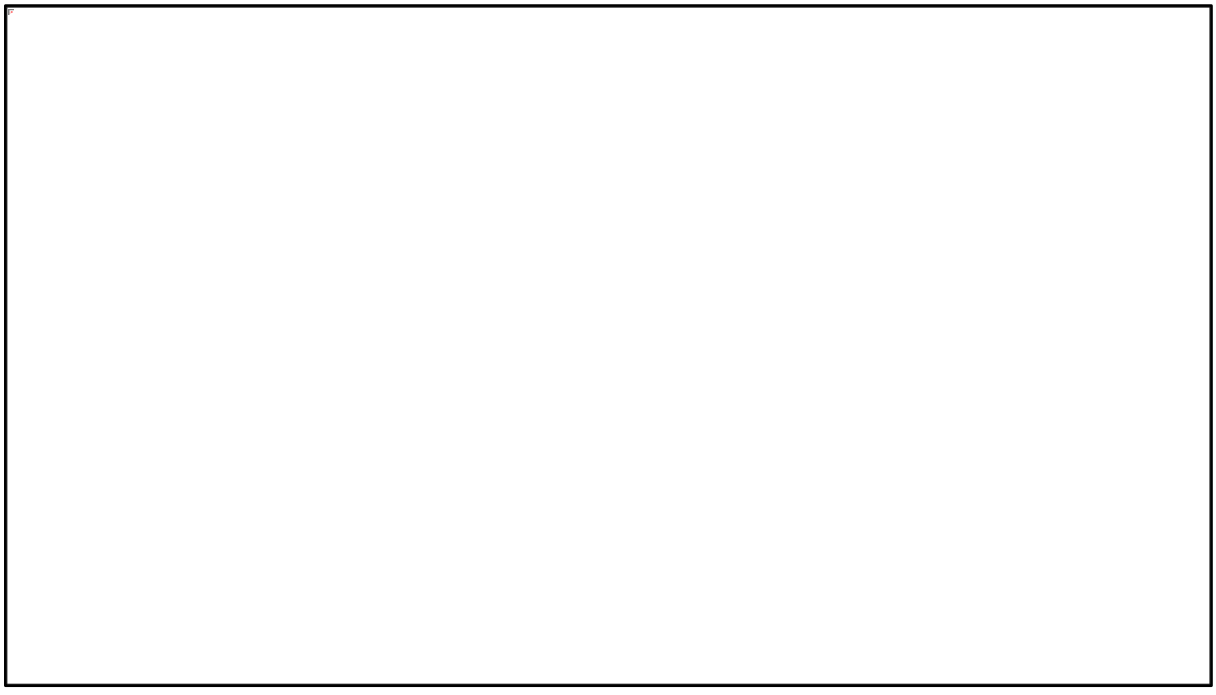
- Visualised trends and state wise comparative analysis for the loan amount
- Represented trends and month wise comparative analysis for the cash flow and cash inflow.
- Visualised Current Ratio (Cash Inflow by Cash Outflow Ratio)- Target vs. Achieved.

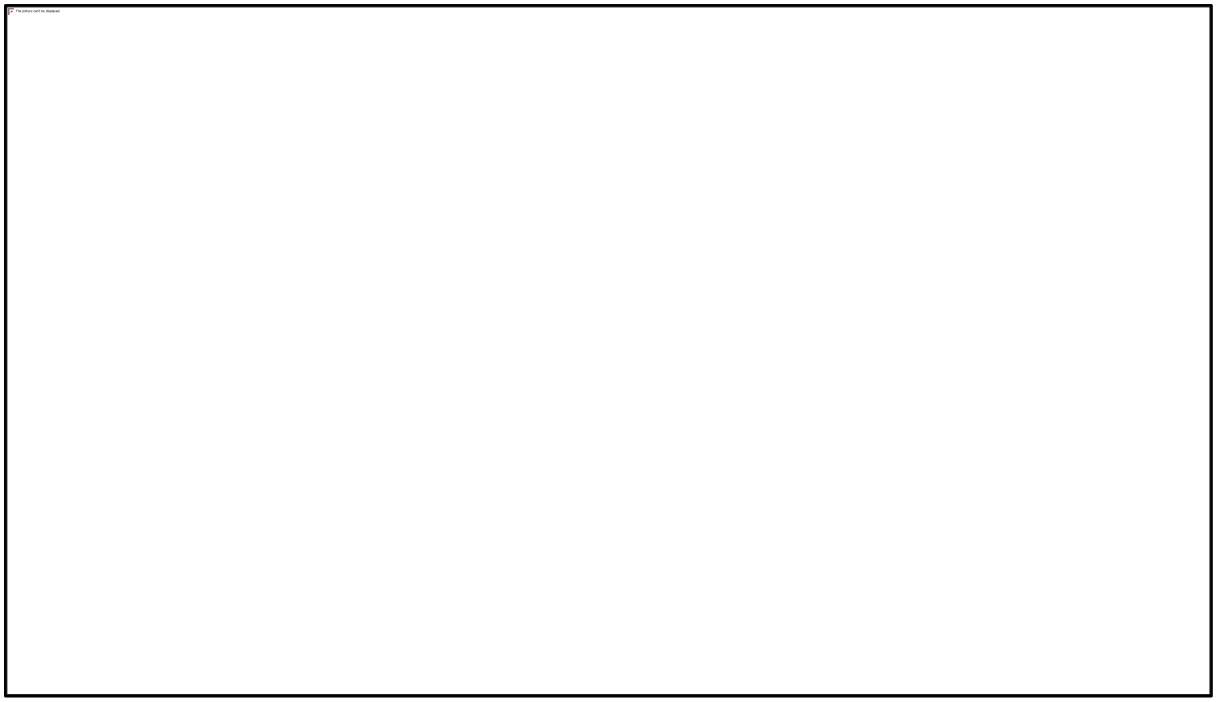


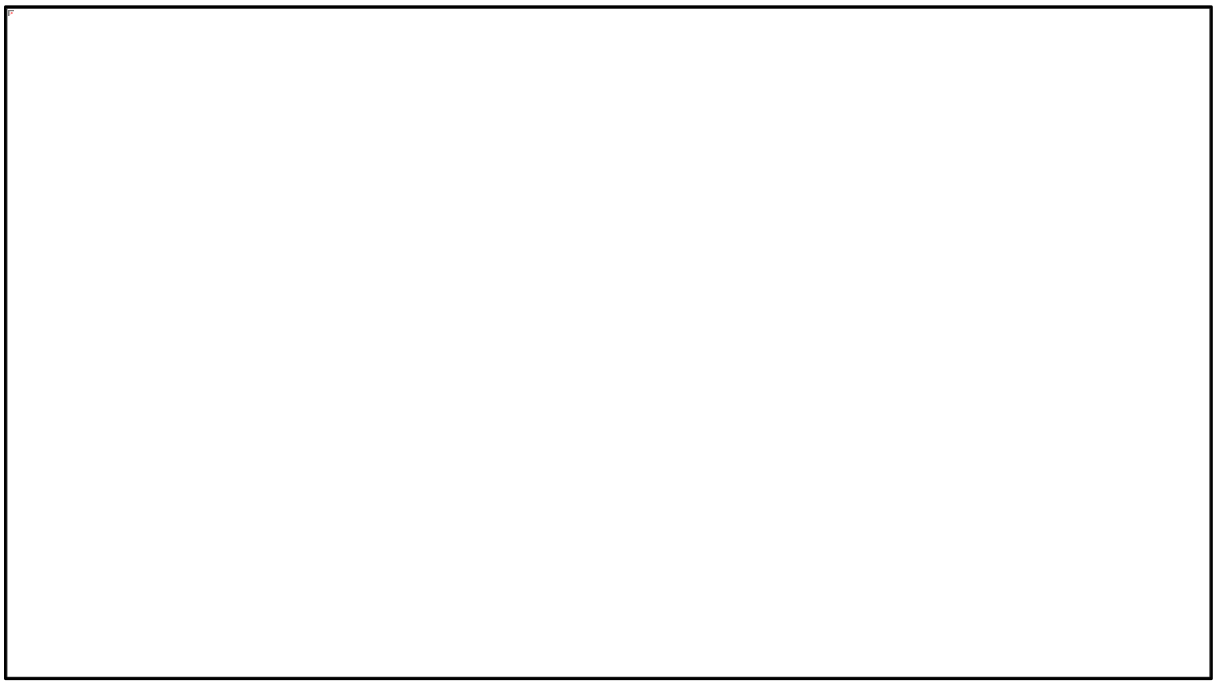


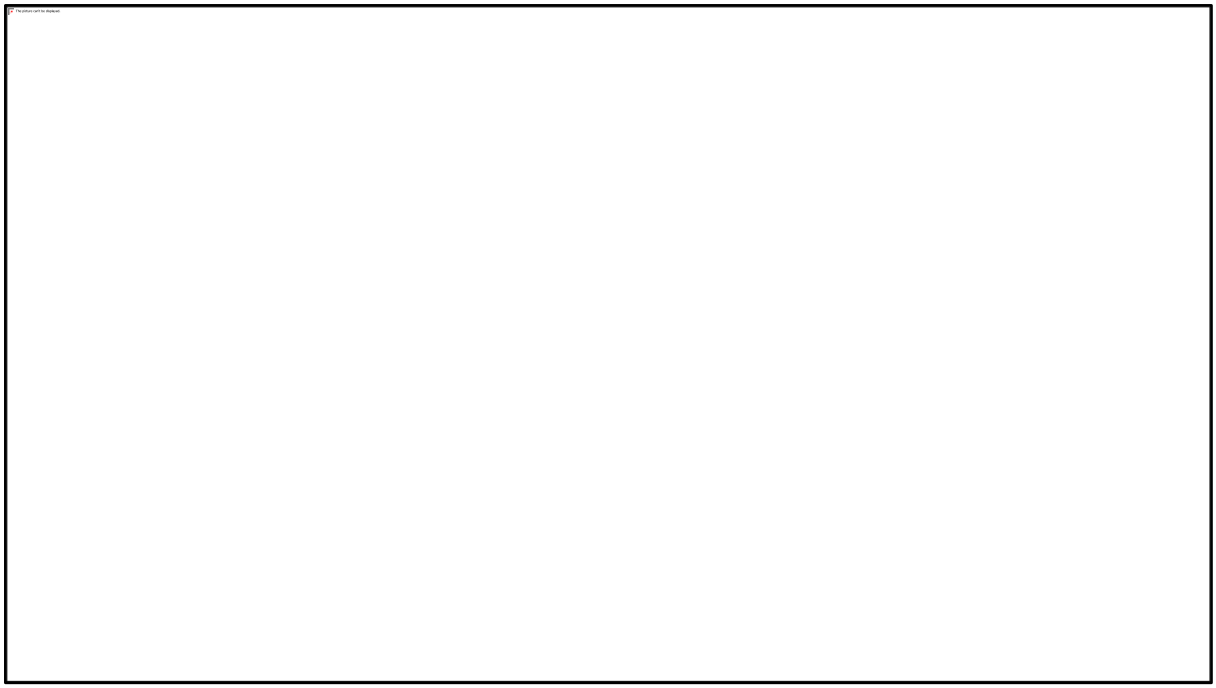
(c) Final Dashboard Layout

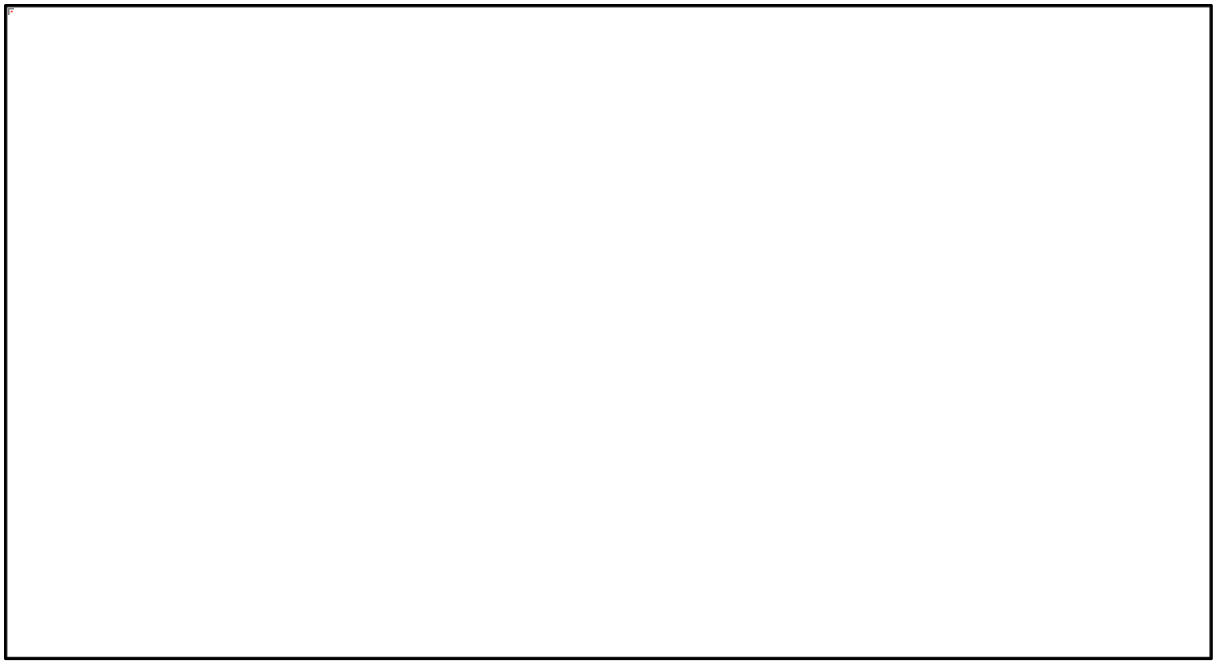


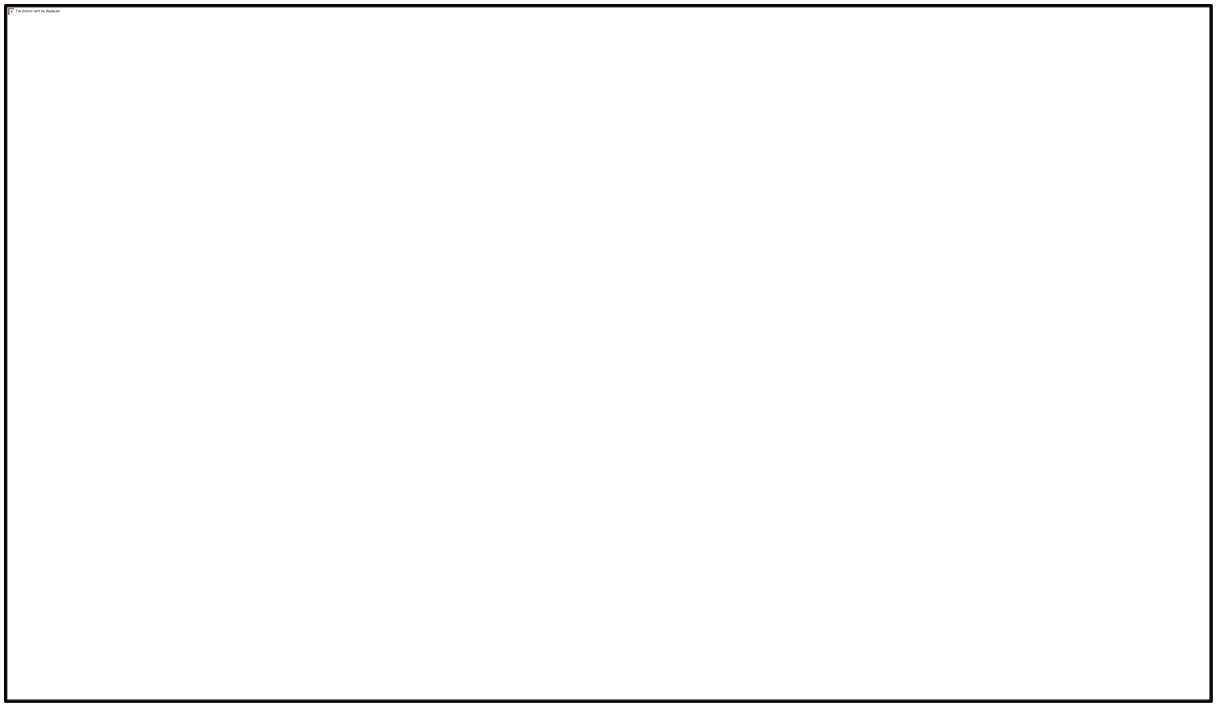


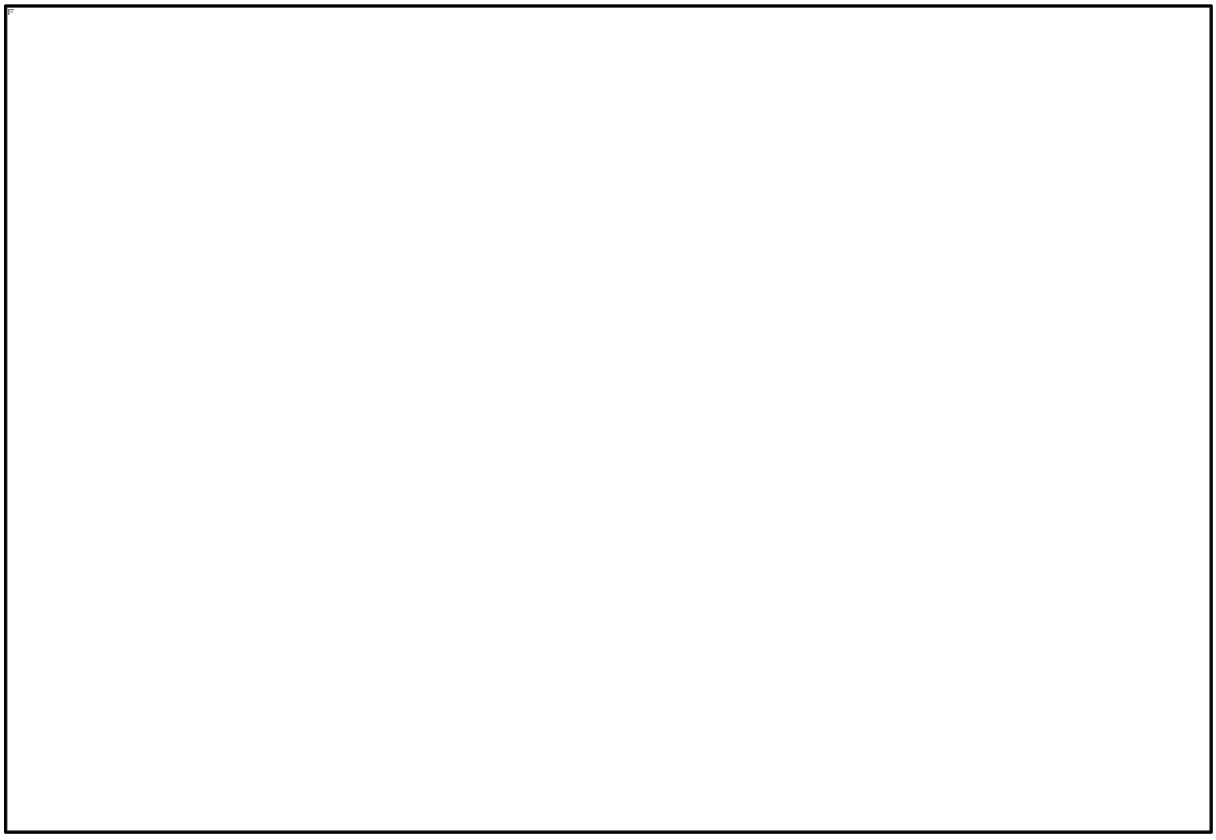












7. REFERENCES

1. Power BI Desktop: Report Creation
2. Power BI Service: Dashboard Creation
3. Draw.IO: Diagramming Tool
4. YouTube link: https://www.youtube.com/watch?v=yzaLl-BvHnc
5. ChatGPT