Project Report

1. **INTRODUCTION**
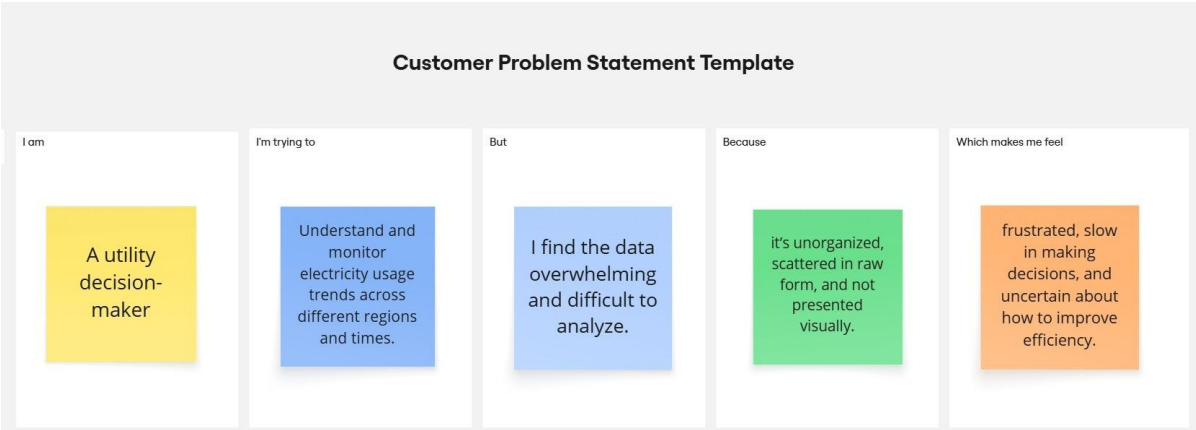
   ### 1.1 Project Overview:

   This project analyzes housing market trends by exploring property sale prices and key features such as renovations, bedrooms, bathrooms, and house age using Tableau. By leveraging interactive visualizations, it aims to simplify complex housing data and support strategic decision-making for real estate analysts, marketers, and company executives.

   ### 1.2 Purpose:

   To visualize electricity consumption patterns and empower smarter, data-driven energy decisions for a sustainable future.
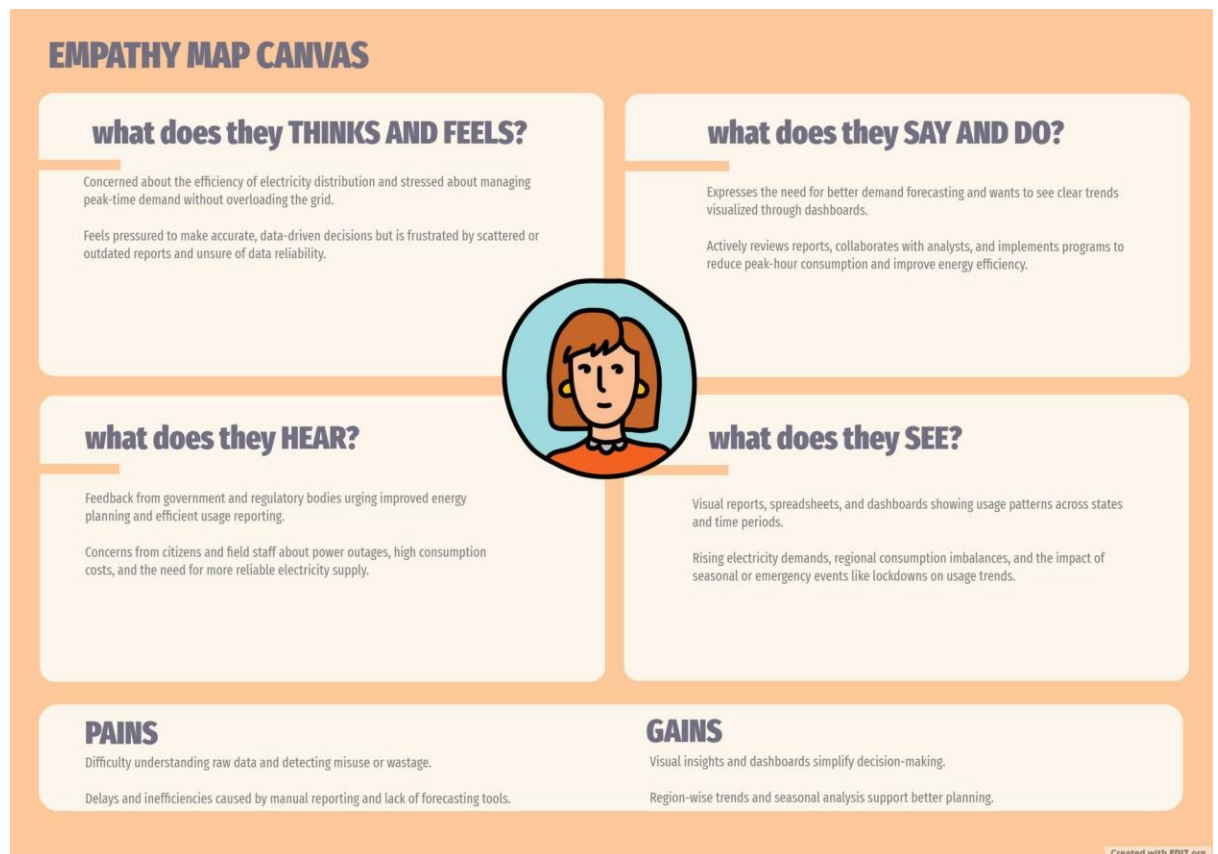
2. **IDEATION PHASE**

   2.1 Problem Statement

   Customer Problem Statement Template

I am	I'm trying to	But	Because	Which makes me feel
A utility decision-maker	Understand and monitor electricity usage trends across different regions and times.	I find the data overwhelming and difficult to analyze.	it's unorganized, scattered in raw form, and not presented visually.	frustrated, slow in making decisions, and uncertain about how to improve efficiency.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A real estate analyst at ABC Company	identify factors affecting house prices and features	the dataset is large and hard to interpret	it lacks clear visualizations and segmentation	overwhelmed and unsure where to focus
PS-2	A marketing team member planning pricing strategies	understand sales trends by renovation and house features	data is spread across multiple tables with limited insights	it hasn't been structured for easy storytelling	confused and unable to create compelling campaigns

2.2 Empathy Map Canvas

EMPATHY MAP CANVAS

what does they THINKS AND FEELS?

Concerned about the efficiency of electricity distribution and stressed about managing peak-time demand without overloading the grid.

Feels pressured to make accurate, data-driven decisions but is frustrated by scattered or outdated reports and unsure of data reliability.

what does they SAY AND DO?

Expresses the need for better demand forecasting and wants to see clear trends visualized through dashboards.

Actively reviews reports, collaborates with analysts, and implements programs to reduce peak-hour consumption and improve energy efficiency.

what does they HEAR?

Feedback from government and regulatory bodies urging improved energy planning and efficient usage reporting.

Concerns from citizens and field staff about power outages, high consumption costs, and the need for more reliable electricity supply.

what does they SEE?

Visual reports, spreadsheets, and dashboards showing usage patterns across states and time periods.

Rising electricity demands, regional consumption imbalances, and the impact of seasonal or emergency events like lockdowns on usage trends.

PAINS

Difficulty understanding raw data and detecting misuse or wastage.

Delays and inefficiencies caused by manual reporting and lack of forecasting tools.

GAINS

Visual insights and dashboards simplify decision-making.

Region-wise trends and seasonal analysis support better planning.

Created with EDIT.org

2.3 Brainstorming

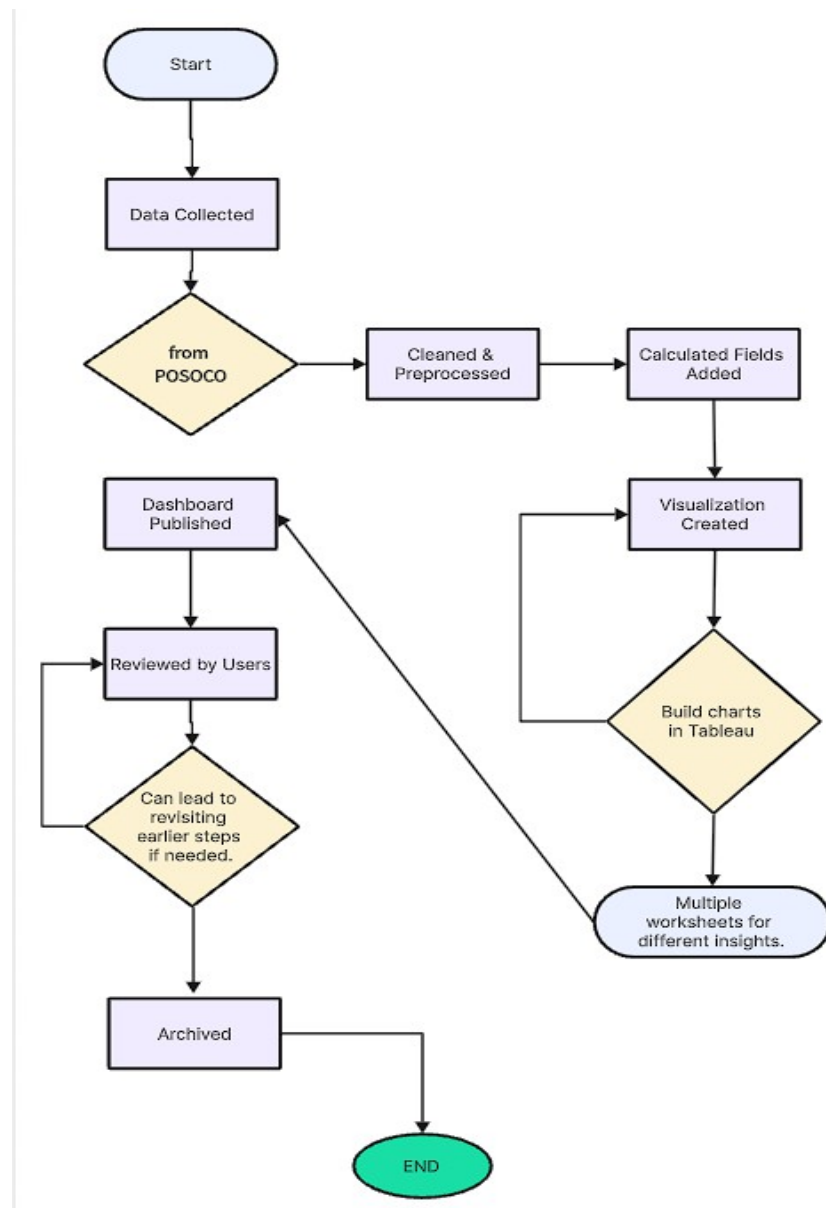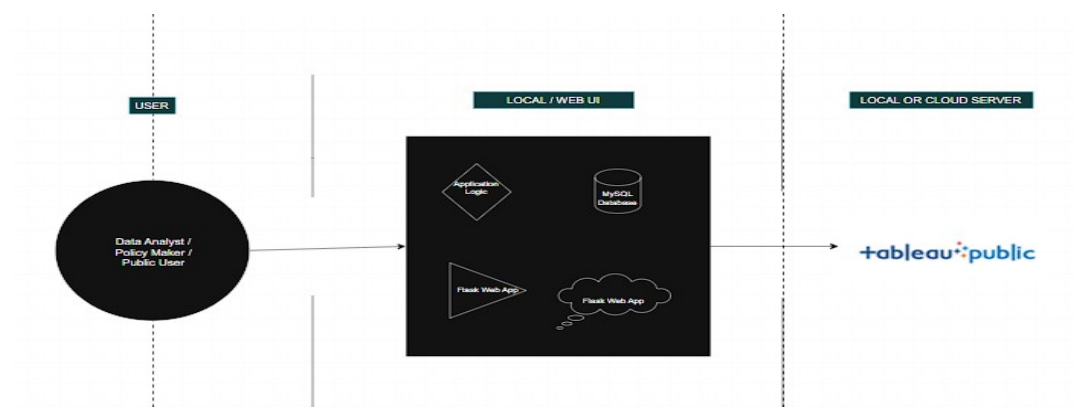| Idea	Idea Description	Group/Category
1	Show total records, average sale price, and total basement area	Time Patterns
2	Visualize total sales by years since renovation using histogram	Yearly Comparison
3	Pie chart of house age distribution by renovation status	Regional Insights
4	Bar chart showing house age vs. bathrooms, bedrooms, and floors	Event Impact (COVID)
5	Add calculated fields like average age and price difference	Visualization Techniques
6	Use filters for renovation status, age range, and price bands	Deployment / Web Integration
7	Use Tableau Story to explain renovation and price trends	Narrative & Communication
8	Show KPIs like avg. price (renovated vs. non-renovated), house area	Dashboard Interactivity
9	Publish and embed dashboard for internal/external sharing	Seasonal Analysis
10	Forecast price trends using historical data	Data Processing / KPIs

3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

3.2 Solution Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Data Upload & Storage	Upload CSV File Store into MySQL Database
FR-4	Data Visualization	Create visualizations in Tableau Integrate with dashboard Age,year charts
FR-5	Dashboard Access	View interactive Tableau dashboard Use filters (Year, Region)
FR-6	Web Integration	Embed Tableau dashboard into Flask-based UI
FR-7	Insights & Reports	View data stories Access summary reports on usage patterns
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Interface should be intuitive and user-friendly for both technical and non-technical users
NFR-2	Security	Secure login with OTP/Email, protected data access
NFR-3	Reliability	System should consistently provide correct visualizations
NFR-4	Performance	Dashboards should load within 3–5 seconds even for larger datasets
NFR-5	Availability	The platform should be available 24/7 without major downtime
NFR-6	Scalability	Should support addition of new datasets and visualizations

3.3 Data Flow Diagram

3.4 Technology Stack

4 .PROJECT DESIGN

4.1 Problem Solution Fit

Problem-Solution fit canvas 2.0 — Purpose / Vision: To visualize electricity consumption patterns and empower smarter, data-driven energy decisions for a sustainable future.
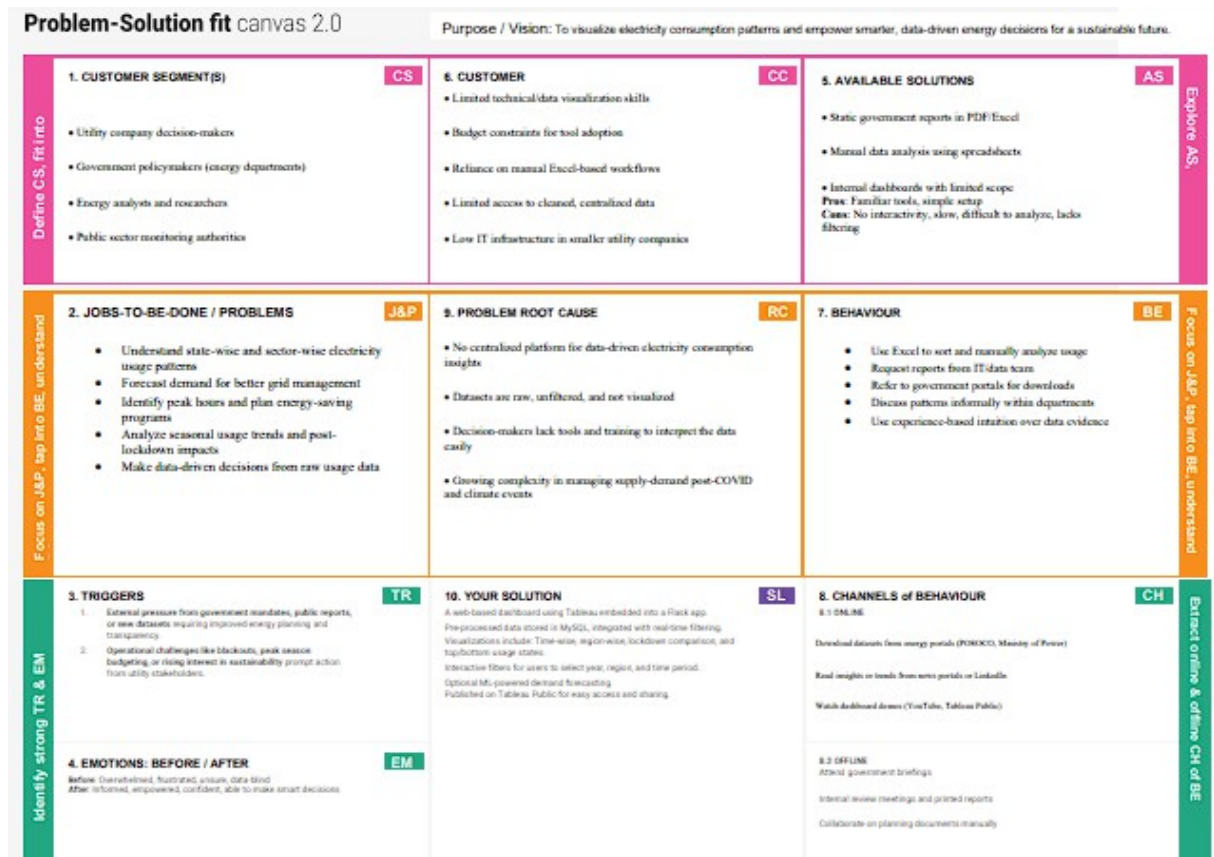
4.2 Proposed Solution

S.No.	Parameter	Description
1	Problem Statement	Understanding the housing market is challenging due to scattered and non-visual datasets. Real estate analysts and executives struggle to identify the factors affecting house prices and renovation trends, impacting pricing strategies and planning.
2	Idea / Solution Description	Our solution uses Tableau to transform raw housing sales data into insightful visual dashboards. The data is cleaned and filtered to highlight renovation age, number of rooms, and house features, enabling deeper analysis through charts like histograms and pie charts.
3	Novelty / Uniqueness	Unlike basic spreadsheets, this solution offers interactive, filter-driven visual exploration. It allows users to see correlations like price changes post-renovation, trends based on the number of bathrooms or floors, and patterns by house age.
4	Social Impact / Customer Satisfaction	The dashboard empowers real estate teams to make data-driven decisions, optimize pricing, and identify market trends. It brings clarity to complex data, supporting both business planning and strategic decision-making.
5	Business Model (Revenue Model)	This project can be extended as a decision-support tool for real estate firms. Value-added features like predictive pricing or renovation impact analysis can be monetized for clients and stakeholders.
6	Scalability of the Solution	The solution is scalable to other real estate markets by integrating regional housing datasets. It can be expanded to include new features, geographies, or predictive analytics over time.

4.3 Solution Architecture
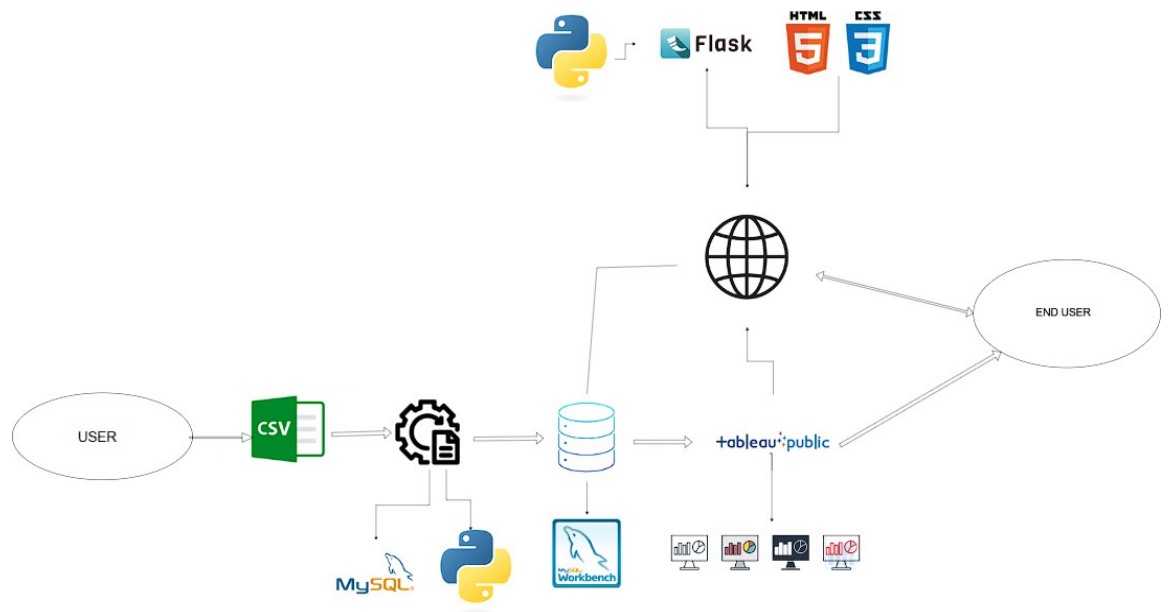
5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

Sprint	Epic	User Story No.	User Story / Task	Points	Priority	Assigned To
Sprint-1	Registration	USN-1	As a user, I can register with my name and email	2	High	N.Mahesh babu
Sprint-1	Upload CSV	USN-2	As a user, I can upload electricity data in CSV format	3	High	V.Sneha latha
Sprint-1	Data Cleaning	USN-3	As a developer, I can clean and preprocess uploaded data using Python	4	High	K.Venkata sai
Sprint-1	Database Storage	USN-4	As a developer, I can store cleaned data into MySQL	2	Low	A.Puneeth
Sprint-2	Tableau Dashboard	USN-5	As a user, I can view dashboards generated using Tableau	5	High	N.Mahesh babu
Sprint-2	Web Integration	USN-6	As a user, I can access the dashboard via Flask UI	3	High	K.venkata sai
Sprint-2	Add Filters	USN-7	As a user, I can filter the data by region, year, and quarter	2	Medium	V.Shena latha
Sprint-3	Data Story	USN-8	As a user, I can view a Tableau Story with key electricity usage insights	2	Low	A.Puneeth
Sprint-3	Forecasting	USN-9	As a developer, I can forecast usage using Prophet	3	Low	V.Sneha latha
Sprint-3	Documentation	USN-10	As a team, we can prepare final project documentation	2	Medium	K.venkata sai
Sprint-4	Deployment	USN-11	As a developer, I can deploy the Flask app and publish the Tableau dashboard online	3	High	A.Puneeth
Sprint-4	Demo Prep	USN-12	As a team, we can prepare a live demo walkthrough for stakeholders	2	Medium	A.Puneeth
Sprint-4	Bug Fixing	USN-13	As a developer, I can test and fix UI/visual bugs from user feedback	2	Medium	N Mahesh babu

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	Dataset contains information about houses, including their price, area, number of bedrooms and bathrooms, and features like parking, furnishing status, and amenities, which can be used for real estate analysis in Tableau
2.	Data Preprocessing	Null values handled, filtered for required years. This was done using Python (Pandas) and stored in MySQL before importing into Tableau.
3.	Utilization of Filters	Filters applied in dashboard: • **Region** • **State** • **Year** • **Quarter** • **Lockdown (Yes/No)** Used across all dashboards to enhance interactivity. | | 4 | **Calculated Fields Used** | Created fields in Tableau: • Year(Date) • Month(Date) • Quarter(Date) • Lockdown Label for categorizing data before and after lockdown. • Top N States (for usage comparison). | | 5 | **Dashboard Design** | **Number of Visualizations:** 3 Dashboards Each dashboard includes: • Line Chart (Monthly trends) • Bar Chart (State-wise comparison) • Map / Tree Map (Region-wise consumption) • KPI indicators (Total and Average Usage) Refer *Screenshots of Dashboard.pdf* | | 6 | **Story Design** | **Number of Slides/Graphs in Story:** 15 Covers: • Intro & Problem • State-wise Usage • Lockdown Comparison

		• Regional Patterns
		• Seasonal Trends
		• Insights + Conclusion
5.	Dashboard design	**No of Visualizations / Graphs - 3 Dashboards , 8 Visualizations / Graphs.**

Dashboard 1

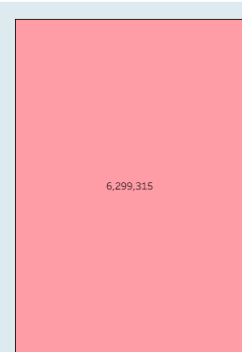Average House Age by Bathrooms   Average House Age by Bedrooms   Average House Age by Floors
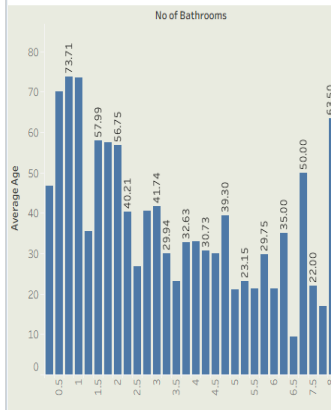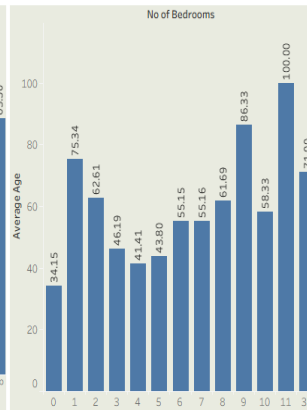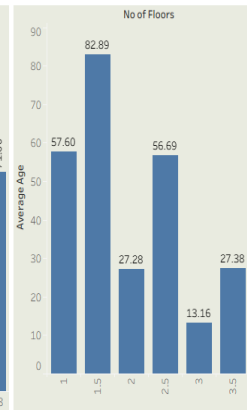
Dashboard 2
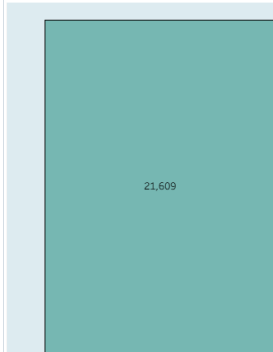
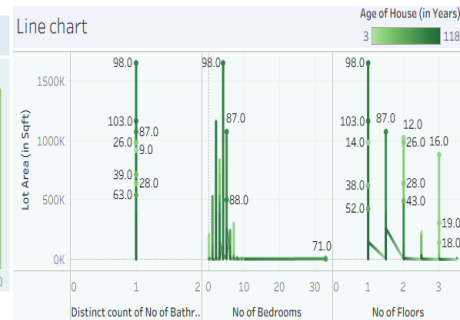Total Records   Avg Sale Price   Total Basement Area

21,609   511,619   6,299,315

Dashboard 3

Total Sales by Years Since Renovation   Line chart

House Age by Renovation Status

| 6 | Story Design | No of Visualizations / Graphs -15 slides. |

The trend of count of Sale Price for Sale Price (bin).
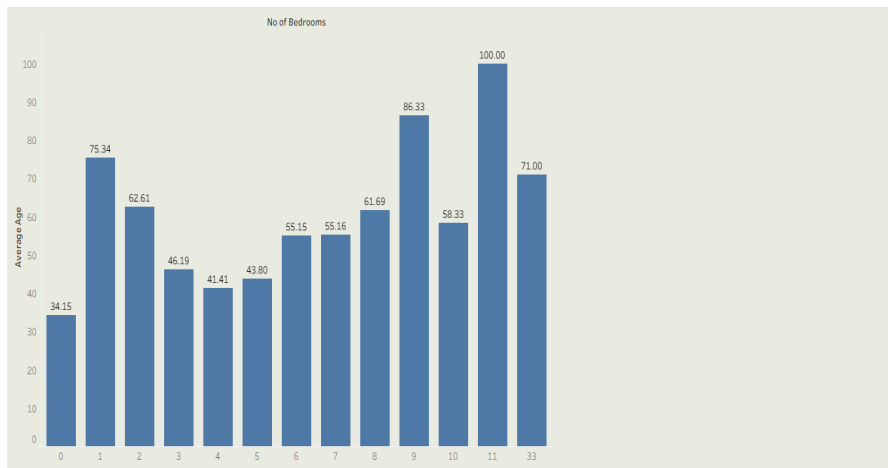
Condition of house Excellent and Fair

Condition of House Excellent and Condition of House Fair for each Sale Price (bin) as an attribute broken down by Zipcode Group 8. Color shows details about Condition of House Excellent and Condition of House Fair.
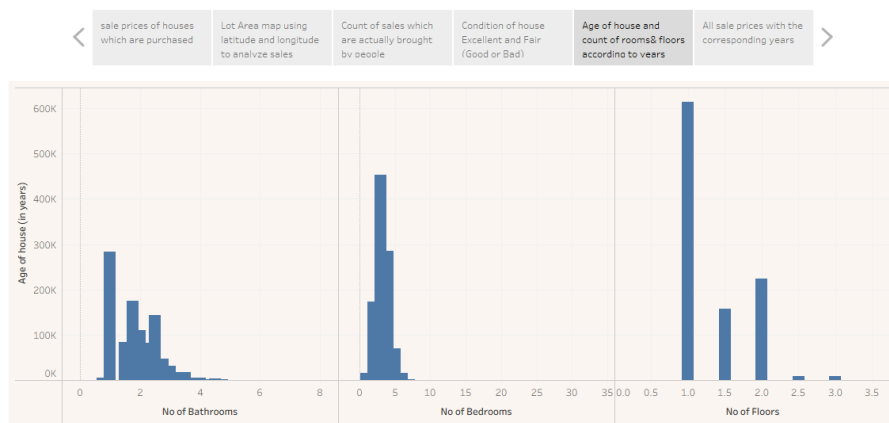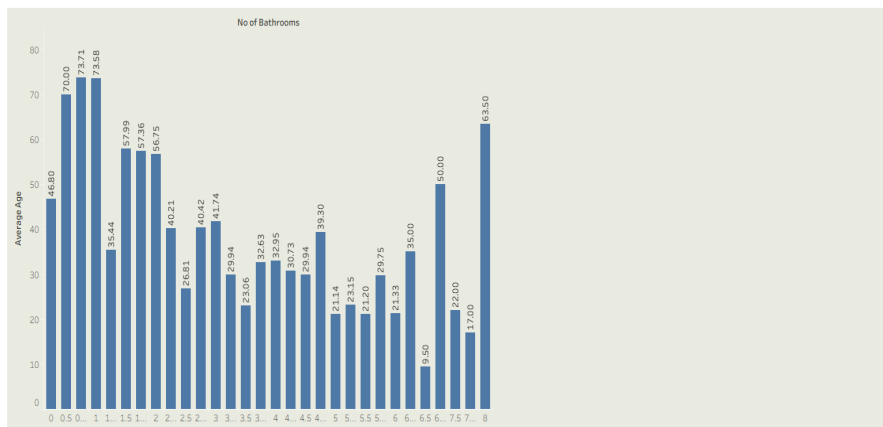
Total Records: 21,609

Avg Sale Price: 511,619

Total Basement Area: 6,299,315

No of Floors

No of Floors	Average Age
1	57.60
1.5	82.89
2	27.28
2.5	56.69
3	13.16
3.5	27.38

No of Bedrooms

No of Bedrooms	Average Age
0	34.15
1	75.34
2	62.61
3	46.19
4	41.41
5	43.80
6	55.15
7	55.16
8	61.69
9	86.33
10	58.33
11	100.00
33	71.00

No of Bathrooms

Values shown: 46.80, 70.00, 73.71, 73.58, 35.44, 57.99, 57.36, 56.75, 40.21, 26.81, 40.42, 41.74, 29.94, 23.06, 32.63, 30.73, 29.94, 39.30, 21.14, 23.15, 21.20, 29.75, 21.33, 35.00, 9.50, 50.00, 22.00, 17.00, 63.50
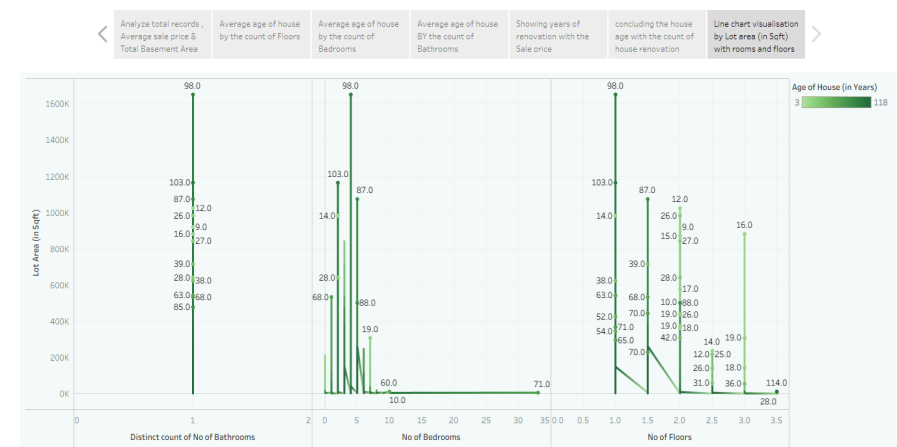
Analyze total records , Average sale price & Total Basement Area | Average age of house by the count of Floors | Average age of house by the count of Bedrooms | Average age of house BY the count of Bathrooms | **Showing years of renovation with the Sale price** | concluding the house age with the count of house renovation | Line chart visualisation by Lot area (in Sqft) with rooms and floors

Years Since Renovation (bin)

Sale Price
- ₹11,00,00,00,000.00
- ₹10,00,00,00,000.00
- ₹9,00,00,00,000.00
- ₹8,00,00,00,000.00
- ₹7,00,00,00,000.00
- ₹6,00,00,00,000.00
- ₹5,00,00,00,000.00
- ₹4,00,00,00,000.00
- ₹3,00,00,00,000.00
- ₹2,00,00,00,000.00
- ₹1,00,00,00,000.00
- ₹0.00

X-axis: 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

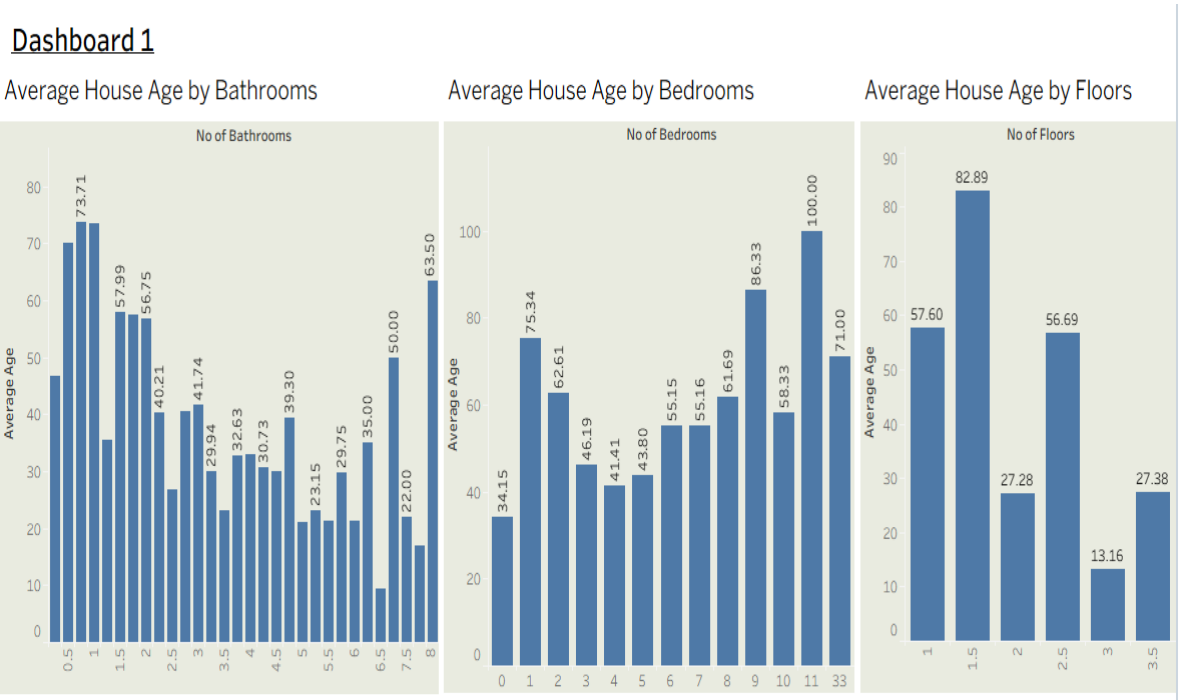Renovated?
- ☑ (All)
- ☑ Not Renovated
- ☑ Renovated

Analyze total records , Average sale price & Total Basement Area | Average age of house by the count of Floors | Average age of house by the count of Bedrooms | Average age of house BY the count of Bathrooms | Showing years of renovation with the Sale orice | **concluding the house age with the count of house renovation** | Line chart visualisation by Lot area (in Sqft) with rooms and floors
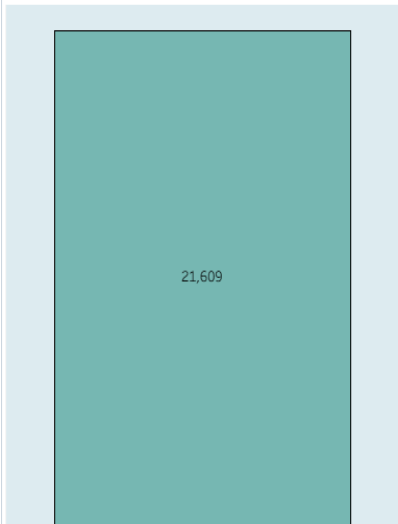
Age of House

0.0   6.2   12.4   18.6   24.8   31.0   37.2   43.4

967   1,740   2,050   1,294   1,503   1,482   1,828

Age of House
- ☑ (All)
- ☑ 0.0
- ☑ 6.2
- ☑ 12.4
- ☑ 18.6
- ☑ 24.8
- ☑ 31.0
- ☑ 37.2
- ☑ 43.4
- ☑ 49.6
- ☑ 55.8
- ☑ 62.0
- ☑ 68.2
- ☑ 74.4
- ☑ 80.6
- ☑ 86.8
- ☑ 93.0
- ☑ 99.2
- ☑ 105.4
- ☑ 111.6
- ☑ 117.8

Count of Renovated?
87 — 2,050

Analyze total records , Average sale price & Total Basement Area | Average age of house by the count of Floors | Average age of house by the count of Bedrooms | Average age of house BY the count of Bathrooms | Showing years of renovation with the Sale orice | concluding the house age with the count of house renovation | **Line chart visualisation by Lot area (in Sqft) with rooms and floors**
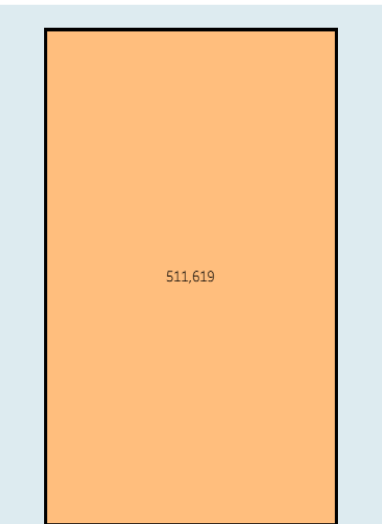
Lot Area (in Sqft)
1600K, 1400K, 1200K, 1000K, 800K, 600K, 400K, 200K, 0K

Distinct count of No of Bathrooms | No of Bedrooms | No of Floors

Age of House (in Years)
3 — 118

7. RESULTS

7.1 Output Screenshots

Dashboard 1

Average House Age by Bathrooms

Average House Age by Bedrooms

Average House Age by Floors

Dashboard 2

Total Records

21,609

Avg Sale Price

511,619

Total Basement Area

6,299,315

Dashboard 3

Total Sales by Years Since Renovation

Years Since Renovation (bin)

Renovated?
- [x] (All)
- [x] Not Renovated
- [x] Renovated

Line chart

Age of House (in Years)
3 ▦ 118

House Age by Renovation Status

Dashboard 4

Lot Area using Map

Sale Price
75,000 — 1,129,575

© 2025 Mapbox © OpenStreetMap

Condition of house Excellent and Fair

Zipcode Group 8
00000 — 00001

Measure Names
- ■ Condition of House Excellent
- ■ Condition of House Fair

Dashboard:

Story:

8. ADVANTAGES & DISADVANTAGES

Advantages	Disadvantages
Free, open-source technology stack	Depends on Tableau Public hosting
Visually rich dashboards with no coding	Manual data upload (not automated)
Easy to scale and reuse with other datasets	Limited customization in Tableau Public
Interactive filters and storytelling	Requires stable internet for live dashboards

9. CONCLUSION

The project successfully demonstrated how data visualization can transform complex housing sales data into actionable insights. Stakeholders can now make informed pricing and market decisions backed by clear trends in renovation impact, house features, and sales patterns..

10. FUTURE SCOPE

- Automate data updates from real estate listing platforms or Excel feeds
- Integrate predictive pricing models using machine learning
- Extend analysis to include rental trends and property tax insights
- Develop a mobile-responsive version of the dashboard for on-the-go analysis

11. APPENDIX

Source Code : NIL

Dataset link :

https://docs.google.com/spreadsheets/d/1Aeug2Xc6gim8fUmveDm8Z
Gi44t7MmWfr/edit?usp=drivesdk&ouid=113831785895254557512&rtp
of=true&sd=true

GitHub link : https://github.com/Kvenkatasai-18/Visualizing-Housing-Market-Trends-An-Analysis-of-Sale-Prices-and-Features-using-Tableau.git

Project Demo Link: