



Innovation & Entrepreneurship Hub for Educated Rural Youth (SURE Trust – IERY)

BIKE SALES ANALYSIS AND PERFORMANCE REPORT

The domain of the Project
Data Analysis, Visualization using Power BI

Under the guidance of
Mrs. Siddhika Shah

By
Mr. Vignesh Sivaram A G (B. Tech IT, 3rd Year)

Period of the project
December 2024 to March 2025



SURE TRUST PUTTAPARTHI,
ANDHRA PRADESH



DECLARATION

The project titled “*Bike Sales Analysis and Performance report*” has been mentored by **Mrs. Siddhika Shah** and organized by SURE Trust from December 2024 to March 2025. This initiative aims to benefit educated unemployed rural youth by providing hands-on experience in industry-relevant projects, thereby enhancing employability.

I, **Mr. Vignesh Sivaram A G**, hereby declare that I have solely worked on this project under the guidance of my mentor. This project has significantly enhanced my practical knowledge and skills in the domain.

Name

Mr. Vignesh Sivaram A G

Signature

Mentor

Mrs. Siddhika Shah

Signature

Seal & Signature

Prof. Radhakumari
Executive Director & Founder
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Executive Summary

This project delivers a detailed analysis of the bike sales market through a dynamic and interactive Power BI dashboard, aimed at uncovering valuable insights into vehicle performance, customer behavior, and brand competitiveness. The analysis leverages a dataset containing over 2,900 bike transaction records, enriched with features such as brand, model, pricing, manufacturing details, engine specifications, fuel type, insurance status, and geographic location. The dashboard was developed with a clear objective: to help manufacturers, dealers, and stakeholders understand key market trends and performance drivers using data visualization and custom calculations.



Introduction

Background and Context

India has one of the largest two-wheeler markets in the world, with bikes playing a crucial role in daily transportation due to their affordability, efficiency, and adaptability to urban and rural environments. With rising fuel costs, growing environmental concerns, and increasing consumer awareness, buyers are more attentive to long-term value, resale potential, and efficiency before making purchase decisions. The used bike market has seen rapid growth, driven by affordability and availability. However, decision-making in this segment often lacks data support, leading to suboptimal choices for both buyers and sellers. This project aims to bring clarity through data analytics.

Problem Statement

Despite the booming second-hand bike industry in India, there is limited analytical visibility into key performance indicators such as resale value trends, vehicle efficiency, depreciation patterns, and regional sales behaviors. Consumers, manufacturers, and dealerships often operate without a clear understanding of which models perform better in the long run or how fuel type, engine capacity, and ownership history impact a bike's value.

This project addresses the need for a data-driven decision-support tool to analyze and visualize these factors comprehensively.

Scope

- Analyze sales, resale, and technical data of bikes across multiple Indian states.
- Evaluate **brand performance**, **vehicle efficiency**, and **ownership trends**.
- Develop **interactive Power BI dashboards** with filters for brand, model, fuel type, and year.
- Implement custom measures like **Efficiency Score**, **Depreciation**, and **Resale Score** to provide deeper insights.
- Provide actionable insights for manufacturers, resellers, and policy-makers.



Limitations

- The dataset is limited to historical data from a specific period and may not represent the entire market.
- External factors such as road conditions, individual usage behavior, and aftermarket modifications are not considered.
- Insurance details are partially incomplete, which may affect legal/valuation insights.
- Predictive modeling and live market integration were beyond the current project scope.

Innovation

This project has several innovative elements that enhance the depth and usability of the analysis. One of the key innovations is the development of a custom *Efficiency Score*, which allows for a standardized comparison of fuel economy across bikes with varying engine capacities. The dashboard also incorporates *dynamic KPI cards, gauge charts, and color-coded visuals*, enabling users to track real-time performance against set benchmarks. Furthermore, the integration of technical specifications, sales metrics, and ownership patterns into a single, interactive Power BI platform provides a holistic view of the market. This multi-dimensional analysis, combined with user-driven filters for brand, model, year, and fuel type, offers a powerful tool for data-driven decision-making in the two-wheeler segment.



Project Objectives

Project Objectives:

1. Data Cleaning and Preparation

The first objective was to ensure that the dataset was accurate, complete, and consistent. This involved handling missing values, correcting data types, standardizing brand, and model names, and deriving new fields such as Efficiency Score, Depreciation Value, and Resale Score. Proper preparation laid the foundation for meaningful and reliable analysis.

2. Design Interactive Dashboards

To build a user-friendly and visually intuitive Power BI dashboard that could allow users to explore the data from multiple angles. Interactivity was enabled through slicers for brand, model, fuel type, manufacture year, and state, giving users full control over their analytical view.

3. Developing Custom Measures and KPIs

To generate deeper business insights, the project introduced custom DAX measures like Avg Mileage by Brand, Efficiency Score ($\text{Mileage} \div \text{Engine CC}$), and Resale Score ($\text{Resale Price} \div \text{Original Price}$). These KPIs helped assess real-world bike performance and user value, going beyond basic metrics like sales count or price.

4. Visualizing Sales, Efficiency, and Regional Trends

Multiple chart types including line graphs, bar charts, gauge meters, maps, and tree maps were used to visualize key indicators. This enabled users to track trends over time, evaluate regional sales patterns, and compare efficiency across different brands and models with ease.



5. Enabling Brand and Model-Level Drilldowns

The dashboard allows users to drill down into individual brands and models to see performance-specific metrics. This helps manufacturers and sellers identify high-performing bikes, understand consumer preferences, and tailor offerings to market demand.

6. Creating a Scalable and Reusable BI Solution

The structure of the project was designed to be scalable and easily updatable. With a few changes in source data, the dashboard can be refreshed to reflect new sales data, new brands, or additional KPIs, making it a sustainable analytical tool for ongoing business use.

Expected Outcomes:

1. Deeper Market Insights:

- Insights into sales trends, resale patterns, fuel efficiency, and regional preferences.
- Helps stakeholders make informed decisions regarding pricing, inventory, and marketing strategies.

2. Efficiency based vehicle comparison:

- Unique, data-driven comparison of bikes based on a custom Efficiency Score
- Enables users to evaluate performance beyond price and mileage.

3. Brand & Model-Level Performance Tracking:

- Performance metrics such as average resale value, depreciation, and mileage trends for specific brands and models, facilitates competitive analysis.

4. Resale and Depreciation Analysis:

- Understanding of how bikes from different brands hold value over time, offering useful insights for customers, resellers, and insurers.



Methodology and Results

Methods/Technology Used

The project applies Data Analytics and Business Intelligence (BI) methodologies to transform raw data into meaningful insights. It includes:

- **Data preprocessing:** Cleaning and transforming the data using Power Query Editor in Power BI.
- **Data modeling:** Creating relationships, hierarchies, and DAX measures for aggregations and calculations.
- **Interactive visualization:** Use visual analytics to detect trends in sales, resale performance & fuel efficiency across various regions and categories.
- **Descriptive analysis:** Summarizing historical data to uncover what has happened.
- **Diagnostic analysis:** Explored reasons behind variations in bike resale value, efficiency scores, and depreciation.

Tools/Software Used

- Microsoft Power BI Desktop: Primary tool for data visualization, modeling, and dashboard creation.
- Power Query Editor: For data transformation and cleaning.
- DAX (Data Analysis Expressions): For custom calculations and KPIs.
- CSV Files: Used as the source for importing datasets.



Data Collection Approach

The datasets were sourced from open-source repositories and simulated environments:

- **Bike Sales Dataset:** Contains data such as State, City tier, Brand model, Fuel type, Price, Resale price and other performance metrics.

The data was downloaded in CSV format, and no real-time APIs were used. The datasets contain state-wise bike sales and their performance.

Project Architecture

1. Data Source

- Used a structured CSV file with over 2,900 records of used bike sales, including key attributes like brand, model, fuel type, engine capacity, mileage, price, and location.

2. Data Ingestion and Transformation

- Imported into Power Query Editor for cleaning and shaping the data. Created calculated columns like **Efficiency Score**, **Depreciation**, and **Resale Score**.

3. Data Modeling

- Established relationships and created DAX measures for key KPIs (e.g., average mileage, resale value). Built a logical model for accurate filtering and summarization.

4. Visualization Layer

- Built an interactive dashboard with visuals like:
 - Bar/line charts (trends & comparison)
 - Gauge (efficiency)
 - Maps (regional insights)
 - KPIs and slicers for user control

5. User Interaction

- Enabled dynamic filtering by **brand, model, year, fuel type**, and **location**. Drilldowns allow detailed performance views per bike.



Insights from Dashboard - Results

1. High-Value Models:

- *Meteor 350* is the costliest model, indicating high brand value and market positioning for *Royal Enfield*.
- Brands like *Honda*, *Bajaj*, and *Hero* have consistent average pricing, suggesting stable consumer demand.

2. Yearly Growth in Sales:

- A clear upward trend in both *sales and resale prices* from 2019 to 2024, indicating a growing second-hand bike market.

3. State-Wise Sales Patterns:

- *Maharashtra, Karnataka, and Tamil Nadu* lead in bike sales, suggesting these are lucrative regions for dealerships and promotions.
- Tier-1 cities show higher transaction volumes, pointing toward urban concentration of bike buyers.

4. Depreciation Spike in 2020:

- Notable drop in resale prices for 2020-manufactured bikes may be linked to *COVID-related market slowdowns* or oversupply.

5. Strong Resale in Recent Years:

- Resale value has increased for bikes manufactured post-2021, indicating *brand trust and model durability*.

6. High Efficiency Scores:

- Bikes manufactured around 2016 and 2021 show higher *efficiency scores*, suggesting those years had better fuel-optimized models.

7. Electric Bikes Lead in Daily Distance:

- *Electric bikes* are used more frequently per day, likely due to lower operational costs – a key marketing point for e-vehicles.

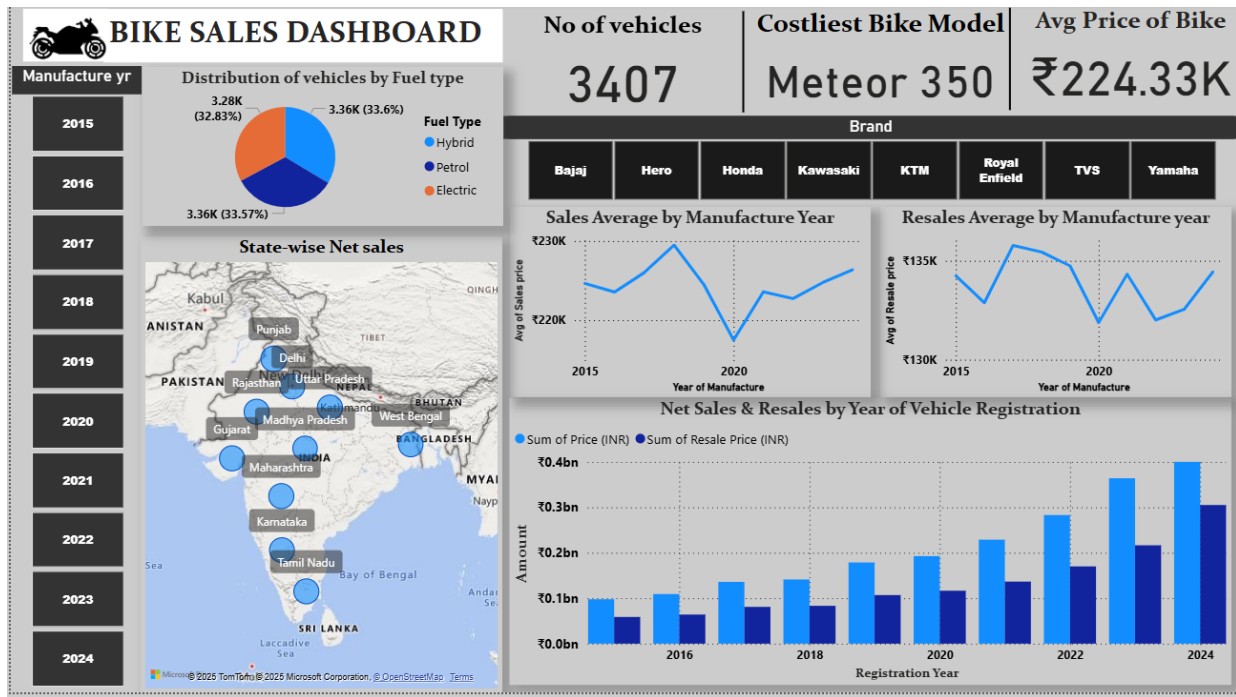
8. Average Fuel Consumption is Low:

- At *0.72 liters/day*, overall fuel consumption per bike is minimal, showing a trend toward more fuel-efficient two-wheelers.

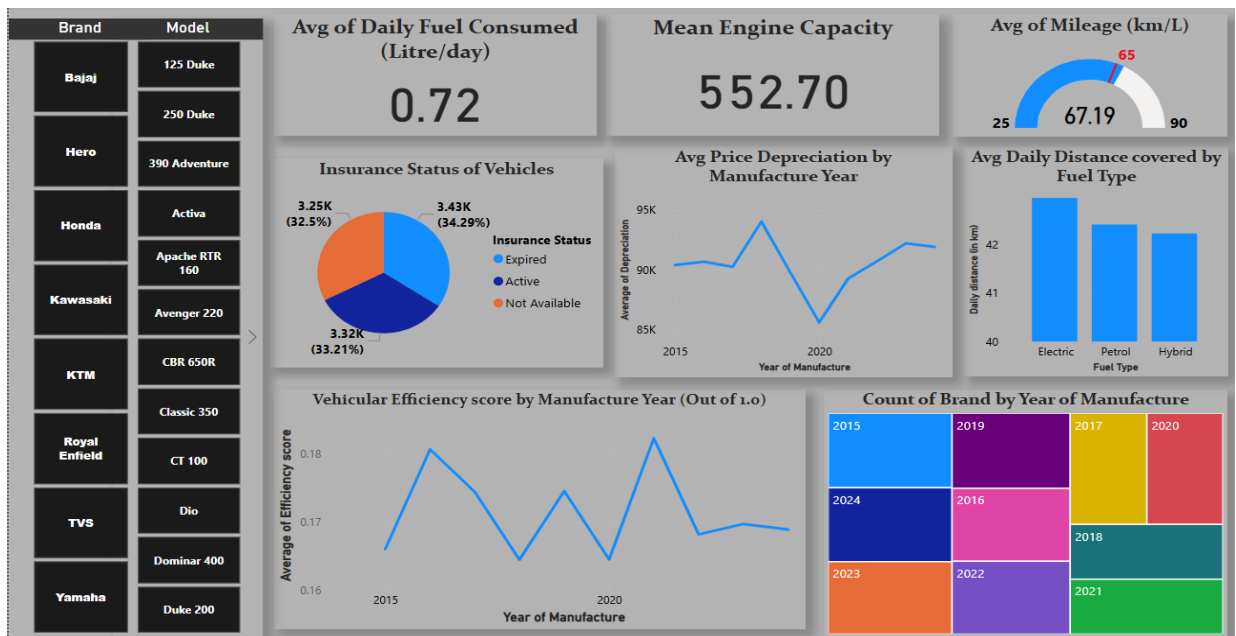


Final Project Working Screenshots

Dashboard - Bike Sales



Dashboard – Bike Performance-metrics



GitHub Link

<https://github.com/sure-trust/VIGNESH-SIVARAM-A-G-g16-sql/tree/main/Final%20capstone%20project>



Learning and Reflection

This project provided me a learning experience in applying Power BI to real-world data and highlighted the importance of data-driven decision-making in the automotive sector. One of the key takeaways was understanding how to transform raw, unstructured data into meaningful insights through effective data cleaning, modeling, and visualization. Working with real data emphasized the challenges of inconsistency, missing values, and the importance of calculated columns like Efficiency Score and Resale Score to unlock deeper analysis.

Technically, the project enhanced my proficiency in Power Query Editor, DAX functions, and designing interactive dashboards that are both insightful and user-friendly. Implementing custom measures and dynamic visuals such as gauge charts, maps, and drilldowns deepened the understanding of how visual storytelling can make data accessible to both technical and non-technical audiences.

The project highlighted how crucial it is to design with the end-user in mind. By focusing on interactivity and clarity, the dashboard evolved into a practical decision-support tool for buyers, sellers, and marketers. The experience also reinforced the value of iterative development—refining visuals, experimenting with metrics, and adjusting filters based on user feedback to improve insight quality.



Conclusion and Future Scope

Conclusion

The Bike Sales Analysis dashboard successfully delivers overview of the Indian two-wheeler market, combining sales trends, vehicle efficiency, customer behavior, and geographic insights into a single, interactive platform. This project demonstrates the ability to transform raw data into actionable insights, enabling informed decisions for manufacturers, dealers, and potential buyers. Key metrics such as average mileage, fuel consumption, resale value, and depreciation provide deep understanding of a bike's lifecycle and market performance.

Future Scope

The project lays a strong foundation for real-time, data-driven decision-making in the domains of vehicle(bike) sales and determining various performance metrics among brands and models. While the current dashboards are static and based on historical data, there is significant potential for future enhancements:

1. Integration with Real-Time Data Sources

Currently based on static CSV data, the dashboard can be enhanced by integrating live data feeds from online marketplaces or dealership networks. This would allow real-time updates on sales, pricing trends, and consumer behavior, enabling continuous and proactive decision-making.

2. Advanced Predictive Analytics

Incorporating machine learning models (using tools like Python or Azure ML) can help predict future resale values, demand trends, or depreciation rates. These predictive insights can benefit resellers, insurers, and customers in financial planning.

3. Multi-Language and Regional Customization

To cater to a wider audience, especially across India, the dashboard can support multiple languages and region-specific customizations. This would improve accessibility and relevance for users in different states.



4. More User-Centric KPIs

Future versions can include user-centric metrics such as cost-per-kilometer, maintenance frequency, or user ratings, offering a more holistic view of bike performance and ownership experience.

5. Expansion to Other Vehicle Categories

The analytical framework can be extended to include other types of vehicles, such as scooters, electric bikes, or even four-wheelers. This will broaden the user base and provide comparative insights across different vehicle segments.

6. Integration with E-commerce and Dealer Portals

The dashboard could be linked to e-commerce platforms or dealer websites, allowing users to directly access listings, compare options, or book test rides, bridging analytics with action.