Project Report

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Visualization Tool for Electric Vehicle Charge and Range Analysis

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BY

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1.INTRODUCTION

1.1 Project Overview

The Visualization Tool for Electric Vehicle Charge and Range Analysis project focuses on analyzing and visualizing data related to electric vehicles (EVs) using Tableau. The project integrates multiple datasets containing EV specifications, pricing, brand performance, charging infrastructure, and regional distribution to provide meaningful insights.

The dashboard presents key information such as EV market trends, brand comparisons, efficiency metrics, price variations, and charging station availability across different regions. Various interactive visualizations like bar charts, maps, treemaps, and KPI indicators are used to simplify complex data and make it easy to understand.

This project helps users explore EV data effectively and supports data-driven decision-making for stakeholders such as customers, researchers, and policymakers.

1.2 Purpose

The main purpose of this project is to analyze electric vehicle data and present insights through an interactive and user-friendly dashboard. It aims to:

■ Provide a clear understanding of EV market trends and growth

■ Compare different EV brands based on performance, price, and efficiency

■ Analyze charging infrastructure availability across regions

■ Help users make informed decisions regarding EV selection

■ Support awareness of sustainable transportation and future mobility trends

The project also demonstrates the use of data visualization tools like Tableau to transform raw data into actionable insights.

2.IDEATION PHASE

2.1 Problem Statement

Analysing different data from Multiple sources for Electric cars in India and Globally. We have 4 Different datasets we need to analyse the data and create Dashboard and story that can represent the data and show the Visuals for the data.

2.2 Empathy Map Canvas

2.2 Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statemen t

Our team gathered and discussed various real-world problems related to transportation, environment, and technology. After discussion, we selected the problem of analyzing electric vehicles growth and performance in India. This problem was chosen because EV adoption is increasing and needs proper analysis for better understanding and decision-making.

Step-2: Brainstorm, Idea Listing and Grouping The team brainstormed ideas such as EV sales trends, brand comparison, charging infrastructure, EV vs fuel vehicles, and price-performance analysis. These ideas were grouped into categories like Sales Analysis, Brand Comparison, Performance Metrics, and Infrastructure Analysis.

Step-3: Idea Prioritization Ideas were prioritized based on feasibility, data

availability, impact, and ease of implementation. Final selected ideas include EV growth trends, brand comparison, price-performance analysis, and charging infrastructure visualization.

3.REQUIREMENT ANALYSIS

3.1 Customer Journey Map

3.2 Solution Requirement

Functional Requirements

FR No.	Requirement	Description
FR-1	Data Input	System should accept EV data from Excel/CSV files
FR-2	Data Processing	System should clean and transform data using Tableau
FR-3	Dashboard Creation	System should generate interactive dashboards
FR-4	Story Creation	System should create a story for insights
FR-5	Publish to Tableau Public	System should publish dashboards online
FR-6	Web Integration	System should embed dashboard & story using iframe
FR-7	User Interaction	Users should be able to interact with filters and charts

NON Functional Requirements

NFR No.	Requirement	Description
NFR-1	Performance	Dashboard should load quickly in browser
NFR-2	Usability	Interface should be simple and user-friendly
NFR-3	Reliability	System should work without errors
NFR-4	Scalability	Should support larger datasets in future
NFR-5	Compatibility	Should work on all browsers (Chrome, Edge)
NFR-6	Availability	Website should be accessible online anytime

3.3 Data Flow Diagram

3.4 Technology Stack

Layer	Technology	Description
Data Source	Excel / CSV	Stores electric vehicle dataset (price, range, battery, etc.)
Data Processing	Tableau Prep / Tableau	

Desktop		Used for data cleaning and transformation	
Query / Analysis	SQL (in Tableau)	Used for calculations and data querying	
Visualization	Tableau Desktop	Creates dashboards, charts, and stories	
Visualization Engine	Tableau Engine (VizQL)	Converts user actions into visual outputs	
Visualization Hosting	Tableau Public	Publishes dashboards and provides shareable links	
Web Structure	HTML	Builds the structure of the website	
Styling	CSS	Designs layout, colors, and appearance	
UI Framework	Bootstrap	Provides responsive design and UI components	
Integration	iFrame	Embeds Tableau dashboard and story into webpage	
Deployment	GitHub Pages	Hosts the website online for public access	
Client Interface	Web Browser	Allows users to view and interact with the system	

4.PROJECT DESIGN

4.1 Problem Solution Fit

4.2 Proposed Solution

4.3 Solution Architecture

5.PROJECT PLANNING AND SCHEDULDING

5.1 Project Planning

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Perfomance Testing

7.RESULTS

7.1 Output Screenshots

8.ADVANTAGES&DISADVANTAGES

■■ Advantages of the Project

■ ■■■■■ Easy Data Understanding

Visual dashboards make EV data simple to understand

■ ■ Interactive Analysis

Users can apply filters and explore data dynamically

■ ■■ Accessible Anywhere

Hosted online → can be accessed from any device

■ ■■■■■■ Saves Time

No need for manual analysis

■ ■■■ Better Decision Making

Helps users analyze trends and insights

■ ■■■■■■■■■■■■■ User-Friendly Interface

Simple website using Bootstrap

■ ■■ Promotes EV Awareness

Encourages eco-friendly decisions

■ Disadvantages of the Project

■ ■ Internet Required

Cannot work without internet connection

■ ■■■ Data Privacy Issues

Tableau Public makes data visible to everyone

■ ■■■ Limited Customization

Tableau Public has some feature limitations

■ ■■■■■ Dependent on Data Quality

Wrong data → wrong insights

■ ■■■ No Real-Time Data

Uses static Excel/CSV data

■ ■■■■ Performance Issues (Large Data)

May slow down with large datasets

9.CONCLUSION

The Visualization Tool for Electric Vehicle Charge and Range Analysis successfully provides a clear and interactive way to understand key aspects of electric vehicles such as charging time, battery capacity, and driving range. By using Tableau for data visualization, the project transforms raw data into meaningful insights through dashboards and stories. The integration of these visualizations into a web-based interface using HTML, CSS, and Bootstrap improves accessibility and user experience. Overall, the proj ect helps users analyze EV performance e ■ectively and supports better awareness and decision-making in the adoption of electric vehicles.

10.FUTURE SCOPE

1.Add real-time data instead of static Excel files

2. Use a database for better data storage

3.Develop a mobile app version

4. Add more advanced charts and filters

5.Include global EV data

6.Add user login system

11.APPENDIX

Source code :

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
```

```
<title>E-CarStart</title>
<!-- Bootstrap CSS -->
<link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/css/bootstrap.min.css"
rel="stylesheet">
<!-- Custom CSS -->
<link rel="stylesheet" href="css/style.css">
</head>
<body>
<!-- NAVBAR -->
<nav class="navbar navbar-expand-lg navbar-dark bg-dark fixed-top">
<div class="container">
<a class="navbar-brand" href="#">E-CarStart</a>
<button class="navbar-toggler" data-bs-toggle="collapse" data-bs-
target="#menu">
<span class="navbar-toggler-icon"></span>
</button>
<div class="collapse navbar-collapse" id="menu">
<ul class="navbar-nav ms-auto">
<li class="nav-item"><a class="nav-link"
href="#dashboard">Dashboard</a></li>
<li class="nav-item"><a class="nav-link" href="#story">Story</a></li>
</ul>
</div>
</div>
</nav>
<!-- DASHBOARD SECTION -->
<section id="dashboard" class="container my-5">
<h2 class="mb-3">Dashboard</h2>
```

```
<!-- Dashboard iframe will come here -->
<iframe
src="https://public.tableau.com/views/SmartBridgeProject_17707335826020/
Dashboard1?:showVizHome=no&publish=yes"
width="100%"
height="700"
frameborder="0"
allowfullscreen>
</iframe>
</section>
<!-- STORY SECTION -->
<section id="story" class="container my-5">
<h2 class="mb-3">Story</h2>
<!-- Story iframe will come here -->
<iframe
src="https://public.tableau.com/views/SmartBridgeProject_17707335826020/
StoryOfElectricCarsInIndia?:showVizHome=no&publish=yes"
width="100%"
height="700"
frameborder="0"
allowfullscreen>
</iframe>
</section>
<!-- Bootstrap JS -->
<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.2/dist/js/bootstrap.bundle.min.j
s"></script>
</body>
```

</html>

DatasetsLink:

https://drive.google.com/drive/folders/1jnEk8BjRbMRELOYApKTfvbCF51Ng

ODzu?usp=sharing

Github Link

https://github.com/Bharathkata/visualization-tool-for-electric-vehicle-charge-

and-range-analysis.git

vedio demo

https://drive.google.com/file/d/1abEGcSazgfkgWre9VUQHefPXjw_ikb60/view?usp=sharing