

Vande Bharat Express

1. INTRODUCTION

1.1 Project Overview

In this project we will outlines the features and significance of the Vande Bharat Express, also known as Train 18, a semi-high-speed intercity electric train developed by the Integral Coach Factory (ICF) in Chennai, India. The train, named after the patriotic phrase "Vande Mataram," operates at a maximum speed of 160 km/h and is recognized for its sleek design, energy efficiency, and indigenous technological contributions to India's railway sector. The key features include modern amenities, safety measures, reduced travel time, and alignment with the "Make in India" initiative. While the text emphasizes the positive aspects of the Vande Bharat Express, it does not explicitly mention potential challenges or issues associated with the train's development and operation.

1.2 Purpose

- 1) Increased Ridership and Revenue Generation: *Business Impact:* The enhanced speed and comfort provided by the Vande Bharat Express could attract more passengers, contributing to increased ridership on relevant routes. This, in turn, can lead to higher revenue generation for the railway sector.
- 2) Economic Stimulus and Local Development: *Social and Business Impact:* The introduction of the Vande Bharat Express can stimulate tourism, boost local economies, and generate employment opportunities related to maintenance, operations, and hospitality. This contributes to both economic growth and social development.
- 3) Environmental Sustainability: *Social Impact:* The use of electric trains like the Vande Bharat Express contributes to reduced greenhouse gas emissions, aligning with India's efforts to promote sustainable transportation. This has a positive impact on the environment and public health.
- 4) technological Showcase and Export Potential: *Business Impact:* The successful development and deployment of the Vande Bharat Express showcase India's technological capabilities. This can lead to business opportunities through technology transfer and export potential, further contributing to the national economy.
- 5) Infrastructure Development: *Business Impact:* The introduction of high-speed trains can drive the development and upgrading of rail infrastructure, including tracks, signaling systems, and stations. This infrastructure development is crucial for the efficient operation of the Vande Bharat Express and benefits the overall transportation network.

2. LITERATURE SURVEY

2.1 Existing problem

Competition with Air Travel: By offering competitive travel times on certain routes, the Vande Bharat Express poses competition to the airline industry. This impact can influence pricing strategies and service offerings in the air travel sector.

Government's Transportation Initiatives: The Vande Bharat Express aligns with the government's initiatives to modernize and upgrade the country's transportation

infrastructure. This has long-term positive impacts on connectivity, economic growth, and public welfare.

Proud National Achievement: The Vande Bharat Express is not only a technological achievement but also a source of national pride. It symbolizes India's capability to innovate and contribute to the global rail technology landscape, fostering a sense of pride and identity among the citizens.

Modernization of Rail Travel: The advanced features of the Vande Bharat Express, including comfortable seating, onboard Wi-Fi, and improved amenities, contribute to modernizing the passenger rail experience in India, enhancing overall passenger satisfaction.

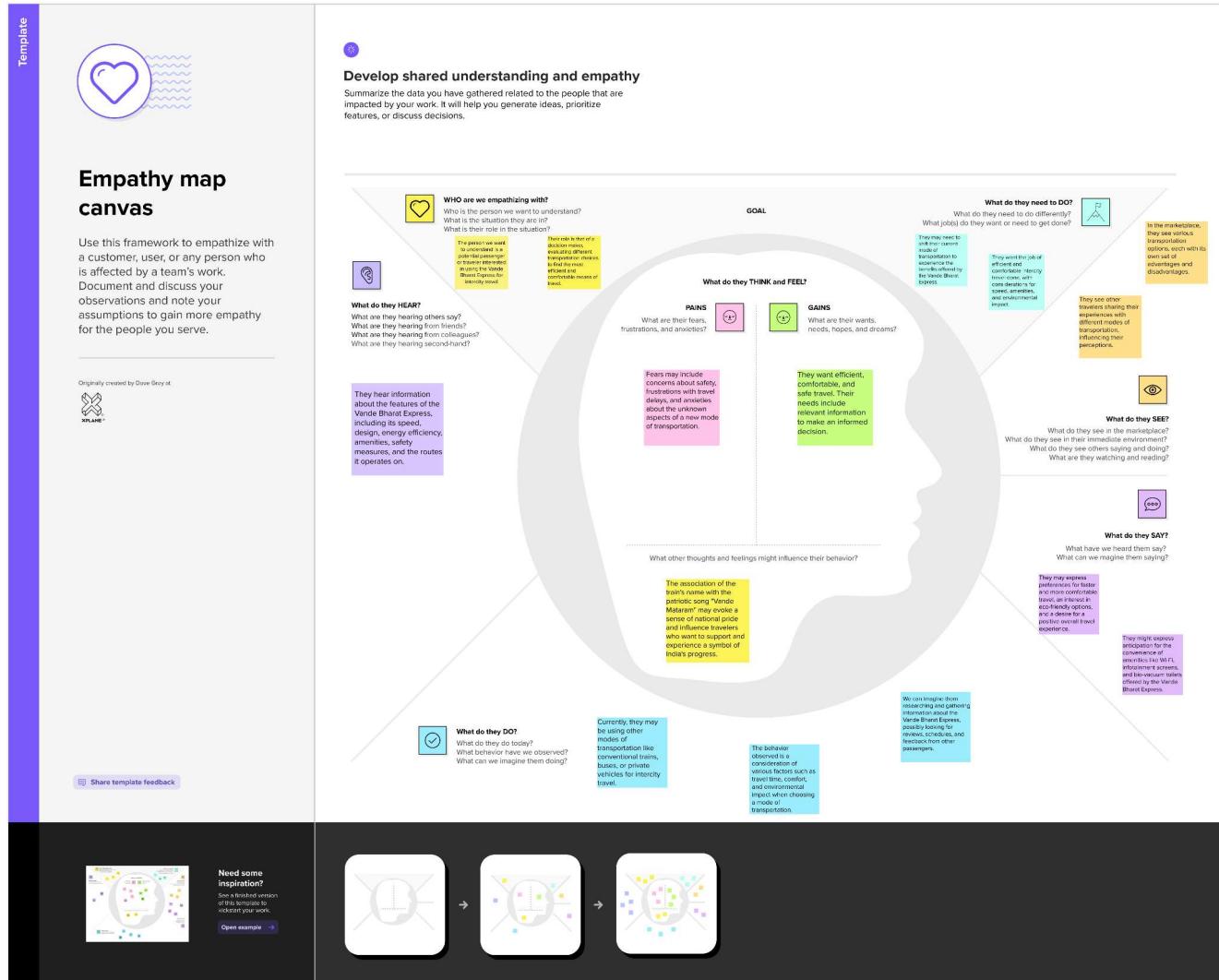
Government's Transportation Initiatives: The Vande Bharat Express aligns with the Indian government's initiatives to modernize and upgrade the country's transportation infrastructure. This creates business opportunities for stakeholders involved in the transportation sector.

2.2 Problem Statement Definition

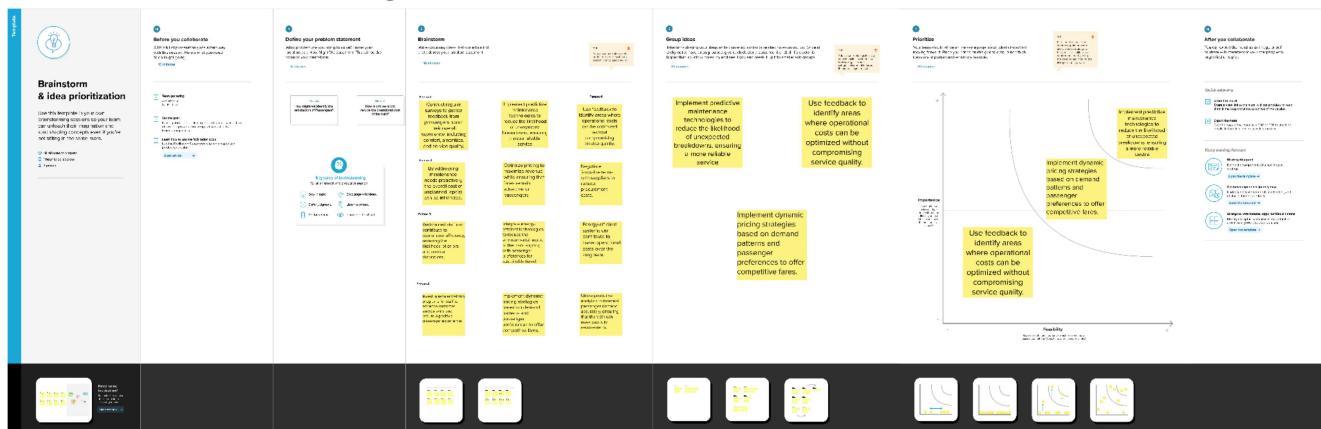
Vande Bharat Express, also known as Train 18, a semi-high-speed intercity electric train developed by the Integral Coach Factory (ICF) in Chennai, India. The train, named after the patriotic phrase "Vande Mataram," operates at a maximum speed of 160 km/h and is recognized for its sleek design, energy efficiency, and indigenous technological contributions to India's railway sector. The key features include modern amenities, safety measures, reduced travel time, and alignment with the "Make in India" initiative. While the text emphasizes the positive aspects of the Vande Bharat Express, it does not explicitly mention potential challenges or issues associated with the train's development and operation.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Authorization and Authentication of Users: It should be necessary for users to log in before they can submit or categorise reviews. To manage the system, admin roles need to be established. Examine the submission: Reviews from users should be able to include information about the Train, the date of the train, and the content of the

review. Assessment Method: Permit consumers to rate various characteristics such as timeliness, cleanliness, and service with numbers. Looking for and Sorting: Give consumers the ability to search for reviews using criteria like train, date, rating, or other pertinent information. Analytics and Reporting: For every train, create reports on general sentiment trends. Provide statistics on the good and negative elements that are frequently brought up in evaluations. Feedback System: Permit people to comment on how accurate the sentiment analysis and classification are.

4.2 Non-Functional requirements

Operation: Even during periods of high utilization, the system ought to react quickly to user interactions. Scalability: It should be possible for the system to grow in size to accommodate more users and reviews. Dependability: Make sure there is little downtime for updates or maintenance on the system. Protection: Put strong security measures in place to safeguard user information and guarantee safe system access. Utilization: It should be simple for users to post reviews and use the system thanks to an intuitive user interface. Adaptability: To improve user accessibility, make sure the system is interoperable with a range of devices and browsers. Data Security: Respect user privacy when managing personal data and follow data protection laws. Reliability: The system must be simple to maintain, enabling upgrades and enhancements without posing any problems.

5. PROJECT DESIGN

5.1 Data Flow Diagrams & User Stories

Data Collection:

Collect Train data from datasets.

Clean and label the data.

Split the data into training and test sets.

Data Pre-processing:

Clean the data and remove null values.

Model Deployment:

Choose a deployment platform, such as a web server or cloud service.

Prepare your model for deployment, including packaging it into a deployable format.

Set up an interface for users to easily understand data.

User Interaction:

- Display the information about train.
- Include messages for invalid inputs or errors.

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	02-11-2023
Team ID	609498
Project Name	Vande Bharat
Maximum Marks	20 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Project Setup & Infrastructure	USN-1	Set up the development environment with the required tools and frameworks to start the vande bharat analysis	2	High	Arvind Garg
Sprint-1	Development Environment	USN-2	Gather a dataset containing the data of vande bharat about their routes, time & capacityetc.	1	High	Arvind Garg
Sprint-2	Data Pre-Processing	USN-3	Pre-process the collected dataset by removing the unwanted columns and Handling the Null values and feature	2	Low	Arvind Garg

			scaling the data and at last we have to separate the dependent and independent Variables and we have to separate the data as training data and splitting data			
Sprint-3	Data Development	USN-4	We have to analyze the problem and make best visuals that suits the problem.and make dashboard and write story for visuals we made.	2	Medium	Arvind Garg
Sprint-4	Data Deployment	USN-5	We have to deploy the dashboard and story on web page.	1	High	Arvind Garg
			Now we have to use the testing data and we have to search for bugs.			

6.3 Sprint Delivery Schedule

Sprint-1	20	6 Days	21 Oct 2023	29 Oct 2023	20	29 Oct 2022
Sprint-2	20	6 Days	26 Oct 2023	05 Nov 2023		
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2023		
Sprint-4	20	6 Days	14 Nov 2023	19 Nov 2023		
Sprint-5	20	6 Days	14 Nov 2023	19 Nov 2023		

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Collect the dataset

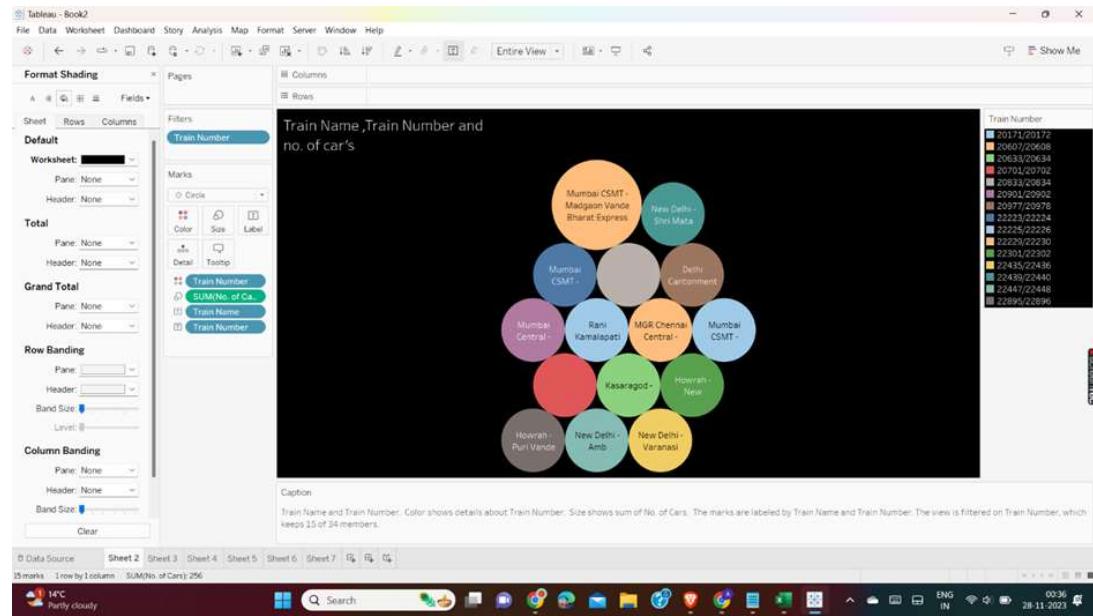
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7.2 Understand the data

7.3 Connect Dataset to Tableau

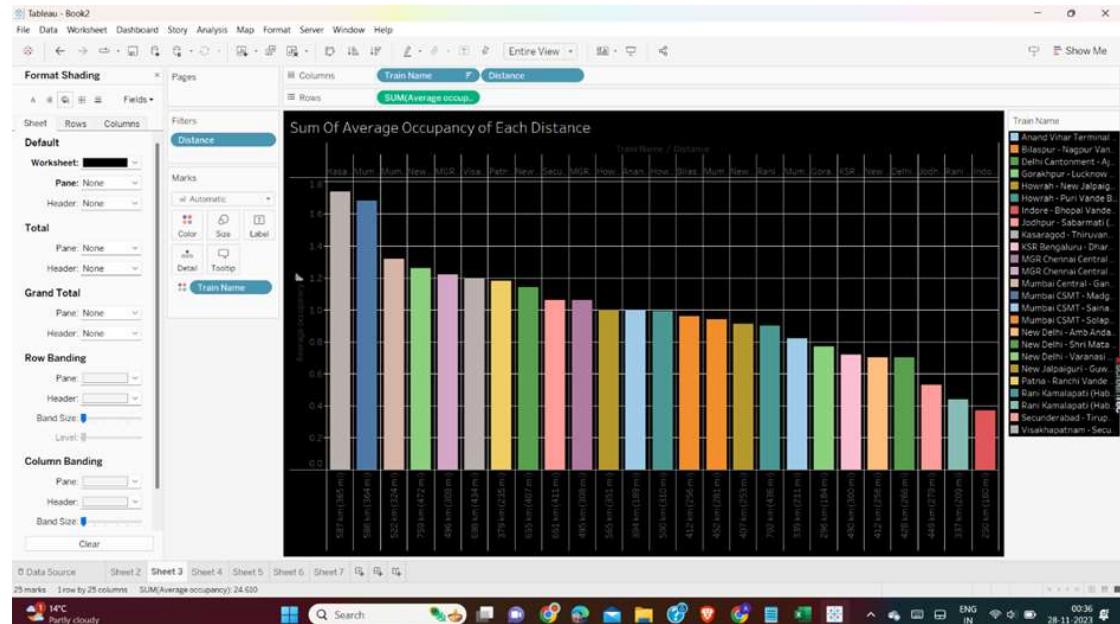
7.4 Find the Train Name and Train Number and also how many no. of car's are

available:



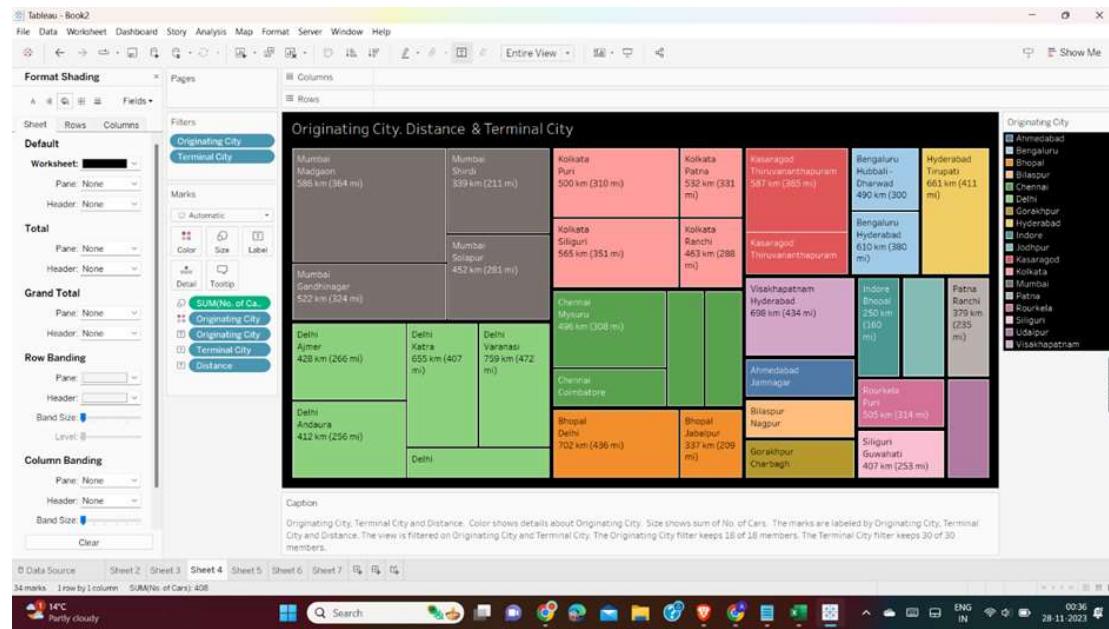
Train Name and Train Number. Color shows details about Train Number. Size shows sum of No. of Cars. The marks are labeled by Train Name and Train Number. The view is filtered on Train Number, which keeps 15 of 34 members.

7.5 Find the distance and average occupancy of Train:



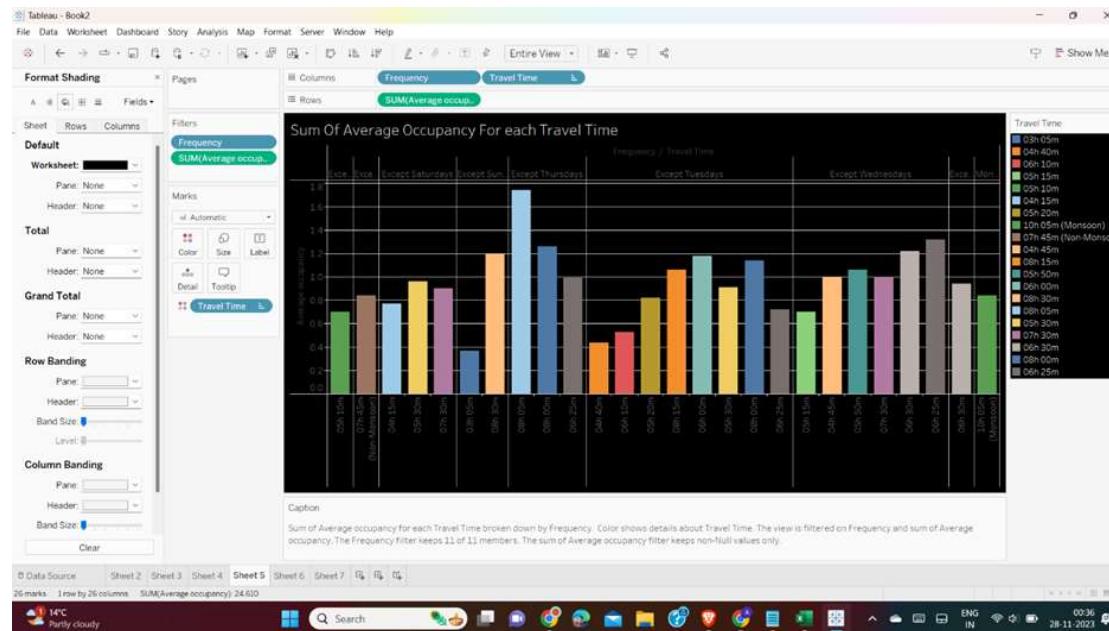
Sum of Average occupancy for each Distance broken down by Train Name. Color shows details about Train Name. The view is filtered on Distance, which keeps 24 of 33 members.

7.6 Find the distance difference between originating city and Terminal City:



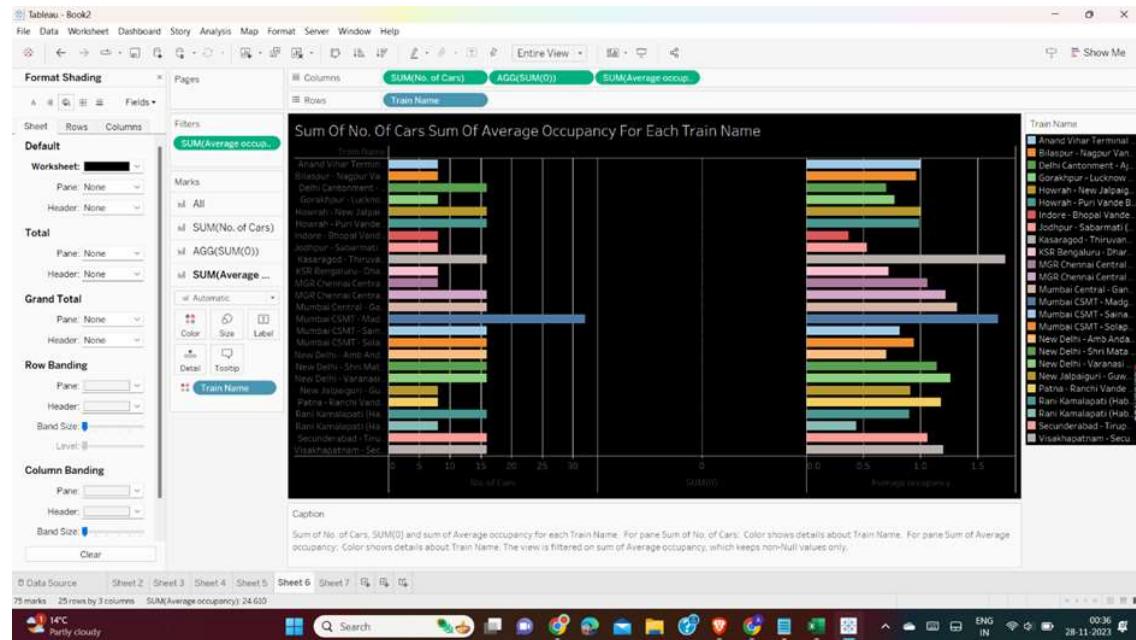
Originating City, Terminal City and Distance. Color shows details about Originating City. Size shows sum of No. of Cars. The marks are labeled by Originating City, Terminal City and Distance. The view is filtered on Originating City and Terminal City. The Originating City filter keeps 18 of 18 members. The Terminal City filter keeps 30 of 30 members.

7.7 Find the Travel time of Train's given



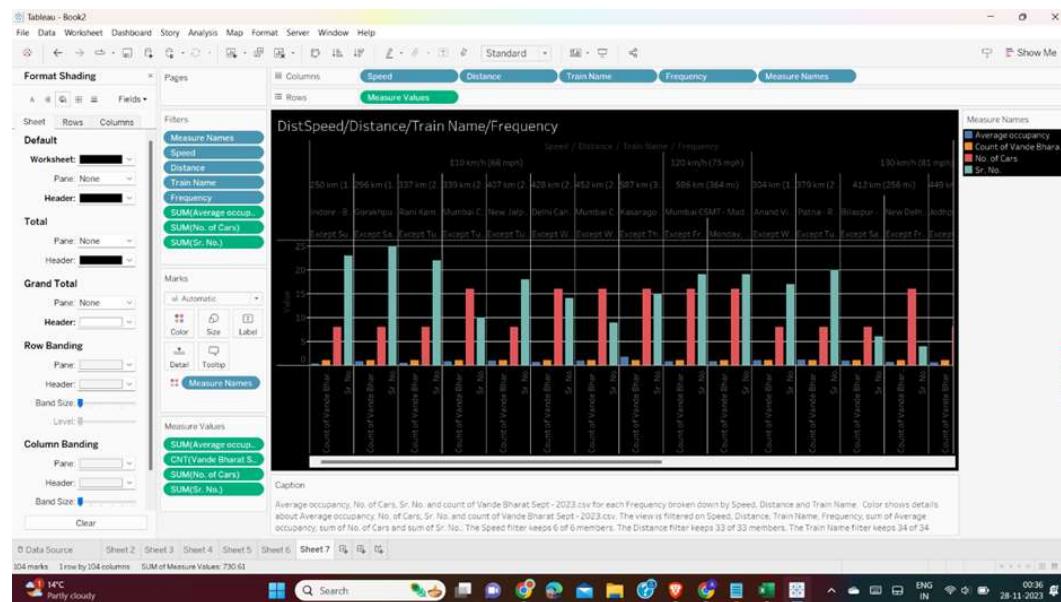
Sum of Average occupancy for each Travel Time broken down by Frequency. Color shows details about Travel Time. The view is filtered on Frequency and sum of Average occupancy. The Frequency filter keeps 11 of 11 members. The sum of Average occupancy filter keeps non-Null values only.

7.8 Find the Train Name and its average occupancy and no.of cars:



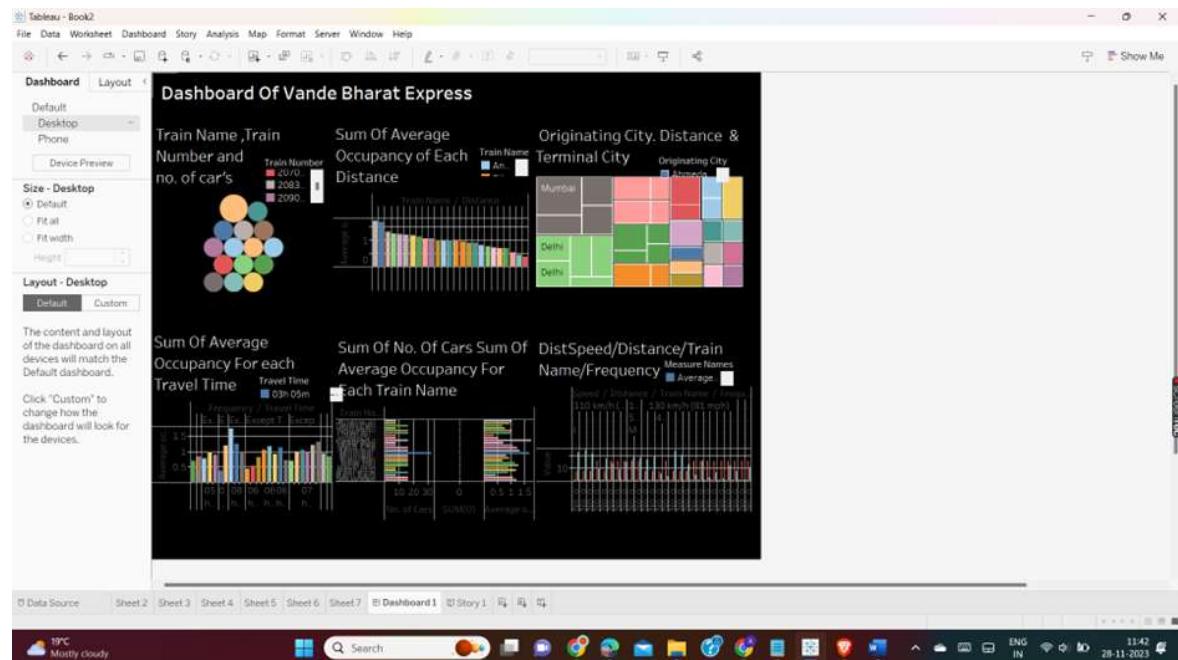
Sum of No. of Cars, SUM(0) and sum of Average occupancy for each Train Name.
For pane Sum of No. of Cars: Color shows details about Train Name. For pane Sum of Average occupancy: Color shows details about Train Name. The view is filtered on sum of Average occupancy, which keeps non-Null values only.

7.9 Find the Train distance speed and frequency

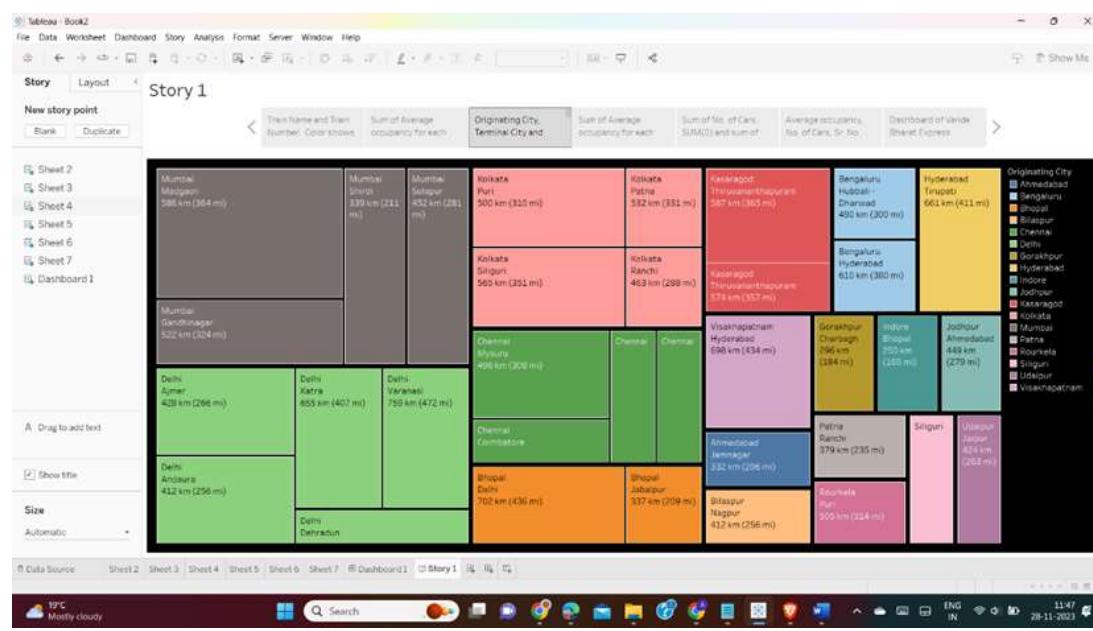


, Except Tuesdays (20631) and Except Wednesdays (22926), Except Tuesdays (22925). The sum of Average occupancy filter keeps non-Null values only. The sum of No. of Cars filter keeps non-Null values only. The sum of Sr. No. filter keeps non-Null values only.

7.10 Dashboard



7.11 Story



8. RESULTS

9.1 Output Screenshots

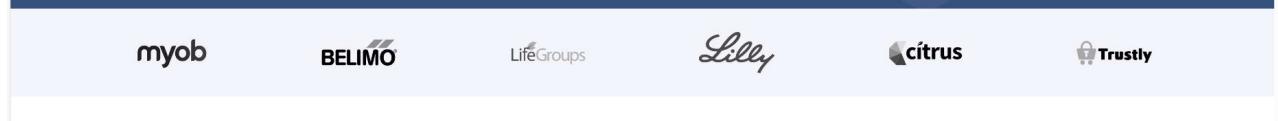
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"Revolutionizing Rails: Vande Bharat"

Uniting Vision, Speed, and Progress

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Dashboard Of Vande Bharat Express

Train Name ,Train Number and no. of car's

Sum Of Average Occupancy of Each Distance

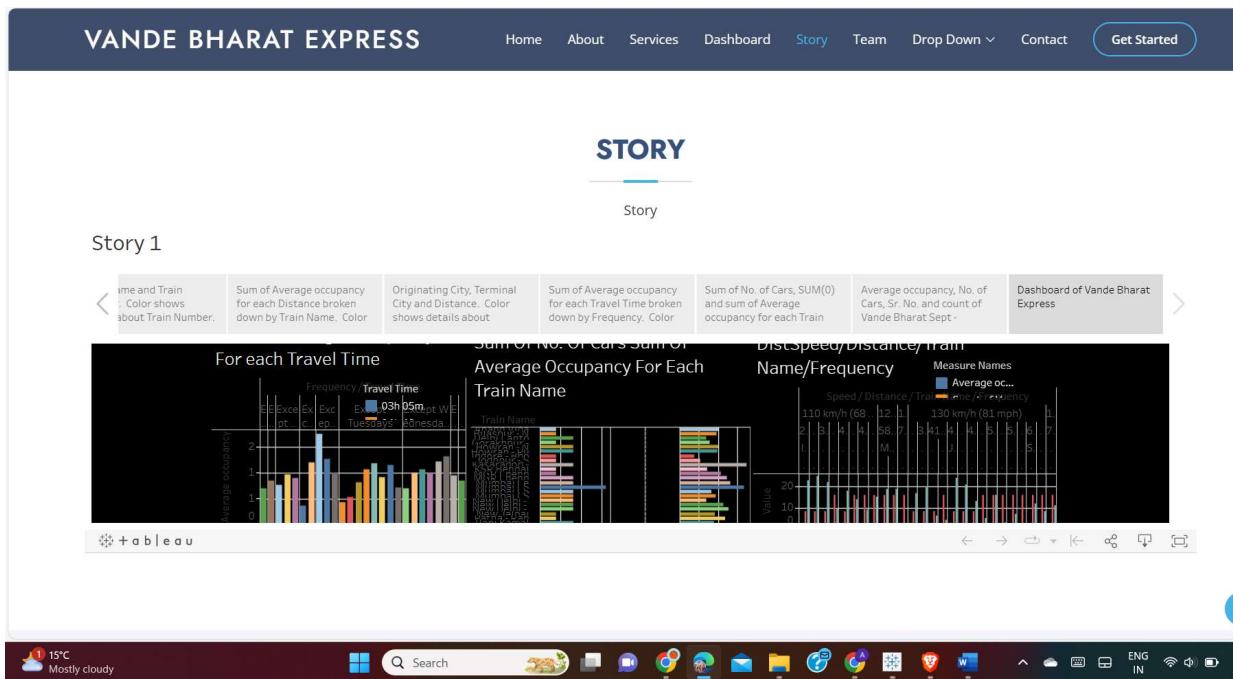
Originating City, Distance & Terminal City

Sum Of Average Occupancy For each Travel Time

Sum Of No. Of Cars Sum Of Average Occupancy For Each Train Name

DistSpeed/Distance/Train Name/Frequency

15°C Mostly cloudy



9. ADVANTAGES & DISADVANTAGES

Advantages:

- 1) High Speed and Reduced Travel Time: The train operates at a maximum speed of around 160 km/h, significantly reducing travel time between destinations compared to traditional trains.
- 2) Sleek and Modern Design: The aerodynamic design not only enhances the train's efficiency but also contributes to a modern and visually appealing appearance.
- 3) Energy Efficiency and Environmental Friendliness: Being an electric multiple unit train, the Vande Bharat Express reduces greenhouse gas emissions, promoting a more sustainable and environmentally friendly mode of transportation.
- 4) Passenger Amenities: The train offers a range of passenger amenities, including comfortable seating, onboard Wi-Fi, infotainment screens, bio-vacuum toilets, and catering services, contributing to an enhanced travel experience.
- 5) Safety Features: Incorporation of safety features such as fire and smoke detection systems, automatic doors with sliding footsteps, and crash-resistant features ensures the safety of passengers and crew.
- 6) Indigenous Technological Showcase: The development of the Vande Bharat Express demonstrates India's technological capabilities in terms of design, engineering, and manufacturing, fostering national pride and self-sufficiency.
- 7) Made in India Initiative: The train exemplifies India's commitment to promoting domestic manufacturing and technological innovation, aligning with the "Make in India" initiative.
- 8) Potential Economic Impact: The introduction of the Vande Bharat Express can stimulate tourism, boost local economies, and generate employment opportunities related to maintenance, operations, and hospitality.

Disadvantages:

- 1) Technical Issues: The introduction of new technology, especially in high-speed trains, can bring about technical challenges such as glitches, mechanical failures,

- or electronic malfunctions that may disrupt services.
- 2) Infrastructure Compatibility: Operating at high speeds requires well-maintained tracks and signaling systems. Incompatibility with existing infrastructure may impact the train's performance.
 - 3) Maintenance Costs: High-speed trains demand specialized and regular maintenance, potentially leading to higher operational costs.
 - 4) Safety Concerns: Any safety-related incidents, even minor ones, can lead to negative publicity, passenger apprehension, and a loss of public trust.
 - 5) Operational Costs: High-speed trains often come with higher operational costs due to specialized technology, maintenance, and energy requirements.
 - 6) Public Acceptance and Competition: Ensuring public acceptance and competing effectively with other modes of transport, such as airlines, is crucial for the success of the Vande Bharat Express.
 - 7) Infrastructure Expansion Challenges: Expanding the high-speed rail network to new routes requires considerable investment in infrastructure, potentially leading to delays and limitations in the train's reach.
 - 8) Regulatory and Political Hurdles: Coordination with regulatory bodies and government agencies may face challenges, causing delays in approvals, funding, and project implementation.

10. CONCLUSION

The Vande Bharat Express, or Train 18, stands as a remarkable achievement in India's rail technology landscape, symbolizing the nation's commitment to innovation, sustainability, and efficient transportation. With its high speed, sleek design, and focus on passenger comfort, the train has undoubtedly made positive contributions to the modernization of Indian rail travel. The emphasis on indigenous technology and the "Make in India" initiative highlights the nation's capability to design, engineer, and manufacture cutting-edge transportation solutions.

However, as with any ambitious project, challenges and potential areas for improvement exist. Technical issues, infrastructure compatibility, and the need for ongoing maintenance pose challenges that require careful attention. Public acceptance, competition with other modes of transport, and addressing safety concerns are vital aspects that contribute to the long-term success of the Vande Bharat Express.

11. FUTURE SCOPE

The future of the Vande Bharat Express holds promising opportunities for further advancements and positive impacts on India's transportation sector. Here are potential future avenues:

- 1) Expansion to New Routes: The planned expansion of the Vande Bharat Express to other important routes indicates a potential network expansion. This can enhance connectivity between major cities, contributing to economic growth and regional development.
- 2) Technological Upgrades: Continuous research and development can lead to technological upgrades, improving the train's efficiency, safety features, and passenger amenities. Integration of emerging technologies could further elevate the travel experience.

- 3) Collaboration and Export: Collaborations with international partners and potential export of Indian rail technology can position the Vande Bharat Express as a global benchmark in high-speed rail innovation. Sharing technological expertise can lead to mutually beneficial partnerships.
- 4) Operational Optimization: Continuous efforts to optimize operations, reduce maintenance costs, and enhance reliability will be crucial for the sustained success of the project. Implementing data-driven analytics and predictive maintenance could play a pivotal role.
- 5) Environmental Sustainability: Focusing on enhancing the environmental sustainability of the train, such as exploring energy-efficient technologies and further reducing carbon emissions, aligns with global efforts towards a greener future.

13. APPENDIX

Source Code

GITHUB REPOSITORY LINK:

<https://github.com/smarterinternz02/SI-GuidedProject-609498-1700929797>