

# **E.T. Transportation: Data Analysis Report**

Title: PowerBI Dashboard Report

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Course: Data Science

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# 1. Introduction

This report takes a closer look at the logistics operations of E.T. Transportation through a data-driven approach. Using Power BI for visualization and analysis, it aims to uncover key insights that can improve delivery times, fuel efficiency, and vehicle usage. The ultimate goal is to enhance operational efficiency while keeping customer satisfaction high. The following sections explore the dashboard created to achieve these objectives, outlining the data, metrics, and findings.

## 2. Project Purpose and Goals

The core objective of this project is to use data analytics to help E.T. Transportation operate more efficiently. Specifically, the project focuses on:

- Minimizing vehicle downtime: Ensuring that the fleet is used as effectively as possible.
- Improving fuel efficiency: Reducing fuel consumption across different routes by optimizing driving patterns and vehicle assignments.
- Boosting delivery performance: Enhancing the percentage of on-time deliveries by addressing route inefficiencies and other factors causing delays.

By achieving these goals, E.T. Transportation can streamline its operations, reduce costs, and deliver better service to its customers.

## 3. Dataset Overview

The dataset analyzed contains detailed records on several aspects of E.T. Transportation's logistics operations, including:

- Fuel Consumption: This data reflects the amount of fuel used (in kilometers per liter) across different vehicles and routes. By comparing actual vs. expected fuel efficiency, we can pinpoint inefficiencies caused by traffic conditions, vehicle type, or driving patterns.
- Vehicle Utilization: This section provides insights into how often vehicles are in use versus how often they remain idle. It tracks idle hours and active hours, showing how effectively the fleet is being managed.
- Delivery Performance: This data includes on-time delivery rates, delays, and cancellations, helping to identify trends and common causes of late or failed deliveries. Factors like route length, traffic conditions, and mechanical issues are taken into account.

This data was carefully cleaned and structured before it was analyzed in Power BI, ensuring that the insights drawn were accurate and reliable.

Current Fuel Efficiency ( KM/L) <b>13.52</b>	Average Vehicle Utilization Rate (%) <b>76.15</b>	OnTimeDeliveries <b>30.00%</b>
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## 4. Key Questions

The analysis is driven by several essential questions that aim to address operational inefficiencies:

Q1) How can we increase the utilization of vehicles that are currently underused?

- This involves assessing idle time across vehicles and understanding scheduling inefficiencies.

Q2) What are the primary factors impacting fuel efficiency on various routes?

- The goal is to identify whether terrain, traffic, or vehicle type is contributing to higher fuel consumption.

Q3) How can we improve the on-time delivery rate, which currently stands at 30%?

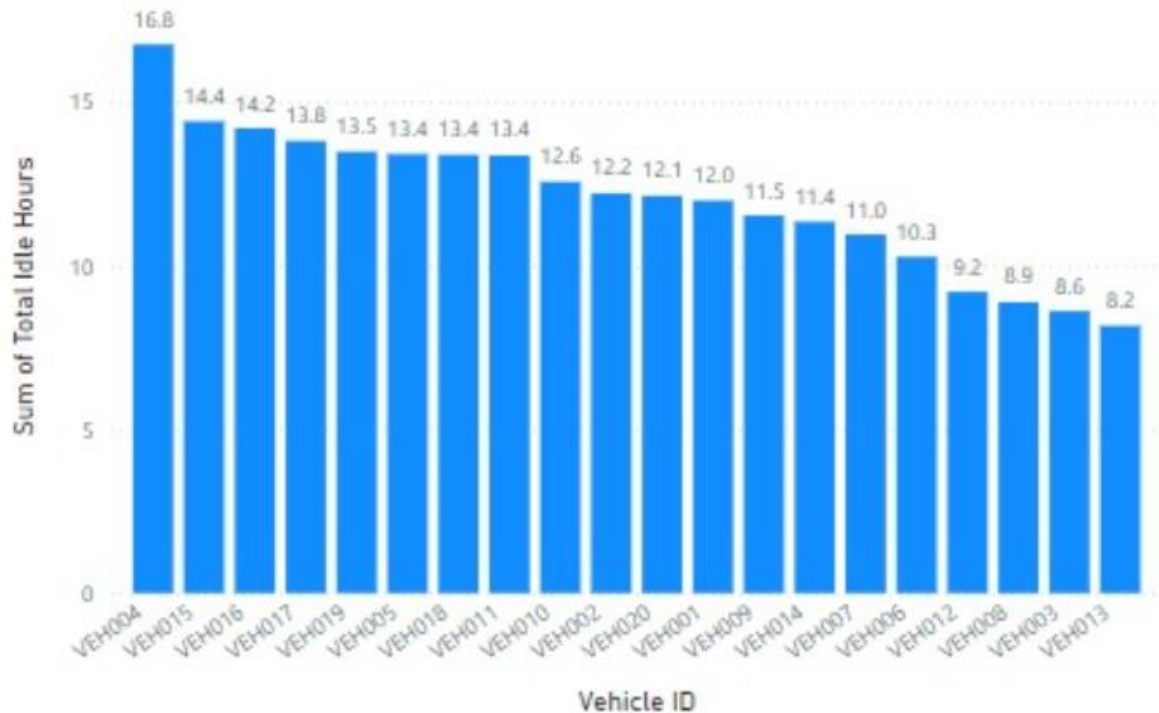
- By understanding the root causes of delays—whether due to traffic, vehicle maintenance, or scheduling—strategies can be developed to enhance delivery performance.

## 5. Metrics and KPIs

The following KPIs have been identified and tracked in the dashboard to assess E.T. Transportation's logistics operations:

- Fuel Efficiency (13.52 KM/L): This KPI measures how efficiently fuel is being consumed on different routes. Higher fuel efficiency leads to lower operational costs. The dashboard shows the performance of each route in terms of fuel usage.
- Average Vehicle Utilization Rate (76.15%): This KPI measures the percentage of time vehicles are in use compared to idle. A higher utilization rate means that the fleet is being used effectively, minimizing downtime. A focus on balancing the workload between vehicles can improve this metric.
- On-Time Deliveries (30%): This KPI tracks how many deliveries arrive on time. The low percentage indicates issues with routing, traffic, or scheduling that need to be addressed to improve customer satisfaction.

Sum of Total Idle Hours by Vehicle ID



## 6. Data Model

The data model connects several key tables, providing a holistic view of E.T. Transportation's operations. The relationships between these tables enable a deep analysis of how different factors interact:

- Shipments and Routes: This data shows the routes taken for each delivery, allowing for analysis of delivery times, traffic patterns, and route efficiency.
- Fuel Costs: Fuel consumption is linked to vehicle usage, enabling the analysis of fuel efficiency by vehicle and route.
- Delivery Status: This data tracks the outcomes of deliveries, whether they were completed on time, delayed, or canceled. It allows for a comprehensive review of performance issues.

The structured data model allows for real-time data visualization, providing insights into operational performance across multiple dimensions.

## 7. Results and Chart Explanations

The dashboard provides several visualizations that offer a detailed view of E.T. Transportation's operations:

### **1. Fuel Efficiency (13.52 KM/L)**

Dashboard Card Explanation: The Fuel Efficiency card shows the overall efficiency of fuel consumption in kilometers per liter. This metric is essential for assessing the cost-effectiveness of the fleet and identifying potential areas for fuel-saving strategies.

Insight: Routes with heavy congestion or longer distances may contribute to lower fuel efficiency. Focusing on rerouting these deliveries could lead to cost savings and environmental benefits.

### **2. Vehicle Utilization (76.15%)**

Dashboard Card Explanation: The Vehicle Utilization card displays the percentage of the fleet being actively used. Vehicles with low utilization rates are costing the company without providing adequate value.

Insight: Idle time across several vehicles can be reduced by reassigning them to more active routes or optimizing delivery schedules. Improving utilization can also reduce the wear and tear on vehicles that are overused.

### **3. On-Time Deliveries (30%)**

Dashboard Card Explanation: The On-Time Delivery card reflects the percentage of deliveries completed on time, which currently stands at 30%. This highlights a major area of concern for improving customer satisfaction.

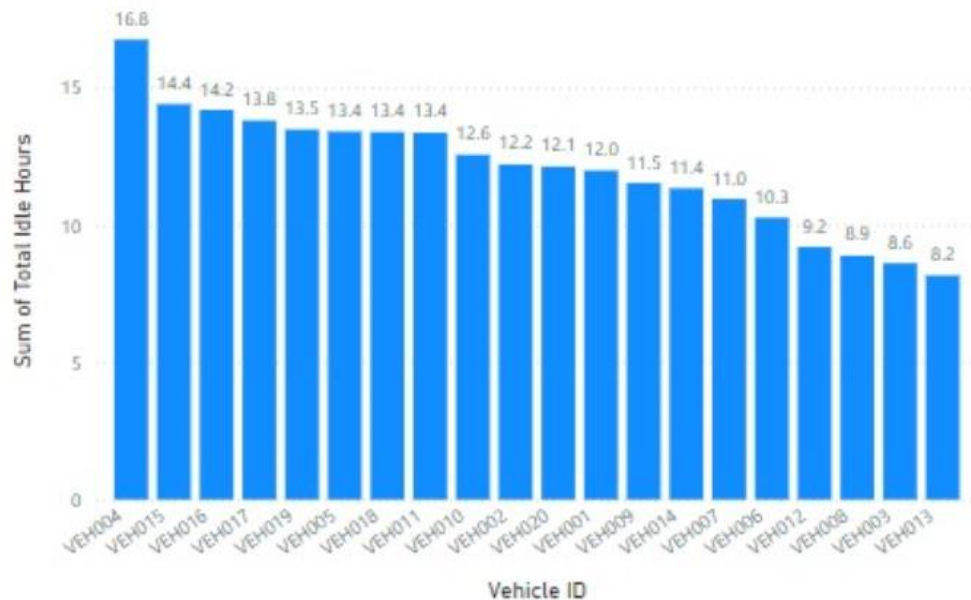
Insight: A large proportion of deliveries are delayed due to traffic congestion or inefficiencies in routing. Scheduling adjustments, predictive traffic analysis, and better route planning are needed to improve this KPI.

### **4. Sum of Total Idle Hours by Vehicle ID**

Chart Explanation: This bar chart shows the total idle hours for each vehicle. Vehicles with significantly higher idle hours are underutilized and can be reassigned or scheduled more effectively.

Insight: By redistributing delivery assignments, the fleet's workload can be better balanced, reducing the overall operational costs associated with idle vehicles.

Sum of Total Idle Hours by Vehicle ID

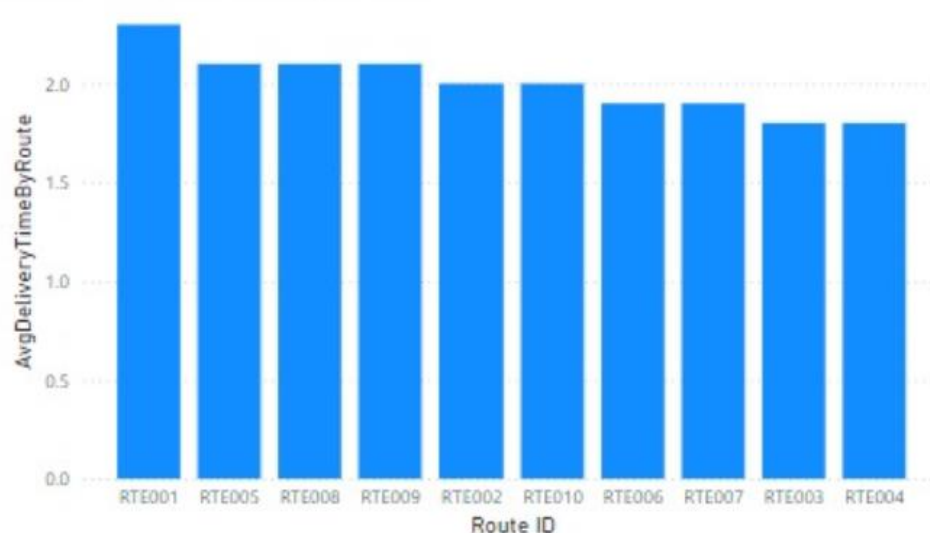


## 5. Average Delivery Time by Route

**Chart Explanation:** The Average Delivery Time by Route bar chart shows how long deliveries take to complete on different routes. This is crucial for understanding where delays are occurring and identifying routes that take longer than expected.

**Insight:** Routes with higher average delivery times may need to be re-examined for alternative paths or better scheduling to avoid peak traffic hours.

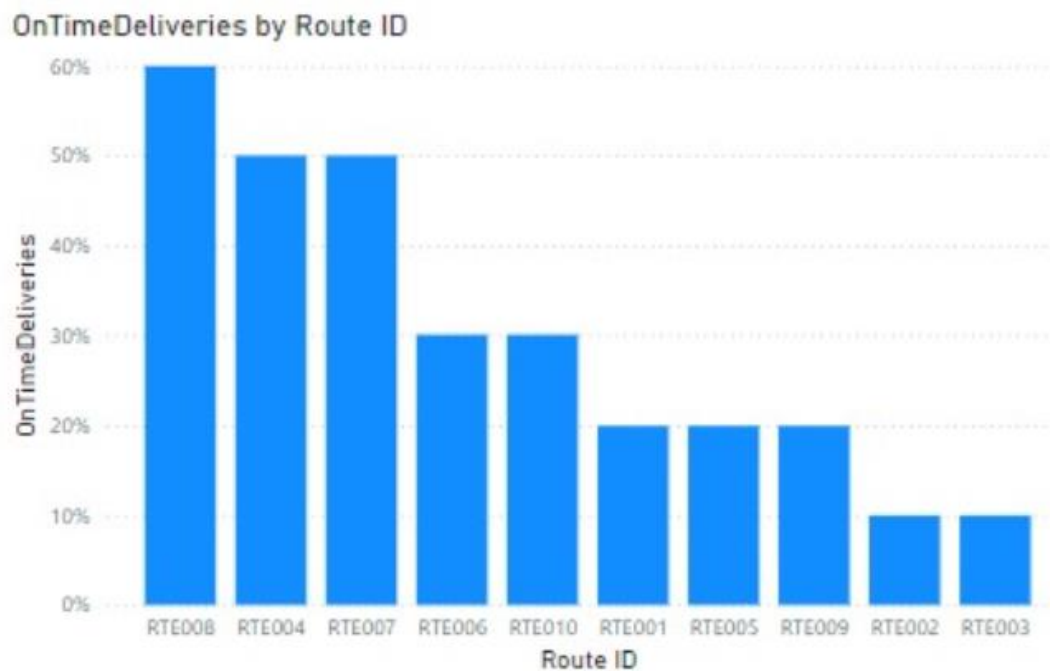
AvgDeliveryTimeByRoute by Route ID



## 6. On-Time Deliveries by Route

Chart Explanation: This bar chart visualizes On-Time Deliveries by Route and identifies which routes have the lowest on-time performance.

Insight: Routes with lower on-time deliveries are likely impacted by congestion, vehicle breakdowns, or inefficient scheduling. These routes should be adjusted to ensure a higher percentage of timely deliveries.



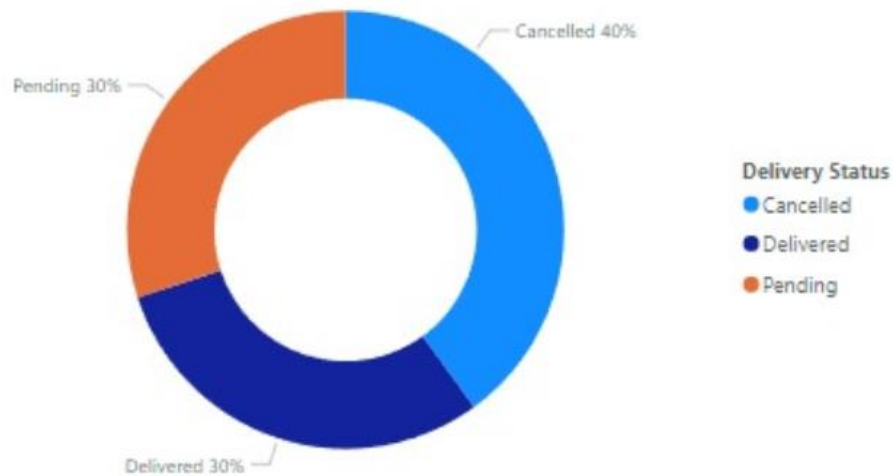
## 7. Count of Delivery ID by Delivery Status

Chart Explanation: The doughnut chart shows the breakdown of delivery status: canceled, pending, and completed. This gives a quick overview of how many deliveries face issues and where the company is losing efficiency.

Insight: A high percentage of canceled or pending deliveries indicates operational inefficiencies that need to be addressed. Streamlining communication and better route planning can help mitigate cancellations.



Count of Delivery ID by Delivery Status



## 8. Insights and Recommendations

Based on the data analysis and dashboard findings, the following recommendations are proposed:

- Route Optimization: Reevaluate routes with low fuel efficiency and high average delivery times. Utilizing alternative routes or adjusting delivery times to avoid peak traffic can improve both fuel efficiency and delivery performance.
- Improve Vehicle Scheduling: Reassign vehicles with high idle hours to busier routes or reschedule their use to better distribute the workload. This can reduce costs associated with underutilized vehicles and increase overall fleet efficiency.
- Enhance Predictive Maintenance: Introducing a predictive maintenance strategy can prevent unexpected breakdowns, improving the on-time delivery rate and reducing vehicle downtime.
- Offer Real-Time Delivery Updates: Providing customers with real-time updates on delivery progress can improve customer satisfaction and help manage expectations, especially when delays are unavoidable.

## 9. Conclusion

This analysis of E.T. Transportation's logistics data reveals several opportunities for improvement in operational efficiency. By focusing on optimizing routes, improving vehicle utilization, and addressing delivery delays, E.T. Transportation can reduce costs, improve fuel efficiency, and boost customer satisfaction. The insights provided in this report offer actionable steps to drive long-term improvements in fleet management and logistics performance.

## 10. Appendix

### • Dashboard:

