**TRANSPORTATION LOGISTICS ANALYSIS REPORT**

**Prepared for:** Resume Portfolio   
**Prepared by:** Pratik Gujar  
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**1. Introduction**

This report provides an in-depth analysis of transportation logistics based on the available dataset. It includes insights into fuel efficiency, delivery performance, and route optimization using pivot tables and data visualizations.

**2. Data Overview**

The dataset contains the following key columns:

* **Route ID**: Identifies different transportation routes.
* **Vehicle ID & Driver ID**: Links each route with a specific vehicle and driver.
* **Distance & Fuel Consumption**: Tracks the efficiency of fuel usage.
* **Delivery Times**: Measures the frequency of deliveries per route.
* **Date Columns**: Start and end dates of trips.
* **Additional Metrics**: Fuel efficiency, distance range, and peak delivery days.

**3. Data Cleaning & Basic Insights**

Before analysis, data cleaning was performed to remove inconsistencies and ensure accuracy. The following insights were derived from the cleaned dataset:

* **Missing Values Handling**: Any missing or inconsistent data entries were corrected or removed.
* **Duplicate Records**: Identified and removed duplicate trip entries to avoid skewed results.
* **Outlier Detection**: Extreme values in fuel consumption and distance were reviewed and validated.
* **Data Formatting**: Standardized date formats and numerical precision for accurate calculations.
* **Categorical Grouping**: Grouped routes based on distance range and fuel efficiency for better comparison.

**4. Key Findings**

**A. Route-Wise Fuel Efficiency**

* The average fuel efficiency varies by route, indicating that some routes are more optimized than others.
* Certain routes show higher fuel consumption despite shorter distances, suggesting inefficiencies.

**B. Peak Delivery Days Analysis**

* Deliveries peak on **Saturdays and Wednesdays**, showing trends that can help in workforce planning.
* Low delivery counts on certain weekdays may indicate an opportunity for better resource utilization.

**C. Monthly Delivery Trends**

* Deliveries are **highest during the end of the year** (October to December), indicating seasonal demand variations.
* A decline in deliveries during the mid-year period (May to July) suggests possible inefficiencies or lower demand.

**D. Distance and Fuel Consumption Analysis**

* Long-distance routes generally have lower fuel efficiency, but some shorter routes still exhibit high fuel consumption, indicating potential vehicle maintenance issues.
* Vehicles with high fuel consumption per trip should be assessed for possible optimization.

**5. Pivot Table Summaries**

|  |  |
| --- | --- |
| **Category** | **Key Insights** |
| **Fuel Efficiency (By Route)** | Routes with over 20% fuel inefficiency need optimization. |
| **Deliveries per Month** | The last quarter of the year sees the highest delivery volume. |
| **Distance vs Fuel** | Some short routes show disproportionately high fuel consumption. |

**7. Conclusion**

This analysis provides valuable insights into transportation efficiency. By acting on the recommendations, the organization can reduce costs and improve operational efficiency. Further automation and advanced analytics can enhance decision-making in logistics management.

**Data Visualizations**

* Dashboard visuals include:
  + Fuel Efficiency by Route
  + Peak Delivery Days Heatmap
  + Monthly Deliveries Trend
  + Distance vs Fuel Consumption Comparison