Group: 9

<u>Title:</u> **The Road to Better Deliveries: Pruning Lead Time.**

<u>Research problem:</u> Can we predict the lead time of deliveries in order to minimize it?

Why delivery lead time is important to decision makers:

Timely delivery is not only critical for customer satisfaction and gaining a competitive edge, but also for cost control and efficient operations. Customers expect timely delivery and any delay in delivery will damage the reputation of the brand/company providing the goods/services. Hence, timely delivery is crucial for maintaining customer loyalty. Customer will most likely choose the company which has a lower delivery time. So, to compete with others, the company must maintain minimum delivery lead time. Avoiding any delays will avert any potential penalties for late delivery and will also reduce costs such as transportation and storage. Minimizing delivery lead time helps the company gain operational excellence. It helps optimize inventory as the need to hold large stockpiles goes down and allows better coordination across the entire supply chain and improving overall efficiency.

Hence, delivery lead time is of utmost importance to decision makers of a logistics company. In order to minimize the delivery lead time, we must be able to predict it using the factors that affect it the most.

<u>Dataset:</u> Logistics.

The variables in the dataset are:

• factory_location: The city where the factory is located.

• destination: The destination city for the shipment.

• distance_km: The distance to the customer in kilometres.

• transport_mode: The mode of transportation used for the shipment (e.g., Road, Air).

• fuel_price: The fuel price per litre in USD.

• shipment_weight: Weight of the shipment in kilograms.

• shipment_volume: Volume of the shipment in cubic meters.

• num_stops: Number of stops during the shipment.

• shipment_urgency: Urgency level of the shipment (e.g., High, Medium, Low).

• weather_conditions: Weather during shipment.

• carrier_reliability: Reliability of the carrier.

• order_volume: Volume of the order in units.

• product_type: Type of product being shipped.

• packaging_type: Packaging used (e.g., Fragile, Oversized).

• special_handling: Whether the shipment requires special handling.

• customs_clearance: Whether customs clearance is needed.

• supply_chain_disruption: Whether there is a disruption in the supply chain.

• seasonality: Seasonality effects (e.g., Peak, Off-Peak).

• temp_control: Whether temperature control is needed.

• delivery_lead_time: Time in days for the delivery.

• id: Unique identifier for the shipment.

For a logistics research problem focused on optimizing delivery efficiency, several key variables stand out as crucial:

1. Distance: Directly impacts travel time, making it a critical factor in time optimization.

2. Number of stops/Hubs: Higher number of stops will indicate longer delivery time.

3. Weather conditions: Adverse weather conditions will result in longer delivery time.

4. Customs clearance: If customs clearance is needed, the delivery time will increase.

5. Transport mode: Different modes (e.g., road, air) have varying costs, speeds, and reliability, influencing overall efficiency.

6. Shipment urgency: Impacts prioritization and may lead to selecting faster, but costlier, transport methods.

7. Carrier reliability: High reliability can reduce delays and ensure timely deliveries

8. Order volume and shipment weight: These factors influence transportation mode selection, packing efficiency, and delivery time.

9. Supply chain disruption: If there is a supply chain disruption, delivery time will be longer.

Focusing on these variables enables a more efficient logistics operation by minimizing the delivery lead time.

There are 1010 observations in the dataset.