Innovation Brief – Predictive Delivery Optimizer

Company: NexGen Logistics Pvt. Ltd.

Role: Logistics Innovation Analyst

Tool Built: AI-Driven Predictive Delivery Optimization Dashboard

1. Problem Statement

NexGen Logistics is facing frequent delivery delays across multiple routes due to varying traffic conditions, unpredictable weather, and inconsistent carrier performance. These delays negatively impact customer satisfaction and result in increased penalty and re-delivery costs. Currently, operations teams react after delays happen instead of preventing them.

2. Objective

To **predict delivery delays before they occur** by analyzing logistics data and highlighting high-risk orders early, enabling proactive intervention.

3. Data Sources Used

Dataset	Description
orders.csv	Order, priority, product category, origin, destination
delivery_performance.csv	Promised vs actual delivery time & carrier data
routes_distance.csv	Route distance, fuel usage, tolls, traffic & weather impact

4. Solution Approach

1. **Data Integration:** Merged all datasets using order_id.

2. **Feature Engineering:**

   o **Delay Hours** = Actual Time – Promised Time

   o **Priority Score** = Express > Standard > Economy

   o **Route Risk Score** = Traffic Delay + Weather Impact

3. **Machine Learning Model:**
   Trained a **Random Forest Classifier** to predict delay probability (High / Medium / Low).

4. **Interactive Streamlit Dashboard:**

   o Upload or auto-load data

   o View delay risk trends

   o Inspect high-risk orders

   o Suggested corrective actions for each risky order

5. Key Features of the Dashboard

 Predicts whether a delivery will be delayed
Highlights high-risk orders with severity levels
 Provides route & carrier-level performance insights
 Suggests preventive actions (priority upgrade, carrier change, route shift)

6. Technology Stack

Python, Streamlit, Pandas, NumPy, scikit-learn, Plotly

7.Conclusion

The Predictive Delivery Optimizer transforms logistics operations from **reactive** to **proactive**, empowering NexGen Logistics to act early, reduce delays, enhance customer trust, and optimize cost efficiency.