

Courier Performance and Delivery Efficiency Report

1. Introduction

This report provides an in-depth analysis of courier performance and delivery efficiency by examining key performance indicators (KPIs) related to average delivery time, idle time, and regional performance. The objective is to optimize delivery routes, balance courier workload, and improve on-time delivery rates.

2. Key Performance Indicators (KPIs) & Formulas

2.1 Average Delivery Time per Package

Formula:

$$\text{AvgDeliveryTime} = \text{SUM}(\text{delivery_time} - \text{accept_time}) / \text{COUNT}(\text{package_id})$$

Objective: Measures the time taken from order acceptance to delivery completion.

2.2 On-Time Delivery Rate (%)

Formula:

$$\text{OnTimeDeliveryRate} = (\text{COUNTROWS}(\text{FILTER}(\text{DeliveryData}, \text{delivery_time} \leq \text{target_time})) / \text{COUNTROWS}(\text{DeliveryData})) * 100$$

Objective: Tracks the percentage of deliveries completed within the expected time frame.

2.3 Courier Utilization Rate (%)

Formula:

$$\text{CourierUtilization} = (\text{COUNTROWS}(\text{DISTINCT}(\text{package_id})) / \text{COUNTROWS}(\text{DISTINCT}(\text{courier_id}))) * 100$$

Objective: Evaluates workload distribution across couriers.

2.4 First Attempt Delivery Success Rate (%)

Formula:

$$\text{FirstAttemptSuccessRate} = (\text{COUNTROWS}(\text{FILTER}(\text{DeliveryData}, \text{first_attempt_success} = \text{TRUE}))) / \text{COUNTROWS}(\text{DeliveryData})) * 100$$

Objective: Measures the percentage of successful first-attempt deliveries.

2.5 Average Idle Time Between Deliveries (Minutes)

Formula:

$$\text{AvgIdleTime} = \text{SUM}(\text{accept_time} - \text{previous_delivery_time}) / \text{COUNT}(\text{package_id})$$

Objective: Identifies courier downtime between deliveries.

2.6 Region-Wise Delivery Efficiency

Formula:

$$\text{RegionDeliveryEfficiency} = \text{SUM}(\text{delivery_time} - \text{accept_time}) / \text{COUNT}(\text{package_id})$$

Objective: Evaluates delivery efficiency across different regions.

2.7 Delivery Time Variation by Package Type

Formula:

$$\text{DeliveryTimeByType} = \text{AVERAGE}(\text{delivery_time} - \text{accept_time}) \text{ GROUP BY package_type}$$

Objective: Compares delivery times across different package categories.

3. Filters & Slicers

Date Range (ds): Analyze trends over specific timeframes.

City & Region: Identify inefficiencies across locations.

Courier ID: Monitor individual courier performance.

Package Type: Compare delivery efficiency for different types of goods.

Delivery Status: Differentiate between successful and failed deliveries.

Traffic Conditions & Time of Day: Assess external factors affecting delivery performance.

4. Data Visualizations & Insights

4.1 KPI Summary

Key performance indicators such as **Average Delivery Time**, **On-Time Delivery Rate**, **Courier Utilization**, and **First Attempt Success Rate** are displayed using KPI cards for quick analysis.

4.2 Delivery Time Distribution (Histogram)

X-Axis: Delivery Time (Minutes)

Y-Axis: Number of Deliveries

Insight: Identifies common delivery time ranges and potential bottlenecks.

4.3 Regional Performance (Heatmap)

Objective: Highlights geographic areas with frequent delays.

4.4 Idle Time Analysis (Box Plot)

Purpose: Examines variations in idle time between deliveries per courier.

4.5 First Attempt Success Rate (Pie Chart)

Categories: Successful vs. Failed First Attempt Deliveries.

Objective: Identifies areas for improvement in first-attempt delivery success.

4.6 Courier Utilization & Workload Distribution (Bar Chart)

X-Axis: Courier IDs

Y-Axis: % of Total Deliveries Assigned

Purpose: Balances workload distribution among couriers.

5. Pickup Performance and Route Optimization

5.1 Objective

This section evaluates pickup route efficiency and courier workload to optimize performance and reduce delays.

5.2 Key Performance Indicators (KPIs) & Formulas

5.2.1 Average Route Efficiency Score

Formula:

$\text{RouteEfficiency} = \text{Total Distance Covered} / \text{Total ETA}$

Objective: Measures the efficiency of couriers in covering assigned pickup routes.

5.2.2 Average Pickup Time per City

Formula:

$\text{AvgPickupTime} = \text{SUM}(\text{pickup_time} - \text{accept_time}) / \text{COUNT}(\text{pickup_id})$

Objective: Compares pickup efficiency across different cities.

5.2.3 Region-Wise Route Delay Percentage

Formula:

$$\text{RouteDelayRate} = (\text{COUNT}(\text{pickups where ETA} > \text{time_window_end}) / \text{COUNT}(\text{pickups in region})) * 100$$

Objective: Identifies regions experiencing frequent pickup delays.

5.2.4 AOI-Based Pickup Delay Rate

Formula:

$$\text{AOIDelayRate} = (\text{COUNT}(\text{delayed pickups per AOI}) / \text{COUNT}(\text{total pickups per AOI})) * 100$$

Objective: Highlights problem areas in different AOIs.

5.2.5 Courier Workload Distribution

Formula:

$$\text{WorkloadDistribution} = (\text{COUNT}(\text{pickups per courier}) / \text{COUNT}(\text{total pickups})) * 100$$

Objective: Ensures fair workload distribution among couriers.

6. Data Visualizations & Insights

Route Efficiency Score Heatmap

Pickup Time Variation (Box Plot)

Courier Workload Distribution (Bar Chart)

Pickup Success Rate by AOI (Stacked Bar Chart)

Pickup Delays by Region (Map Visualization)

First Attempt Pickup Success Rate (Pie Chart)

7. Conclusion & Recommendations

Optimize courier dispatching to reduce idle time and balance workload distribution.

Improve first-attempt deliveries through enhanced customer communication.

Refine ETA models based on real-world performance data.

Optimize regional performance by adjusting staffing and route planning.

Enhance pickup efficiency by refining route strategies and identifying high-delay areas.

