Route Intelligence & Optimization System

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Introduction

➢ This project focuses on building a Route Intelligence System for a logistics company.

➢ We have simulated a real-world package delivery operation in Nairobi, Kenya, where a logistics company needs to optimize delivery routes, improve driver performance, and reduce its environmental footprint.

➢ Companies uses GPS telemetry, weather data, and vehicle tracking to monitor and analyze delivery operations in real time.

Business Problem & Objectives

Challenges

- Rising fuel costs due to inefficient routing.

- Delivery delays impacting customer satisfaction.

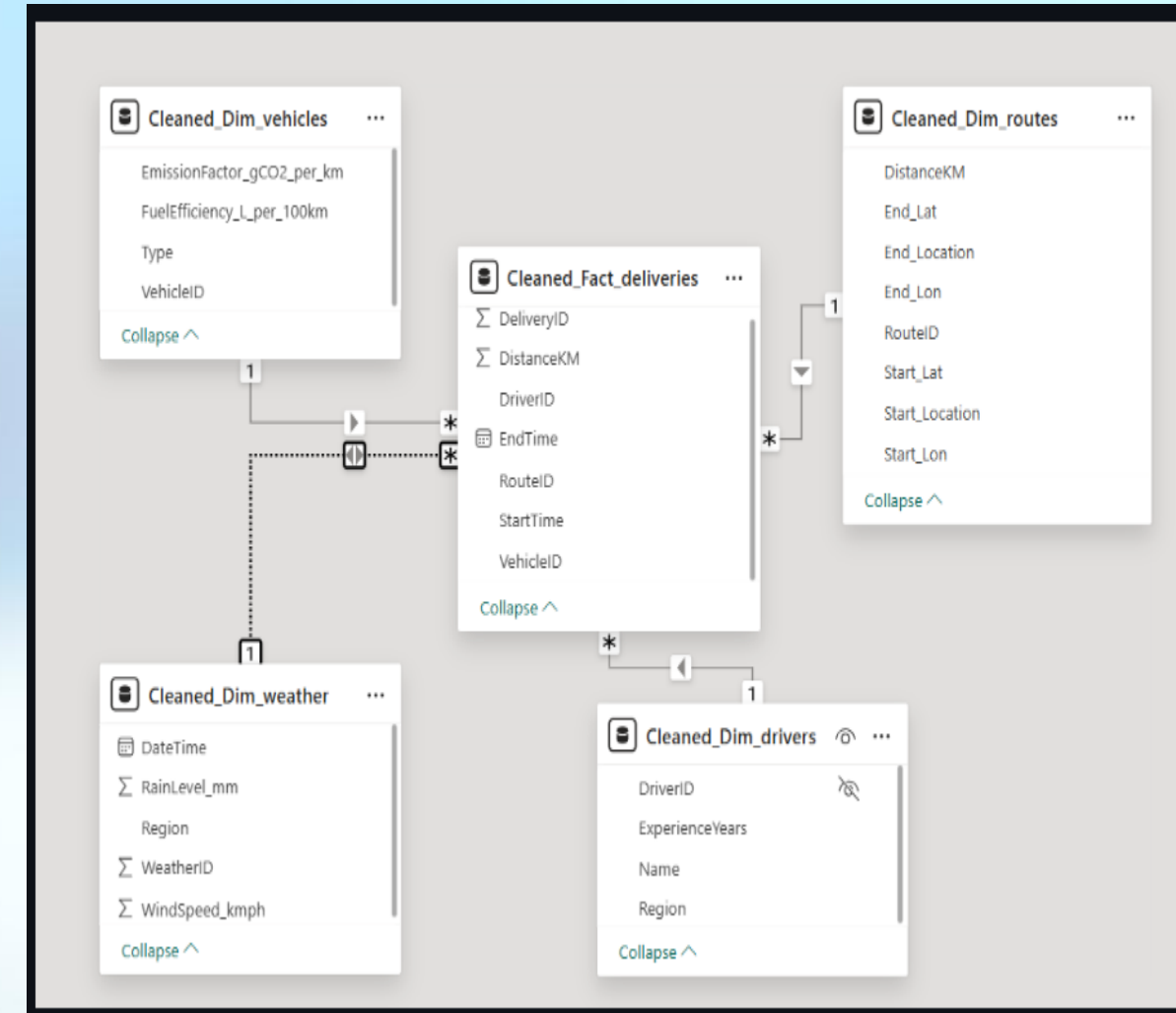- No insights on driver or environmental performance.

Objectives

- Optimize delivery routes using GPS & weather data.

- Monitor and improve driver efficiency.

- Track and reduce carbon emissions.
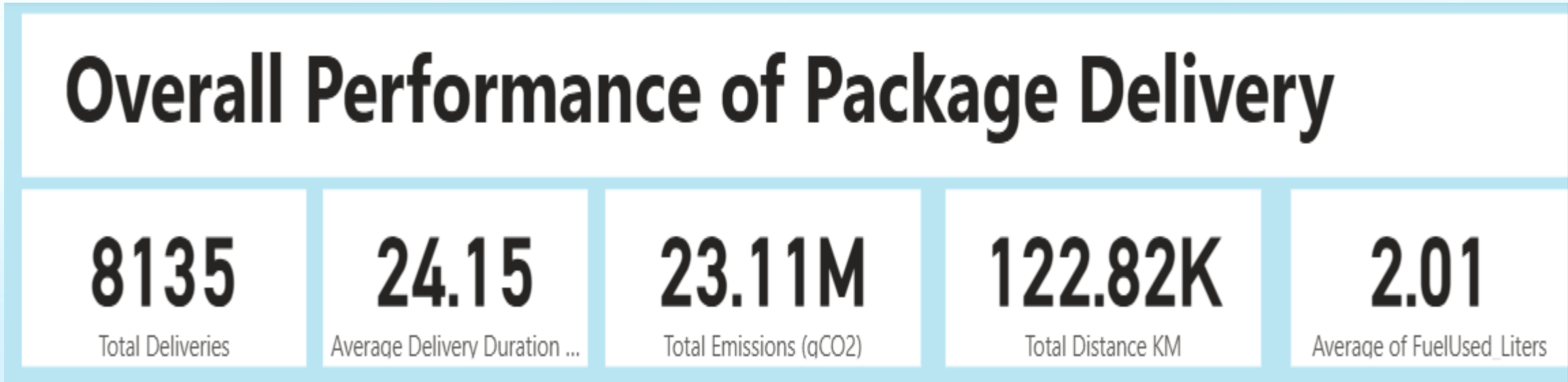
Data Architecture Overview

Main Dashboard Overview

Overall Performance of Package Delivery

8135	24.15	23.11M	122.82K	2.01
Total Deliveries	Average Delivery Duration ...	Total Emissions (gCO2)	Total Distance KM	Average of FuelUsed_Liters

Performance measure over the last five yours 2022- 2025

Drivers Performance Insights

1 **Driver Efficiency**

- Deliveries per Driver

- Average Delivery Time by Driver

- Total Distance per Driver

2 **Interactive Drill-through**

- Driver Profile Deep Dive (Click-through views)

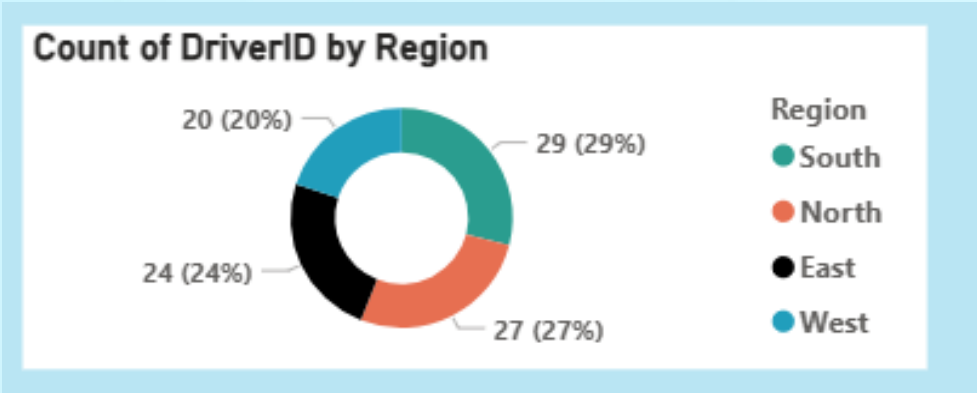- Count of total Delivery by month Analysis.

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DriverID	Total Deliveries	Average Delivery Duration per Driver (Min)	Total Distance KM
41	105	22.52	1,449.20
4	104	24.50	1,574.40
95	102	25.68	1,607.20
93	100	23.93	1,512.20
10	96	24.35	1,430.20
76	96	26.00	1,515.70
61	94	24.04	1,394.10
9	93	23.65	1,320.50
33	92	23.51	1,352.10
84	92	24.95	1,461.80
96	92	25.54	1,452.90
Total	**1066**	**24.41**	**16,070.30**

Top 10 Drivers Best Performers

DriverID	Average Delivery Duration per Driver (Min)	Total Distance KM	Total Deliveries
24	24.26	938.30	61
99	23.10	862.50	61
67	22.83	927.70	64
68	23.14	938.50	64
81	24.05	955.70	65
14	24.06	1,016.00	67
56	23.22	987.70	67
83	24.20	1,038.40	69
51	23.99	1,012.80	70
53	25.04	1,131.00	70
91	24.54	1,107.40	70
Total	**23.88**	**10,916.00**	**728**

Bottom 10 Drivers Least Performers

Count of DriverID by Region

20 (20%)

29 (29%)

24 (24%)

27 (27%)

Region
- South
- North
- East
- West

Distribution of Drivers Across Regions

Vehicle & Environmental Analytics

Vehicle Type Breakdown

- Emissions by Vehicle Type
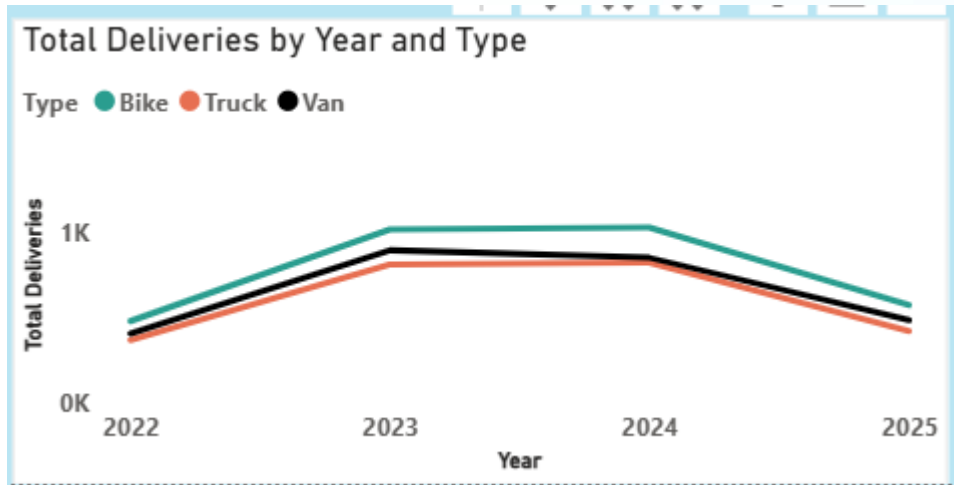
- Fuel Usage Comparison

Weather Impact Analysis

- Delivery Duration by Rainfall Levels
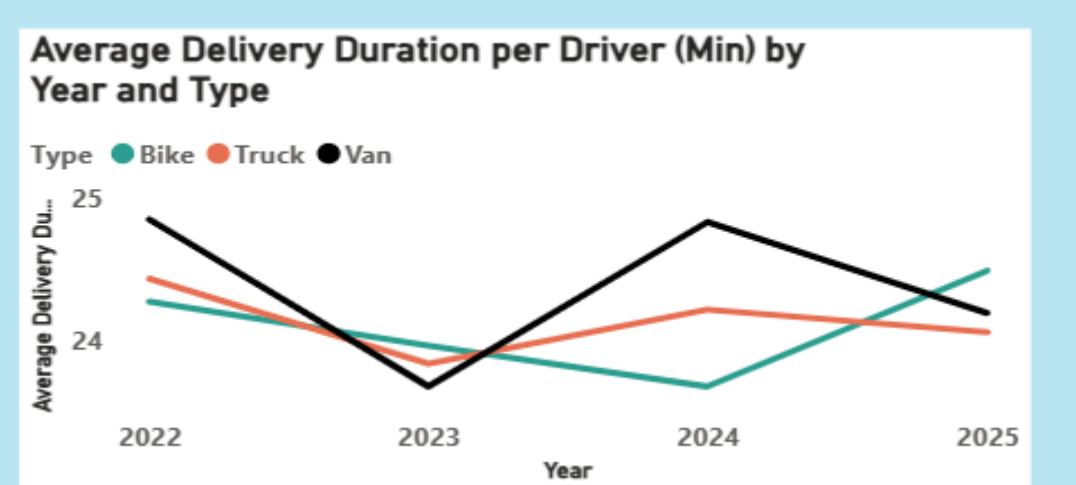
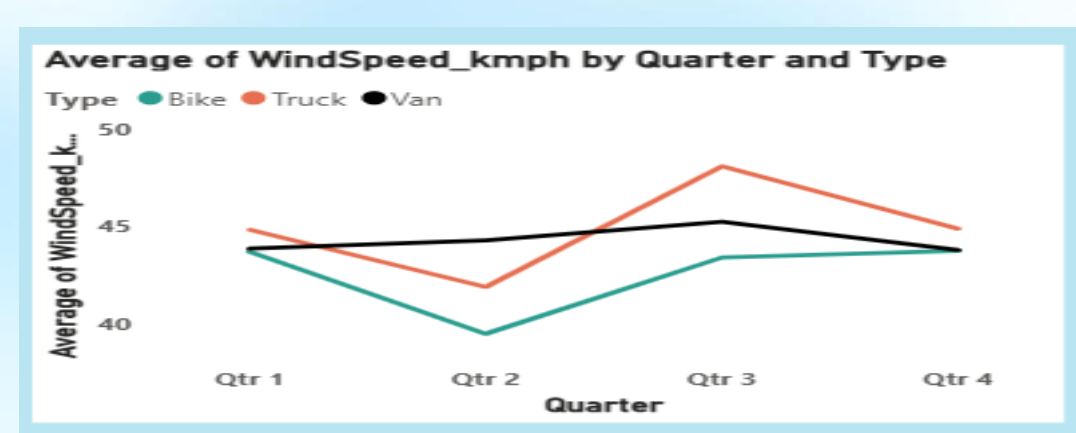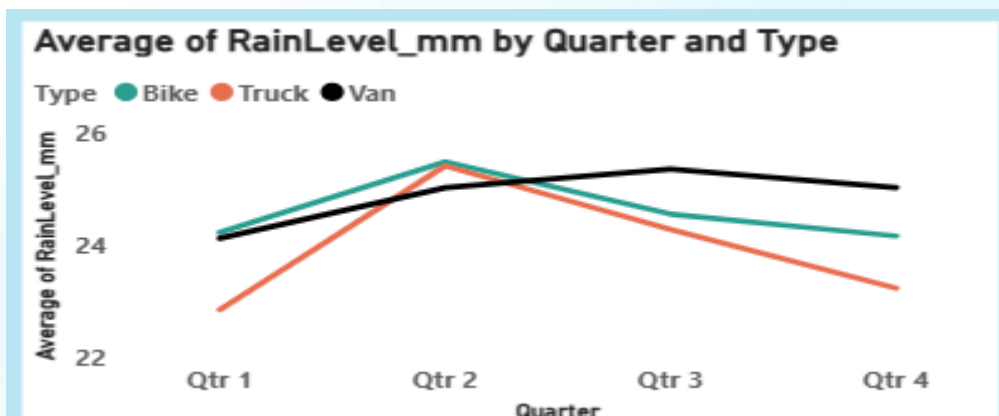- Wind Speed Influence by Quarter

Optimization Actions

- Route adjustments based on weather predictions.

- Vehicle allocation strategies.

Bikes have highest deliver

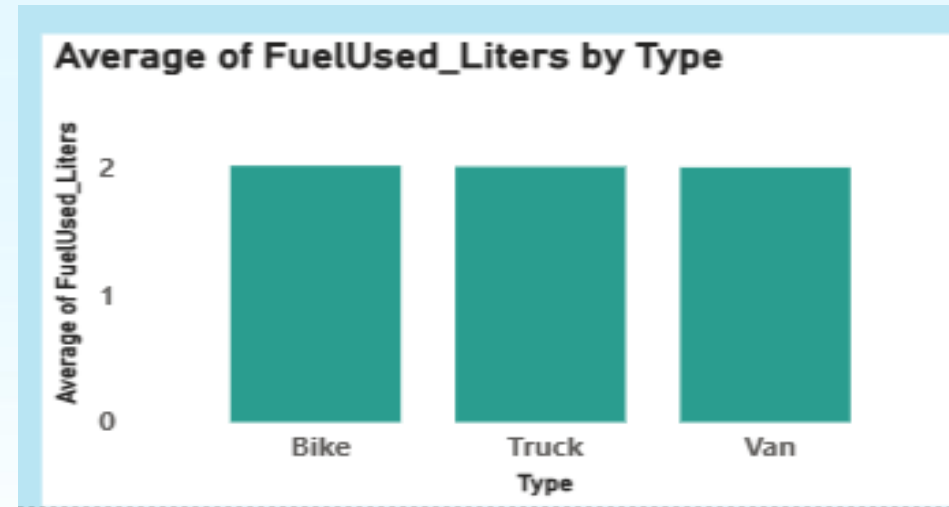**Overall Bikes have fast delivery duration**

Average of Emissions_gCO2 by Type
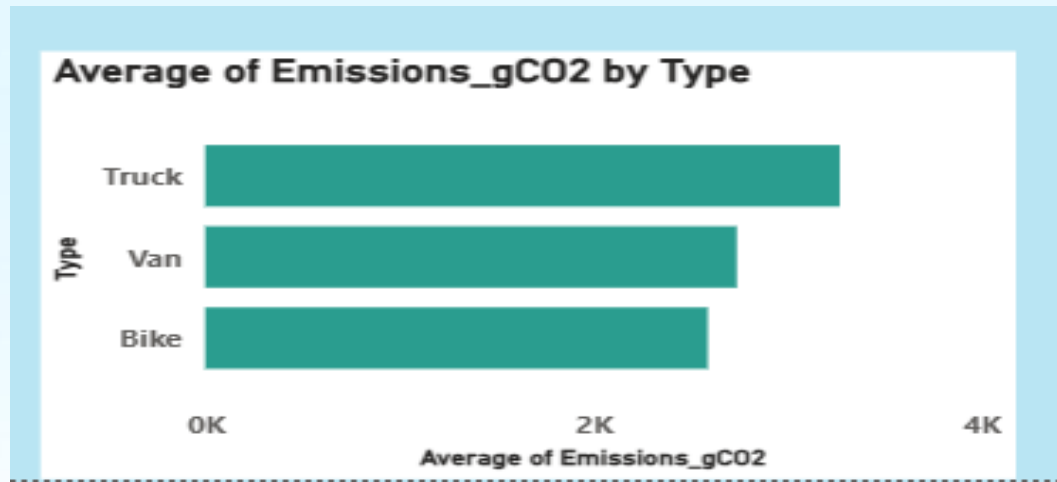
Environmental effect of Vehicle Type

Average of FuelUsed_Liters by Type

The Consumption of Fuel is same on average across all Vehicles

Average of DeliveryDurationMin by Start_Location
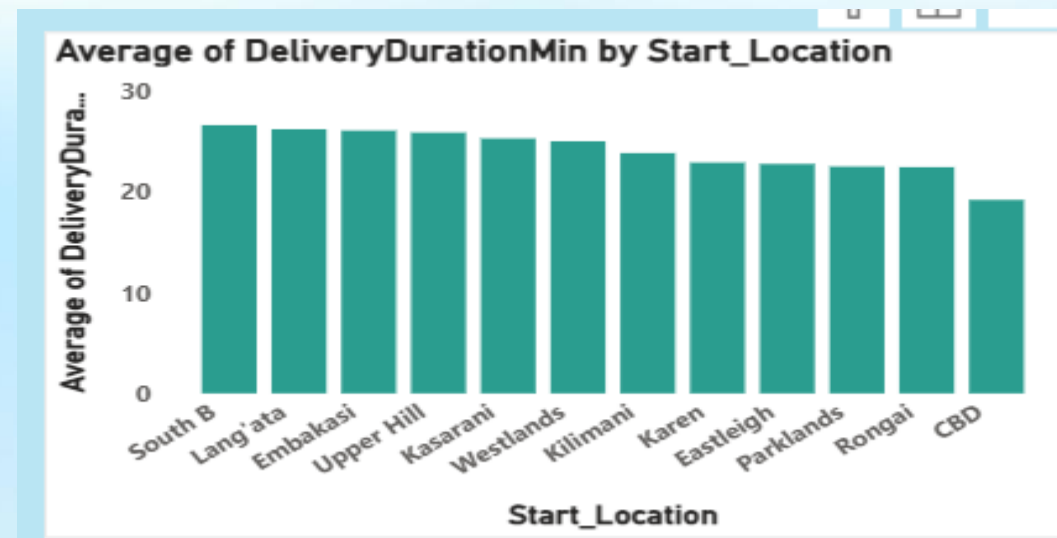
Overall Delivery Duration from every starting point

Key Insights

| Start_Location	CBD	Eastleigh	Embakasi	Karen	Kasarani	Kilimani	Lang'ata	Parklands	Rongai	South B	Upper Hill	Westlands	Total
CBD			8.20	27.00	16.24		23.60	19.00		17.50	19.20	13.63	18.18
Eastleigh	16.63		18.00	26.43	21.64	13.10	28.65		19.00	24.67	14.70	28.23	22.40
Embakasi	32.78	38.11		12.50	24.89	22.00			30.00	23.33	37.46	14.10	26.06
Karen	20.00	22.80	15.19		16.90	37.37	19.23		16.44	28.21	32.62	28.63	22.67
Kasarani		27.56	33.43	14.00		31.69	31.69	16.52			31.00	22.46	25.37
Kilimani	34.27		25.88	13.48	21.46		23.00		19.45	32.11			24.01
Lang'ata	24.55	32.88	24.77		23.57			40.00	30.67	19.72	26.96		25.77
Parklands	10.27	26.28	31.61	19.02	38.57	16.20	24.77		23.36	25.26	14.27	11.29	22.12
Rongai	28.21		31.82	9.79	24.91		27.52	16.64			15.18	17.88	23.05
South B	23.41	28.37	30.85		34.75		29.91	22.00	27.56		16.78		27.45
Upper Hill		25.76	20.19	23.33			38.00	30.22	16.58	26.07		36.28	25.62
Westlands	33.75		24.53	22.67	23.29	22.43	8.00	37.20	11.00	30.83			25.14
Total	24.85	28.10	24.05	19.26	23.40	25.00	26.67	24.84	20.42	25.78	22.24	24.44	24.00

➢ **The Overall estimated time to every other destination.**

➢ **This helps to predict the delivery duration of deliveries to any destination.**

Best three Destinations: Karen, Rongai and Upper Hill.
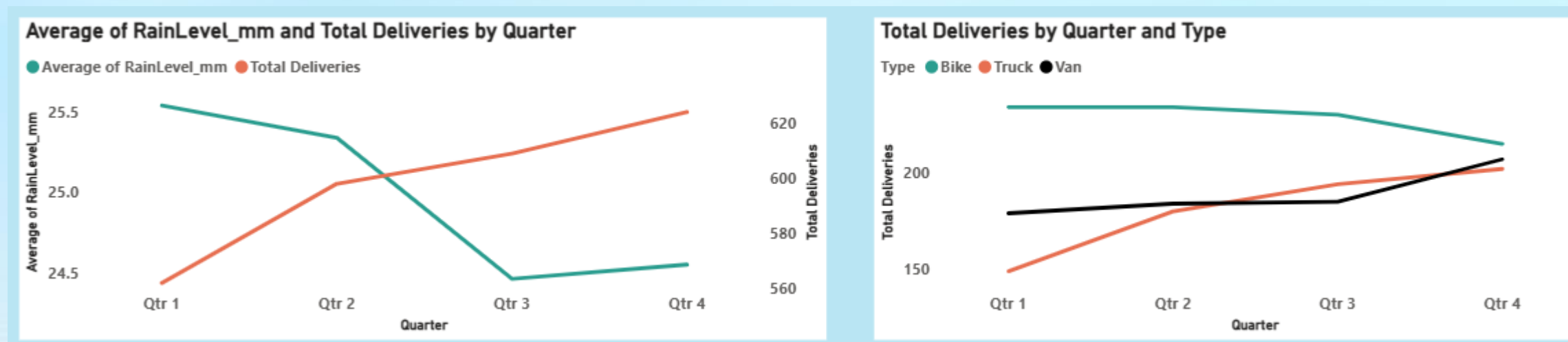
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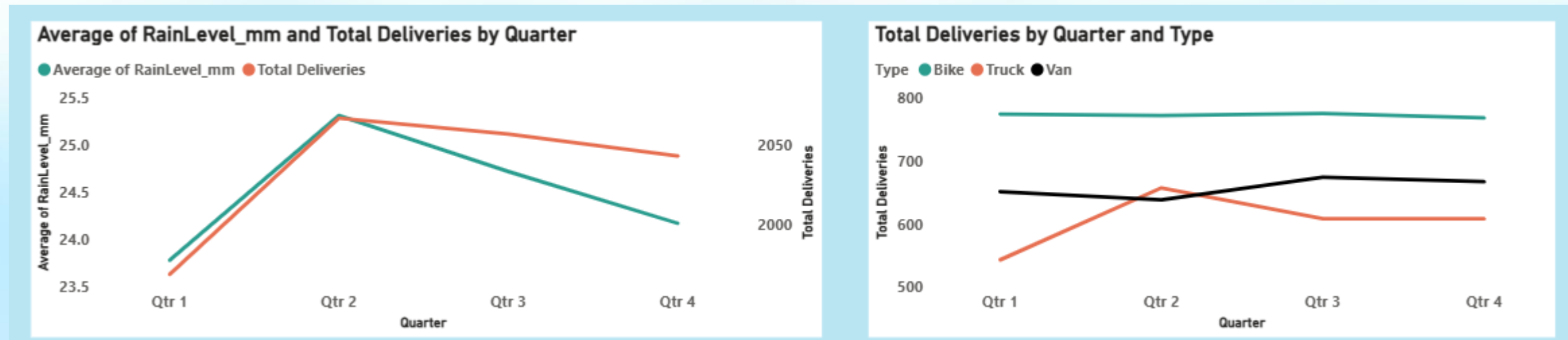## Eastern Region Weather insights and Vehicle Optimization
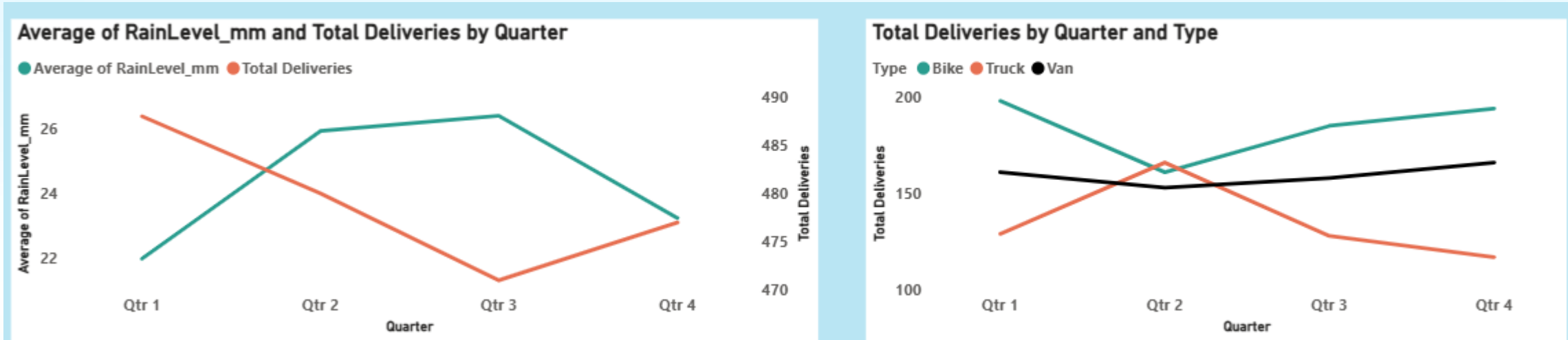
Southern Region Weather insights and Vehicle Optimization

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➢ **As above visuals are key indicators of optimal vehicle type under the consideration of weather impact across Eastern and Sothern regions.**

➢ **For the other regions the impact of weather is doesn't affect for overall delivery while the preferred type is Bikes delivery.**

Thank You