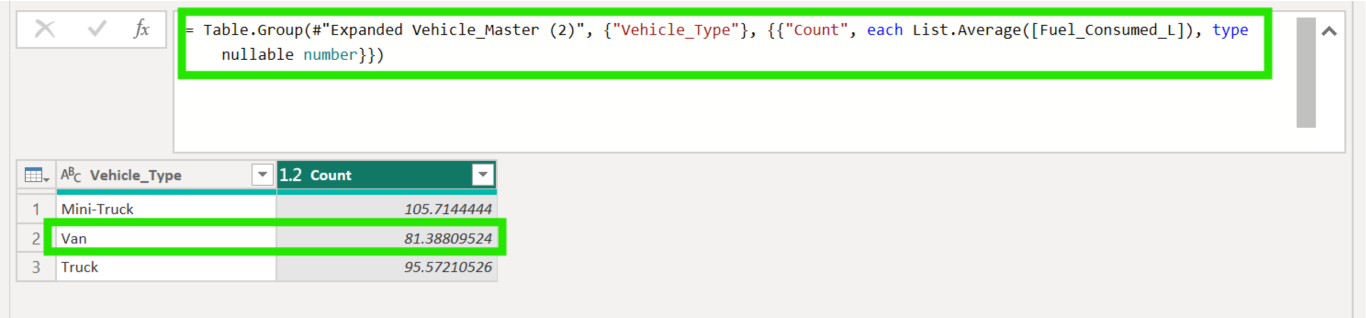
Module End Assignment Power BI- Fleet Performance & Delivery Efficiency

1. Data Cleaning & Modeling:

a. Fix missing fuel consumption values (use avg. per vehicle type):

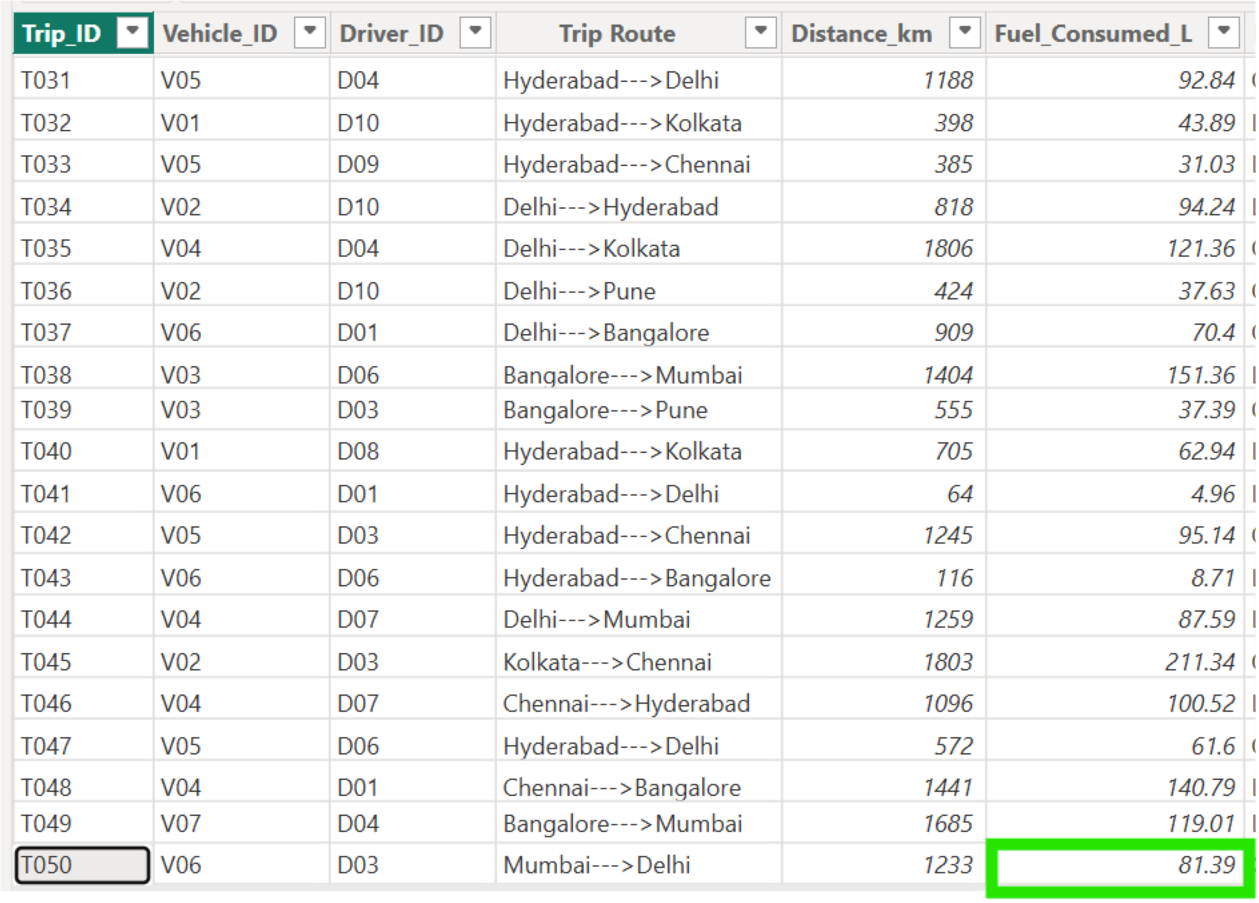
- **Group vehicles by Vehicle Type** (e.g., Truck, Van, Trailer).
- Calculate the **average fuel consumption per Vehicle Type**.
- Use this group-wise average to fill in missing values.

☞ This ensures that missing values are replaced based on **similar vehicles**, maintaining data integrity.



```
= Table.Group(#"Expanded Vehicle_Master (2)", {"Vehicle_Type"}, {{"Count", each List.Average([Fuel_Consumed_L]), type
   nullable number}})
```

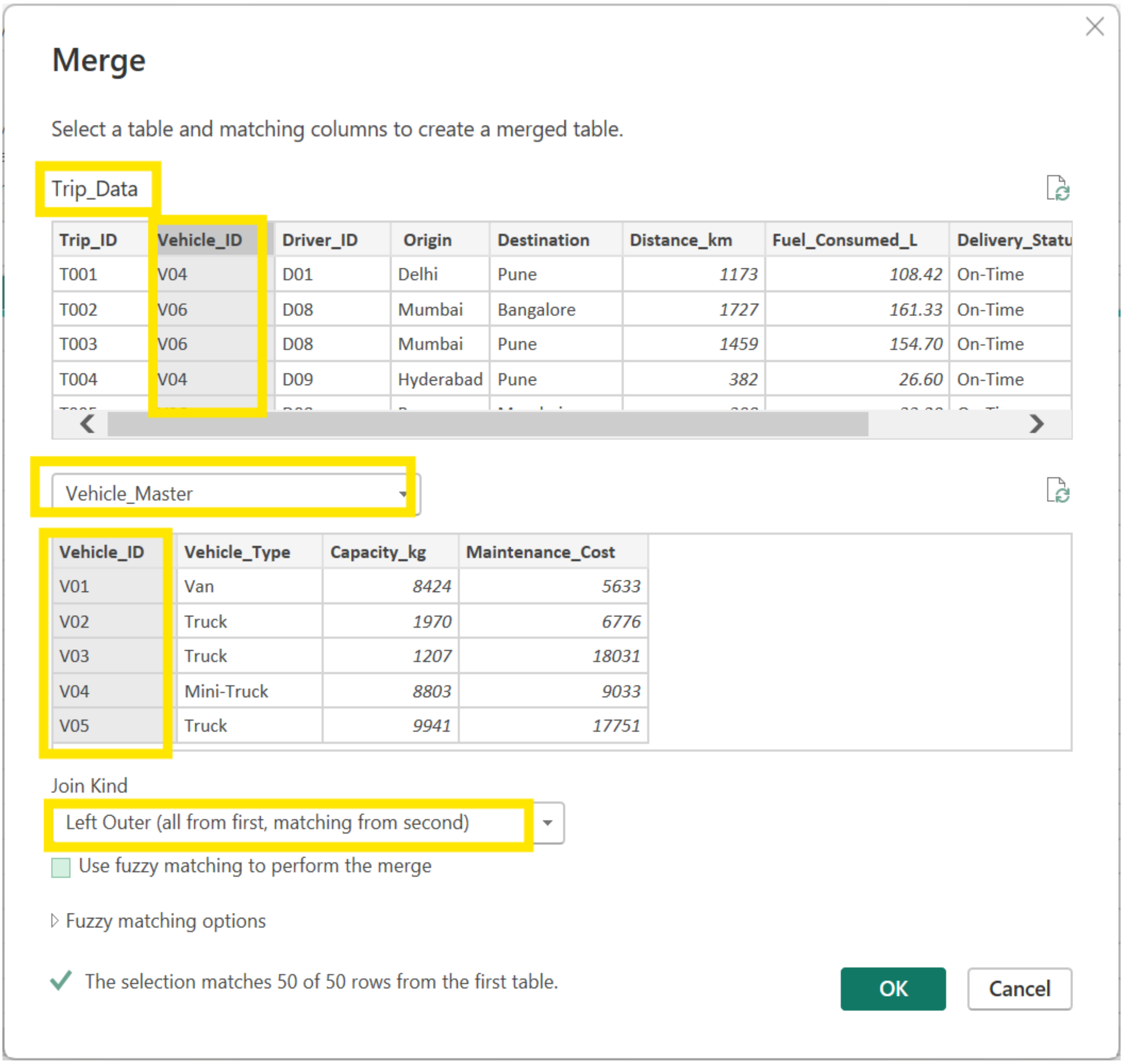
	Vehicle_Type	Count
1	Mini-Truck	105.7144444
2	Van	81.38809524
3	Truck	95.57210526



Trip_ID	Vehicle_ID	Driver_ID	Trip Route	Distance_km	Fuel_Consumed_L
T031	V05	D04	Hyderabad--->Delhi	1188	92.84
T032	V01	D10	Hyderabad--->Kolkata	398	43.89
T033	V05	D09	Hyderabad--->Chennai	385	31.03
T034	V02	D10	Delhi--->Hyderabad	818	94.24
T035	V04	D04	Delhi--->Kolkata	1806	121.36
T036	V02	D10	Delhi--->Pune	424	37.63
T037	V06	D01	Delhi--->Bangalore	909	70.4
T038	V03	D06	Bangalore--->Mumbai	1404	151.36
T039	V03	D03	Bangalore--->Pune	555	37.39
T040	V01	D08	Hyderabad--->Kolkata	705	62.94
T041	V06	D01	Hyderabad--->Delhi	64	4.96
T042	V05	D03	Hyderabad--->Chennai	1245	95.14
T043	V06	D06	Hyderabad--->Bangalore	116	8.71
T044	V04	D07	Delhi--->Mumbai	1259	87.59
T045	V02	D03	Kolkata--->Chennai	1803	211.34
T046	V04	D07	Chennai--->Hyderabad	1096	100.52
T047	V05	D06	Hyderabad--->Delhi	572	61.6
T048	V04	D01	Chennai--->Bangalore	1441	140.79
T049	V07	D04	Bangalore--->Mumbai	1685	119.01
T050	V06	D03	Mumbai--->Delhi	1233	81.39

b. Relate Trips with Vehicle Master:

- To enrich the trip-level data with vehicle details, we merged the **Trips table** with the **Vehicle Master table** using the common key **Vehicle ID**.
- In Power Query, the **Merge Queries** option was used, and we applied a **Left Outer Join**. This join ensures that **all trips are retained** from the Trips table, while the corresponding vehicle information (such as vehicle type, capacity, and fuel efficiency) is brought in from the Vehicle Master table.
- This relationship allows us to analyze trip performance (e.g., distance, delivery status, fuel efficiency) in the context of the vehicle characteristics. For example, we can now calculate and compare the **fuel efficiency by vehicle type** or evaluate whether certain vehicle categories are more prone to late deliveries.



Merge

Select a table and matching columns to create a merged table.

Trip_Data

Trip_ID	Vehicle_ID	Driver_ID	Origin	Destination	Distance_km	Fuel_Consumed_L	Delivery_Statu
T001	V04	D01	Delhi	Pune	1173	108.42	On-Time
T002	V06	D08	Mumbai	Bangalore	1727	161.33	On-Time
T003	V06	D08	Mumbai	Pune	1459	154.70	On-Time
T004	V04	D09	Hyderabad	Pune	382	26.60	On-Time

Vehicle_Master

Vehicle_ID	Vehicle_Type	Capacity_kg	Maintenance_Cost
V01	Van	8424	5633
V02	Truck	1970	6776
V03	Truck	1207	18031
V04	Mini-Truck	8803	9033
V05	Truck	9941	17751

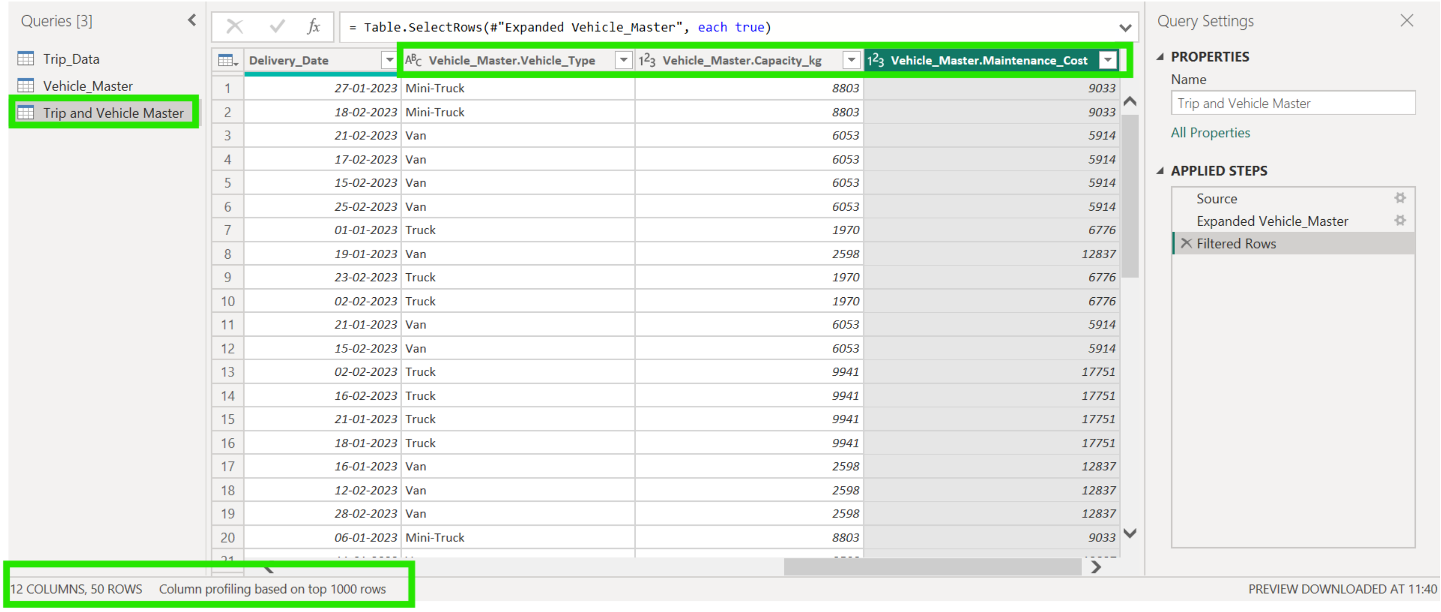
Join Kind

Left Outer (all from first, matching from second)

□ Use fuzzy matching to perform the merge

▷ Fuzzy matching options

✓ The selection matches 50 of 50 rows from the first table.



```
= Table.SelectRows(#"Expanded Vehicle_Master", each true)
```

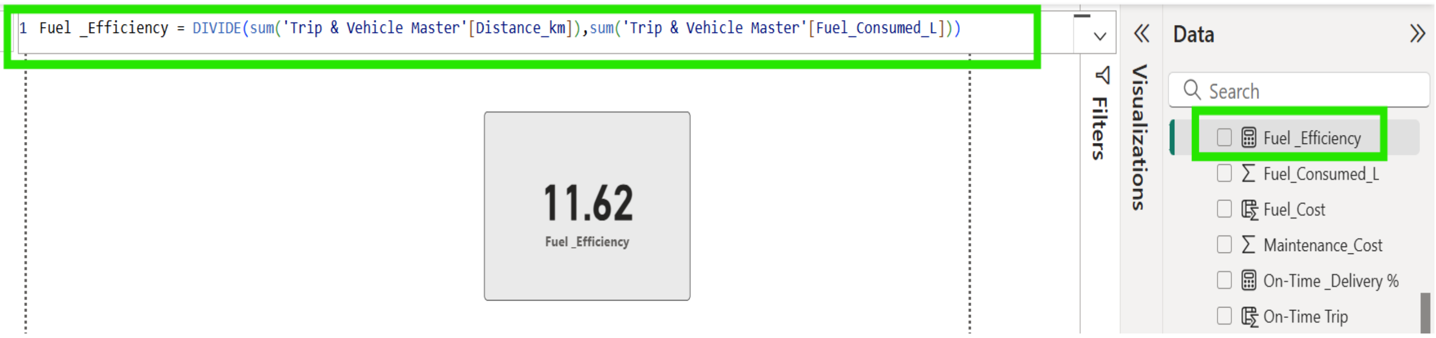
	Delivery_Date	Vehicle_Master.Vehicle_Type	Vehicle_Master.Capacity_kg	Vehicle_Master.Maintenance_Cost
1	27-01-2023	Mini-Truck	8803	9033
2	18-02-2023	Mini-Truck	8803	9033
3	21-02-2023	Van	6053	5914
4	17-02-2023	Van	6053	5914
5	15-02-2023	Van	6053	5914
6	25-02-2023	Van	6053	5914
7	01-01-2023	Truck	1970	6776
8	19-01-2023	Van	2598	12837
9	23-02-2023	Truck	1970	6776
10	02-02-2023	Truck	1970	6776
11	21-01-2023	Van	6053	5914
12	15-02-2023	Van	6053	5914
13	02-02-2023	Truck	9941	17751
14	16-02-2023	Truck	9941	17751
15	21-01-2023	Truck	9941	17751
16	18-01-2023	Truck	9941	17751
17	16-01-2023	Van	2598	12837
18	12-02-2023	Van	2598	12837
19	28-02-2023	Van	2598	12837
20	06-01-2023	Mini-Truck	8803	9033

12 COLUMNS, 50 ROWS Column profiling based on top 1000 rows

2. DAX Measures:

a. Fuel Efficiency:

- Fuel efficiency is a key performance indicator in logistics, as it directly affects both operational cost and environmental impact.
- In this project, a DAX measure was created to calculate **Fuel Efficiency** by dividing the **total distance travelled (in KM)** by the **total fuel consumed (in Liters)**.
- This measure helps identify how effectively vehicles are utilizing fuel across different trips. By analyzing fuel efficiency at the **vehicle type**, **route**, or **driver level**, insights can be generated to optimize resource utilization, reduce costs, and improve sustainability.
- **Fuel efficiency = DIVIDE(sum('Trip and Vehicle Master'[Distance_km]),sum('Trip and Vehicle Master'[Fuel_Consumed_L]))**



```
Fuel _Efficiency = DIVIDE(sum('Trip & Vehicle Master'[Distance_km]),sum('Trip & Vehicle Master'[Fuel_Consumed_L]))
```

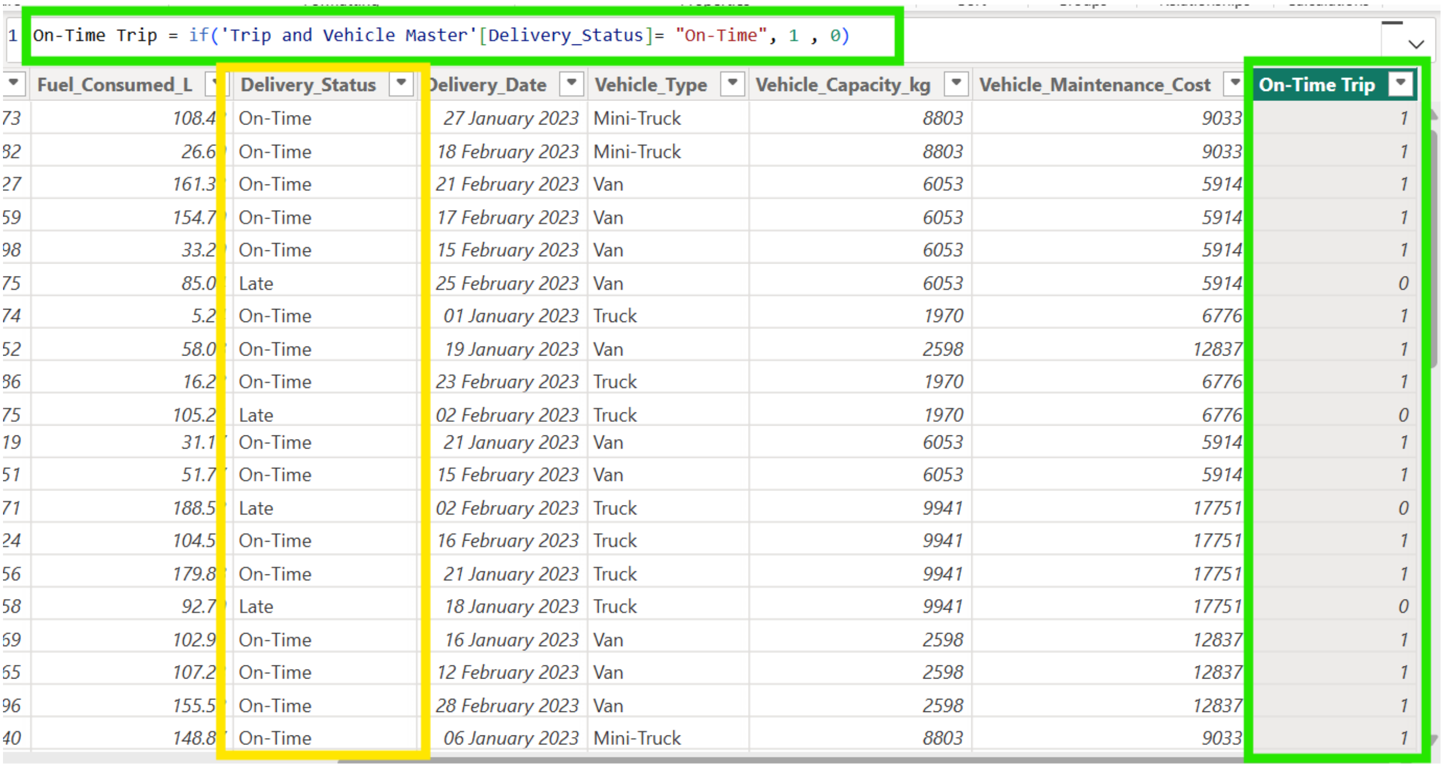
b. On-Time Delivery%:

Step 1: Create Calculated Column for On-Time Trips

Since the dataset contains **Delivery Status** (e.g., “On-Time” / “Delayed”), we created a new column:

On-Time Trip = if ('Trip and Vehicle Master'[Delivery _ Status] = "On-Time", 1, 0)

☞ This assigns **1** for on-time deliveries and **0** for others. It makes it easy to count how many trips were delivered on time.



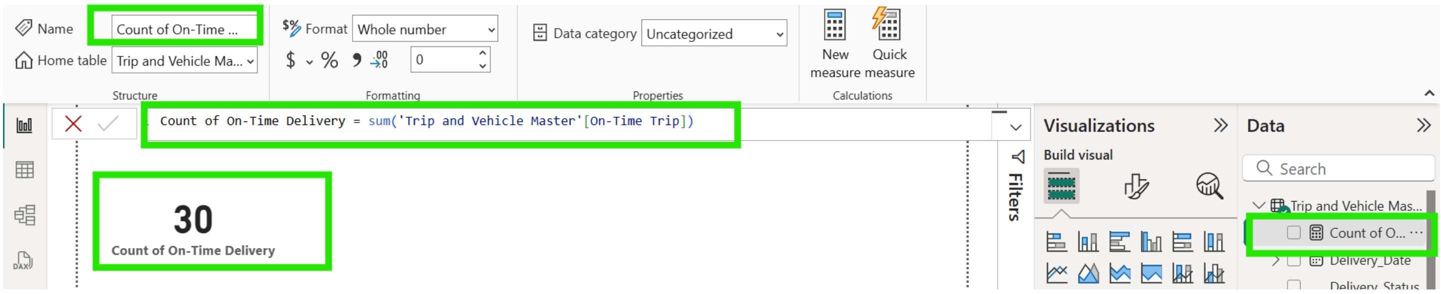
```
On-Time Trip = if('Trip and Vehicle Master'[Delivery_Status]= "On-Time", 1 , 0)
```

	Fuel_Consumed_L	Delivery_Status	elivery_Date	Vehicle_Type	Vehicle_Capacity_kg	Vehicle_Maintenance_Cost	On-Time Trip
73	108.4	On-Time	27 January 2023	Mini-Truck	8803	9033	1
82	26.6	On-Time	18 February 2023	Mini-Truck	8803	9033	1
27	161.3	On-Time	21 February 2023	Van	6053	5914	1
59	154.7	On-Time	17 February 2023	Van	6053	5914	1
98	33.2	On-Time	15 February 2023	Van	6053	5914	1
75	85.0	Late	25 February 2023	Van	6053	5914	0
74	5.2	On-Time	01 January 2023	Truck	1970	6776	1
52	58.0	On-Time	19 January 2023	Van	2598	12837	1
86	16.2	On-Time	23 February 2023	Truck	1970	6776	1
75	105.2	Late	02 February 2023	Truck	1970	6776	0
19	31.1	On-Time	21 January 2023	Van	6053	5914	1
51	51.7	On-Time	15 February 2023	Van	6053	5914	1
71	188.5	Late	02 February 2023	Truck	9941	17751	0
24	104.5	On-Time	16 February 2023	Truck	9941	17751	1
56	179.8	On-Time	21 January 2023	Truck	9941	17751	1
58	92.7	Late	18 January 2023	Truck	9941	17751	0
69	102.9	On-Time	16 January 2023	Van	2598	12837	1
65	107.2	On-Time	12 February 2023	Van	2598	12837	1
96	155.5	On-Time	28 February 2023	Van	2598	12837	1
40	148.8	On-Time	06 January 2023	Mini-Truck	8803	9033	1

Step 2: Create Measure for On-Time Trips Count

Count of On-Time Delivery = sum ('Trip and Vehicle Master'[On-Time Trip])

☞ This measure counts all trips that were delivered on time.



Name: Count of On-Time ...
Home table: Trip and Vehicle Ma...
Format: Whole number
Data category: Uncategorized

```
Count of On-Time Delivery = sum('Trip and Vehicle Master'[On-Time Trip])
```

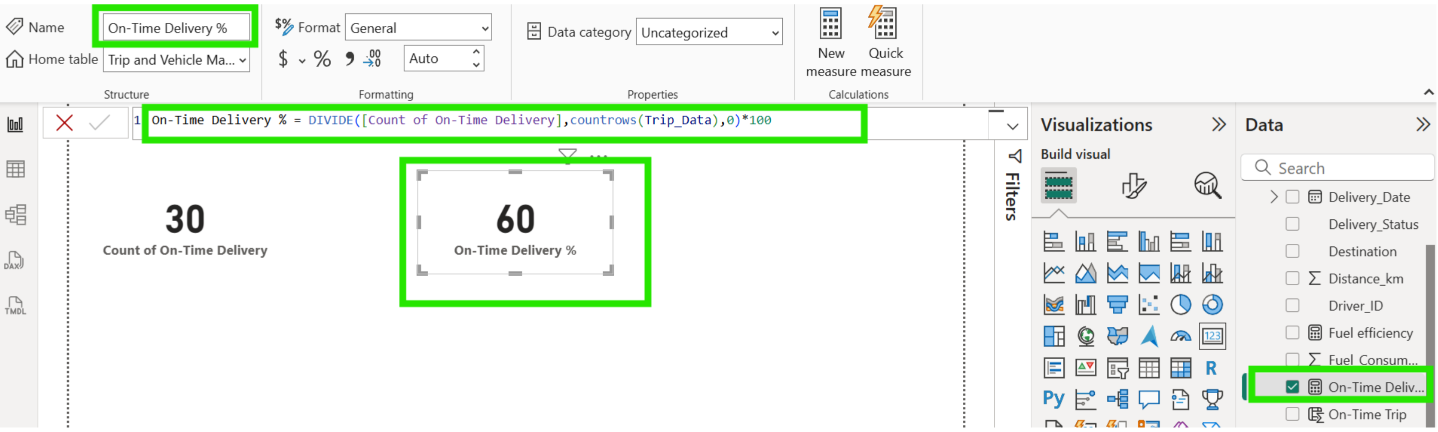
30
Count of On-Time Delivery

Step 3: Create Measure for On-Time Delivery %

On-Time Delivery % = DIVIDE ([Count of On-Time Delivery], countrows(Trip_Data),0)*100

☞ Here,

- **Numerator:** Total On-Time Delivery
- **Denominator:** Total Trips
- The formula gives the **percentage of deliveries completed on time**.



```
1 On-Time Delivery % = DIVIDE([Count of On-Time Delivery],countrows(Trip_Data),0)*100
```

Name: On-Time Delivery %
Home table: Trip and Vehicle Ma...
Format: General
Data category: Uncategorized

30
Count of On-Time Delivery

60
On-Time Delivery %

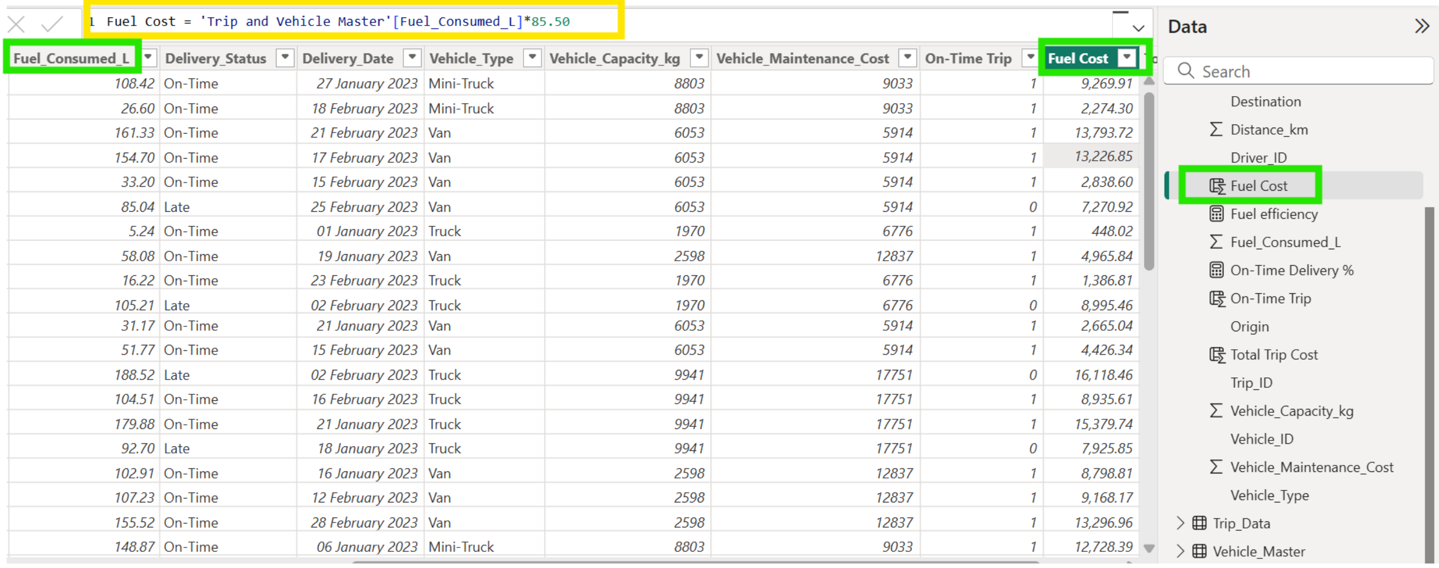
c. Cost per Kilometer (Cost Efficiency Analysis):

Step 1: Fuel Cost Calculation

We created a **calculated column** for fuel cost, assuming the average fuel rate = **₹85.50 per liter**.

Fuel Cost = 'Trip and Vehicle Master'[Fuel_Consumed_L]*85.50

☞ This gives the total **fuel expense** for each trip.



```
1 Fuel Cost = 'Trip and Vehicle Master'[Fuel_Consumed_L]*85.50
```

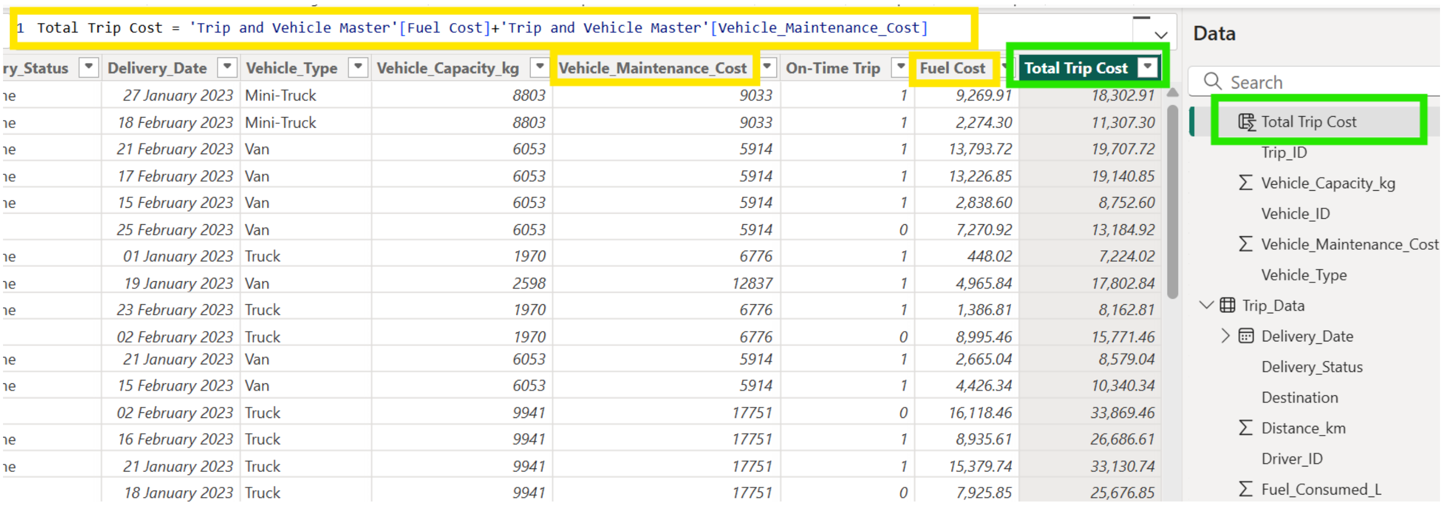
Fuel_Consumed_L	Delivery_Status	Delivery_Date	Vehicle_Type	Vehicle_Capacity_kg	Vehicle_Maintenance_Cost	On-Time Trip	Fuel Cost
108.42	On-Time	27 January 2023	Mini-Truck	8803	9033	1	9,269.91
26.60	On-Time	18 February 2023	Mini-Truck	8803	9033	1	2,274.30
161.33	On-Time	21 February 2023	Van	6053	5914	1	13,793.72
154.70	On-Time	17 February 2023	Van	6053	5914	1	13,226.85
33.20	On-Time	15 February 2023	Van	6053	5914	1	2,838.60
85.04	Late	25 February 2023	Van	6053	5914	0	7,270.92
5.24	On-Time	01 January 2023	Truck	1970	6776	1	448.02
58.08	On-Time	19 January 2023	Van	2598	12837	1	4,965.84
16.22	On-Time	23 February 2023	Truck	1970	6776	1	1,386.81
105.21	Late	02 February 2023	Truck	1970	6776	0	8,995.46
31.17	On-Time	21 January 2023	Van	6053	5914	1	2,665.04
51.77	On-Time	15 February 2023	Van	6053	5914	1	4,426.34
188.52	Late	02 February 2023	Truck	9941	17751	0	16,118.46
104.51	On-Time	16 February 2023	Truck	9941	17751	1	8,935.61
179.88	On-Time	21 January 2023	Truck	9941	17751	1	15,379.74
92.70	Late	18 January 2023	Truck	9941	17751	0	7,925.85
102.91	On-Time	16 January 2023	Van	2598	12837	1	8,798.81
107.23	On-Time	12 February 2023	Van	2598	12837	1	9,168.17
155.52	On-Time	28 February 2023	Van	2598	12837	1	13,296.96
148.87	On-Time	06 January 2023	Mini-Truck	8803	9033	1	12,728.39

Step 2: Total Trip Cost Calculation:

Another calculated column was created to capture the **overall cost of a trip**, which includes both **fuel cost** and **vehicle maintenance cost**.

Total Trip Cost = 'Trip and Vehicle Master'[Fuel Cost]+'Trip and Vehicle Master' [Vehicle_Maintenance_Cost]

☞ This ensures we capture all direct costs associated with each trip.



```
Total Trip Cost = 'Trip and Vehicle Master'[Fuel Cost]+'Trip and Vehicle Master'[Vehicle_Maintenance_Cost]
```

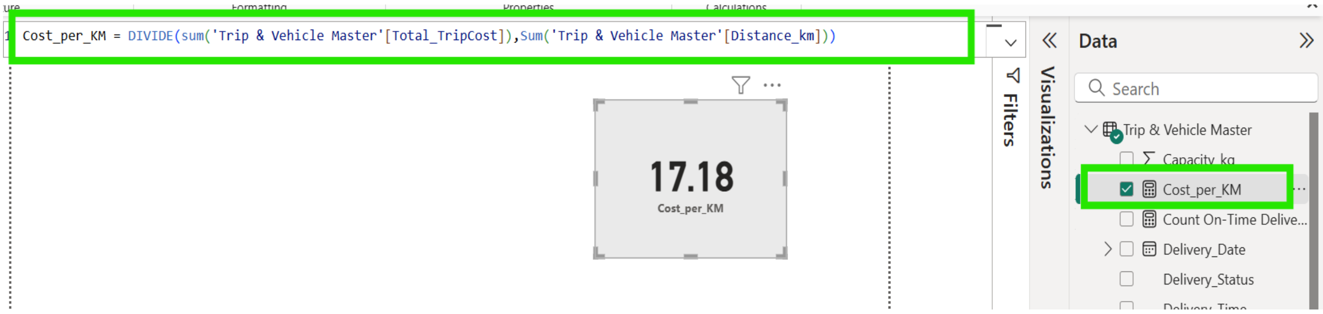
ry_Status	Delivery_Date	Vehicle_Type	Vehicle_Capacity_kg	Vehicle_Maintenance_Cost	On-Time Trip	Fuel Cost	Total Trip Cost
ne	27 January 2023	Mini-Truck	8803	9033	1	9,269.91	18,302.91
ne	18 February 2023	Mini-Truck	8803	9033	1	2,274.30	11,307.30
ne	21 February 2023	Van	6053	5914	1	13,793.72	19,707.72
ne	17 February 2023	Van	6053	5914	1	13,226.85	19,140.85
ne	15 February 2023	Van	6053	5914	1	2,838.60	8,752.60
	25 February 2023	Van	6053	5914	0	7,270.92	13,184.92
ne	01 January 2023	Truck	1970	6776	1	448.02	7,224.02
ne	19 January 2023	Van	2598	12837	1	4,965.84	17,802.84
ne	23 February 2023	Truck	1970	6776	1	1,386.81	8,162.81
	02 February 2023	Truck	1970	6776	0	8,995.46	15,771.46
ne	21 January 2023	Van	6053	5914	1	2,665.04	8,579.04
ne	15 February 2023	Van	6053	5914	1	4,426.34	10,340.34
	02 February 2023	Truck	9941	17751	0	16,118.46	33,869.46
ne	16 February 2023	Truck	9941	17751	1	8,935.61	26,686.61
ne	21 January 2023	Truck	9941	17751	1	15,379.74	33,130.74
	18 January 2023	Truck	9941	17751	0	7,925.85	25,676.85

Step 3: Cost per Kilometer Measure

Finally, we created a **measure** to compute cost per kilometer by dividing the total trip cost by the total distance travelled.

Cost_per_KM = DIVIDE(sum('Trip & Vehicle Master'[Total_TripCost]),Sum('Trip & Vehicle Master' [Distance_km]))

☞ This provides the **average cost per kilometer** across all trips.



```
Cost_per_KM = DIVIDE(sum('Trip & Vehicle Master'[Total_TripCost]),Sum('Trip & Vehicle Master'[Distance_km]))
```

3. Visualization:

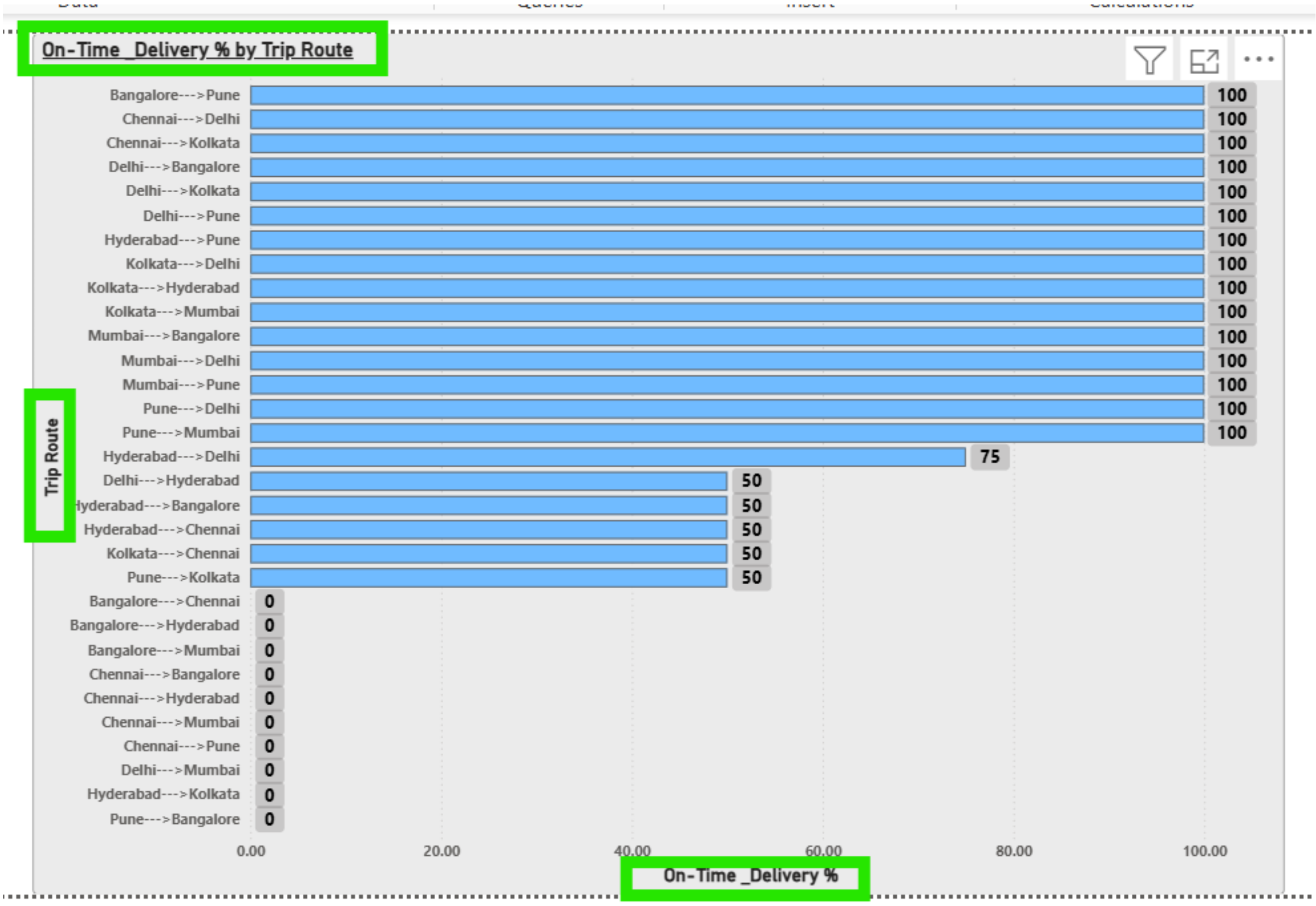
a. Bar chart: On-Time Delivery % by Route.

The purpose of this chart is to analyze the **delivery performance by route**, identifying which routes consistently achieve higher on-time delivery rates and which routes require operational improvements.

Visual Type: Stacked Bar Chart.

Axis (X-Axis): On-Time Delivery % (DAX measure).

Values (Y-Axis): Trip Route (Origin – Destination).



Insights:

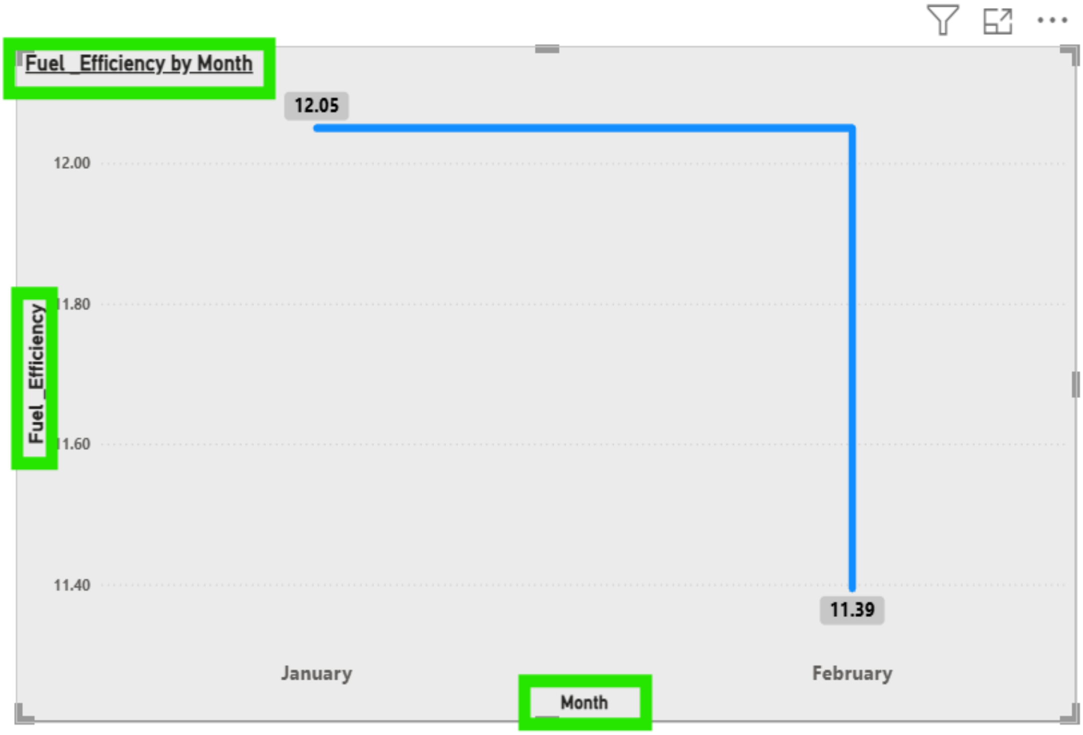
- Routes with **high On-Time Delivery %** indicate efficient planning and execution.
- Routes with **low On-Time Delivery %** highlight problem areas where delays frequently occur.
- This enables the logistics team to **prioritize operational improvements** (e.g., vehicle scheduling, driver allocation, or route optimization).
- This visualization provides a clear comparison of delivery performance across different routes. By focusing on On-Time Delivery %, logistics managers can make **data-driven decisions** to optimize transportation planning, reduce delays, and improve customer satisfaction.

b. Line chart: Fuel Efficiency Trend by Month:

The purpose of this visualization is to analyze the **fuel efficiency (km per liter)** over time, identifying whether operational efficiency is improving or declining across months. This helps in monitoring **fuel usage patterns** and detecting inefficiencies in fleet management.

- **Visual Type**: Line Chart.
- **Axis (X-Axis)**: Month (from Delivery Date).
- **Values (Y-Axis)**: Fuel Efficiency (km/ltr) – DAX Measure.

- Trend line is smooth to highlight the month-to-month pattern.
- Data labels enabled to show actual fuel efficiency values.

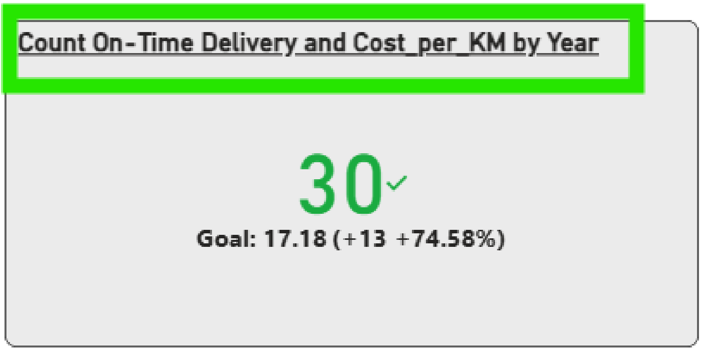


Insights:

This line chart provides a **time-based analysis** of fuel efficiency across all trips. It helps logistics managers identify trends, monitor operational effectiveness, and take corrective actions (such as preventive maintenance, route optimization, or driver training) to reduce fuel costs and improve sustainability.

c. KPI Cards: Count of On-Time Delivery, Cost per KM:

KPI cards were used to display the **Count of On-Time Deliveries** and **Cost per KM**. These visuals provide a quick snapshot of operational performance. The on-time delivery card highlights service reliability, while the cost per km card reflects efficiency in fleet usage. Both KPIs are formatted for clear visibility with large numbers and descriptive titles.



Count On-Time Delivery and Cost_per_KM by Year

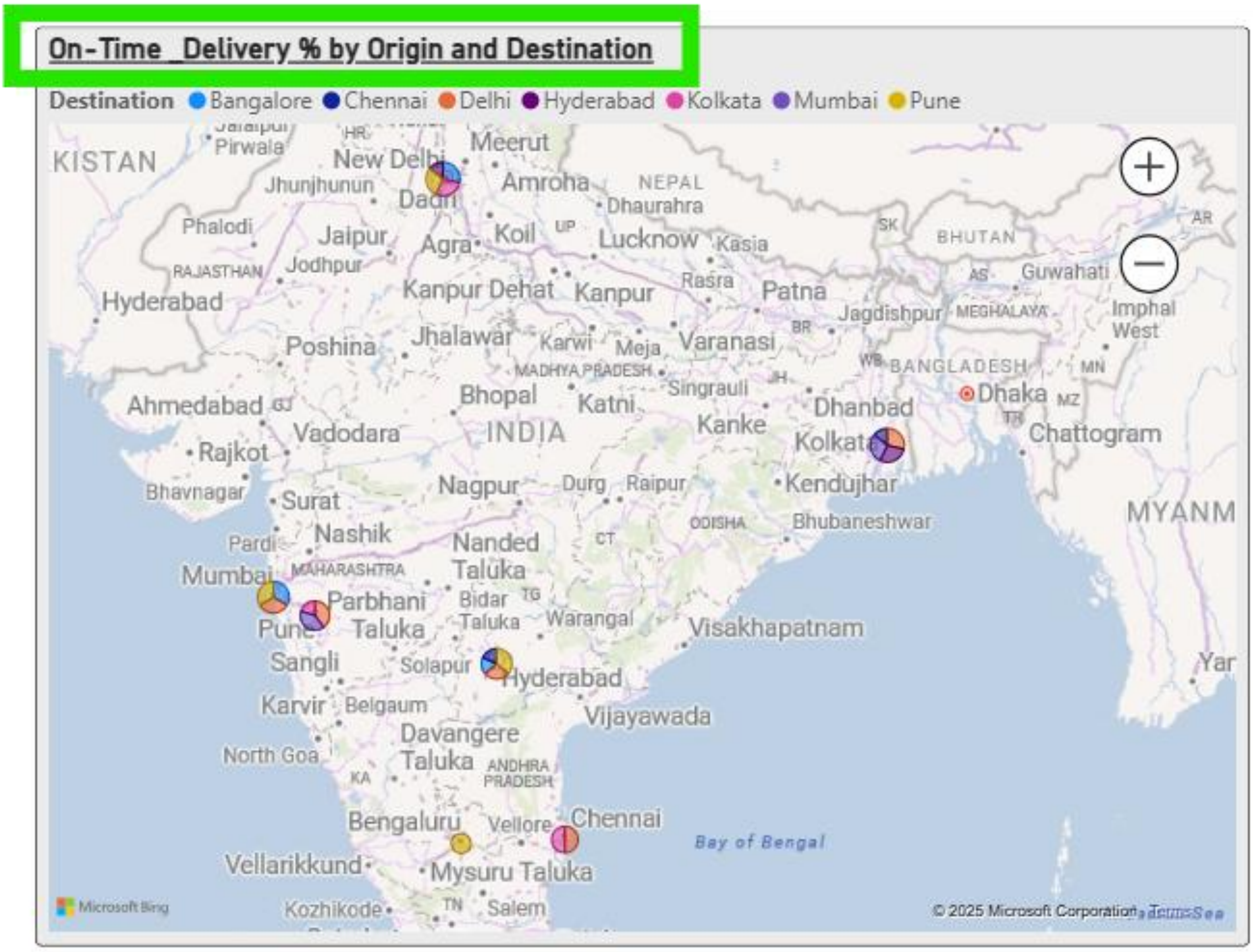
30✓

Goal: 17.18 (+13 +74.58%)

d. Map Visual: Delivery Performance by Route (Origin → Destination):

The purpose of this visualization is to analyze **delivery performance across different transport routes**, specifically from the Origin location to the Destination. It helps in identifying which routes are performing well in terms of timely deliveries and which routes may require operational improvements.

- Placed **Origin** in the “Location” field and **Destination** in “Details”.
- Used the **On-Time Delivery %** measure in the “Values” field.
- Applied **bubble size** to represent the volume of trips and **color intensity** to show performance
- The visual shows each **route as a bubble/marker** on the map.
- Larger bubbles indicate routes with more trips.
- Color intensity indicates delivery performance



On-Time _Delivery % by Origin and Destination

Destination ● Bangalore ● Chennai ● Delhi ● Hyderabad ● Kolkata ● Mumbai ● Pune

Transport Operations Dashboard:

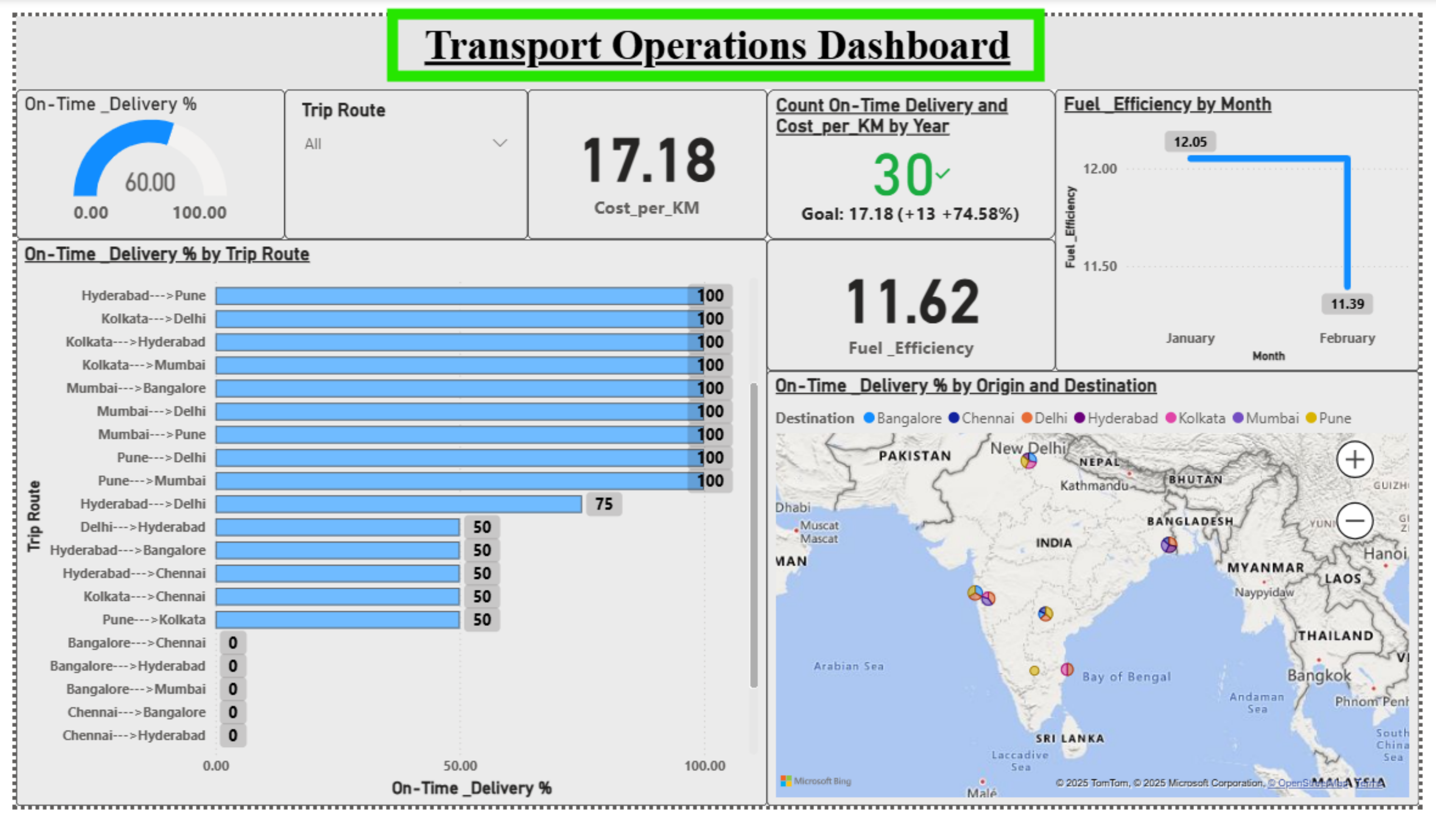
Objective:

The Transport Operations Dashboard provides a **comprehensive view of logistics performance**, enabling stakeholders to monitor on-time delivery, cost efficiency, and route-wise performance. This helps optimize routes, reduce costs, and improve fleet utilization.

◆ Key Visuals in the Dashboard:

1. Gauge Chart – On-Time Delivery %
2. Slicer – Trip Route
3. Bar Chart – On-Time Delivery % by Trip Route
4. Card – Cost per KM
5. KPI Card – Count of On-Time Deliveries and Cost per KM

6. Card – Fuel Efficiency
7. Line Chart – Fuel Efficiency Trend by Month
8. Map Visual – On-Time Delivery % by Origin & Destination



✓ Conclusion

The **Transport Operations Dashboard** integrates multiple KPIs and visuals into a single view. It enables decision-makers to:

- Monitor **on-time delivery performance** by route.
- Control **cost efficiency and fuel consumption**.
- Identify **problematic routes** geographically.
- Take **data-driven actions** to optimize routes, reduce costs, and improve customer satisfaction.