Supply Chain Performance Analysis

Barbara Carmody
Lasted Updated December 2025

Purpose of project

This project analyzes a supply chain and sales dataset to identify operational and financial risk affecting company performance. Two major executive concerns were detected in early exploration of the data:

1- A high volume of pending payments, which may negatively impact cash flow.
2- On time delivery challenges, affecting customer satisfaction, return rates and long term- revenue

The objective of this project is to investigate the root causes behind these issues and build an executive dashboard that allows leadership to monitor payment risk and delivery performance in real time.

The executive dashboard will focus on answering the following questions:

- How do orders and profit distribute across different order statuses?
- What percentage of orders are being delivered late?
- Which Order Statuses are most associated with late deliveries?
- Which Shipping modes experience the highest delivery delays?
- How does actual delivery time compare to scheduled delivery time?
- What operational changes could improve on-time delivery and cash flow stability?

Executive summary

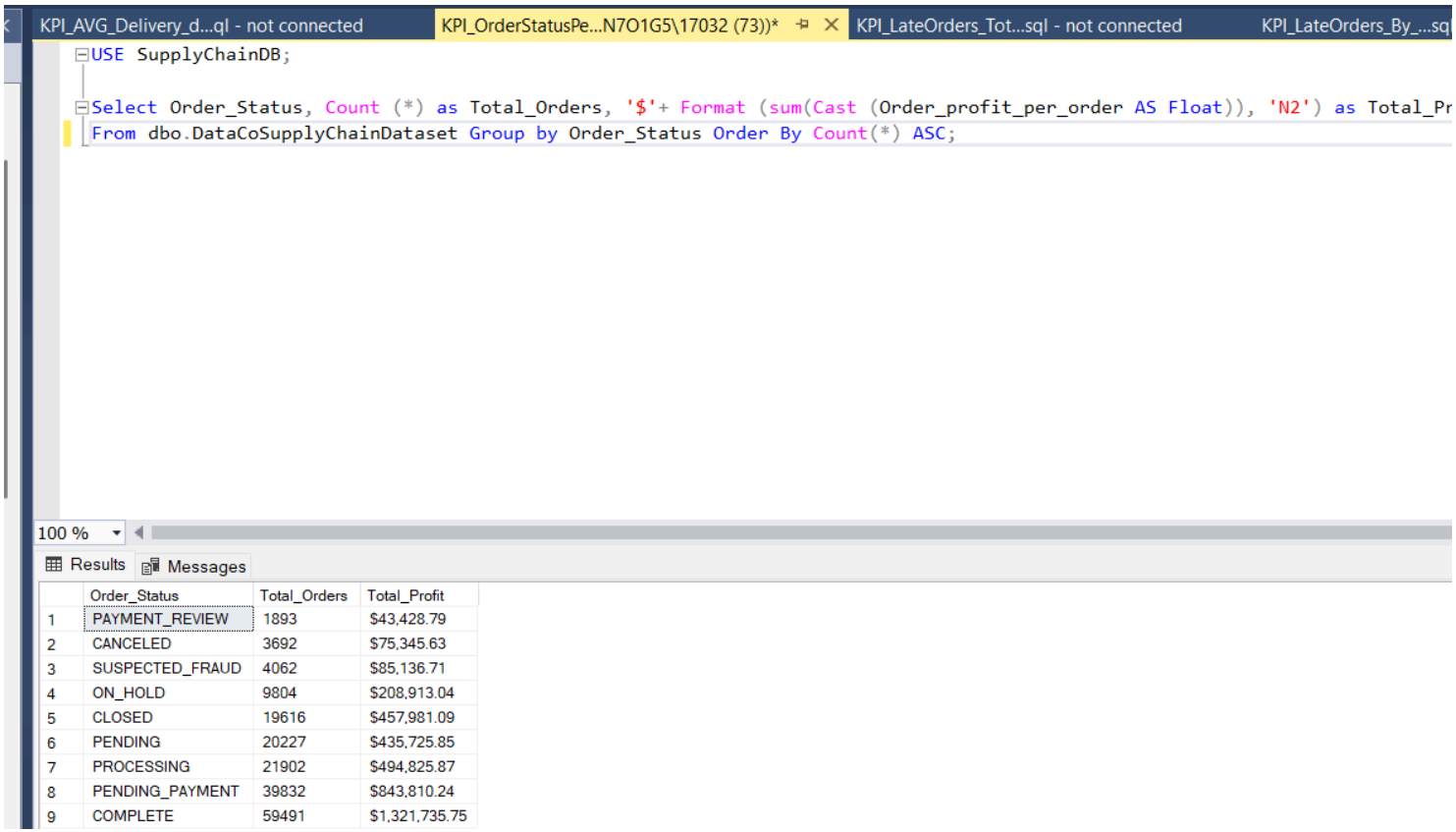
This project was conducted to analyze a supply chain dataset in order to identify operational and financial risk for the company. The analysis focused on Order Status, payment status, delivery delays and shipping modes. The results showed that Completed orders are the highest volume and profit, however a significant number of orders remain unresolved such as pending, processing, canceled, fraud- related and on hold. These unresolved orders may create a potential risk around cash flow and customer satisfaction due to delayed deliveries.

Data Source

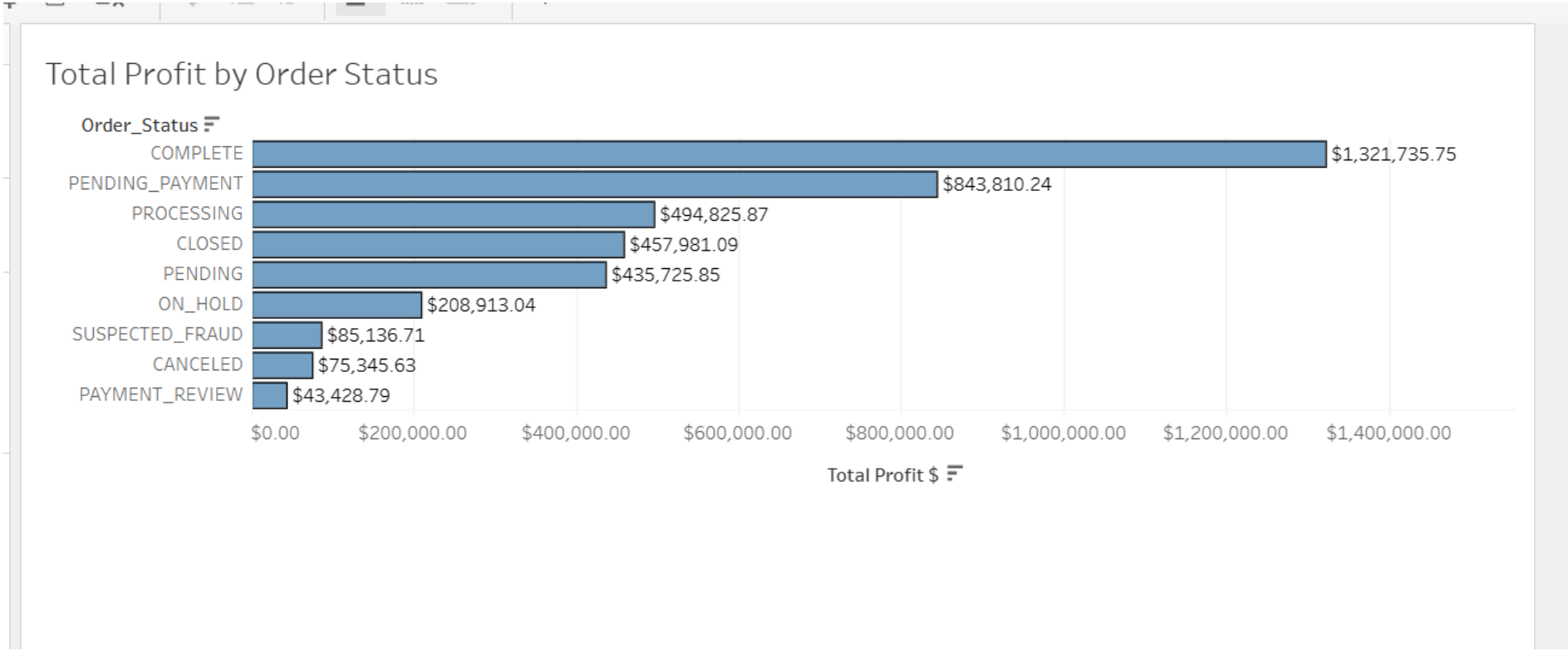
The project uses a Dataset public chain and sales which contains 180.519 orders. This dataset includes order status, payment status, shipping mode, scheduled vs actual delivery days, and delivery risk. Data was analyzed using SQL server and for visualizations Tableau.

KPI #1 Order Status Performance

Orders were grouped by status and calculated the total order count and total profit, to check how much profit they generated and what was at risk.



	Order_Status	Total_Orders	Total_Profit
1	PAYMENT_REVIEW	1893	$43,428.79
2	CANCELED	3692	$75,345.63
3	SUSPECTED_FRAUD	4062	$85,136.71
4	ON_HOLD	9804	$208,913.04
5	CLOSED	19616	$457,981.09
6	PENDING	20227	$435,725.85
7	PROCESSING	21902	$494,825.87
8	PENDING_PAYMENT	39832	$843,810.24
9	COMPLETE	59491	$1,321,735.75



Results: Completed orders statuses represent the highest volume and profit, indicating that finalized transactions are the primary driver of revenue. However, pending payment, processing, fraud, canceled and on-hold statutes shows a substantial portion of orders have not been fully converted into cash yet. These unresolved order statuses highlight potential cash flow uncertainty and operational risk.

Kpi 2 Delivery performance (Late delivery risk)

KPI_AVG_Delivery_d...ql - not connected KPI_OrderSt

```
USE SupplyChainDB
SELECT Order_Status,
FORMAT(COUNT(*), 'N0') AS Late_Orders
FROM dbo.DataCoSupplyChainDataset
WHERE Late_delivery_risk = 1
GROUP BY Order_Status;
```

100 %

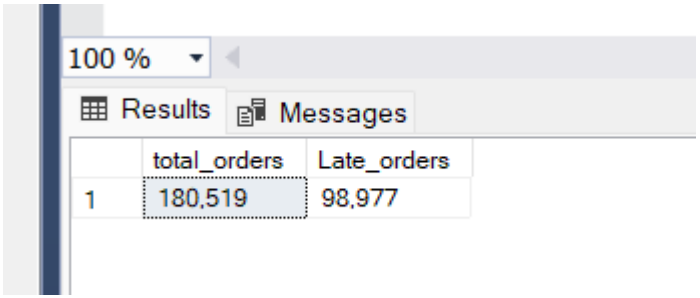
Results Messages

	Order_Status	Late_Orders
1	CLOSED	11,109
2	COMPLETE	34,199
3	ON_HOLD	5,450
4	PAYMENT_REVIEW	1,082
5	PENDING	11,712
6	PENDING_PAYMENT	22,922
7	PROCESSING	12,503

Late deliveries are observed across multiple order statuses, with the highest count occurring in completed, processing, pending payment and pending orders. This shows that deliveries are not only happening in unresolved orders, but also in orders that get completed, this suggests that delivery delays are an operational issue and not in just isolated cases.

Total Orders and Late orders

```sql
SELECT FORMAT(COUNT(*), 'N0') AS total_orders,
FORMAT(SUM(CASE WHEN late_delivery_risk = 1 THEN 1 ELSE 0 END), 'N0') AS Late_orders
FROM dbo.DataCoSupplyChainDataset;
```



Late delivery orders represent 98.977 out of 180,519, a substantial portion of overall order volume. This indicates that late delivery risk affects substantial customers and not isolated cases. At this scale. Delivery delays may have a meaningful impact on customer satisfaction, operational efficiency and return risk.

KPI- Late Delivery Risk Rate %

KPI_LateDeliveryR...N7O1G5\17032 (73)) | KPI_OrderStatusPe...N7O1G5\17032 (52)) | KPI_LateOrders_To...

```
SELECT COUNT(*) AS total_orders,
SUM(CASE WHEN late_delivery_risk = 1 THEN 1 ELSE 0 END) AS Late_orders,
FORMAT(
SUM(CASE WHEN late_delivery_risk = 1 THEN 1 ELSE 0 END) * 1.0 / COUNT(*),
'P2'
) AS delivery_late_rate
FROM dbo.DataCoSupplyChainDataset;
```

Results | Messages

	total_orders	Late_orders	delivery_late_rate
1	180519	98977	54.83%

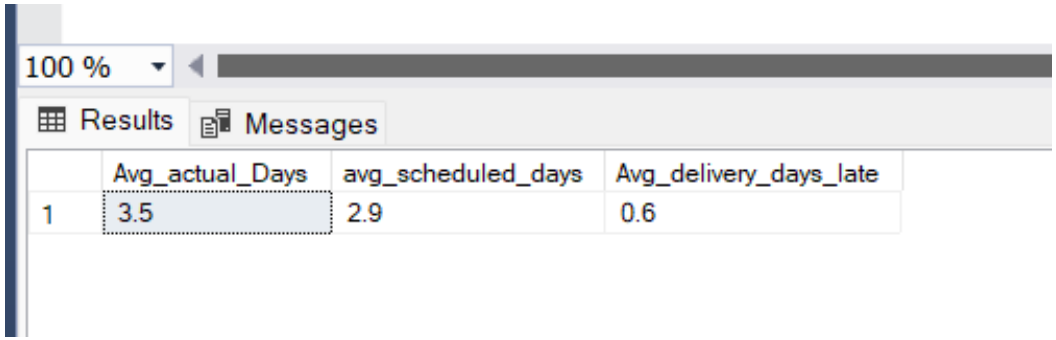
Out of 180.519 total orders, 98,977 are flagged as late deliveries which represent 54.83%. At this scale, this indicates that more than half of orders experience a delivery delay. Late deliveries are likely to affect customer satisfaction and overall service reliability.

KPI 2C- Actual Shipping Day Vs Scheduled shipping dates

Average actual delivery time is 3.5 days, compared to scheduled delivery time of 2.9 days, resulting in an average delay of 0.6 days.

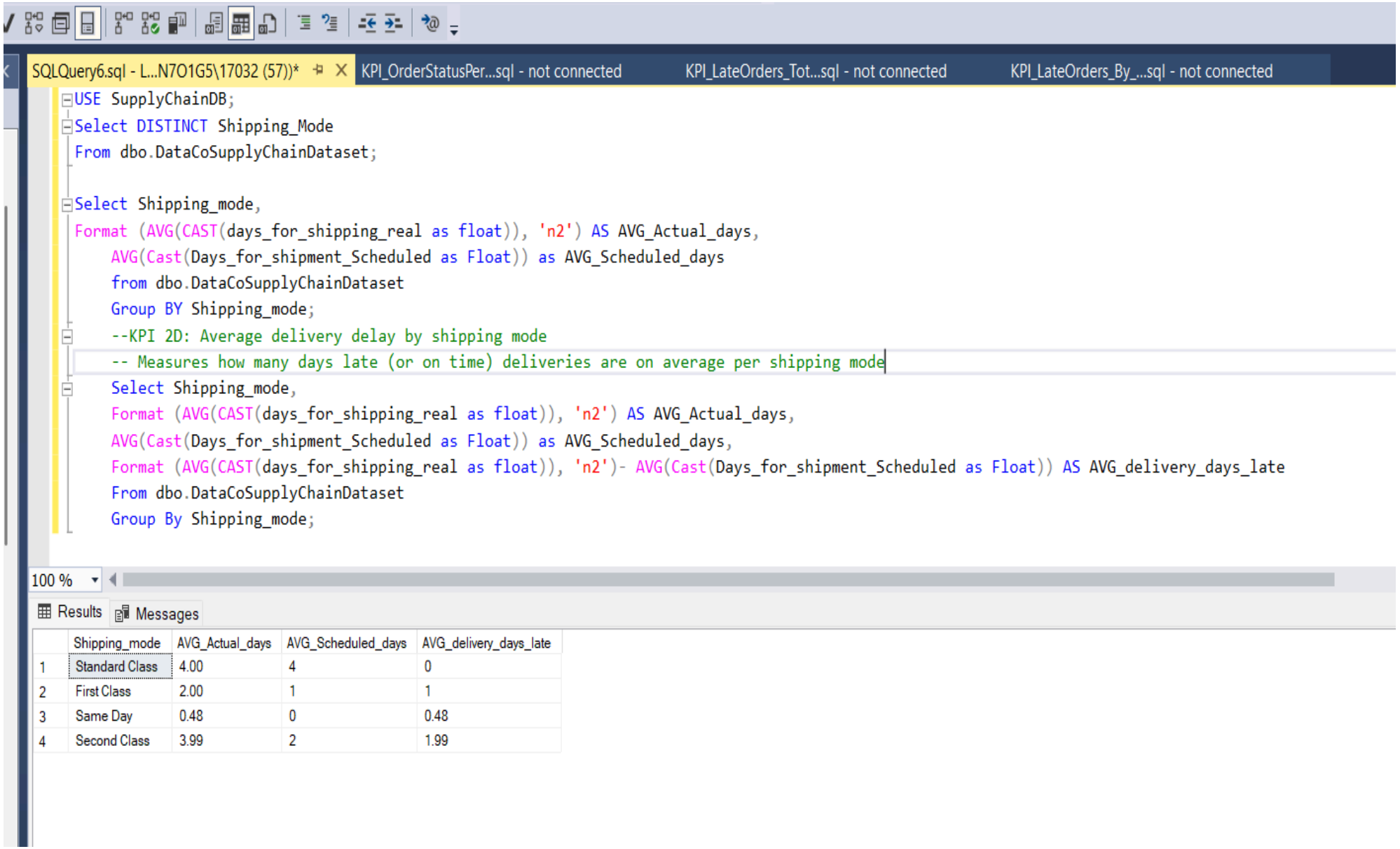
This gap indicates potential risk to Customer satisfaction, as timelines are not consistently meeting expected services level .

```
Select Format (AVG( Cast(days_for_shipping_real as float) ), 'N1')as Avg_actual_Days,
Format (AVG (Cast(Days_for_shipment_scheduled as float)),'N1') as avg_scheduled_days,
FORMAT(AVG( Cast(days_for_shipping_real as float) ) - (AVG (Cast(Days_for_shipment_scheduled as float))),'N1') AS Avg_delivery_days_late
From dbo.DataCoSupplyChainDataset;
```



	Avg_actual_Days	avg_scheduled_days	Avg_delivery_days_late
1	3.5	2.9	0.6

KPI Average Deliveries delay by shipping mode



SQLQuery6.sql - L...N7O1G5\17032 (57))* | KPI_OrderStatusPer...sql - not connected | KPI_LateOrders_Tot...sql - not connected | KPI_LateOrders_By_...sql - not connected

```
USE SupplyChainDB;
Select DISTINCT Shipping_Mode
From dbo.DataCoSupplyChainDataset;

Select Shipping_mode,
Format (AVG(CAST(days_for_shipping_real as float)), 'n2') AS AVG_Actual_days,
    AVG(Cast(Days_for_shipment_Scheduled as Float)) as AVG_Scheduled_days
    from dbo.DataCoSupplyChainDataset
    Group BY Shipping_mode;
    --KPI 2D: Average delivery delay by shipping mode
    -- Measures how many days late (or on time) deliveries are on average per shipping mode
    Select Shipping_mode,
    Format (AVG(CAST(days_for_shipping_real as float)), 'n2') AS AVG_Actual_days,
    AVG(Cast(Days_for_shipment_Scheduled as Float)) as AVG_Scheduled_days,
    Format (AVG(CAST(days_for_shipping_real as float)), 'n2')- AVG(Cast(Days_for_shipment_Scheduled as Float)) AS AVG_delivery_days_late
    From dbo.DataCoSupplyChainDataset
    Group By Shipping_mode;
```

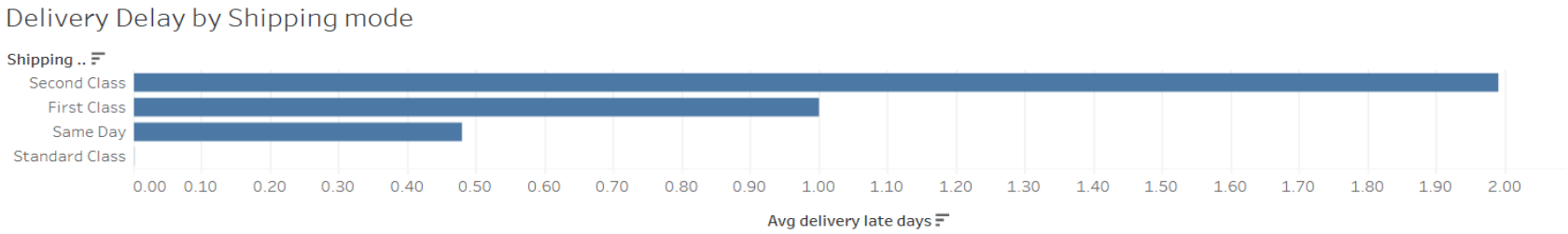
100 %

Results | Messages

	Shipping_mode	AVG_Actual_days	AVG_Scheduled_days	AVG_delivery_days_late
1	Standard Class	4.00	4	0
2	First Class	2.00	1	1
3	Same Day	0.48	0	0.48
4	Second Class	3.99	2	1.99

KPI2- Delivery Performance Overview

Total Orders	Late Orders	Late Delivery Rate %
180,519	98,977	54.83%



Second class and first class have the highest average delivery delays. Standard class is on time on average and the same day still shows a small delay. This suggests that faster shipping options are more sensitive to operational inefficiencies.

Limitations

The analysis does not include root causes of delivery delay like weather, warehouse capacity etc.
The dataset does not include customer satisfaction metrics.

Business Recommendations

- Review operational processes for first class and second class shipping as faster options show higher delays
- Prioritize clearing pending payment and processing orders to reduce cash flow risk
- Investigate Fulfillment bottlenecks causing average delivery delays of 0.6 days.

Conclusions

The analysis shows that Completed orders have the highest volume and generate the highest total profit, which indicates that most orders are successfully fulfilled and contribute positively to revenue. However, pending payment orders are very close in volume to completed orders, suggesting that a large number of orders are still waiting for payment confirmation. This represents a potential risk to cash flow, since revenue from these orders has not yet been fully realized.

In addition, several non- completed order statuses such as canceled, suspected fraud, on hold, payment review, and pending together account for a significant amount of total profit. Although these orders are not completed, they still represent revenue at risk due to cancellations, fraud concerns, or operational delays.

Overall, while the business performs well in completing orders, the high volume and value of orders in pending and risk-related statutes indicate opportunities to improve payment processing, fraud handling, and order resolution to reduce revenue risk and improve cash flow stability.

The analysis was performed directly on the raw transactional dataset. No physical modifications were made to the source data. Data standardization and type conversions were handled within SQL queries to preserve data integrity and reflect real-world analyst workflow