Supply Chain Demand & Inventory Analytics

Introduction

End-to-end analytics project on 60K+ supply chain records focusing on demand, inventory risk, supplier performance and revenue loss.

Tools

Python, Pandas, MySQL, SQL, Power BI, GitHub

Dataset

Large dataset with products, warehouses, suppliers, seasons, promotions and financial metrics.

Python Processing

Created revenue, profit, demand-supply gap and stock_out_flag columns. Performed feature engineering and exported clean data to MySQL.

SQL Analysis

Generated 15 KPIs including revenue, profit, stock-outs, lead time analysis and promotion impact.

Dashboards

Executive overview, inventory performance and supplier impact dashboards.

Insights

Stock-outs lead to major revenue loss. Certain suppliers have longer lead times. Promotions increase demand significantly.
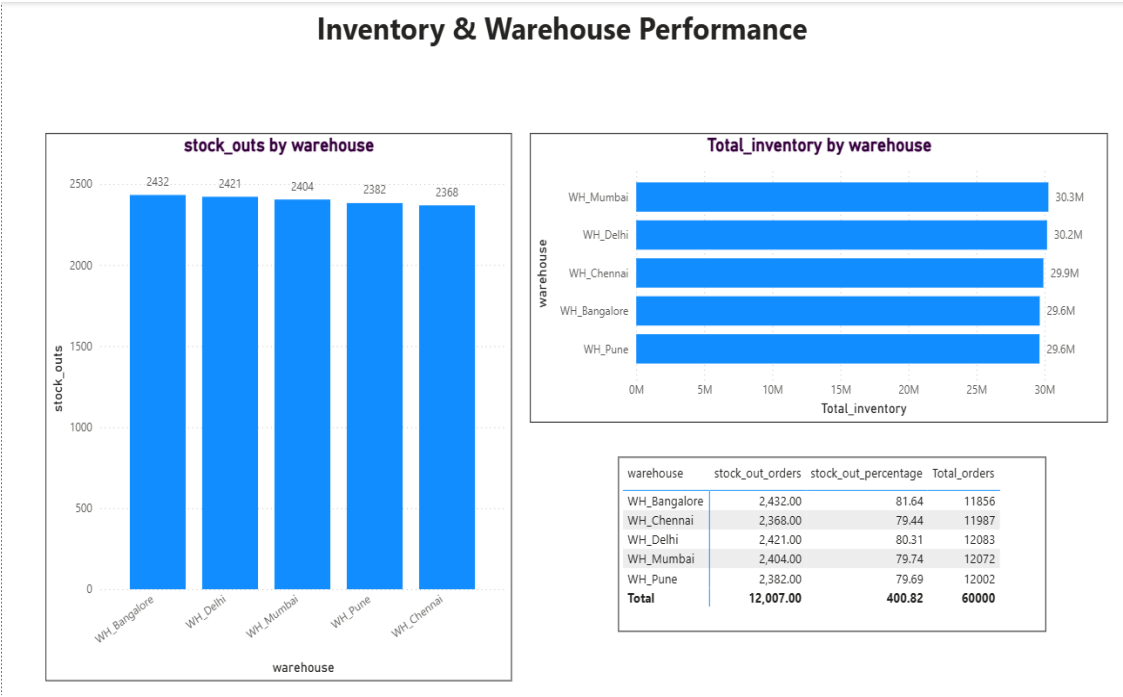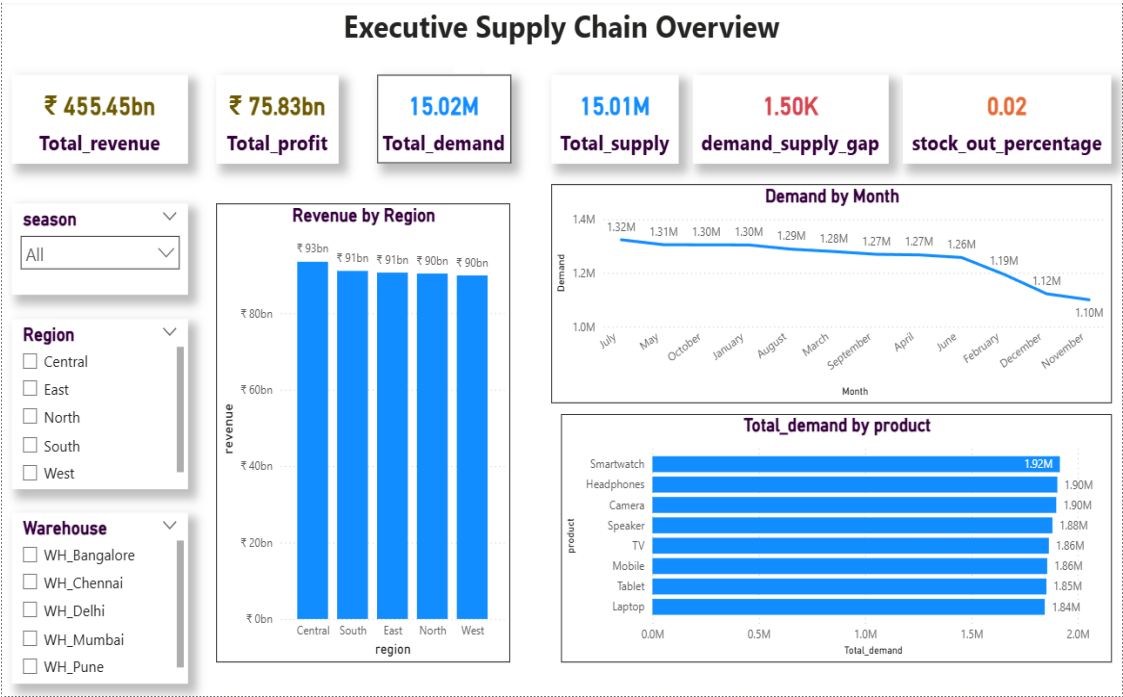
Recommendations

Improve supplier SLAs, maintain safety stock, optimize warehouse inventory.

Conclusion

Demonstrates strong skills in SQL, Python and Power BI.

Power BI Dashboards

Executive Supply Chain Overview

₹ 455.45bn	₹ 75.83bn	15.02M	15.01M	1.50K	0.02
Total_revenue	Total_profit	Total_demand	Total_supply	demand_supply_gap	stock_out_percentage

season
All

Region
- Central
- East
- North
- South
- West

Warehouse
- WH_Bangalore
- WH_Chennai
- WH_Delhi
- WH_Mumbai
- WH_Pune

Revenue by Region

Region	Revenue
Central	₹93bn
South	₹91bn
East	₹91bn
North	₹90bn
West	₹90bn

Demand by Month

Month	Demand
July	1.32M
May	1.31M
October	1.30M
January	1.30M
August	1.29M
March	1.28M
September	1.27M
April	1.27M
June	1.26M
February	1.19M
December	1.12M
November	1.10M

Total_demand by product

product	Total_demand
Smartwatch	1.92M
Headphones	1.90M
Camera	1.90M
Speaker	1.88M
TV	1.86M
Mobile	1.86M
Tablet	1.85M
Laptop	1.84M

Inventory & Warehouse Performance

stock_outs by warehouse

warehouse	stock_outs
WH_Bangalore	2432
WH_Delhi	2421
WH_Mumbai	2404
WH_Pune	2382
WH_Chennai	2368

Total_inventory by warehouse

warehouse	Total_inventory
WH_Mumbai	30.3M
WH_Delhi	30.2M
WH_Chennai	29.9M
WH_Bangalore	29.6M
WH_Pune	29.6M

warehouse	stock_out_orders	stock_out_percentage	Total_orders
WH_Bangalore	2,432.00	81.64	11856
WH_Chennai	2,368.00	79.44	11987
WH_Delhi	2,421.00	80.31	12083
WH_Mumbai	2,404.00	79.74	12072
WH_Pune	2,382.00	79.69	12002
Total	**12,007.00**	**400.82**	**60000**

Supplier & Business Impact

Stock_out_orders by lead_time_bucket

Bar chart — Stock_out_orders (y-axis, 0K to 4K) by lead_time_bucket (x-axis): 11–20 days, 20+ days, 6–10 days, 0–5 days

Total_demand by promotion

Bar chart — Total_demand (y-axis, 0M to 10M) by promotion: No, Yes

Avg_lead_time by supplier

supplier	Avg_lead_time
Supplier_A	15.1
Supplier_C	15.1
Supplier_B	15.0
Supplier_D	15.0

Revenue_loss_due_to_stockout

Bar chart — Sum of revenue_loss_due_to_stockout (x-axis, ₹0bn to ₹4bn) by product: Smartwatch, Mobile, Tablet, Laptop, Camera, TV, Speaker, Headphones

Demand by season and product

Treemap — Demand by season and product:
- Winter: Smartwatch, Headphones, Laptop
- Summer: Camera, Speaker, Headphones
- Festive: Smartwatch, Speaker, Tablet
- Monsoon: Camera, Headphones, Tablet