

DATA ANALYSIS WITH ML ESSENTIALS

EDA-USING POWERBI

TOPIC : Supply Chain & Inventory Analysis

Presented By :

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Problem Statement

A manufacturing company operates multiple warehouses to manage its inventory. The company is currently facing two critical challenges:

- **Stock-outs**, which result in delayed customer deliveries
- **Overstocking**, which increases holding costs and ties up working capital

At present, inventory decisions are made manually, without the support of analytical tools or data-driven insights.

Objective

As a **Supply Chain Analyst(Persona)**, your objective is to:

- Monitor inventory levels across all warehouses
- Identify products that are either understocked or overstocked
- Optimize reorder quantities and timing to ensure balanced stock levels
- Improve overall inventory turnover and operational efficiency

Collecting Data – For Analysis

- To analyze and optimize inventory management, we have collected data from the company's multiple warehouses. The dataset includes key information on:

The screenshot shows the Power BI Data view interface. On the left is a table titled "Inventory" with 100 rows, displaying columns for ProductID, ProductName, Warehouse, CurrentStock, ReorderPoint, MaxStockLevel, UnitCost, LastRestockDate, and Stock Status. The table has icons for DAX and TMDL. On the right is a "Data" pane containing a search bar and a tree view of data models. The "Inventory" model is expanded, showing measures like Average Stock, CurrentStock, and Total_Current_Stock, and dimensions like ProductID, ProductName, ReorderPoint, Stock Status, and Warehouse. Other collapsed models include Sales and Warehouses.

ProductID	ProductName	Warehouse	CurrentStock	ReorderPoint	MaxStockLevel	UnitCost	LastRestockDate	Stock Status
P001	Product_1	WH6	224	97	340	51	2025-10-06	Optimal
P002	Product_2	WH5	347	41	122	724	2025-06-14	Excess
P003	Product_3	WH9	426	23	107	915	2025-02-10	Excess
P004	Product_4	WH3	471	82	367	273	2025-02-17	Excess
P005	Product_5	WH12	180	56	143	740	2024-08-28	Excess
P006	Product_6	WH8	492	54	314	899	2025-10-22	Excess
P007	Product_7	WH7	29	57	116	907	2025-07-26	Low
P008	Product_8	WH11	250	31	329	976	2024-05-28	Optimal
P009	Product_9	WH7	177	47	207	750	2026-01-23	Optimal
P010	Product_10	WH8	315	84	231	231	2024-07-13	Excess
P011	Product_11	WH5	316	31	324	136	2024-11-07	Optimal
P012	Product_12	WH5	182	25	204	18	2026-01-18	Optimal
P013	Product_13	WH10	63	88	291	264	2025-08-22	Low
P014	Product_14	WH7	360	35	130	411	2025-02-04	Excess
P015	Product_15	WH11	65	66	163	457	2025-01-16	Low
P016	Product_16	WH9	455	88	299	342	2025-04-20	Excess
P017	Product_17	WH8	353	62	205	223	2026-01-13	Excess
P018	Product_18	WH1	500	33	260	705	2025-02-01	Excess
P019	Product_19	WH3	394	56	176	701	2025-07-09	Excess
P020	Product_20	WH12	482	34	266	429	2024-12-17	Excess
P021	Product_21	WH8	492	60	336	562	2024-09-22	Excess
P022	Product_22	WH12	176	55	186	134	2025-06-23	Optimal
P023	Product_23	WH2	198	62	140	158	2024-07-15	Excess
P024	Product_24	WH1	207	60	344	489	2025-02-06	Optimal
P025	Product_25	WH2	332	26	268	413	2025-11-27	Excess
P026	Product_26	WH2	468	57	281	64	2025-04-04	Excess
P027	Product_27	WH12	297	76	361	648	2024-03-16	Optimal
P028	Product_28	WH6	16	00	105	1000	2025-06-20	Low

Table: Inventory (100 rows)

Data Cleaning

- ▶ The dataset has been cleaned to ensure accuracy, with duplicates removed and inconsistencies corrected. This prepares the data for reliable analysis and insights into inventory management.

The screenshot shows a Power BI Data view for the 'Sales' dataset. The table has columns: SaleID, ProductID, Warehouse, SaleDate, QuantitySold, SaleCategory, and % Sales Contribution. The data consists of 200 rows of sales records. A sidebar on the right lists various measures and columns from the Sales table, such as % Sales Contribution, Current Inventory, ProductID, Total Quantity Sold, and Total Sales. The bottom of the screen displays the table caption 'Table: Sales (200 rows)'.

SaleID	ProductID	Warehouse	SaleDate	QuantitySold	SaleCategory	% Sales Contribution
S0001	P074	WH5	2024-09-26	9	Medium	0.00412654745529574
S0002	P065	WH7	2024-05-27	6	Low	0.00275103163686382
S0003	P038	WH5	2025-04-05	15	High	0.00687757909215956
S0004	P085	WH12	2024-07-28	12	Medium	0.00550206327372765
S0005	P059	WH7	2024-11-20	9	Medium	0.00412654745529574
S0006	P002	WH11	2025-11-22	6	Low	0.00275103163686382
S0007	P098	WH4	2025-05-06	14	Medium	0.00641907381934892
S0008	P076	WH10	2024-02-11	16	High	0.0073360843649702
S0009	P048	WH9	2026-01-22	6	Low	0.00275103163686382
S0010	P024	WH3	2024-03-29	15	High	0.00687757909215956
S0011	P013	WH7	2024-05-11	7	Medium	0.00320953690967446
S0012	P094	WH2	2025-08-21	3	Low	0.00137551581843191
S0013	P026	WH6	2025-03-23	1	Low	0.000458505272810637
S0014	P022	WH8	2024-06-06	4	Low	0.00183402109124255
S0015	P042	WH1	2025-07-02	18	High	0.00825309491059147
S0016	P092	WH6	2025-06-16	14	Medium	0.00641907381934892
S0017	P033	WH5	2025-02-10	2	Low	0.000917010545621275
S0018	P020	WH12	2025-09-16	14	Medium	0.00641907381934892
S0019	P025	WH1	2026-01-28	18	High	0.00825309491059147
S0020	P085	WH11	2025-08-02	20	High	0.00917010545621275
S0021	P086	WH3	2025-01-18	10	Medium	0.00458505272810637
S0022	P010	WH5	2024-02-19	3	Low	0.00137551581843191
S0023	P040	WH5	2025-10-26	9	Medium	0.00412654745529574
S0024	P074	WH6	2024-10-28	17	High	0.00779458963778083
S0025	P042	WH9	2025-01-16	17	High	0.00779458963778083
S0026	P022	WH5	2025-08-08	6	Low	0.00275103163686382
S0027	P008	WH1	2025-06-29	11	Medium	0.00504355800091701
S0028	P011	WH10	2025-04-12	8	Medium	0.0036600471071051

The screenshot shows a Power BI Data view for the 'Warehouses' dataset. The table has columns: Warehouse, Location, Manager, Capacity, and CurrentUtilization. The data consists of 12 rows of warehouse information. A sidebar on the right lists various measures and columns from the Warehouses table, such as Capacity, CurrentUtilization, Location, Manager, and Warehouse. The bottom of the screen displays the table caption 'Table: Warehouses (12 rows)'.

Warehouse	Location	Manager	Capacity	CurrentUtilization
WH1	Mumbai	Ramesh	1107	1057
WH2	Bangalore	Priya	704	238
WH3	Delhi	Amit	1081	274
WH4	Hyderabad	Sonia	1065	702
WH5	Chennai	Vikram	1604	1259
WH6	Kolkata	Neha	852	540
WH7	Pune	Rahul	1343	335
WH8	Noida	Kavita	899	675
WH9	Ahmedabad	Anil	801	797
WH10	Jaipur	Sneha	869	220
WH11	Lucknow	Arjun	1202	1161
WH12	Surat	Pooja	1770	635

Table: Warehouses (12 rows)

Solution

- By analyzing inventory data and visualizing stock patterns, we can quickly identify low-stock and overstocked products.
This enables optimized reorder decisions, reduces stock-outs, minimizes holding costs, and improves overall inventory turnover.

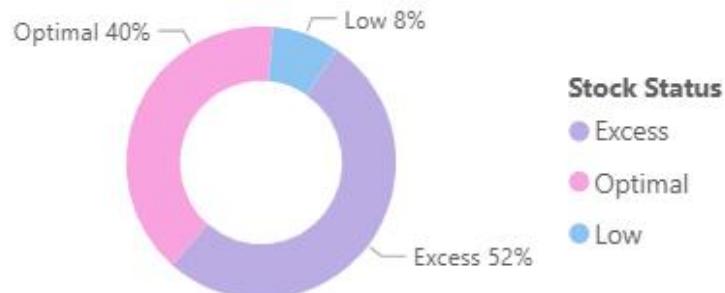
Dashboards Created

- Inventory Health & Stock Status Dashboard
- Product Performance & Demand Analysis Dashboard
- Warehouse Utilization & Stock Movement Dashboard
- Final Insights & Recommendations



Inventory Health & Stock Status Dashboard

Proposition of Product by Stock Status



Sales by Month



Low Stock Count by Warehouse



Key influencers Top segments

What influences SaleCategory to be High ?

When...

....the likelihood of
SaleCategory being High
increases by

Month is February

2.52x

Warehouse is WH7

1.94x

Warehouse, ProductName

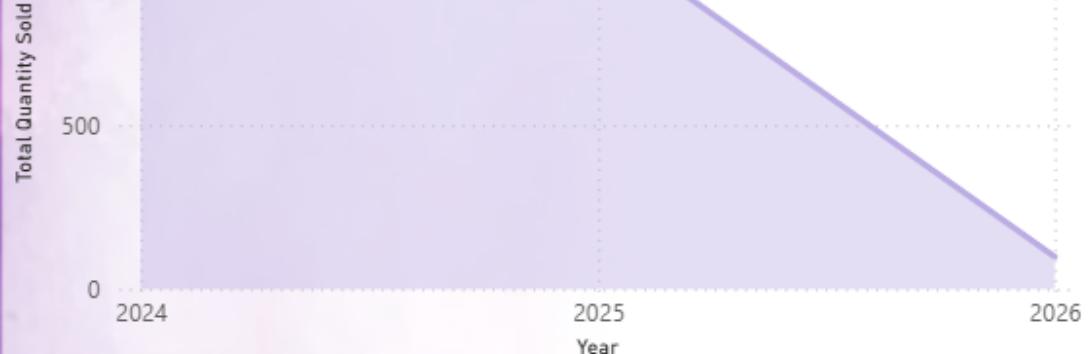
- WH1
- Product_18
- Product_24
- Product_34
- Product_45
- Product_63
- Product_90

Inventory Turnover



Product Performance & Demand Analysis Dashboard

Total Quantity Sold by Year



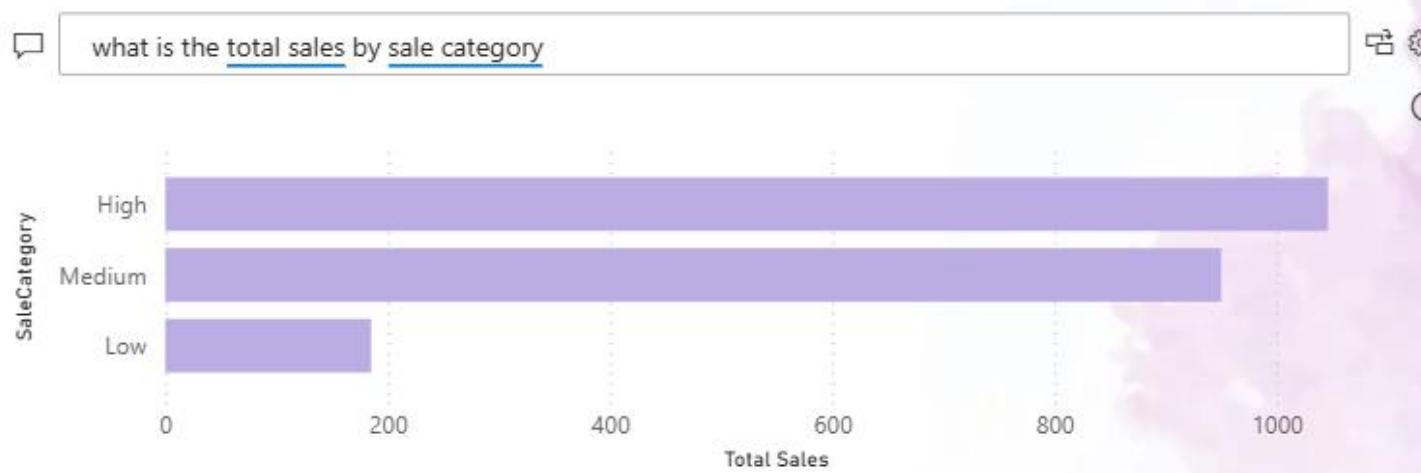
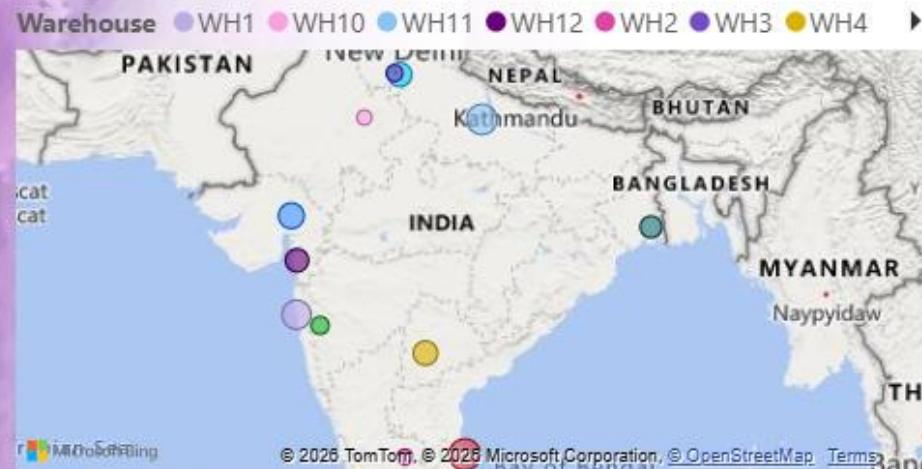
Count of Quantity Sold by Warehouse and ProductID



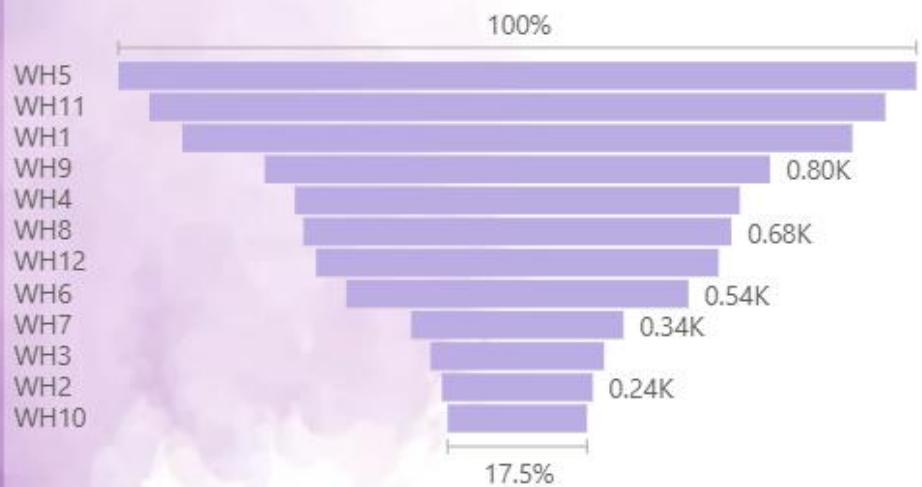
ProductID	Total Quantity Sold	Sum of % Sales Contribution	Warehouse	Year	Quarter	Month	Day
P001	7	0.00	WH2	2025	Qtr 1	March	21
P001	7	0.00	WH5	2025	Qtr 1	March	7
P001	8	0.00	WH7	2025	Qtr 2	May	18
P002	14	0.01	WH1	2026	Qtr 1	January	12
P002	6	0.00	WH11	2025	Qtr 4	November	22
P002	4	0.00	WH2	2025	Qtr 4	October	27
P002	3	0.00	WH4	2024	Qtr 1	March	27
P002	18	0.01	WH5	2024	Qtr 3	August	20
P002	10	0.00	WH7	2024	Qtr 2	June	17
P003	2	0.00	WH8	2024	Qtr 2	June	4
P004	11	0.01	WH11	2024	Qtr 4	December	5
P004	5	0.00	WH5	2025	Qtr 2	April	24
P004	6	0.00	WH6	2025	Qtr 3	July	4
P005	7	0.00	WH4	2025	Qtr 1	March	3
P005	6	0.00	WH5	2026	Qtr 1	January	20
P005	11	0.01	WH6	2025	Qtr 1	February	19
P005	13	0.01	WH8	2024	Qtr 2	May	4
P006	1	0.00	WH11	2025	Qtr 1	March	8
P007	5	0.00	WH3	2024	Qtr 3	August	23
P008	11	0.01	WH1	2025	Qtr 2	June	29
P008	8	0.00	WH11	2024	Qtr 2	April	12
P008	19	0.01	WH8	2024	Qtr 2	April	2
P009	17	0.01	WH12	2024	Qtr 3	September	9
P009	3	0.00	WH3	2025	Qtr 4	December	19
P009	14	0.01	WH5	2024	Qtr 3	July	24
P009	14	0.01	WH6	2025	Qtr 4	November	6
P009	18	0.01	WH8	2025	Qtr 4	November	10
P010	3	0.00	WH5	2024	Qtr 1	February	19
P010	11	0.01	WH8	2024	Qtr 2	May	24
Total		2181				1.00	

Warehouse Utilization & Stock Movement Dashboard

Utilization by Location and Warehouse



Average of CurrentUtilization by Warehouse



Sum of Capacity by Warehouse and CurrentUtilization



← Final Insights and Recommendation

8 products (8%) are at risk of stock-out — requiring immediate replenishment to prevent customer delays.

54 products (54%) are overstocked — representing \$25,577 in tied-up capital that can be reallocated to reduce holding costs

Stock levels show a nearly symmetric distribution (skewness: -0.01):

- Majority of products are concentrated in the 50-150 units range (22%)
- 25 products (25%) have excessive stock above 400 units
- Distribution reveals inefficient capital allocation

Actionable Impact:

Immediate replenishment of 8 critical products prevents revenue loss from stockouts

Reallocation of overstocked inventory can reduce holding costs by **12-15%**

Thank You