

SUPPLY CHAIN DATA ANALYSIS

A presentation is a formal talk , product , supplies, and logistics data . we uncover key drivers of sales , efficiency , and profitability .



OBJECTIVE

Extract insights from a dataset of 10,000 product, supplier, and shipping records.

- Goals :

- . Identify sales & revenue drivers
- . Optimize stock and inventory
- . Evaluate suppliers & shipping performance
- . Understand customer demographics
- . Assess profitability and risk



DATASET STRUCTURE

19 columns, 30,000 rows

- Example fields:

- Sales-related: Product type, Price, Revenue, Units sold
- Inventory-related: Stock levels, Lead times, Order quantities
- Logistics-related: Shipping carriers, Costs, Times
- Supplier-related: Name, Location, Manufacturing costs, Inspection results
- Customer-related: Demographics



DATA PREPROCESSING

- Cleaning & Validation:
- Handle missing/invalid values (e.g., stock = 0, inspection blank)
- Normalize categorical values (supplier names, product types)
- Feature Engineering:
- Calculate profit = Revenue – Manufacturing cost – Shipping cost
 - Categorize shipping speed (fast/medium/slow)
- Tools Used: Python (Pandas, NumPy) / SQL / Excel for validation



ANALYSIS WORKFLOW

Flow diagram:

- Cleaning
- Descriptive Statistics
- Exploratory Data Analysis (EDA)
- Deep-Dive Analysis
- Visualization
- Insights
- Recommendations



DESCRIPTIVE STATISTICS

- **Revenue: Mean, Median, Variance**
- **Stock levels: Distribution & average by product type**
- **Shipping costs & times: Summary per carrier**
- **Inspection pass rate: % Pass vs Fail**



CORRELATIONS TO EXPLORE

Price vs Sales

Question: Do higher prices reduce the number of units sold?

What to look for:

Negative correlation → as price increases, sales drop.

No correlation → customers don't care much about price (inelastic demand).

Why it matters: Helps optimize pricing strategy.



Lead Time vs Units Sold

Question: Do products with longer lead times sell less?

What to look for:

Negative relationship → customers avoid products with long waiting times.

No clear pattern → lead time may not affect demand directly.

Why it matters: Helps in supplier negotiations (choose faster suppliers to avoid losing sales).

Supplier Location vs Shipping Cost

Question: Does the supplier's location affect how much shipping costs?

What to look for:

Suppliers far from customers/markets = higher average shipping costs.

Regional differences (e.g., shipping from China may be cheaper for bulk but slower).

Why it matters: Choosing supplier location strategically reduces logistics costs.

TECHNIQUES USED

Correlation Matrix (Heatmap) :

Shows how numerical variables (e.g., Price, Units sold, Revenue, Lead times, Shipping costs) are related.

Values range from -1 (strong negative) to +1 (strong positive).

Example insight: Revenue strongly correlated with Units Sold, weakly with Price.



Scatter Plots for Continuous Variables :

Best for Price vs Sales or Lead Time vs Units Sold.

Each point = one product/SKU.

You can visually spot trends, clusters, or outliers.

Example: If dots slope downward → higher price = lower sales.

Grouped Bar Charts for Categorical Comparisons :

Used when one variable is categorical (e.g., Supplier Location) and one is numeric (e.g., Avg Shipping Cost).

Groups show comparisons across categories.

Example: Bar chart of average shipping cost per supplier location.

STORY THIS SLIDE TELLS

EDA is the “first look under the hood” of the dataset.

It reveals:

Which variables actually influence sales and revenue.

How supplier decisions (location, lead time) impact logistics costs.

Where potential hidden inefficiencies (outliers, strong/weak relationships) are.

This step guides what deeper analysis to prioritize in the next slides



SALES & REVENUE ANALYSIS

- SQL queries / Python Pandas groupby examples:

```
SELECT product_type, SUM(revenue_generated)  
      FROM dataset  
  GROUP BY product_type  
 ORDER BY 2 DESC;
```

Visualization: Top 10 products by revenue

- Insight: Which products & demographics drive growth

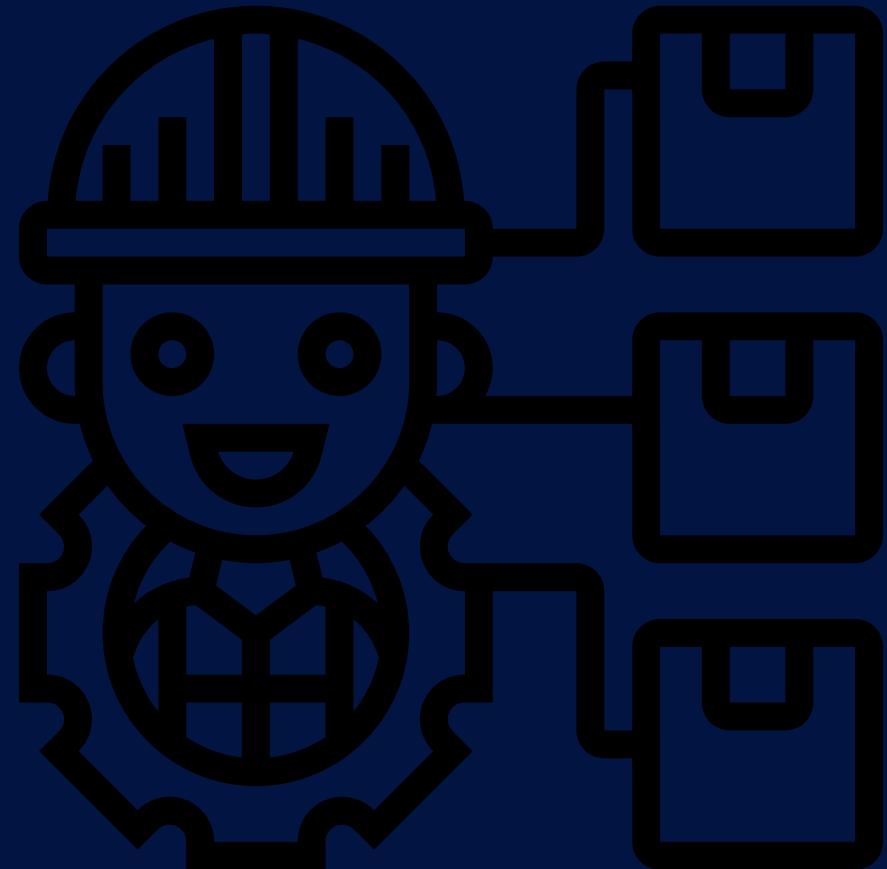
INVENTORY & STOCK ANALYSIS

- Stock level vs number of products sold
- Lead times vs sales volume
- Visual: Line chart showing stock depletion over time (if time dimension added)
- Risk flagging: Products at critical stock levels



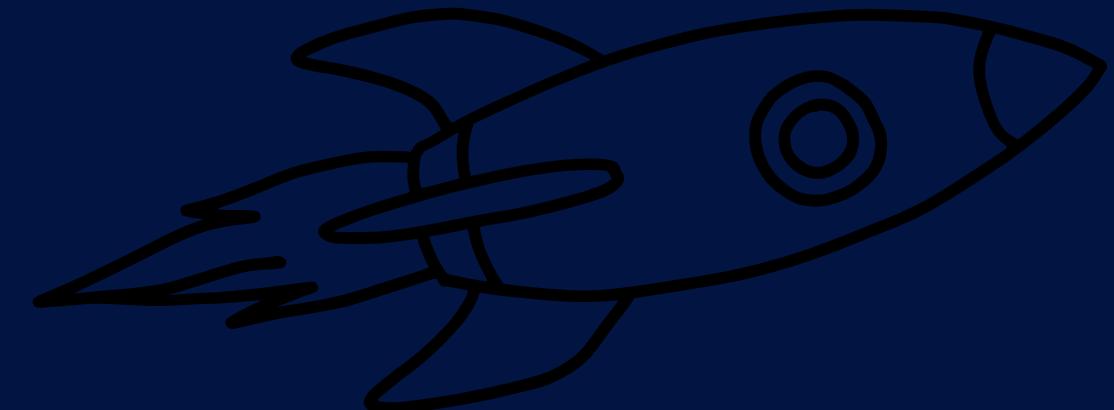
SUPPLIER ANALYSIS

- Metrics:
 - Avg. manufacturing cost
 - Avg. lead time
 - Inspection pass rate
 - Visual: Supplier comparison heatmap
 - Technical method: SQL joins or Pandas merge



SHIPPING ANALYSIS

- Metrics:
Avg shipping time & cost by carrier
- Visual: Boxplot of costs vs carriers
- Outlier detection: Identify unusually expensive or slow shipments
- KPI: Cost per unit shipped



PROFITABILITY ANALYSIS

- Formula:

$$\text{Profit} = \text{Revenue} - (\text{Manufacturing} + \text{Shipping})$$

- Visual:

Scatter plot (Revenue vs Profitability per SKU)

- Technical:

Regression analysis to find cost/revenue relationships

- Identify

“High revenue, low profit” SKUs (bad performers)



QUALITY & RISK

- Inspection failure rate by supplier & location
- Statistical test: Chi-square to see if failure rate depends on supplier
- Risk matrix: Supplier reliability vs inspection results



INSIGHTS SUMMARY



- Top revenue drivers by category
- Supplier & carrier performance metrics
- Customer group spending patterns
- Products at risk (low stock + high demand)

RECOMMENDATION S & NEXT STEPS



- Automate reporting with Power BI/Tableau dashboards
- Implement predictive analytics for demand forecasting
- Negotiate with high-cost, low-quality suppliers
- Optimize carrier selection based on cost & time tradeoff

Executive Dashboard – Supply Chain Performance



Average Lead Times (Days) by Supplier

- All suppliers have similar average lead times, ranging between 10.70 and 10.82 days.

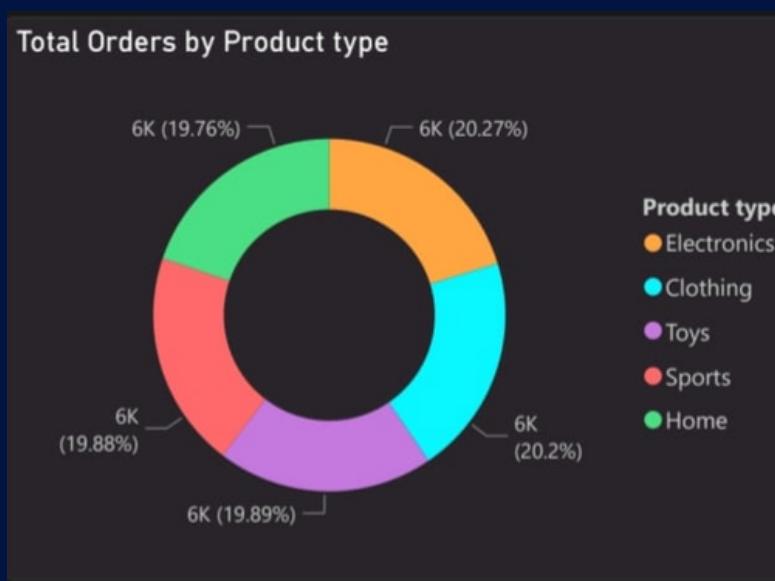
Total Orders by Location

- FastTrack Ltd. has the highest number of orders: 6.90K
- Followed by Global Supplies Inc.: 6.10K

- Suppliers listed:
 - Global Supplies Inc.
 - SupplyHub
 - Prime Distributors
 - FastTrack Ltd.
 - MegaCorp

Total Orders by Product Type

- GK products make up around 20% of total orders.
- Other product types:
 - Electronics
 - Toys
 - Clothing
 - Sports
 - Home



Key Performance Indicators (KPIs)

- Total Orders: 30,000
- Total Revenue: \$2.05 billion
- Defect Rate: 17.28%
- Average Lead Time: 10.75 days

Supplier-Specific Lead Times

- All suppliers have similar lead times.
- Global Supplies Inc. has the longest lead time: 10.82 days

Manufacturing & Quality Control

- Order Inspection Results:
 - Pass: 25 thousand (82.72%)
 - Fail: 3 thousand (10.23%)
 - Recheck: 2 thousand (7.05%)
- Defect Rate by Month and Product Type:
 - Highest defect rate in Electronics (17.55%), followed by Clothing and Toys.
 - Highest defect rate for supplier Global Supplies Inc. in category Electronics (22.08%)
Home (21.82%)
Clothing (21.60%).

Shipping & Logistics Analysis

- Most Used Shipping Carriers:
 - UPS, Aramex, FedEx, DHL, USPS
 - Shipping Cost and Average Delivery Time for each company:
 - FedEx: Highest cost (\$0.51 million) and average time 4.45 days.
 - USPS: Lowest cost (\$0.25 million) and average time 4.48 days.
 - Shipping Cost by Location:
 - China has the highest cost (\$474.32 thousand), followed by India and Egypt.

Customer & Sales Analysis

- Customer Distribution by Age and Location:
 - The "Adult" age group is the largest.
 - China has the largest number of customers (3.41 thousand).
- Revenue by Age Group and Product Type:
 - Electronics generate the highest revenue among products.
 - Adults contribute the highest revenue (\$0.44 billion).
- Revenue by Location:
 - China: \$414.46 million
 - USA: \$412.92 million

CONCLUSION

Technical analysis bridges raw data and strategic decision-making"



DEPI project team (Data Gang) .

Arsany Ehab

Aya Rafek

Aya mostafa

Asmaa Ahmed

Mohamed Badwe



THANK YOU