Digital Egypt Pioneers Initiative (DEPI)

Power BI (Data analysis program)

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Analytics Avengers

Task 1: data analysis report

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• Introduction:

In today's competitive landscape, enhancing our supply chain is essential to boosting revenue and reducing costs. This why we choose it for our graduation project, so this report explains our strategy for analyzing supply chain data. It covers how we select and compute key performance indicators (KPIs), build our data models, and derive insights that drive smart, data-based decisions aligned with our overall business goals.

Let's begin with exploring our company departments and how it's work and it's process flow as an E-Commerce platform consisting of several departments:

Operations & Supply Chain: this department is the core of the company and is responsible for

- Inventory management which used to track stock levels, manage suppliers, and Reorder stock.
- Fulfillment & Logistics is responsible for warehouse, packaging, shipping, and delivery.
- Customer support to manage queries, complaints, and returns.

Product Development: create new offerings, products, designs
Technology & IT: to maintain the platform's performance and features, also for ensuring customer data and payment are secure.
Marketing & Sales: for running ads, social media campaigns, and collaboration
Finance & Legal: to handle transactions, pricing, and Profit margins, and also to ensure business meets country laws
.
now it's time to explore our process flow:
1- customer starts browsing: customer visits the website and explores options
2- order placement & payments: customer adds items to cart and checks out then payment is processed (credit card, cash on delivery).
3- order processing: order details are sent to fulfillment.
4- packaging & Shipping: the order is packaged securely and labeled then the logistics partner handles shipping, for last step tracking details are sent to customer.
5- Delivery & customer experience: order is delivered to the recipient then customer receive follow-up messages for feedback, also returns/exchanges are handled if necessary.

for our department supply chain let's explore how it works and it's flow:

supply chain Flow

Procurement → Production → Warehousing → Distribution → Retail/Customer

Procurement: The chain begins with obtaining the raw materials or components needed for production. Suppliers are selected, prices are negotiated, and purchases are made.

Logistics

Production: Raw materials are transformed into finished products through manufacturing or assembly processes. It may include multiple operations such as assembly, testing, and packaging

Warehousing: After production, the products are stored in warehouses or distribution centers. Here the products are organized and arranged to facilitate shipping operations.

Distribution: Stored products are sent to their final destination via different distribution channels. This stage can include land, sea or air transportation

Retail/Delivery: Products reach points of sale or end consumers. In the case of online sales, this stage is the delivery of the product to the customer.

After-Sales Service: Includes technical support, returns management, and customer service to ensure customer satisfaction and relationship continuity.

supply Chain Strategies:
Demand Forecasting
Just-in-Time (JIT)
Warehouse Optimization
Sustainable Supply Chain
Risk Management

In summary, the supply chain (Supply Chain Flow) represents an End-To-End process which interconnected chain of processes that starts from obtaining raw materials and ends with delivering the final product to the consumer With the need to coordinate these processes to ensure efficiency and quality in production and distribution.

• Business Problem Statement:

The company faces several challenges affecting its overall performance which include:

- Inventory Management Issues: Some products might be overstocked or understocked based on sales volume and stock levels.
- Unsuitable Pricing and Discount Strategies: The current strategy is not revenue friendly, also Manufacturing costs may be too high for certain products, reducing profit margins
- Quality Control Issues: High defect rates in some products could indicate manufacturing or supplier problems.
- Supply Chain Efficiency: Delays in shipping (high lead times and shipping times) could affect customer.

By taking a closer look at our data, we can explore trends, identify areas for improvement, and develop recommendations to overcome these challenges, also some facts excel we found :
No discount data available in the dataset
Carrier C: Fastest delivery but higher costs
Carrier B: Balanced cost and efficiency (long time delivery)
High-price products contributed with a good value of total revenue despite low sales volume
Low-price had high sales volume but moderate revenue
many of customers prefer Carrier B
Higher shipping costs (Carrier A) reduced number of orders

Male customers purchased fewer cosmetics compared to females

• Research Questions:

To guide our investigation, we've prepared the following research questions:

1. In what ways do stock levels get affected by sales volume?
2. How do defect rates impact overall supply chain costs?
3. How do supplier lead times affect product availability and sales performance?
4. What products achieve the best margins and affect total revenues?
5. Which customer segments generate the highest revenue?
6. How do different customer demographics influence product demand?
7. What are the most common reasons for failed inspection results?
8. How do transportation costs affect overall profitability?

• Key Performance Indicators (KPIs):

To effectively monitor and enhance our supply chain performance, we will calculate these KPIs from our CSV data which is relative to our available data and align with our goals:

Stock Turnover Ratio: # of products sold / AVG. Stock Level
Shipping cost/product: Total shipping cost/# of product sold
Manufacturing Cost/Unit: Manufacturing cost/Production Volumes
Defect Rates
Inspection Failure Rate : (Failed Inspections / Total Inspections) × 100
Transportation Cost Efficiency: Total Transportation Costs/# products shipped
AVG. Transportation cost/Route: Total Transportation Costs/# routes
Total Revenue:
Profit Margin: (Total Revenue - Total Cost) / Total Revenue
Average Order Value (AOV): Total Revenue / Total Orders

• Analysis Approach:

Our analysis is based on a CSV file that holds transactional so we just normalize it to another table to make our model readable so our approach will first start with Data Exploration:

- Loading the CSV file and inspect its structure.
- Identify the relevant columns and assess data quality
- Identify business problem, KPI and Solution

Our step-by-step plan for data analysis is as follows:

Extract our columns to make a mind map model to optimize and find optimum solution

By Separate into fact and Dimension tables, These tables are connected using unique identifiers (primary keys PK) and corresponding foreign keys FK, forming a star schema. This structure makes querying efficient and ensures our analysis is reliable.

Product type

SKU PK

Price
Availability
Number of products sold
Revenue generated
Customer demographics
Stock levels
Lead times
Order quantities
Shipping times
Shipping carriers FK
Shipping costs
Supplier name FK
Location FK
Lead time
Production volumes
Manufacturing lead time
Manufacturing costs
Inspection results
Defect rates
Transportation modes
Routes
Costs

We separate them into

Products
Product type
SKU PK
Price
Manufacturing costs
Production volumes
Inspection results
Defect rates

Suppliers
Supplier ID PK
Supplier name
Location
Lead time
Manufacturing lead time

Shipping

SKU	PK
Shipping carriers	
Shipping costs	
Transportation modes	
Routes	
Sales	
SKU	FK
Number of products sold	
Revenue generated	
Customer demographics	
Inventory	
SKU	FK
Availability	
Stock levels	
dCalendar	
Date	PK
Manufacturing	
SKU	FK
Manufacturing lead time	
Manufacturing costs	
Inspection results	
Defect rates	
Production volumes	

Then we identify our KPI's and their Formulas
After that we can start our Data Analysis Process and Find out the answer for our question and problems
Then we follow our business alignment by Linking the results to our strategic objectives.
Provide actionable recommendations for reducing shipping costs, refining pricing strategies, and boosting customer retention.

• Expected Outcomes:

Through this analysis we will reveal:

- certain products are overstocked or understocked by comparing stock levels to sales volume.

- whether certain suppliers or manufacturing processes contribute to higher costs due to rework or waste.
- which Products generate the most revenue and profitability.
- which segments contribute most to the company's earnings.
- A detailed cost breakdown of shipping carriers, transportation modes, and routes will reveal the most cost-effective logistics strategies.

So we will seek for the following results:

- Suggested Actions: Practical suggestions for improving Inventory management, supplier performance, and manufacturing cost management.
- Optimized Financial Results: Reduced operational costs by optimizing procurement, inventory, and logistics.
- Optimized Product Results: Define and flag best-selling items for effective stock control and sales management.
- Strategic Alignment: A data powered decision making insight that drives business results.

• Conclusion:

This business project can serve as a case study for our final Graduation project in DEPI. It aims to explain how we intend to examine the supply chain information systems of a company's business processes. With the help of structured data models, KPI calculations, and most importantly, alignment with the business objective, we will strive to formulate insights that would provide value by improving operations and profits. These insights from the business owners will assist in devising tactics that will turn the analysis expertise of the team into action.