Image Credit : Link

Problem Statement

The project focuses on leveraging a practical dataset to conduct supply chain analytics, addressing critical challenges in shipment and inventory management. The overarching goal is to identify inefficiencies within the supply chain and develop informative dashboards to assist business stakeholders in pinpointing issues and proposing enhancements. To effectively achieve this objective, the project is divided into three primary goals.

1. Business Performance (Profit & Cost)

- The initial objective involves analyzing the profit and cost of products. By gaining insights into these metrics, we aim to evaluate the overall performance of the organization.

2. Inventory Analysis (Supply vs Demand)

- The second objective revolves around assessing the balance between supply and demand for each product within the supply chain.
- By examining the supply vs demand ratio, we aim to detect instances of overstocking or understocking for individual products. This insight will facilitate optimized inventory management, ensuring efficient stocking of products and minimizing potential inventory-related inefficiencies.

3. Shipment Analysis

- This objective entails analyzing the trend of shipment delays over time, including compiling data on the average days of shipment delay.

- Through this analysis, we seek to provide valuable insights into the efficiency of the shipment process, enabling the identification of potential areas for improvement to reduce delays and enhance overall performance.

Dataset

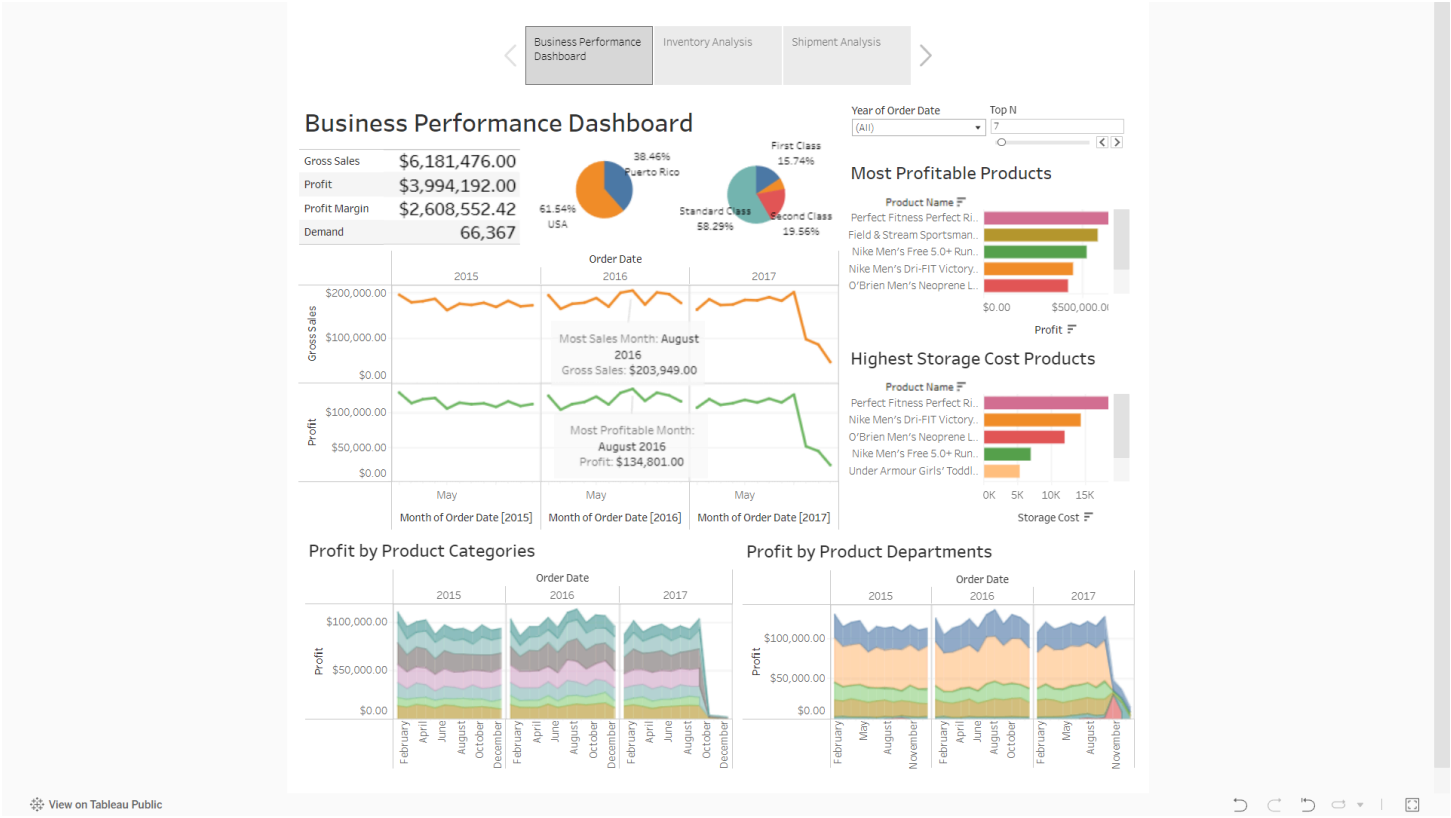
Group	Column name	Dataset	Definition
Customer	Customer ID	orders_and_shipments.csv	Unique customer identification
Customer	Customer Market	orders_and_shipments.csv	Geographic grouping of customer countries,
Customer	Customer Region	orders_and_shipments.csv	Geographic grouping of customer countries,
Customer	Customer Country	orders_and_shipments.csv	Customer's country
Order info	Order ID	orders_and_shipments.csv	Unique Order identification. Order groups on
Order info	Order Item ID	orders_and_shipments.csv	Unique Order Item identification. Order Item
Order info	Order Year	orders_and_shipments.csv	Year of the order
Order information	Order Month	orders_and_shipments.csv	Month of the order
Order information	Order Day	orders_and_shipments.csv	Day of the order
Order information	Order Time	orders_and_shipments.csv	Timestamp of the order in UTC
Order information	Order Quantity	orders_and_shipments.csv	The amount of items that were ordered withi
Product	Product Department	orders_and_shipments.csv	Product grouping into categories such as Fit
Product	Product Category	orders_and_shipments.csv	Product grouping into categories such as Sp
Product	Product Name	orders_and_shipments.csv	The name of the purchased product
Sales	Gross Sales	orders_and_shipments.csv	Revenue before discounts generated by the s
Sales	Discount %	orders_and_shipments.csv	Discount % applied on the catalog price
Sales	Profit	orders_and_shipments.csv	Profit generated by the sales of the Order Ite
Shipment information	Shipment Year	orders_and_shipments.csv	Year of the shipment
Shipment information	Shipment Month	orders_and_shipments.csv	Month of the shipment
Shipment information	Shipment Day	orders_and_shipments.csv	Day of the shipment
Shipment information	Shipment Mode	orders_and_shipments.csv	Information on how the shipment has been c
Shipment information	Shipment Days - Scheduled	orders_and_shipments.csv	Information on typical amount of days neede
Warehouse	Warehouse Country	orders_and_shipments.csv	Country of the warehouse that has fulfilled th
Inventory & Fulfillment	Warehouse Inventory	inventory.csv	The monthly level of inventory of a product, e
Inventory & Fulfillment	Inventory cost per unit	inventory.csv	The monthly storage cost per unit of invento
Inventory & Fulfillment	Warehouse Order fulfillment (days)	fulfillment.csv	The average amount of days it takes to refill

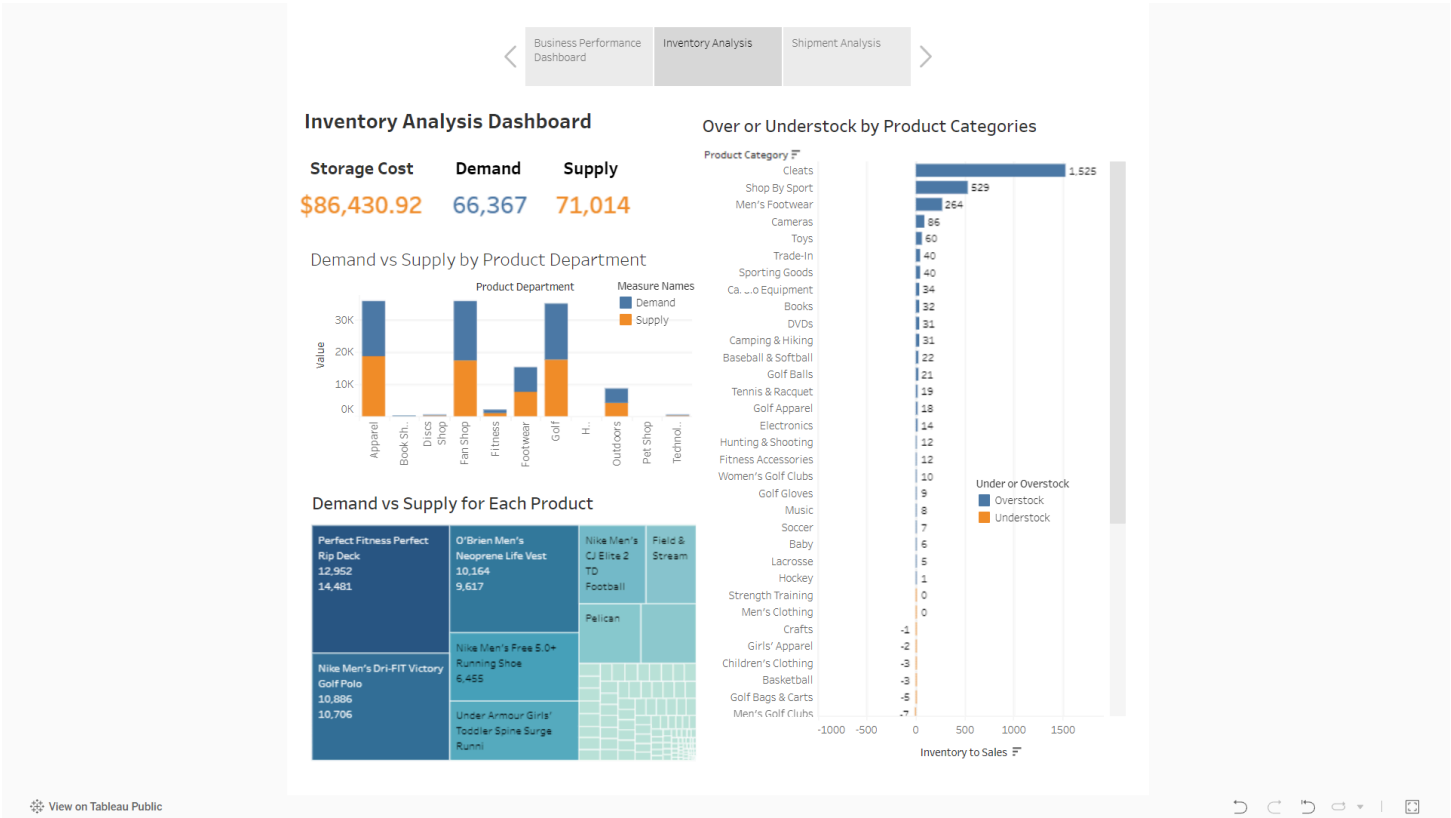
Data Preparation

The data analysis is performed using Python in Jupyter Notebook to gain insights about the data. This involves various data preprocessing, cleaning, and transformation tasks to prepare the data for further analysis.

Notebook: Link

Dashboard


Business Performance Dashboard
Inventory Analysis
Shipment Analysis
Business Performance Dashboard
Gross Sales $6,181,476.00
Profit $3,994,192.00
Profit Margin $2,608,552.42
Demand 66,367
38.46% Puerto Rico
61.54% USA
First Class 15.74%
Standard Class 58.29%
Second Class 19.56%
Year of Order Date
(All)
Top N
7
Most Profitable Products
Product Name
Perfect Fitness Perfect Ri..
Field & Stream Sportsman..
Nike Men's Free 5.0+ Run..
Nike Men's Dri-FIT Victory..
O'Brien Men's Neoprene L..
$0.00
$500,000.0
Profit
Order Date
2015
2016
2017
Gross Sales
$200,000.00
$100,000.00
$0.00
Most Sales Month: August 2016
Gross Sales: $203,949.00
Profit
$100,000.00
$50,000.00
$0.00
Most Profitable Month: August 2016
Profit: $134,801.00
May
Month of Order Date [2015]
Month of Order Date [2016]
Month of Order Date [2017]
Highest Storage Cost Products
Product Name
Perfect Fitness Perfect Ri..
Nike Men's Dri-FIT Victory..
O'Brien Men's Neoprene L..
Nike Men's Free 5.0+ Run..
Under Armour Girls' Toddl..
0K
5K
10K
15K
Storage Cost
Profit by Product Categories
Order Date
2015
2016
2017
Profit
$100,000.00
$50,000.00
$0.00
February
April
June
August
October
December
Profit by Product Departments
Order Date
2015
2016
2017
Profit
$100,000.00
$50,000.00
$0.00
February
May
August
November
April
June
October
View on Tableau Public


Business Performance Dashboard
Inventory Analysis
Shipment Analysis
Inventory Analysis Dashboard
Storage Cost
$86,430.92
Demand
66,367
Supply
71,014
Demand vs Supply by Product Department
Product Department
Measure Names
Demand
Supply
Value
30K
20K
10K
0K
Apparel
Book Sh..
Discs Shop
Fan Shop
Fitness
Footwear
Golf
H..
Outdoors
Pet Shop
Technol..
Demand vs Supply for Each Product
Perfect Fitness Perfect Rip Deck 12,952 14,481
O'Brien Men's Neoprene Life Vest 10,164 9,617
Nike Men's CJ Elite 2 TD Football
Field & Stream
Pelican
Nike Men's Dri-FIT Victory Golf Polo 10,886 10,706
Nike Men's Free 5.0+ Running Shoe 6,455
Under Armour Girls' Toddler Spine Surge Runni
Over or Understock by Product Categories
Product Category
Cleats 1,525
Shop By Sport 529
Men's Footwear 264
Cameras 86
Toys 60
Trade-In 40
Sporting Goods 40
Ca. ...o Equipment 34
Books 32
DVDs 31
Camping & Hiking 31
Baseball & Softball 22
Golf Balls 21
Tennis & Racquet 19
Golf Apparel 18
Electronics 14
Hunting & Shooting 12
Fitness Accessories 12
Women's Golf Clubs 10
Golf Gloves 9
Music 8
Soccer 7
Baby 6
Lacrosse 5
Hockey 1
Strength Training 0
Men's Clothing 0
Crafts -1
Girls' Apparel -2
Children's Clothing -3
Basketball -3
Golf Bags & Carts -5
Men's Golf Clubs -7
Under or Overstock
Overstock
Understock
-1000
-500
0
500
1000
1500
Inventory to Sales
View on Tableau Public

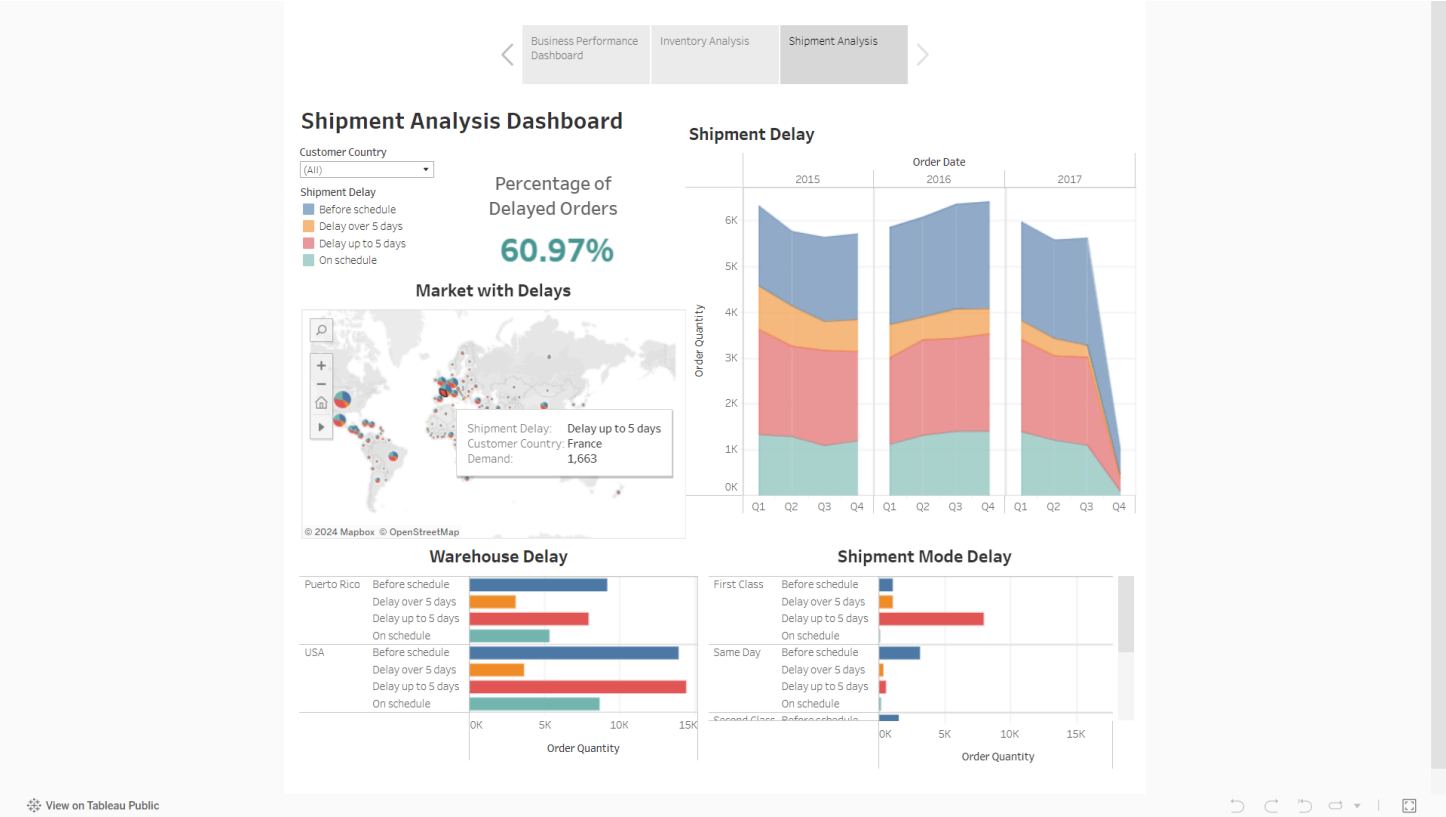


Tableau: [Link Dashboard]

Conclusion

1. Based on Business Performance Dashboard:

- Monthly sales usually fall between 160,000 to 203,000 dollars, while monthly profits typically range from 104,000 to 135,000 dollars with August 2016 being the best month. However, there was a noticeable decrease in profits from October to December 2017, which warrants additional scrutiny due to possible data. constraints.
- Gross Sales : 6,181,476 dollars; Profit : 3,994,192 dollars; Profit Margin : 2,608,552 dollars; Order Quantity/Demand = 66,367 products
- Most profitable product is Perfect Fitness Perfect Rip Deck, earning around $630,924 followed by Field & Stream Sportsman 16 Gun Fire Safe, etc.
- Most profitable by product categories is Cleats and Fan Shop by product departments.

2. Based on Inventory Analysis Dashboard:

- Total Storage : 86,430 dollars; Total demand : 66,367 products; Total Supply : 71,014 products.
- Highest demanding product department is Fan Shop, but its supply(inventory) is compared to less.
- Highest demanding product is Perfect Fitness Perfect Rip Deck, and the supply (inventory) is sufficient.
- Cleats, Shop By Sport, Toys is highest overstock product category and Indoor/Outdoor Games, Water Sports, Fishing is highest understock product category.

3. Based on Shipment Anlysis

- On average, there is a 60,97% delay in shipments across all orders. It's worth noting that the highest delays occur in shipments to the USA, France, and Mexico.
- Before scheduled and delays of up to 5 days most often occur in the product shipment process.
- The most commonly used shipping mode is standard class, with most shipments arriving on time or before the scheduled date.

Suggestions

Based on the insights provided, here are some business suggestions for improving performance in logistics and supply chain:

1. Optimize Inventory Management

- Re-evaluate inventory management, especially for products with excess or insufficient stock.
- Implement more accurate stock adjustment strategies based on historical demand and sales to avoid losses due to overstocking or stockouts.

2. Enhance Shipping Efficiency

- Identify the root causes of shipment delays, particularly to the USA, France, and Mexico.
- Evaluate the shipping process and identify areas for improvement to reduce delays, such as optimizing shipping routes, selecting more reliable shipping service providers, or improving coordination between relevant parties.

3. Product Performance Analysis

- Review the performance of specific products and identify factors contributing to differences in sales and profits.
- Implement more aggressive marketing strategies or improvements to less profitable products to enhance overall performance.
- Investigate the significant decrease in profits from October to December 2017 in more detail. Ensure there are no data errors or external factors affecting performance during that period.

4. Warehouse Performance Improvement

- Pay attention to storage and distribution efficiency in warehouses.
- Update warehouse management systems to improve accuracy and efficiency in managing inventory and processing orders.

6. Customer Service Enhancement

- Improve transparency in shipment tracking to provide customers with more accurate information about the status of their orders.
- Evaluate customer service processes and identify areas for improvement to enhance customer satisfaction.

THANK YOU!!!

REACH ME OUT ON:

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