

# **SUPPLY CHAIN OPTIMIZATION**

## **DATA ANALYSIS REPORT**

### **I. Introduction**

#### **1. Project discription**

With the increase in demand for purchasing today, the issue of supply chain optimization is becoming very important for many retail businesses. Solving supply chain problems to increase profits, provide goods to customers on time, etc. is a problem that requires a lot of time and effort. As an analyst at a company specializing in selling sports products, I need to analyze past data to find insights to help the company optimize the supply chain. In this project, I will focus on analyzing 3 main aspects including demand, supplier and delivery.

#### **2. Business task**

The main objective of this project is to use existing sales, product and supplier data to analyze and find important insights to help the Company optimize its supply chain. The focus is to identify suppliers that do not bring in much revenue, thereby optimizing product sourcing strategies, improving delivery time and reducing total costs, identifying purchasing trends to solve inventory problems.

### **II. Analysis**

#### **1. Data overview**

This dataset for analysis was downloaded from Kaggle. It includes 2 tables: orders and product\_supplier and linked together by product\_id columns. This dataset contains 16 fields in total, and more than 185 thousand records. The dataset is mainly about order information and product information, suppliers. Data period is for 5 years (from 1/1/2017 to 31/12/2021)

Link dataset:

<https://www.kaggle.com/datasets/gabrielsantello/wholesale-and-retail-orders-dataset>

#### **2. Tools**

This project mainly uses Python programming language with some libraries like Pandas, Numpy, Matplotlib, Seaborn for data import, data cleaning, data analysis and visualization.

### **3. Analysis**

See full analysis project here: <https://github.com/hoan110102/Supply-chain-optimization/blob/main/Supply%20Chain%20Optimization.ipynb>

### **4. Result (Insights)**

- Revenue has been increasing for 3 consecutive years (2017, 2018, 2019) and increased again in 2021 after a decline in 2020. The reason may be due to the impact of the Covid pandemic, leading to a decrease in the number of orders, thereby leading to a decrease in revenue. Fortunately, costs and profits also change according to the revenue trend and there is no year with a sudden increase.

- Over the past 5 years, there has always been a general purchasing trend. Sales revenue will decrease slightly at the beginning of the year (first quarter) and tend to increase quite strongly in the summer. Since this is a sportswear company, it is easy to understand that in the summer, the demand for sports increases sharply, leading to a very strong increase in purchasing demand at this time. In the autumn months, revenue begins to show signs of slowing down before falling into a sharp decline in early winter. Although the demand for outdoor sports decreases in this season, the demand for accessories, clothes, and sports shoes increases, as evidenced by the fact that in December, in all 5 years, revenue has increased very strongly.

- The company's main revenue comes mostly from selling products related to Ourdoors, Assorted Sports Articles, Shoes and Clothes with revenue of over 2 million dollars. With the remaining product categories, the revenue does not have too strong a difference, mainly from less popular product categories.

- Although the overall average delivery time is quite low, when looking deeper into the delivery time statistics over the years, it can be seen that there are still many orders with quite high delivery times, even in 2018 there were orders lasting up to 30

days. Most of the remaining orders are only around 2 days, maybe up to 5 days. In general, the issue of delivery time is being optimized quite well.

- The average delivery time over the past 5 years has also shown a clear trend, quite similar to the trend of revenue, which shows that there may be a clear relationship between revenue and average delivery time. The evidence is that delivery time will decrease at the beginning of the year due to fewer orders during this period, and from April to August, revenue increases, meaning more orders, and therefore delivery time also increases. The same is true for the period from September to December.

- The company currently has 64 different suppliers from more than 12 countries, although most of them are from the US. We focus on the 10 suppliers that bring in the largest revenue. It is quite strange that there are suppliers that bring in fewer orders and fewer products sold but have better revenue than suppliers with more orders and more products sold. This can be explained by the selling price of the product as well as the customer segment that the supplier is targeting. Besides, there are also suppliers who have very few orders as well as very few products sold, partly due to the product brand not being favored by customers. The company needs to consider whether to stop cooperating with these suppliers to focus on the suppliers that bring the most revenue to the company.

- There are quite a few suppliers from many countries, which shows that the company is trying to diversify its supply sources, avoiding the influence of a certain country. However, the number of orders from suppliers in the US is still overwhelming, leading to the fact that suppliers from other countries are quite difficult to cooperate with the company in the long term.