

# Project Report

## 1. Introduction

### 1.1. Overview

Our project aims to improve how we manage our supply chain by employing such analytical tools as Qlik that can help clarify data. We would like to operate more efficiently, respond quickly, and increase effectiveness in areas such as goods transportation, inventory management and market research.

#### Challenges:

##### 1. Getting Goods to Customers:

**Problems:** Inaccurate time keeping of deliveries, drivers using the wrong routes and no real-time tracking for our shipments.

**Bad Effects:** High costs, customer dissatisfaction, and inability to meet some orders.

##### Keeping Track of What We Have:

**Problems:** Oversupplying items in storage lack of stock at some points and inaccurate product information's

**Bad Effects:** Heavy investment in maintaining stocks tied up; losing out on sales opportunities; subpar performance.

### 3. Understanding What Customers Want:

- **Problems:** Guessing wrong about what people will buy, not really knowing what they like, and not using our resources wisely.

- **Bad Effects:** Not using our resources in the best way, missing out on growth opportunities, and not making the most of our marketing efforts.

#### Business Requirements:

- **Data Integration Strategy:** Aggregate data from various supply chain sources and centralize.
- **Visualization using Qlik:**
  - Create intuitive dashboards that are dynamic for easy insights.
- **Advanced Analytics for Optimization:**
  - Analyzing historical logistics data to optimize transportation routes.

- **Real-Time Tracking and Monitoring:**
  - o Put in place real-time tracking solutions, thereby reducing lead times and cutting costs.
- **Real-Time Analytics for Quick Decisions:**
  - o Use up-to-date information to make instant decisions as conditions change unexpectedly or otherwise.

**Literature Survey Insights:** Research shows that using data analytics can totally transform traditional supply chain practices. Tools like Qlik make it so much easier to see what's going on and make better predictions. Companies in all sorts of industries have seen big improvements in their operations after using these tools. But there can still be challenges, like managing data and making sure everyone in the company is on board with using data to make decisions.

## **Project Deliverables:**

### **Dashboards:**

- **Inventory Management Dashboard:** Monitor stock levels and operational efficiency
  - o **Sales and Market Analysis Dashboard:** This will let us see how our sales are doing, also the way market trends affect us
  - o **Logistics and Delivery Performance Dashboard:** This will help us track our performance of delivery system operations

- **Analysis Reports:**

**Sales Analysis:** A breakdown of sales performance on granular level

**Order Item Quantity vs. Sales Analysis:** An analysis of correlation between volumes ordered against actual sales made

**Late Delivery Risk Analysis:** Risk associated with geographical location or mode of payment

**Conclusion:** With a solid data integration strategy and Qlik's advanced analytics and visualization tools, we should be able to address our supply chain management challenges. The end result will be higher efficiency rates, reduced costs and more satisfied customers. It is important to ensure that our data is well managed in addition to creating a culture where everyone uses data to make decisions. Hence, all of the knowledge received will be put into use effectively for continuous improvement of the process at hand.

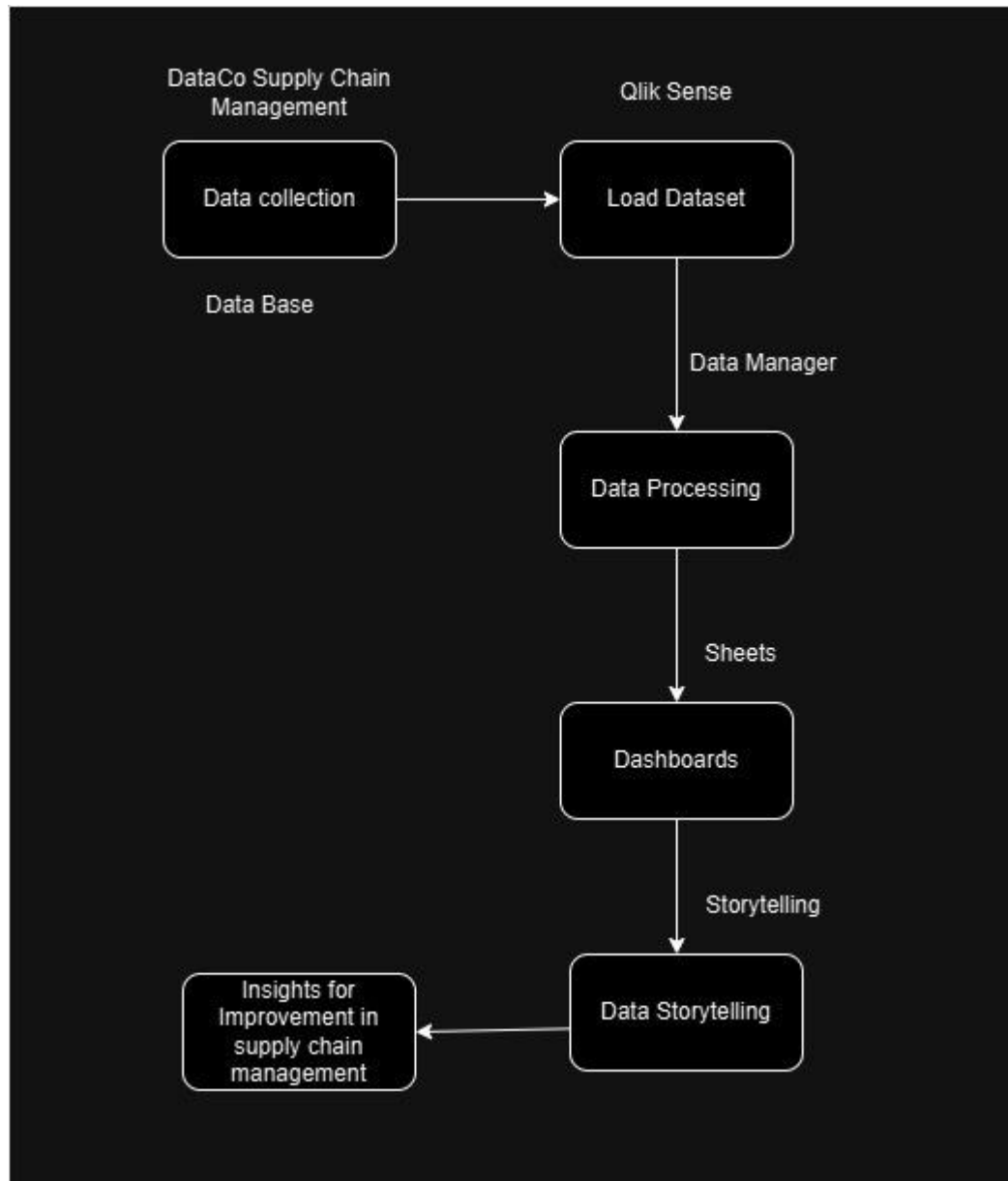
## 1.2.Purpose

To revolutionize our supply chain management system, the project aims at leveraging data-driven insights and advanced analytics. The following are the goals we are striving to achieve by incorporating strong data integration strategies and utilizing Qlik's advanced visualization and analytics tools:

- **Improve operational efficiency.**
  - Logistical and delivery processes need to be aligned to reduce lead time and transportation costs
  - Inventory needs to be managed more efficiently to minimize holding costs as well as avoiding stock-outs.
- **Enhance responsiveness.**
  - Real-time tracking of goods that ensures timely deliveries together with improving information visibility
  - Use real-time analytics for proactive response in case of unexpected events or changes in demand, hence making a flexible and adaptive supply chain.
- **Boost customer satisfaction**
  - Faster order fulfillment through reducing delays in shipping as well as increased accuracy of picking errors which translates into higher customer satisfaction levels
  - Superior service provision due to inventory availability improvements and having efficient logistics
- **Improve decision-making.**
  - Advanced analytics should provide deeper insights into market trends, sales performance, and customer behavior.
  - From forecasting and planning through execution and optimization; support data-driven decision-making at all supply chain levels.
- **Foster a Data-Driven Culture**
  - Build robust frameworks for data governance that guarantee accuracy of information lack of duplication or inconsistency in it and security around it.
  - Culture where every employee values his data will be used for continual improvement purposes plus transformation

In general this initiative hopes to make our supply chain into a productive, prompt and client centered business model giving us an edge over other players which is sustainable growth.

## 1.3.Technical Architecture



## 2. Define Problem/ Problem Understanding

### 2.1. Specify the business problem

To make use of Qlik's data-driven insights to transform supply chain management systems for optimum use in logistics, forecasting and inventory control is the objective.

This project seeks to increase operating efficiency and responsiveness by focusing on logistics and delivery performance, inventory management as well as market and sales analysis.

- **Logistics and Delivery Performance:**

Problems: Late deliveries, inefficient transportation routes as well as lack of real-time tracking technology lead to cost increases and customer dissatisfaction

- **Inventory Management:**

Problems: Excessive inventories leading to increased inventory costs, missed sales opportunities for inventories as well as customer satisfaction; inaccurate records of stocks resulting in inefficiencies in inventorization which can result in lost revenue

- **Market and Sales Analysis:**

Problems: Wrong predictions about what customers want to buy and do not want to buy; products misunderstood by people who lack product knowledge combined with ignorance of market trends have resulted in poor marketing tactics including ineffective advertisements.

## 2.2 Business Requirements

- **Data Integration:**

Also, data needs to be compiled and centralized from different sectors of the supply chain.

- **Simple Explanation:** This entails sourcing all relevant information about the supply chain from the various sources.

- **Visualization with Qlik:**

The next part involves creating easily understood dashboards using visualization tools available in Qlik.

- **Simple Explanation:** This is simply a matter of making clear and dynamic charts and graphs showing the details of the supply chain.

- **Advanced Analytics for Optimization:**

More so, analyze historical logistics data through Qlik's advanced analytics for future trends and improvements in transportation routes.

- **Simple Explanation:** Observe old data to detect patterns which would help make delivery routes better.

- **Real-Time Tracking and Monitoring:**

So, systems for real-time tracking of goods as well as following their movement around are needed to be established.

- **Simple Explanation:** Keep track of products' locations at any given time in order to enhance delivery process while cutting down expenses that are associated with it.

- **Real-Time Analytics for Quick Decisions:**

Besides, they must employ real-time analytics to allow them take quick decisions when things change suddenly in their businesses operations.

- **Simple Explanation:** Use instant data analysis so you can quickly adapt to any sudden changes or problems in your supply chain management.

These requirements will help us build a system that is efficient, responsive, and gives us a clear picture of our supply chain operations.

## 2.3 Literature Survey

In research on how to better supply chain management through the use of data-driven insights and advanced analytics there is a growing interest in employing data analysis to change the traditional process of supply chain. Some scholars argue that tools like Qlik can be used to facilitate better management by companies on their inventory. In this way, it is argued that the use of sophisticated analytics could provide greater visibility into operations, more precise forecasts and higher efficiency in stock control.

Furthermore, other studies examine different ways to improve supply chains with regards to data using various techniques and technologies; they show situations where firms have been able to respond quickly to changes as well as operate efficiently.

However, some research also points out problems with implementing a data approach. It highlights the fact that they have to have firm rules for managing data and instill an organizational culture that ensures effective utilization of information

## 2.4. Social Or Business Impact.

### **Social Impact Analysis:**

1. Create visualizations to showcase the demographic distribution of Supply chain management
2. Analyze how Data-Driven Innovations in Supply Chain Management have impacted social welfare programs, financial inclusion, and other key areas.
3. Explore any correlations between usage and improvements.

### **Business Impact Analysis:**

1. Analyze how Data-Driven Innovations in Supply Chain Management have affected businesses, especially in sectors like banking, telecommunications, and e-commerce.
2. Evaluate the impact of Data-Driven Innovations in Supply Chain Management on sales, customer onboarding, and operational efficiency.

### **3.DATA COLLECTION**

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, evaluate outcomes and generate insights from the data.

#### **3.1. COLLECT THE DATASET**

The DataCo SMART SUPPLY CHAIN Dataset is available in kaggle. The dataset consists of structured and unstructured data. There are three files in that dataset.

Type Data:

##### **Structured Data:**

DataCoSupplyChainDataset.csv

DescriptionDataCoSupplyChain.csv

##### **Unstructured Data:**

Tokenized\_access\_logs.csv (Clickstream)

##### **Description about Dataset:**

**DataCoSupplyChainDataset.csv**

The DataCoSupplyChainDataset.csv consists of 53 columns and 1,80,520 rows. Data Contains all the meta information regarding the columns described in the CSV files

You can download the Dataset. Dataset link:-[DataCo SMART SUPPLY CHAIN Dataset](#)

#### **3.2.CONNECT DATA WITH QLIK SENSE**

There are two ways to load the dataset into the Qlik Sense. First log into the qlik Cloud

## Steps to connect data with Qlik Sense

### 1) With Dataset button

**Step -1:** Open the Qlik Analytics Services platform, home tab

**Step-2:** In the home tab, you can see ‘+’ or add symbol, click the button

**Step-3:** There you can see “Dataset” option, click that option

**Step-4:** Browse the file and load the data

**Step-5:** Now the Dataset is successfully connected to the Qlik sense

### 2) With New Analytics App

**Step-1:** Open the Qlik Analytics Services platform, home tab

**Step-2:** In the home tab, you can see ‘+’ or add symbol, click the button

**Step-3:** there you can see “new analytics app” option, create an app with name

**Step-4:** “open the app”, you can see 3 options. Such as DataCatalog, Files and other sources and Data load Editor.

**Step-5:** with the help of Files and other sources and Data load editor, you can connect dataset with qlik sense

## 4.DATA PREPARATION

Data preparation is the process of **gathering, combining, structuring and organizing data** so it can be used in business intelligence (BI), analytics and data visualization applications.

### 4.1 PREPARE THE DATA FOR VISUALIZATION

After connecting the dataset into the qlik sense, create a new analytics app. Then after you can see the three options, i.e., **explore the dataset, Insight advisor and new analytics sheet.**

**Steps to process the dataset:**



**Step-1:** click the option, “**explore the dataset**”

**Step-2:** There you can see “**associations**” of the tables of the connected dataset, press “**apply all**” if you want.

**Step-3:** to edit the dataset, you can see the **edit dataset** option “**bottom of the tab**”. Press that button

**Step-4:** there, you can remove unwanted columns, handling error, fill the missing values with mean, and removing null values

- To remove unwanted columns, select the “select data from source” option. Then you can unselect the columns which are all not needed for performing Data visualizations
- I replaced the null values with mean

In my Dataset consists of 53 columns, In that I removed 19 columns which are all not needed for my visualization. Those removed columns are Category ID, Customer name, Customer ID, Customer Email, Customer Fname, Customer Lname, Customer Password, Customer zipcode, Customer street, Order city, Order id, Order Item Cardprod Id, Order Item ID, Order zipcode, Product Card Id, Product Category Id, Product description, Product Image and Category ID. Can find the description of columns in the above pages.

## 5.DATA VISUALIZATIONS

### Data visualizations:

- Refers to generating graphical representations of information.
- Involves charts, graphs, maps, and other visual tools.
- Helps analyze and interpret complex datasets.
- Allows easy understanding of patterns, trends, and outliers.

### 5.1.UNIQUE VISUALIZATIONS

#### Steps to visualizing data in qlik sense:

**Step-1:** create a **new sheet** in **analytics app** in which the data is loaded already

**Step-2:** there, you find “**Edit sheet**” option on the **top –right corner**, click the **button**

**Step-3:** there you can visualize the data

**Step-4:** for advance visualization, enable the “ **advance option**”, then you can find many visualizations. With the help of those visualization, visualize the data as per your requirement.

Unique visualizations with my question, variables used and type of visualizations are included :

### 1) Late Delivery Risk by Region

- **Question:** Which regions have the highest risk of late deliveries?
- **Variables:** Late\_delivery\_risk, Order Region
- **Visualization:** Heat map



Fig-1: Late delivery risk by region

### 2) Sum of Order Item Total by Delivery Status

- **Question:** How do delivery statuses affect the total value of orders?
- **Variables:** Order Item Total, Delivery Status
- **Visualization:** line chart



Fig-2: Sum of order Item Total by delivery Status

### 3) Profit per Order by Region

- **Question:** How does profit vary across different regions?
- **Variables:** Order Profit Per Order, Order Region
- **Visualization:** horizontal Bar chart

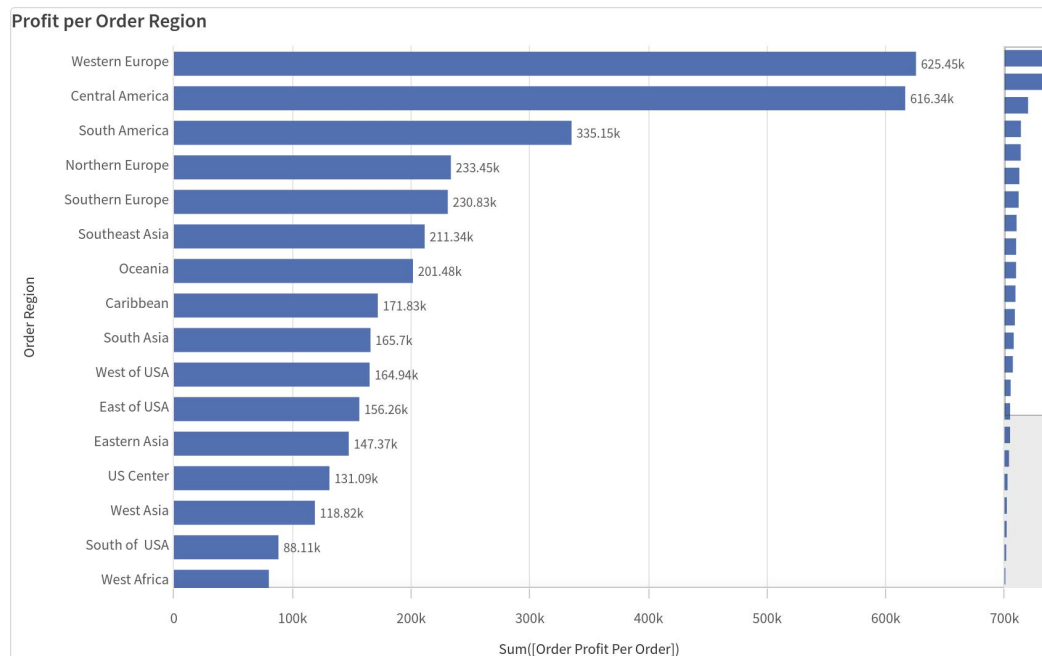


Fig-3: Profit per order region

#### 4) Average Delivery Time by Shipping Mode

- **Question:** What is the average delivery time for each shipping mode?
- **Variables:** Days for shipping (real), Shipping Mode
- **Visualization:** Bar chart



Fig-4: Average Delivery Time by shipping mode

#### 5) Shipping Time Analysis

- **Question:** How does the actual shipping time compare to the scheduled shipping time?
- **Variables:** Days for shipping (real), Days for shipment (scheduled)
- **Visualization:** Scatter plot

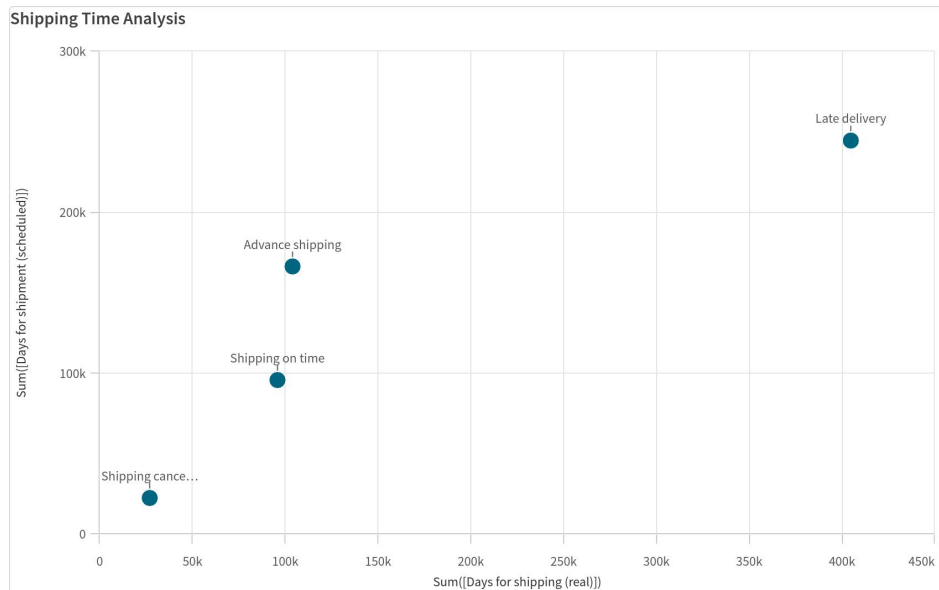


Fig-5: Shipping Time Analysis

#### 6) Sum of Benefit per Order by Different Category

- **Question:** How much profit is generated per order for each product category?
- **Variables:** Benefit per order, Category Name
- **Visualization:** pie chart

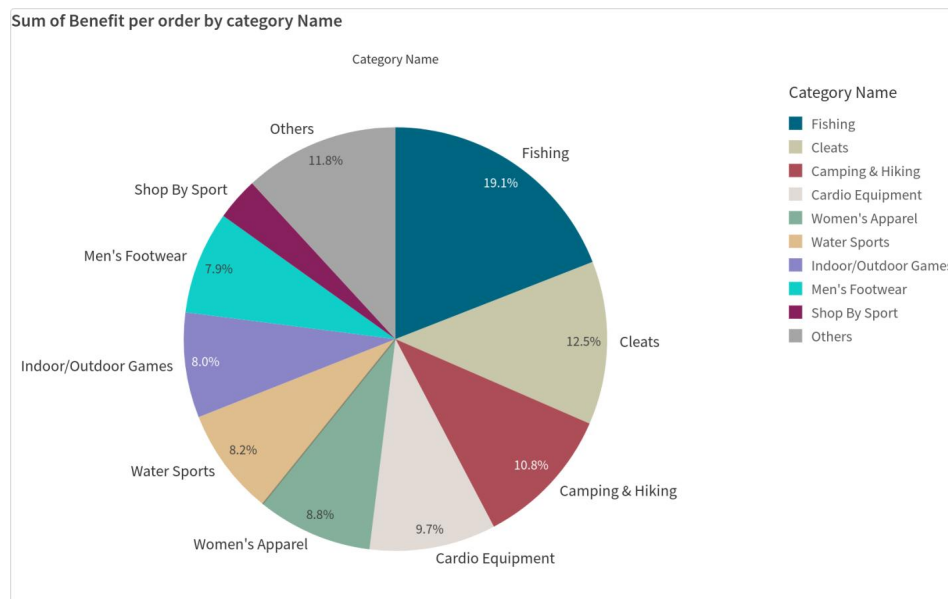


Fig-6: Sum of benefit per order by different Category

## 7) Monthly Sales per Product Category

- **Question:** How do sales vary across different product categories on a monthly basis?
- **Variables:** Sales, Category Name, order date (DateOrders)
- **Visualization:** stacked bar chart

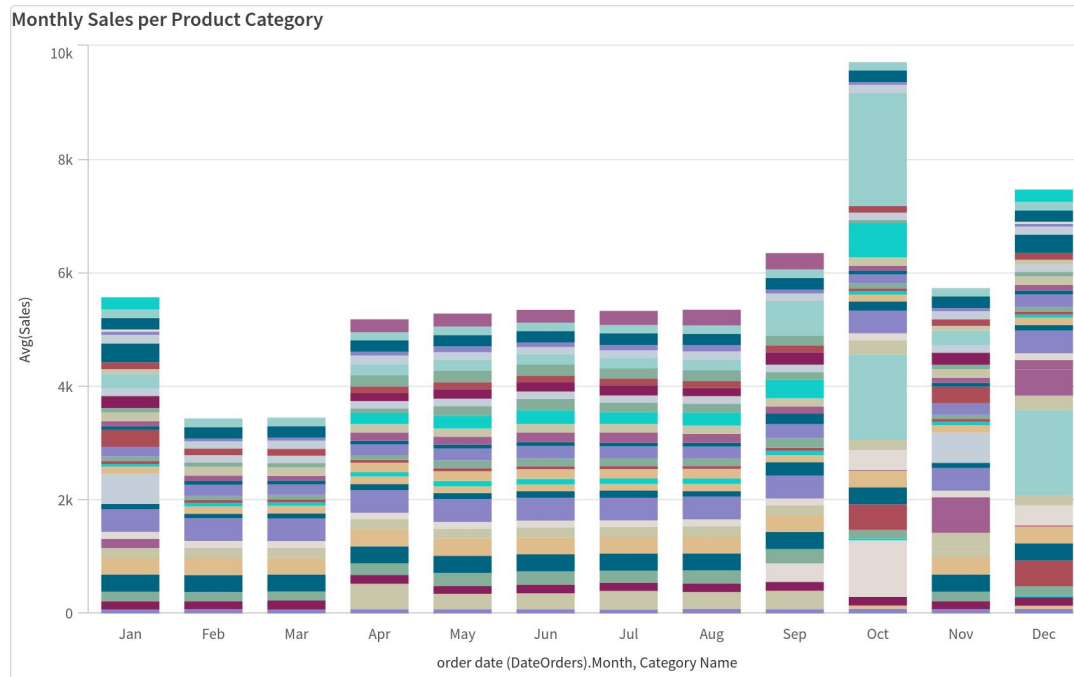


Fig-7: Monthly sales per product category

## 8) Sum of Order Item Quantity by Average Sales

- **Question:** How does the quantity of items ordered correlate with average sales?
- **Variables:** Order Item Quantity, Sales
- **Visualization:** Scatter plot

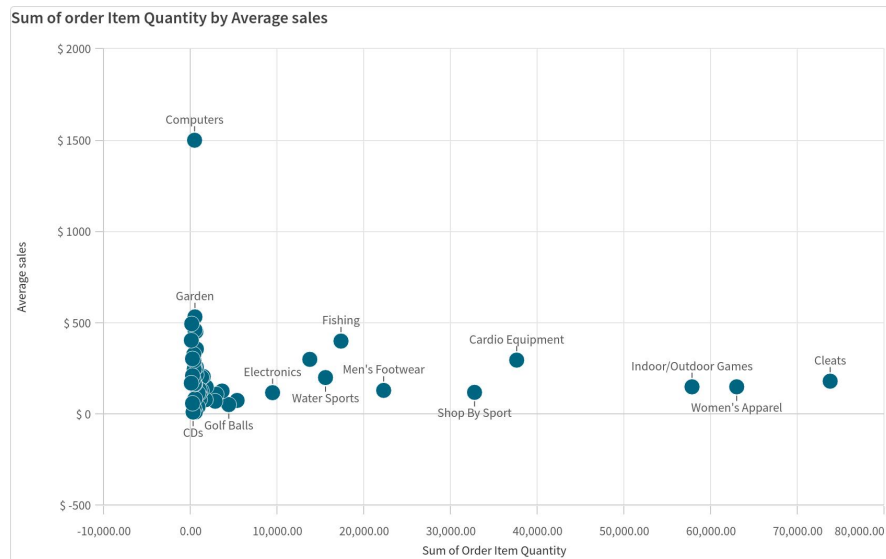


Fig-8: Sum of order item quantity by average sales

## 9) Top 15 Products by Sum of Sales

- **Question:** Which products generate the highest sales?
- **Variables:** Product Name, Sales
- **Visualization:** Bar chart

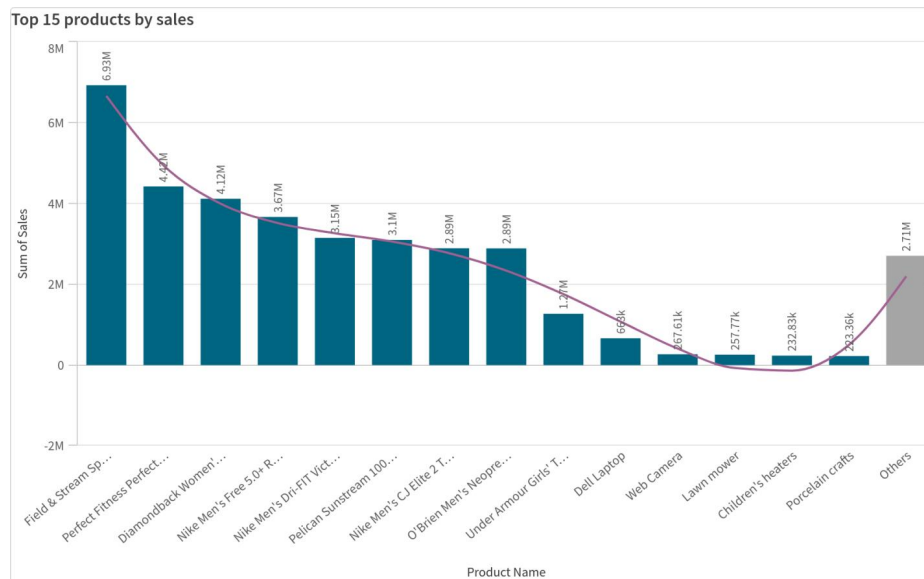


Fig-9: Top 15 products by sum of sales

## 10) Sum of Sales by Different Modes

- **Question:** How does the sum of sales vary by different shipping modes?
- **Variables:** Sales, Shipping Mode
- **Visualization:** Bar chart

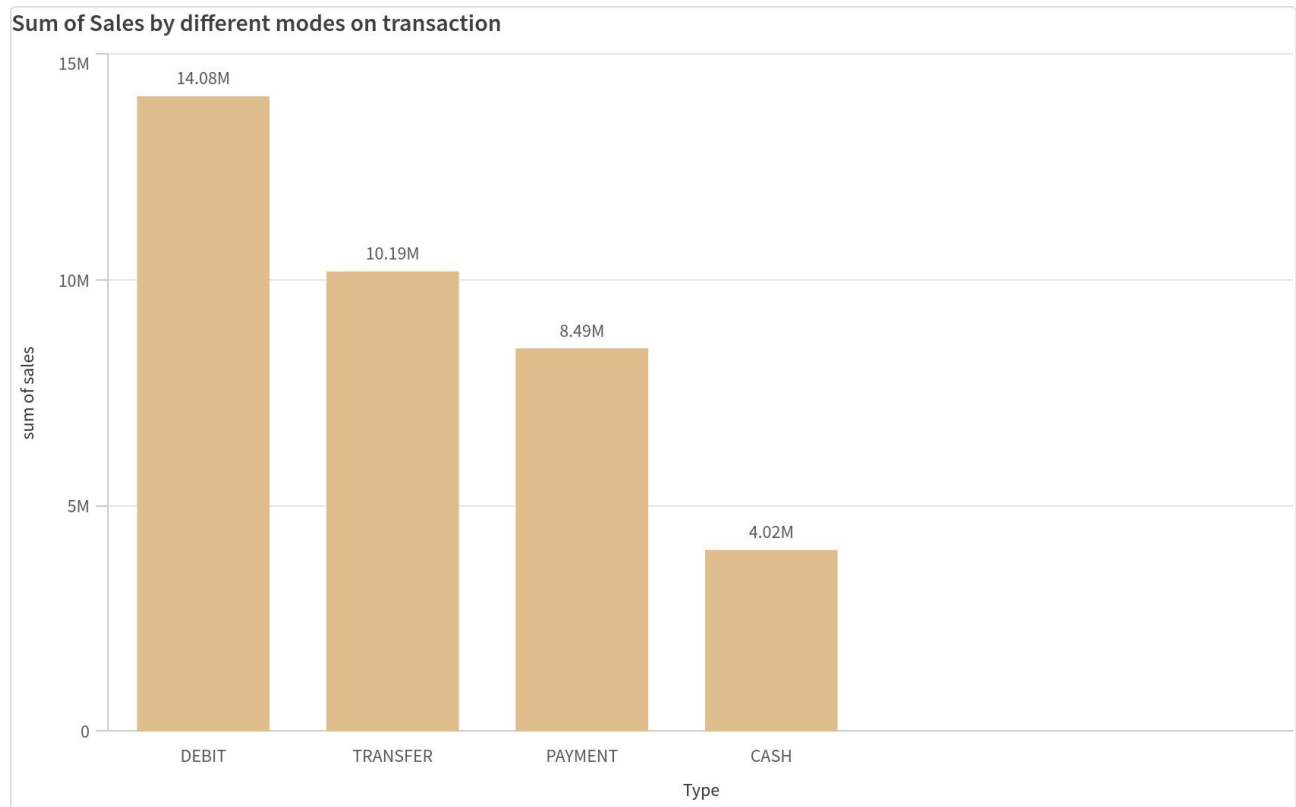


Fig-10: Sum of sales by different modes

#### 11) Sum of Sales by Order Item Profit Ratio based on different categories

- **Question:** What is the total sales amount categorized by the order item total?
- **Variables:** Sales, Order Item Total, category
- **Visualization:** Scatter plot



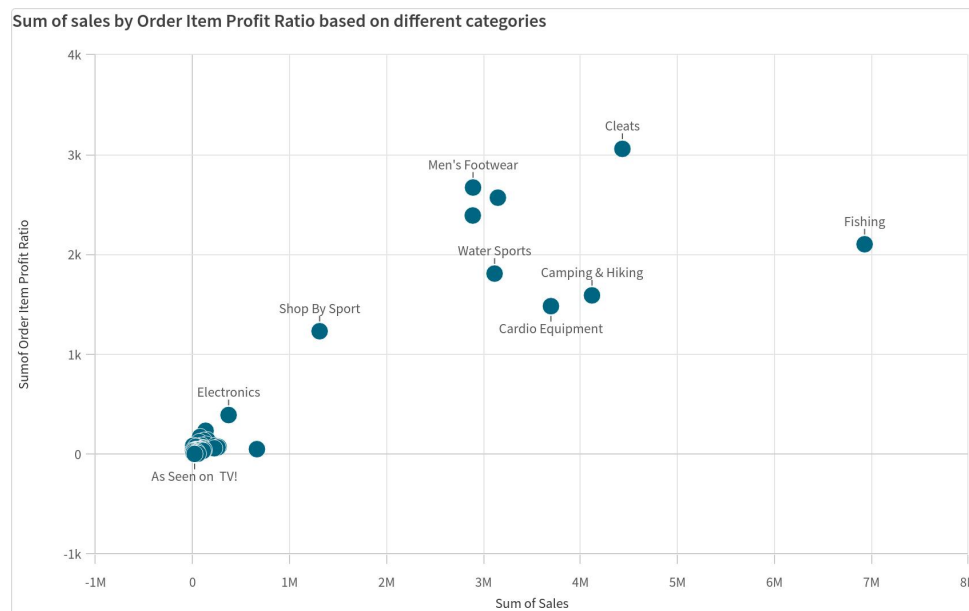


Fig-11: Sum of sales by order Item Total

## 12) Top 20 Highest Count of Markets in Countries

- **Question:** Which markets in which countries have the highest order counts?
- **Variables:** Market, Order Country
- **Visualization:** Bar chart

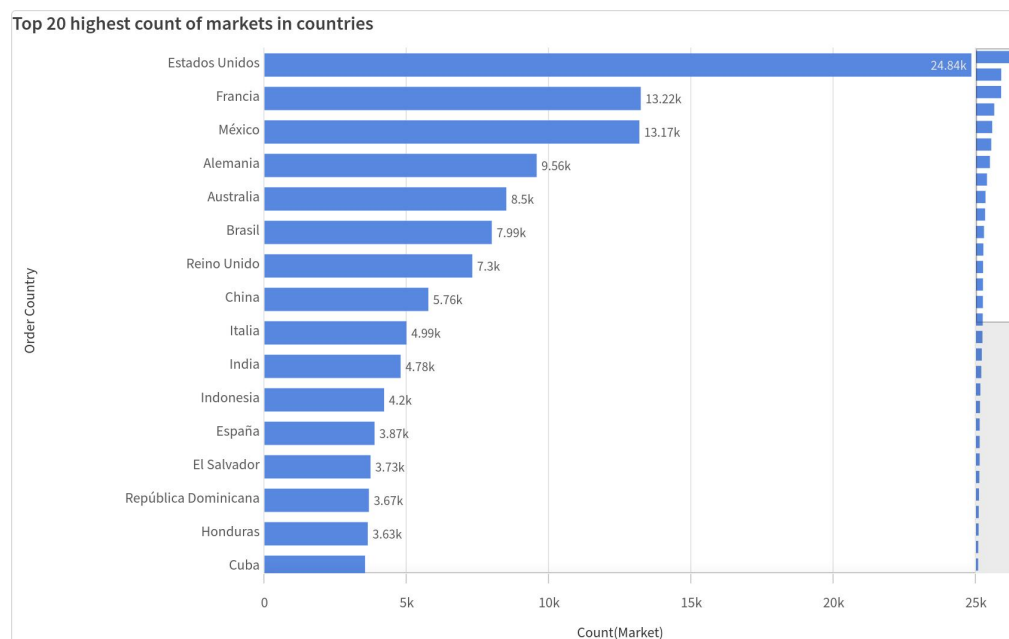
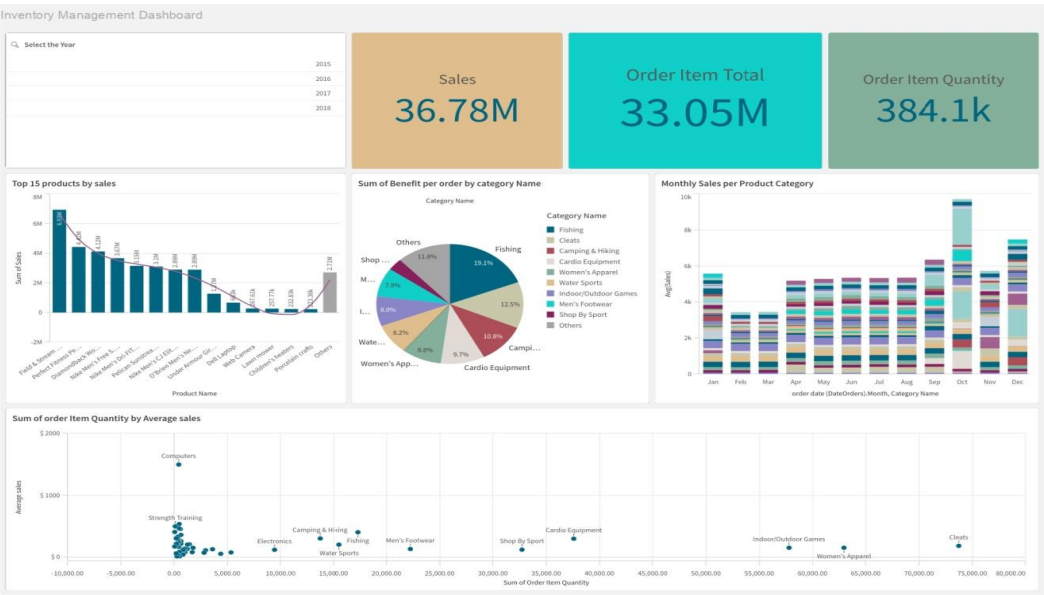


Fig-12: Top 20 highest count of markets in countries

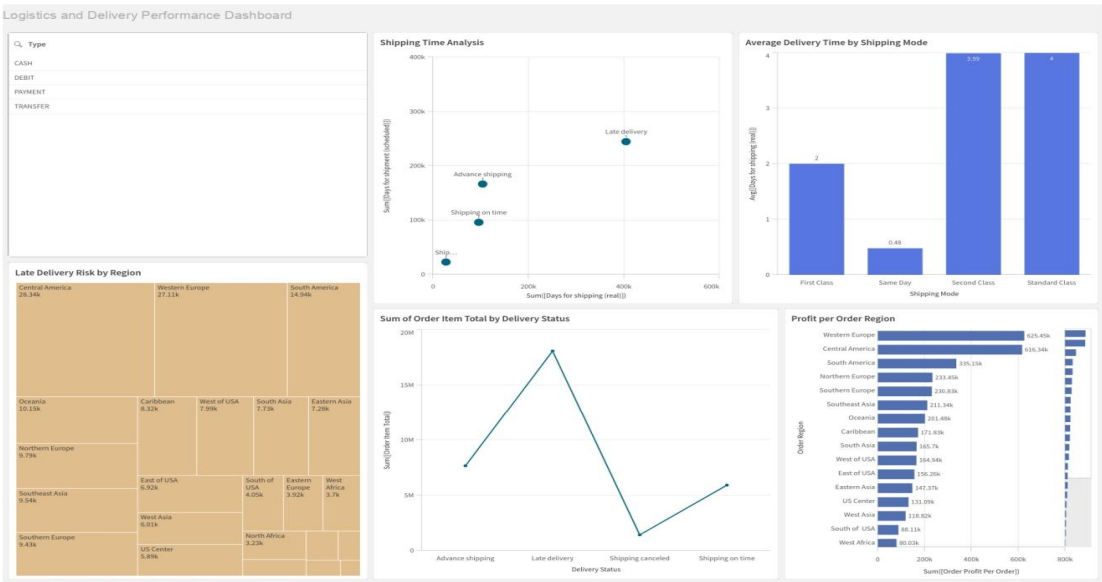
# 6. DASHBOARDS

## 6.1. RESPONSIVE AND DESIGN OF DASHBOARDS

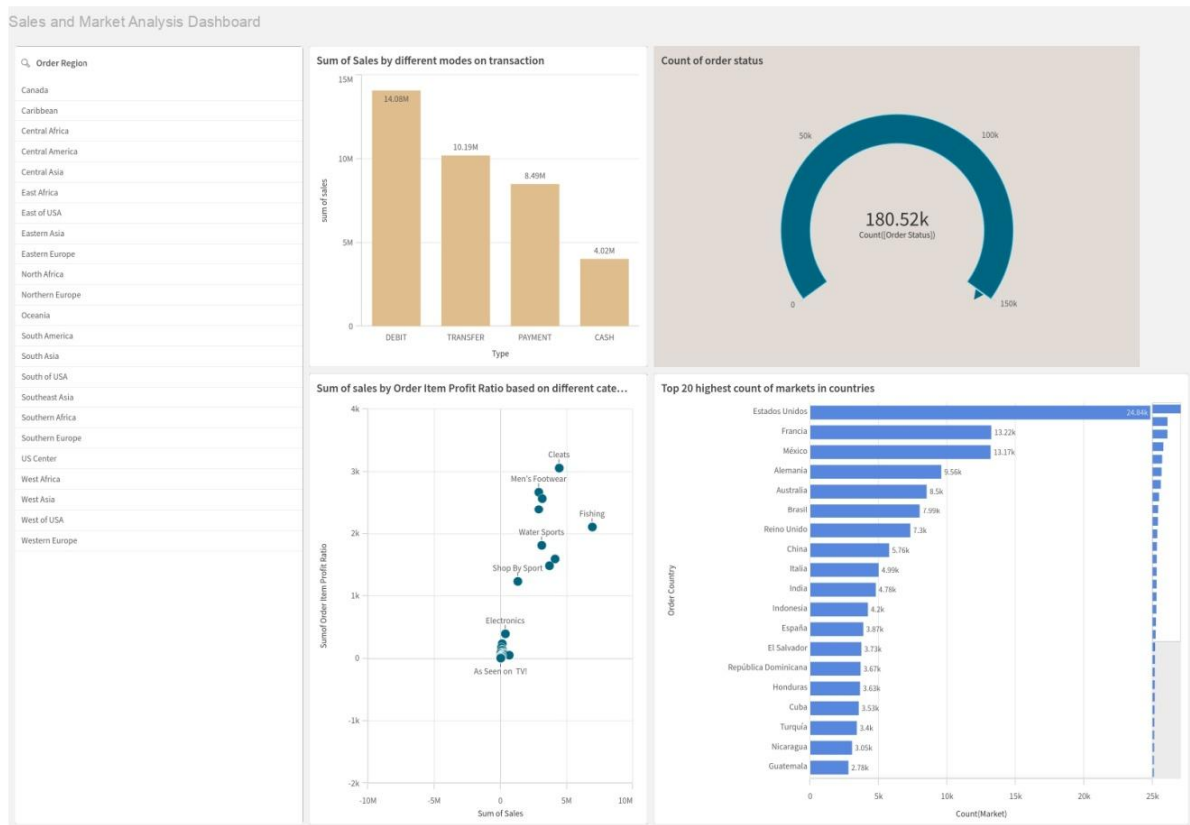
### Inventory Management Dashboard



### Logistics and Delivery Performance Dashboard

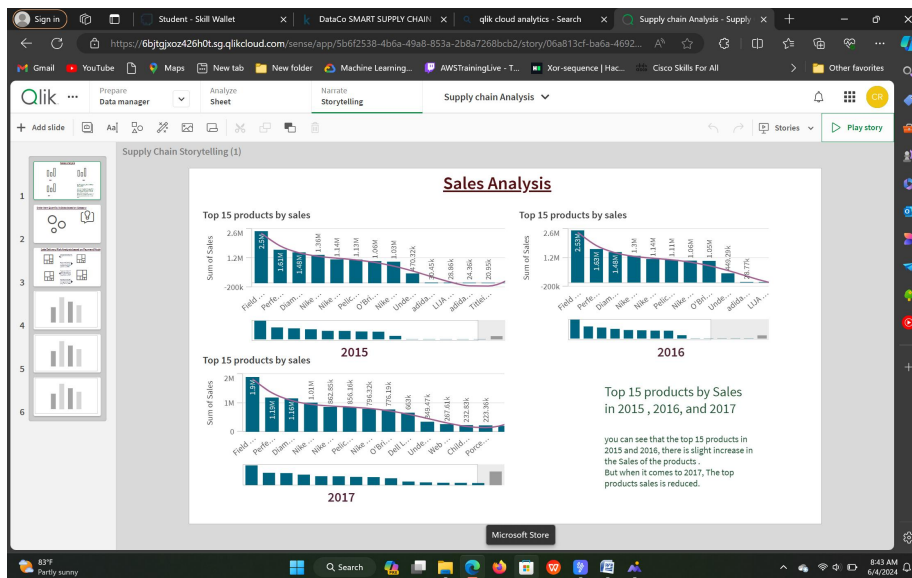


# Sales and Market analysis dashboard



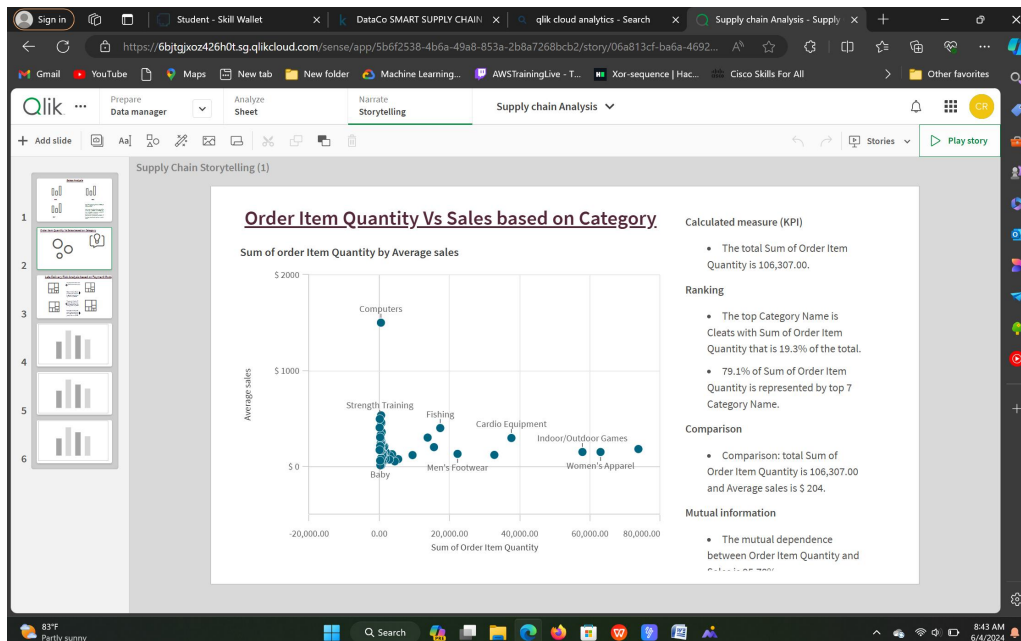
## 7.STORYTELLING

### 7.1. STORY CREATION



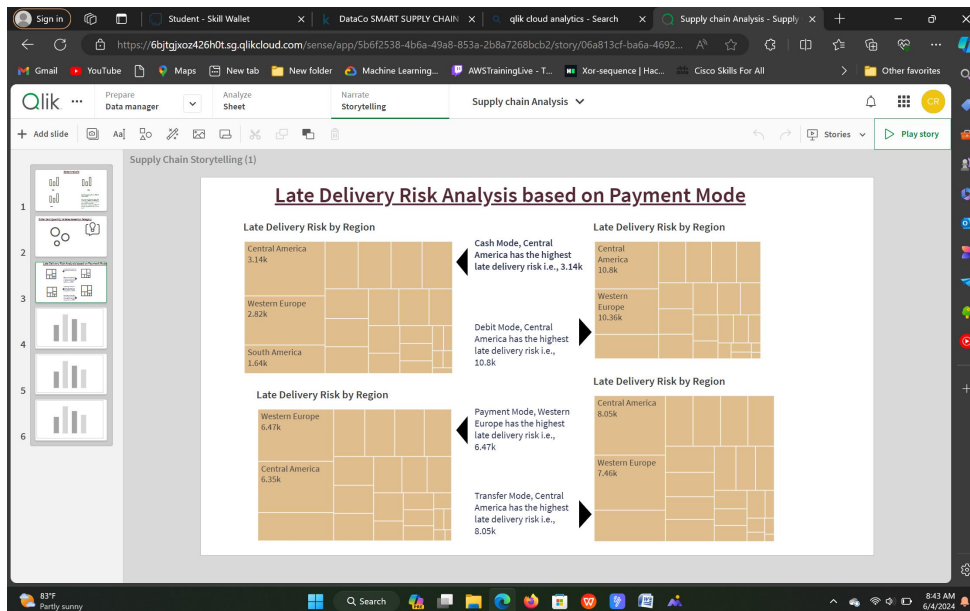
## 1) Top 15 Products by Sales (2015, 2016, 2017)

- **Content:** Sales data for the top 15 products over three years.
- **Purpose:** Show trends in product sales, highlighting a slight increase in 2015 and 2016, and a decline in 2017.



## 2)Order Item Quantity Vs Sales Based on Category

- **Content:** Comparison of order quantities and sales across different product categories.
- **Purpose:** Show the relationship between the number of items ordered and their sales, highlighting which categories perform best.



## 3)Late Delivery Risk Analysis Based on Payment Mode

- **Content:** Analysis of delivery risks associated with different payment modes in various regions.

### Details:

- **Cash Mode:** Central America has the highest late delivery risk (3.14k).
- **Debit Mode:** Central America has the highest late delivery risk (10.8k).
- **Payment Mode:** Western Europe has the highest late delivery risk (6.47k).
- **Transfer Mode:** Central America has the highest late delivery risk (8.05k).
- **Purpose:** Identify the risk areas in delivery based on payment methods, to improve logistics planning.

## 8.PERFORMACE TESTING

### 8.1. AMOUNT OF DATA RENDERED

The dataset is loaded from the kagge.com. I loaded 53 columns and 1,80,520 rows of data into the qlik sense. I removed 19 unwanted columns and some of the null values and then performed the analytics.

## 8.2. UTILIZATION OF DATA FILTERS

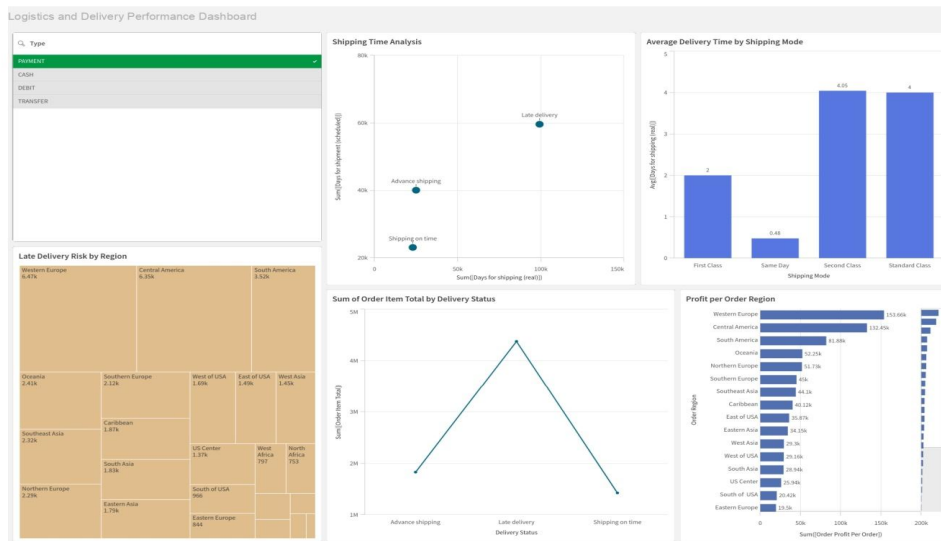


Fig-13: Payment mode filter

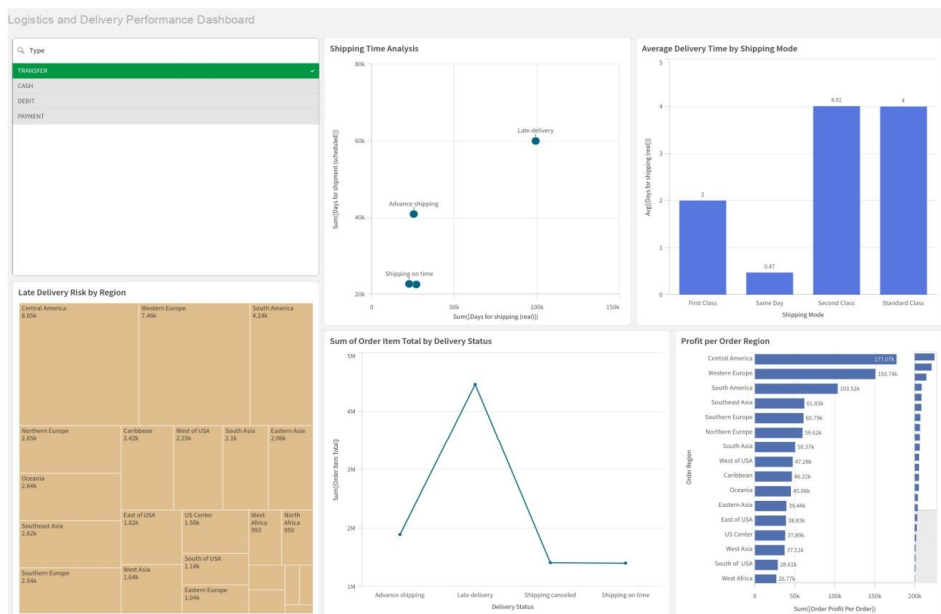


Fig-14: Transfer mode filter

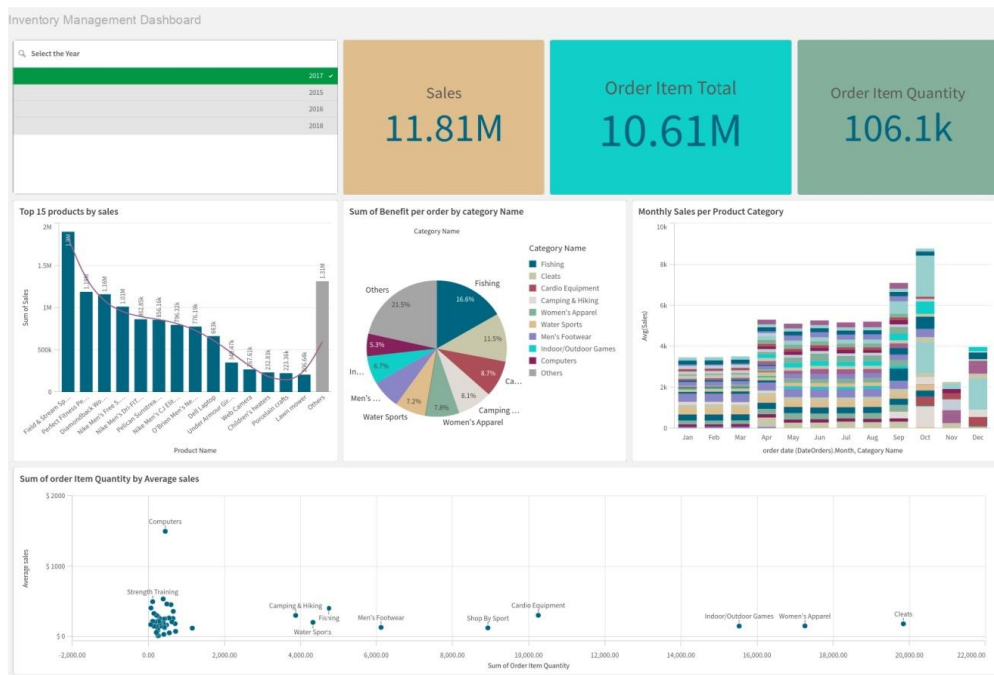


Fig-15: 2017 year filter

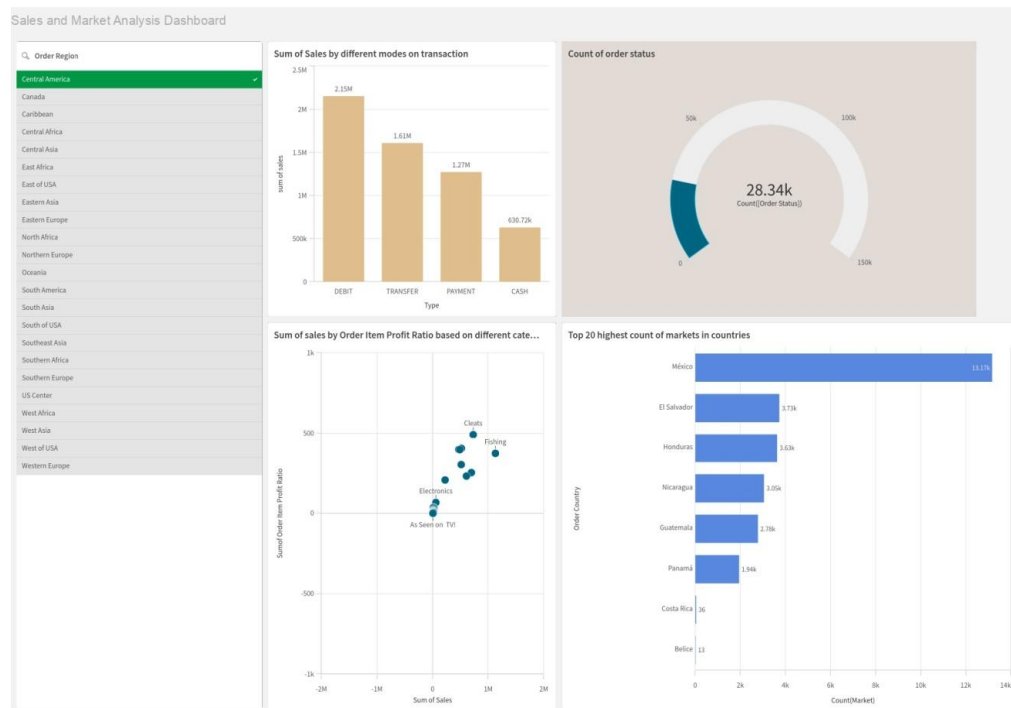


Fig-16: Central America country filter

## **Conclusion:**

From this analysis, there are a few key learnings and improvements to be made in the supply chain through advanced analytics software like Qlik: visibility, transportation route optimization, and inventory management. Sales analysis indicates varying performance trends, which show a noticed decrease in the year 2017, requiring strategic adjustments. Risk associated with different modes of payment helps in mitigating delays and improving customer satisfaction. Overall, the adoption of efficient data integration, real-time tracking, and responsive analytics will significantly improve our operational efficiency and responsiveness, placing us better in the competitive market landscape.