Data-Driven Innovations in Supply Chain Management with Qlik Insights

1. INTRODUCTION

1.1 Overview

This project seeks to make supply chain management more proactive and datadriven by leveraging Qlik Insights, therefore maintaining competitive advantage and operational excellence over time. Key processes include data integration, Visualisation , analysis and drawing conclusions for the said dataset.

1.2 Purpose

Key objectives include enhanced operational transparency and accountability,improved efficiency and reduced costs through optimized processes, greater agility in responding to market changes and customer demands, and increased ability to detect and mitigate fraud risks.

1.3 Techinal Architecture

2. DEFINE PROBLEM

2.1 Specify the business problem

With the help of Qlik, this project seeks to transform supply chain management through data-driven insights. It aims to improve operational responsiveness and efficiency by optimizing inventory management, forecasting, and logistics through the use of sophisticated analytics.

Using Qlik's data-driven insights, this innovative project aims to completely change the supply chain management industry. By utilizing advanced analytics, it aims to transform important aspects like inventory management, forecasting, and logistics, ultimately increasing operational responsiveness and efficiency to unprecedented levels.

2.2 Business requirement

This project aims to revolutionize supply chain management through data-driven insights using Qlik. Leveraging advanced analytics, it seeks to optimize logistics, forecasting, and inventory management, enhancing operational efficiency and responsiveness.

To achieve this, the project will:

1. Implement a Robust Data Integration Strategy: Aggregate and centralize relevant data from diverse supply chain sources, ensuring comprehensive and accurate data sets.

2. Utilize Qlik's Advanced Visualization Capabilities: Create intuitive and dynamic dashboards to provide stakeholders with clear insights into the entire supply chain ecosystem.

3. Leverage Qlik's Advanced Analytics Features: Analyze historical logistics data to identify patterns and optimize transportation routes, enhancing overall efficiency.

4.Implement Real-Time Tracking and Monitoring Solutions: Enhance visibility into the movement of goods, reduce lead times, and minimize transportation costs through continuous monitoring.

5. Facilitate Quick Decision-Making with Real-Time Analytics: Enable rapidresponse to unforeseen events or changes in demand, ensuring a proactive and
responsive supply chain.

This transformative initiative endeavors to reshape the landscape of supply chain
management by harnessing the power of Qlik's data-driven insights. Employing cuttingedge analytics, it strives

to revolutionize key facets such as logistics, forecasting, and
inventory management, with the overarching goal of elevating operational efficiency and
responsiveness to new heights.

2.3 Literature Survey

One of the main strategies for improving responsiveness and efficiency in supply chain management (SCM) is the incorporation of data analytics. With data-driven insights, powerful analytics tools like Qlik present a promising path toward modernizing supply chain management. Important scholarly and commercial sources on data integration, visualization, real-time analytics, and their applications in supply chain management are reviewed in this literature review.

● Data Integration in Supply chain Management

Data integration is critical for consolidating information from various sources within the supply chain. Studies by Chen et al. (2014) emphasize the importance of a unified data integration framework to manage data heterogeneity and improve decision-making processes. Haug and Stentoft Arlbjørn (2011) identify common challenges such as data silos and incompatible systems, proposing the use of ETL (Extract, Transform, Load) processes to ensure seamless data aggregation.

● Visualisations and Dashboards in SCM

Yigitbasioglu and Velcu (2012) highlight the role of dashboards in enhancing managerial decision-making by providing real-time, actionable insights. Visualization tools like Qlik can transform complex data sets into intuitive graphical representations. Research by Few (2006) suggests that effective visualization reduces cognitive load and improves the speed and accuracy of decision-making in supply chains.

● Advanced Analytics in Logistics and Transportation

Lai et al. (2016) discuss how advanced analytics can analyze historical logistics data to identify optimal transportation routes, reducing costs and improving delivery times. Choiet al. (2018) demonstrate the use of machine learning algorithms to detect patterns in logistics data, which can be leveraged to predict and mitigate potential disruptions

.

● Real-Time Tracking and Monitoring

Kembro et al. (2018) emphasize the importance of real-time tracking technologies in enhancing visibility across the supply chain, leading to reduced lead times and improved customer satisfaction.Also the implementation of IoT (Internet of Things) devices for real-time monitoring is discussed by Ben-Daya et al. (2019), highlighting their impact on reducing transportation and inventory holding costs.

● Real-Time Analytics for Proactive SCM

Holweg (2005) underscores the need for real-time analytics to create responsive supply chains capable of adapting to demand fluctuations and unforeseen disruptions.Several case studies, such as those compiled by McAfee and Brynjolfsson (2012), show how real-time data analysis enables companies to react swiftly to market changes, ensuring sustained operational efficiency.

● Qlik in Supply Chain Management

Davenport and Harris (2007) discuss the capabilities of Qlik in transforming data into insights through its powerful analytics and visualization tools. LaValle et al. (2011) provide insights into the implementation of Qlik in various industries, highlighting its benefits in enhancing decision-making and operational efficiency.
The integration of Qlik's advanced analytics and visualization capabilities into SCM can significantly enhance data-driven decision-making. By leveraging robust data integration strategies, intuitive dashboards, real-time tracking, and proactive analytics, supply chains can achieve higher levels of efficiency and responsiveness. This literature survey underscores the transformative potential of Qlik in SCM and provides a foundation for further research and implementation strategies.

3. DATA COLLECTION

3.1 Collect the dataset

The process of acquiring and assessing data on relevant variables in a predetermined, methodical manner is known as data collecting. Accurate data collection ensures that decisions are based on reliable information, leading to more effective supply chain strategies. It allows one to assess results, test hypotheses, respond to research questions, and draw conclusions from the data

.

3.2 Connect Data with Qlik Sense

Integrating and centralizing data from multiple sources, including ERP systems, CRM platforms, IoT devices, and logistics suppliers, is necessary to connect data with Qlik Sense. With its powerful ETL (Extract, Transform, Load) features, Qlik Sense facilitates smooth data aggregation, guaranteeing that many data sources are combined into a solitary, cohesive dataset. These data are integrated, and then turned into user-friendly, interactive dashboards via Qlik Sense's sophisticated analytics and visualization tools. Through the provision of real-time insights into supply chain operations, these dashboards help stakeholders make well-informed decisions, optimize logistics, estimate demand, and improve the overall responsiveness and efficiency of the supply chain.

4. Data preparation

4.1 Preparation of data visualization

The process involves cleaning the data to remove irrelevant or missing data, filtering the data,adding some columns such as metrics and categorization to complete the data, excluding anomaly data within the dataset, removing unnecessary fields and other necessary actions. It ensures that the data is

accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into performance and efficiency.

Metrics

a. Shipping Lead Time Variance
Measures the difference between the actual number of days it took for shipping (real) and the scheduled number of days for shipment (scheduled).
Formula: **Actual Shipping Days — SLA Shipping Days**

b. On-Time Rate
Performance indicator that measures the percentage of deliveries or orders that are completed within the specified or agreed-upon timeframe (SLA).
Formula: **(Number of orders shipped on time / Total number of orders) x 100**

c. Average Shipping Lead Time
Provides an overall view of the time it typically takes for products to be shipped from the company to the customers.
Formula: **AVG (Actual Shipping Days)**

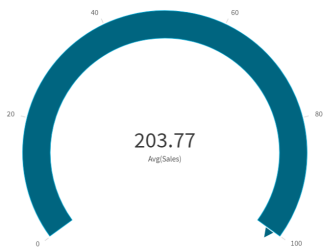
5. DATA VISUALISATION

5.1 Visualisations

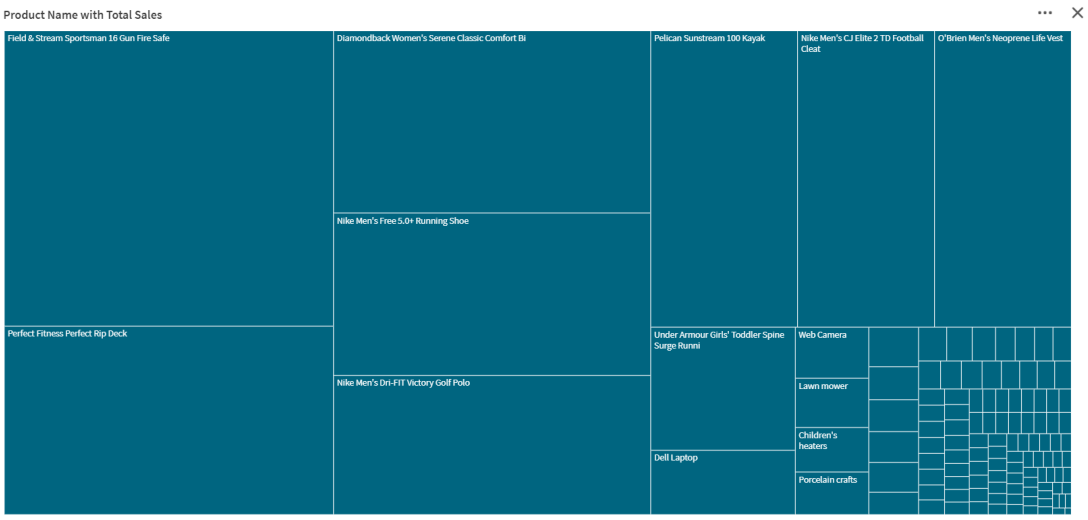
The ability of visualizations to convert complex data into clear, intuitive formats facilitates speedier and more efficient decision-making, which makes them indispensable. In order to facilitate the extraction of actionable insights, they aid in highlighting patterns, trends, and anomalies that may be missed in raw data. Charts, graphs, and dashboards are examples of visual representations that help in communication and collaboration. They enable stakeholders to quickly understand important information and make decisions based on succinct and understandable data presentations. Visualizations essentially fill the knowledge gap between data and interpretation, resulting in more effective and influential analysis.

The following visualisations were performed:

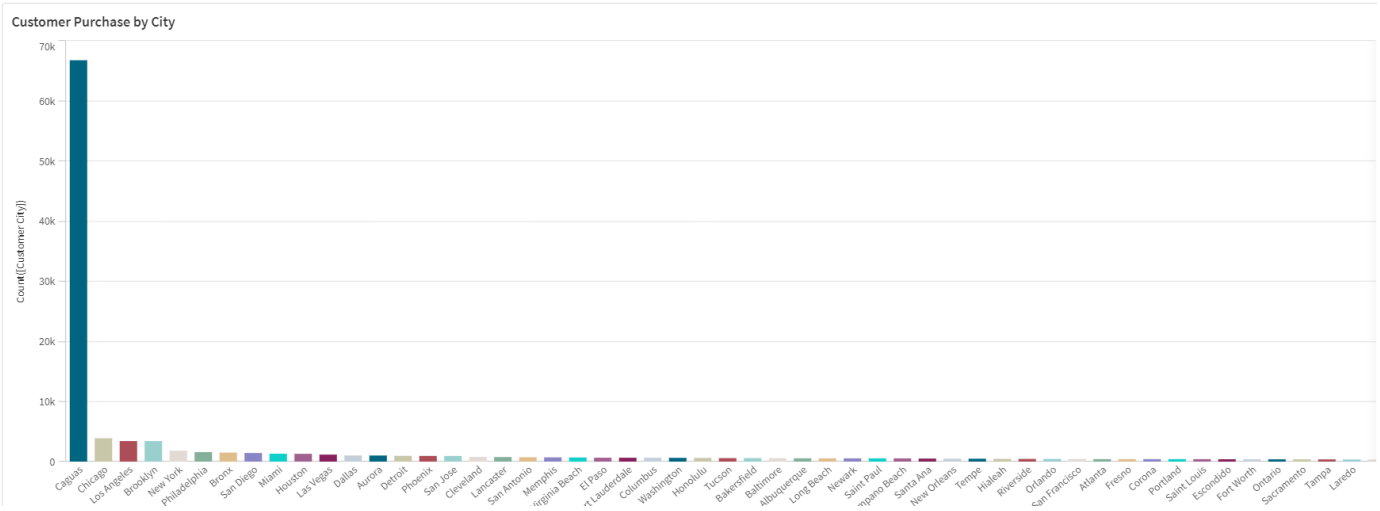
1. Average Sales



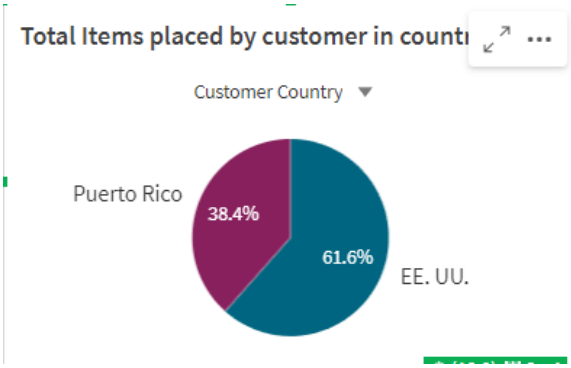
2.Product name with Total sales



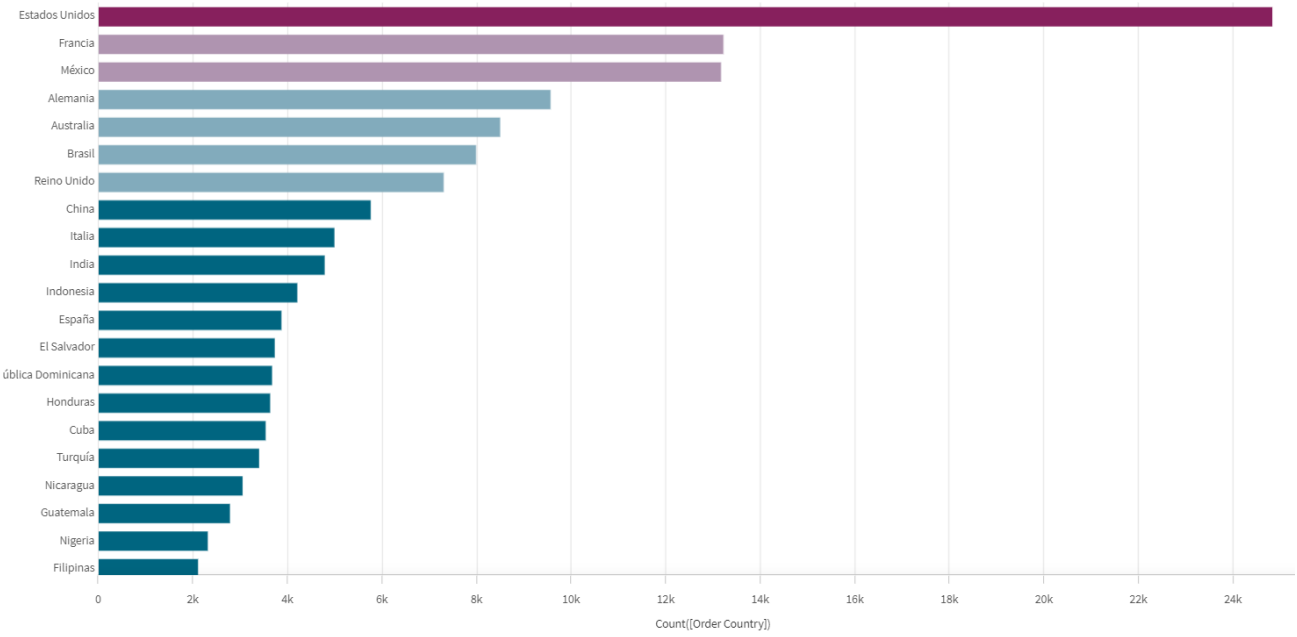
3.Customer purchase by city



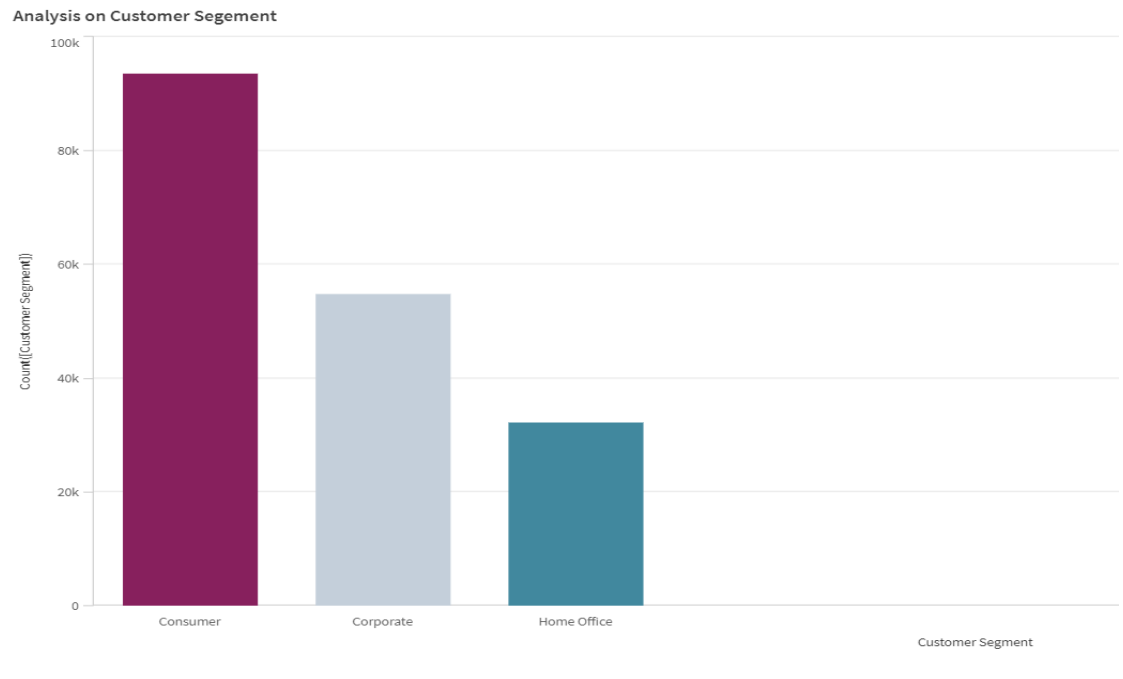
4.Total items places by a customer in country



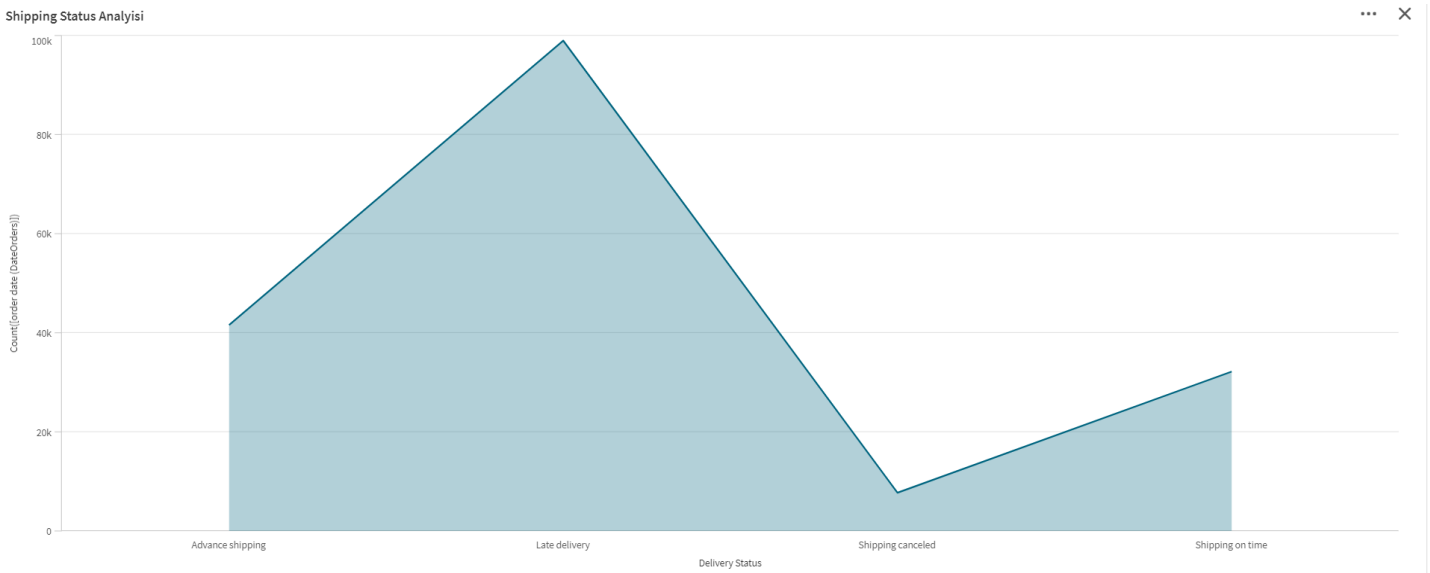
5. Total item places of the country



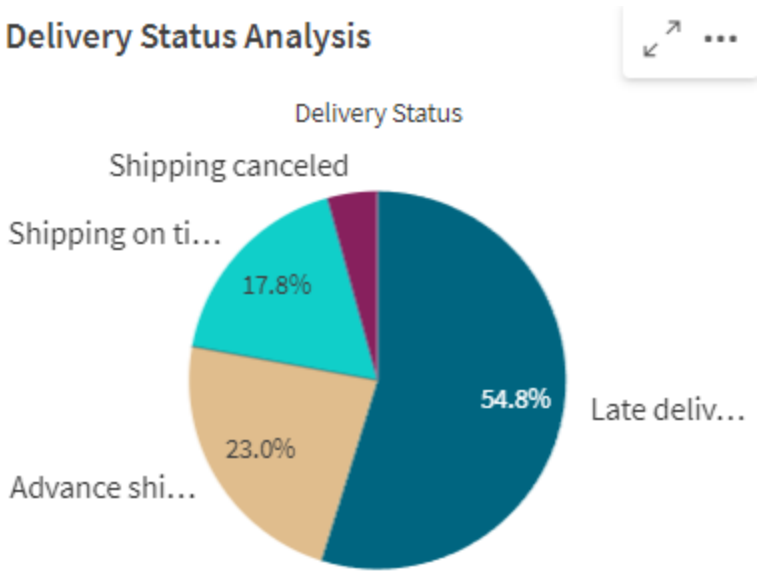
6 .Analysis on Customer Segment



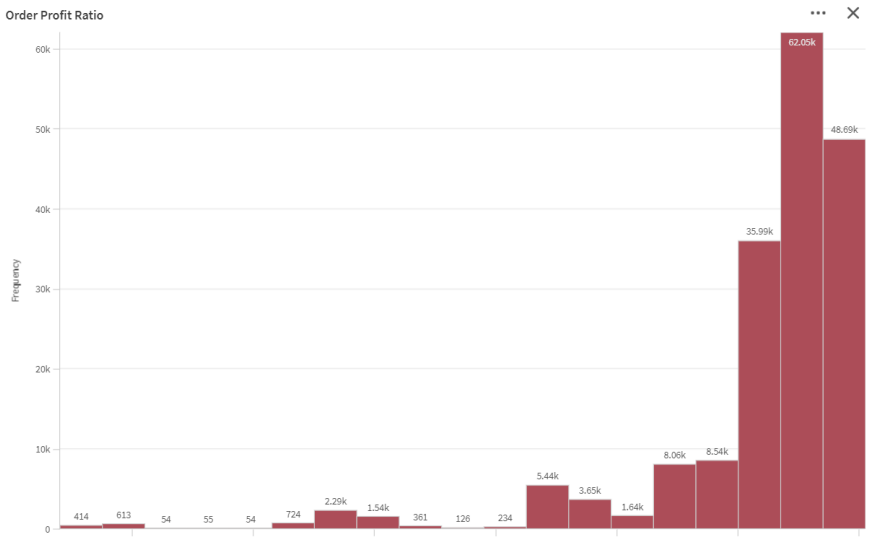
7. Shipping Status analysis



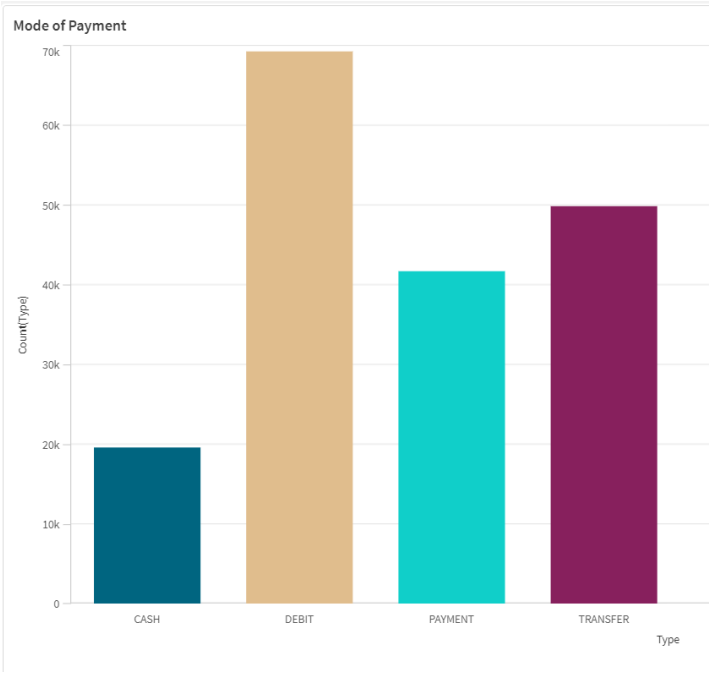
8. Delivery Status analysis



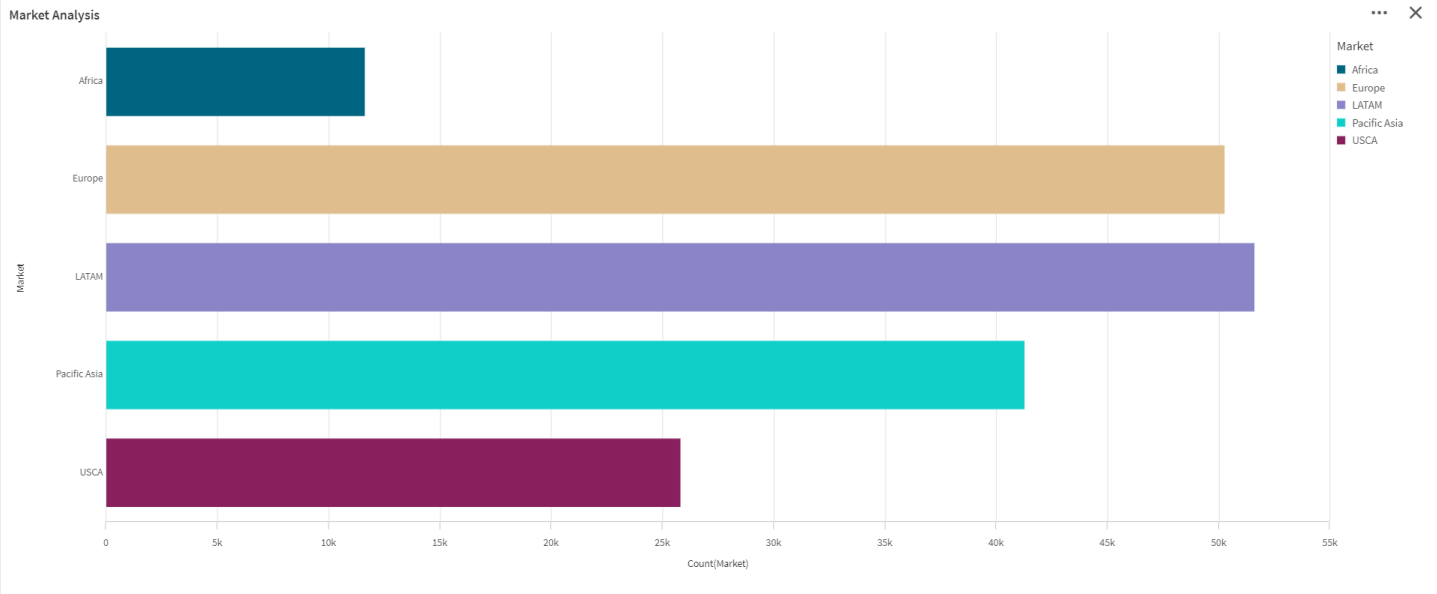
9.Order profit ratio



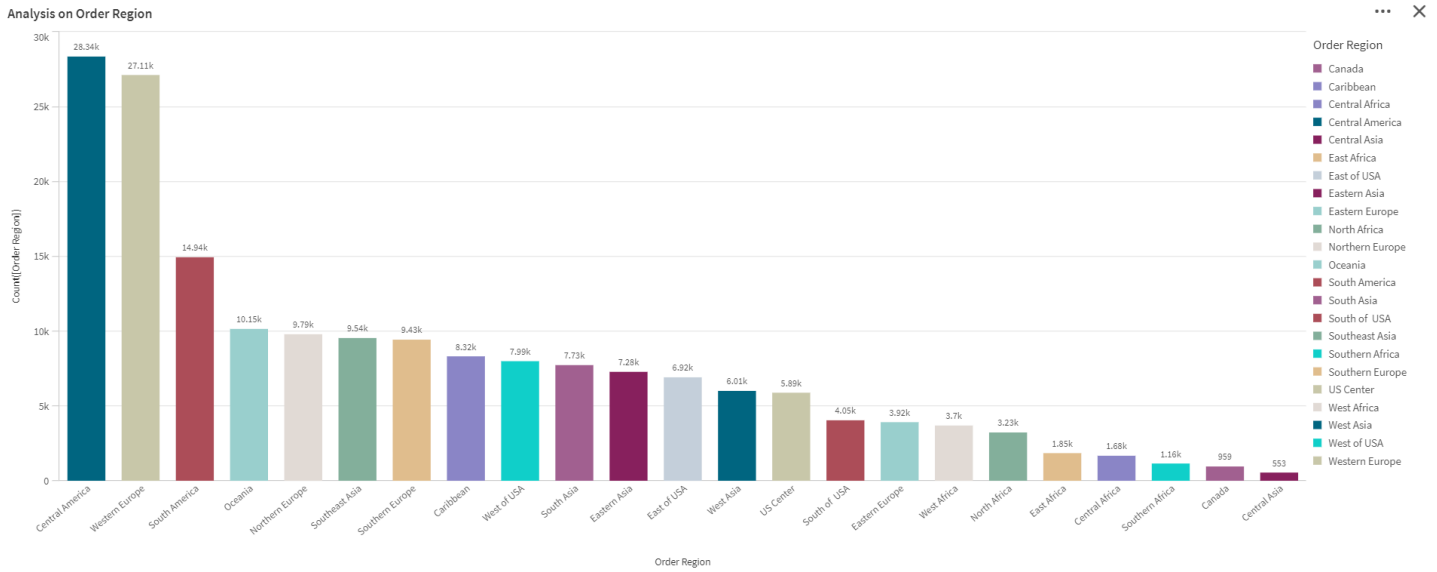
10. Mode of payment



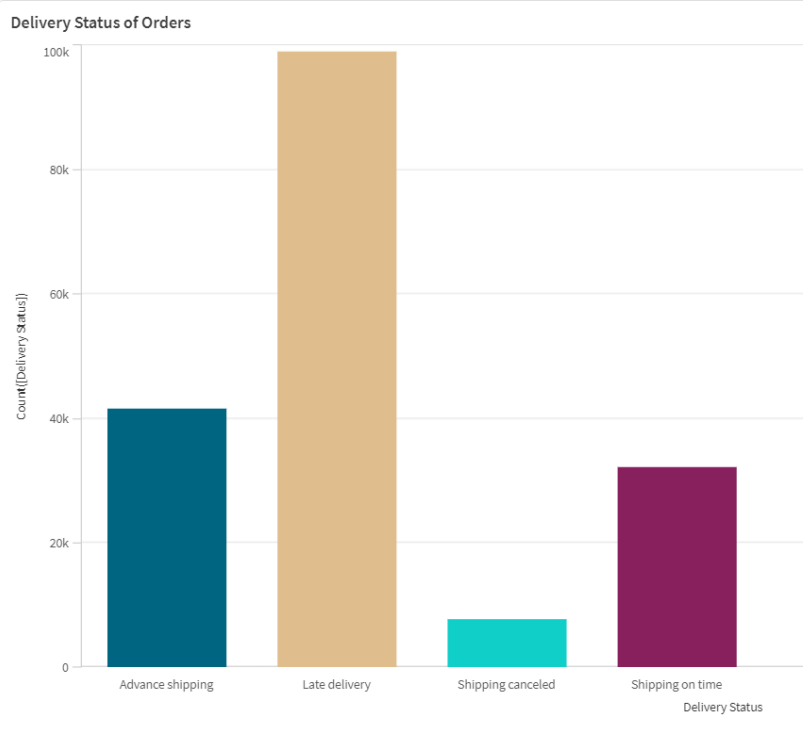
11. Market analysis



12. Analysis on order region



13. Delivery status of orders

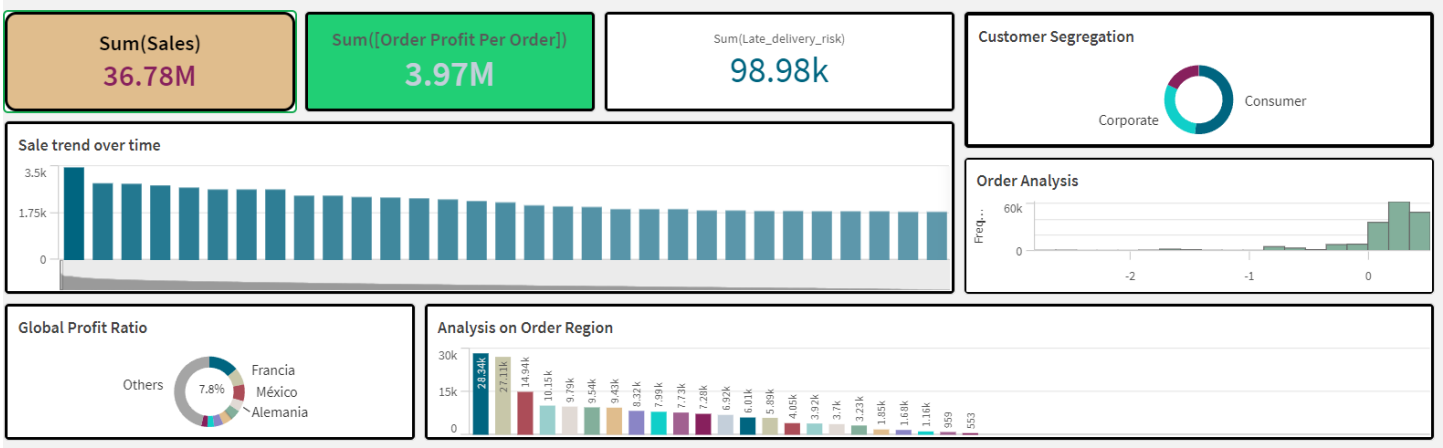


6. DASHBOARD

6.1 Responsive and Design of Dashboard

A dashboard is a single interface that presents important metrics and data points in a visual manner for rapid and simple examination. It gives customers instant insights and a summary of important data, enabling them to effectively track progress, keep an eye on performance, and make data-driven decisions. Dashboards use of a variety of visual components, including tables, graphs, and charts, to show data in an understandable and user-friendly way that makes it possible for stakeholders to quickly assess results, spot patterns, and identify problems. Dashboards improve visibility and expedite decision-making processes within organizations by centralizing critical data.

The following Dashboard was created:



7. Report

7.1 Report Creation

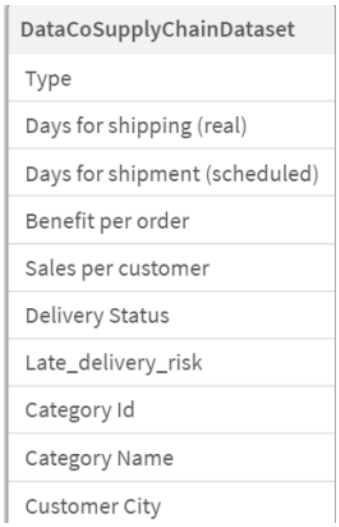
For the year 2017 ,The overall On-Time Rate (OTR) of only 41% indicates that around 41% of customer orders were not delivered according to the service level agreement (SLA). The total sales is 36.78M accross 164 order country. Top sales is 4.88M where top sales is Estados Udidos with sales that is 13.3% of total. 80 percent of sales is represented by top 25 order country.Average order item profit ratio is 0.4. Top market in europe with salesis 29.6% of the total sales. 80% of sales is represented by top 3 market It turns out that DataCo Global's OTR performance remains relatively stable on a month-to-month basis, ranging from 40% to 43%. Although the delivery performance is still considered poor, it is at least consistent and does not fall below the 40% mark. Additionally, it is noteworthy that around 45% of orders are directed towards the destination regions of Western Europe and Central America. This indicates a substantial demand for shipments to these regions, further emphasizing their importance in the overall order distribution. We've gathered the routes originating from Caguas to the Western Europe and Central America regions, which contribute the majority of orders. There are contrasting performance levels between shipping modes highlight the need for a closer examination of the factors affecting the Second Class shipping mode.

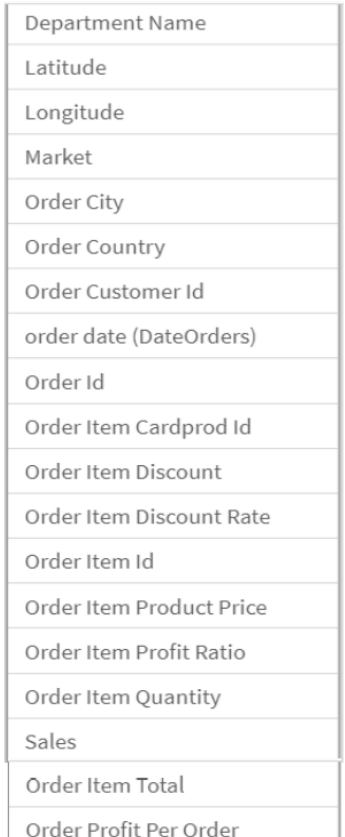
With data storytelling you can create a presentation based on the data in your app. You can take snapshots of selected visualizations and use them in your narrative together with text, shapes, and effects. By converting complex data into compelling stories, Qlik provides actionable insights that drive informed decision-making and strategic planning.

8. PERFORMANCE TESTING

8.1 Amount of Data Rendered

The term "Amount of Data Rendered" describes the amount or volume of data that has been loaded into a database, software program, system, or other data processing or storage environment. It is a gauge of the volume of data that has been effectively processed and made accessible for the system's use, analysis, and manipulation.





Order Item Quantity
Sales
Order Item Total
Order Profit Per Order
Order Region
Order State
Order Status
Product Card Id
Product Category Id
Product Image
Product Name
Product Price
Product Status
shipping date (DateOrders)
Shipping Mode

8.2 Utilization of data filters

The term “Utilization of Filters” denotes the deliberate application of filters within a system or software. These filters selectively extract, manipulate, or analyze data based on predefined criteria. By narrowing down the data scope, filters ensure that only relevant information meeting specific conditions is considered. We can make new columns based on filters. For example shipping lead time variance is difference of real shipping time and scheduled shipping time

8.3 No of Visualizations

1. Average Sales
2. Product name with total sales
3. Customer purchase by city
4. Total item placed by customer in country
5. Total item places of the country
6. Analysis on Customer Segmentations
7 .Shipping Status analysis
8. Delivery status analysis
9. Analysis on order region
10. Mode of payment
11. Market analysis
12.Delivery status of orders
13. Average benefir per order..

Conclusion

We have drawn useful insights using the given DataCo's global dataset of supply chain management.We have analyzed sales ,order and profit ratio of various regions given in the dataset.We have also analyzed delivery patterns and on time ratios for the datset provided.Using qlik sense the measure of total sum of sales, profit and time delay was made easy using KPI's. In a nutshell we can say that overall analysis of supply chain using business anlysis was successful.