Data-Driven Innovations In Supply Chain Management With Qlik Insights

Project Report

Index

1. Introduction

1.1 Overview: A brief description of the project

The project “Data-Driven Innovations In Supply Chain Management With Qlik Insights” deals with the challenge to Optimize inventory to balance demand and cost efficiency. Maximize production efficiency and Quickly respond to shifts in demand with near real-time insights to avoid over- or under-stocking. The project aims to improve supply chain management using data analytics. By using Qlik Insights, we’ll make better decisions, streamline operations, and innovate across the supply chain. Real-time insights and predictive analytics will help us create an efficient and responsive network.

This report dives deep into supply chain analytics, where the analysis of comprehensive datasets provides valuable insights that drive efficient operations and strategic decision-making, mainly in delivery performance.

1.2 Purpose of the project

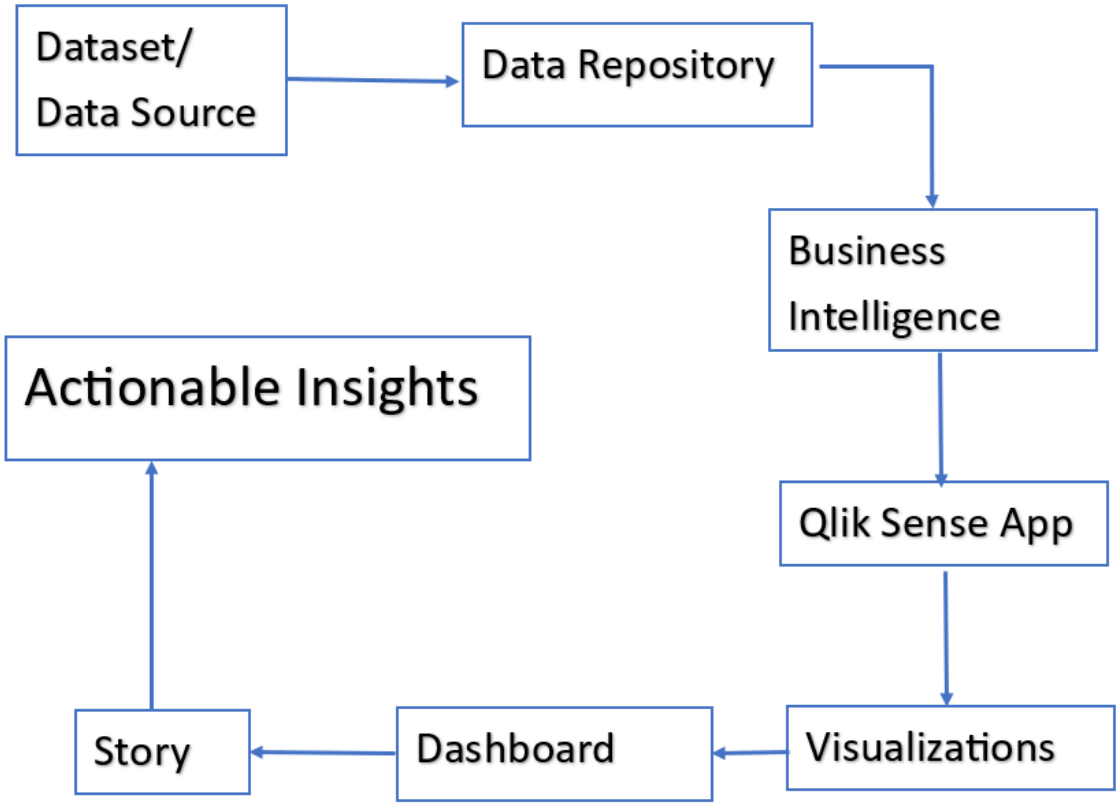
The purpose of the project is to draw useful insights using Qlik Sense platform. It integrates business analytics and Qlik cloud to create visualizations and understand the data more clearly.

The purpose of the project “Data-Driven Innovations in Supply Chain Management with Qlik Insights” is to revolutionize supply chain management through data-driven insights using Qlik. By leveraging advanced analytics, the project aims to optimize logistics, forecasting, and inventory management, ultimately enhancing operational efficiency and responsiveness.

1.3 Technical Architecture

The flowchart depicts a Technical process, starting from the Dataset/Data Source on the top left. Data flows through the Data Repository, ensuring centralized storage and accessibility.The Business Intelligence box represents the layer where data is transformed and analyzed.Here, data modeling, aggregation, and calculations occur.The flow leads to the Qlik Sense App box. In Qlik Sense, users create apps for data visualization and exploration.These apps connect to the data repository and

allow users to build interactive dashboards.The Story and Dashboard boxes highlight the importance of storytelling and visual representation.Users create compelling narratives using visualizations, making data insights more accessible.The final step is creating visualizations (e.g., charts, graphs) in the Visualizations box.These visual representations provide actionable insights for decision-making.



2. Problem Understanding

2.1 Specify Business Problem

Supply chain company must prioritize monitoring customer delivery performance in order to improve customer satisfaction, optimize productivity, and maintain competitiveness in the market. By closely tracking the delivery process and analysing relevant metrics, company can gain valuable insights into their performance, identify areas for improvement, and proactively address any issues that may arise in the future.

The primary objective of this transformative project is to revolutionize supply chain management by leveraging Qlik's data-driven insights. Through advanced analytics, we aim to reshape critical areas such as logistics, forecasting, and inventory management. Our overarching goal is to enhance operational efficiency and responsiveness to unprecedented levels.
In summary, this project represents a significant step forward in optimizing supply chain operations, informed by real-time data and cutting-edge analytics.

2.2 Business Requirement

2.2.1. Data Integration Strategy:

Aggregate data from diverse supply chain sources (e.g., suppliers, warehouses, transportation providers). Centralize this data for consistency and accessibility.

2.2.2. Advanced Visualization:

Utilize Qlik's powerful visualization capabilities to create intuitive dashboards. Provide stakeholders with clear insights into the entire supply chain ecosystem.

2.2.3. Advanced Analytics for Logistics Optimization:

Analyse historical logistics data using Qlik's advanced features. Identify patterns and optimize transportation routes.

2.2.4. Real-Time Tracking and Monitoring:

Implement real-time tracking solutions for goods in transit. Enhance visibility, reduce lead times, and minimize transportation costs.

2.2.5. Responsive Decision-Making:

Use real-time analytics to respond swiftly to unforeseen events or demand changes.
Ensure a proactive and responsive supply chain.

2.3 Literature Survey

A literature survey on the project theme of revolutionizing supply chain management through data-driven insights and advanced analytics reveals a

growing body of research and scholarly articles focused on similar endeavours. Studies underscore the increasing recognition of the pivotal role that data analytics plays in transforming traditional supply chain processes. Research highlights the effectiveness of leveraging advanced analytics tools, such as Qlik, to enhance visibility and decision-making in supply chain operations. The study emphasizes the positive impact on logistics optimization, forecasting accuracy, and inventory management efficiency. Moreover, delves into the broader landscape of data-driven supply chain transformations, exploring diverse analytical techniques and technologies. The findings showcase successful implementations, demonstrating notable improvements in operational efficiency and responsiveness across various industry sectors. In addition, examines the challenges and opportunities associated with the adoption of data-driven insights in supply chain contexts. The literature emphasizes the need for organizations to develop robust data governance frameworks and cultivate a data-driven culture to fully unlock the potential benefits.

3. Data Collection

3.1 Collecting the dataset

This dataset is from the company named DataCo Global. The dataset contains information about the supply chain operational such as customers (seller), orders, distribution, shipping, and products from 2015 to 2018.
The dataset is relatively small with only 180.519 data rows.
Areas of important registered activities: Provisioning, Production, Sales, Commercial Distribution.It also allows the correlation of Structured Data with Unstructured Data for knowledge generation.
Type Data:
a. Structured Data: DataCoSupplyChainDataset.csv
b. Unstructured Data: tokenized_access_logs.csv (Clickstream)
Types of Products: Clothing, Sports, and Electronic Supplies
Additionally, it is attached in another file called DescriptionDataCoSupplyChain.csv, the description of each of the variables

of the DataCoSupplyChainDatasetc.csv.

3.2 Connect the data with Qlik Sense

We need to upload the dataset in the Qlik Cloud. After uploading the dataset, we need to form a new analytics app in Qlik Sense. Now we need to connect the dataset to the analytics app. We need to filter which fields we need for analysis to make the dataset relatively smaller. Now we can preprocess and prepare the data for analysis.

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.

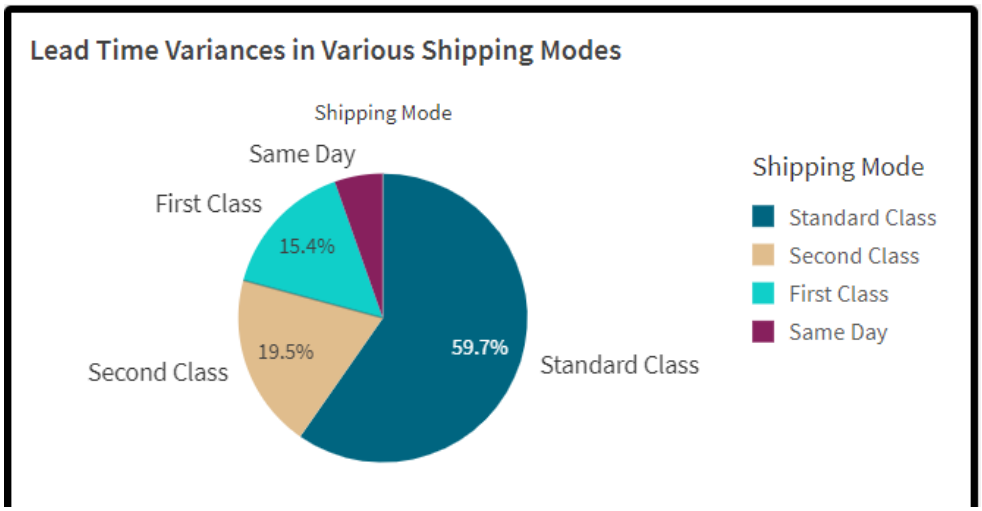
   Formula: AVG (Actual Shipping Days)

5. Data visualization

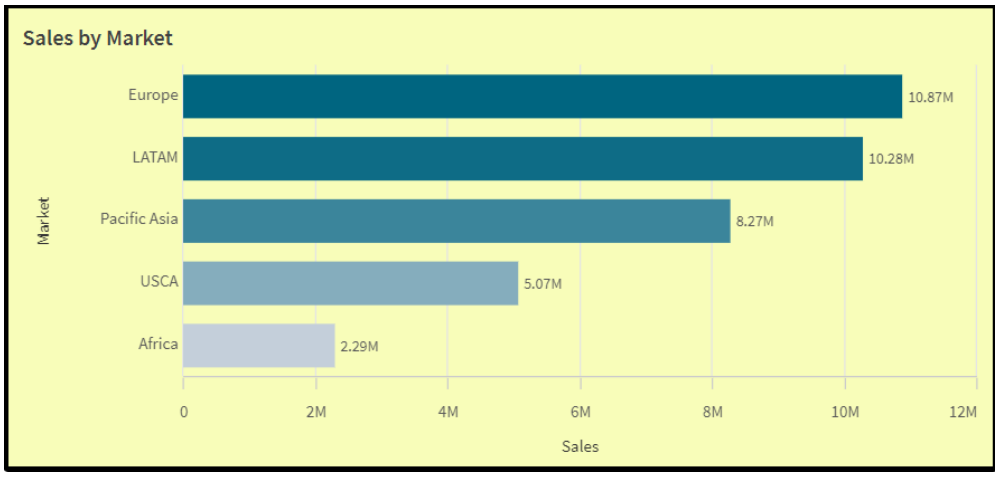
5.1 Visualization of data

Data visualization refers to the graphical representation of information and data using visual elements such as charts, graphs, and maps. These visual tools make it easier to understand trends, patterns, and outliers within a dataset. By presenting complex data relationships in a visual format, data visualization helps convey insights in an accessible and intuitive manner There are number of unique visualizations that can be created with the given dataset. These visualizations can be used to, show distribution, and relationships between variables, breakdown of revenue and customer demographics, divide the supply and order into regions and state, finding ratio of profits in each country.

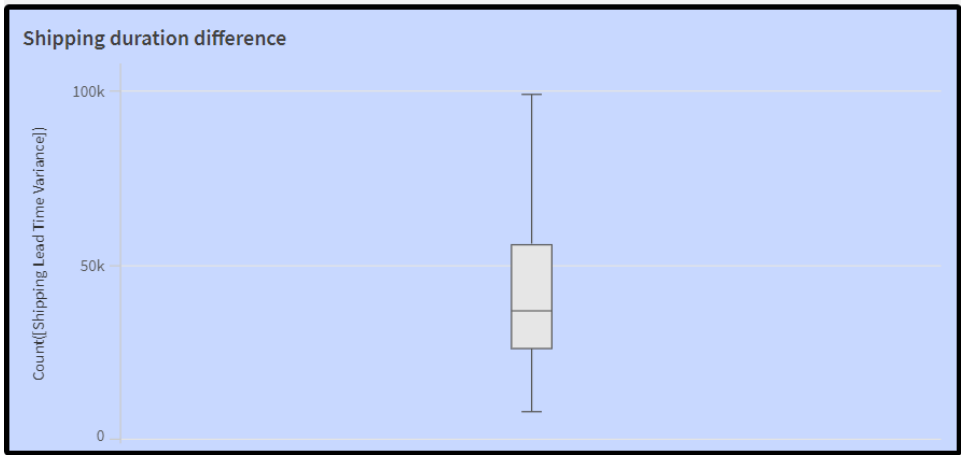
A.) Pie Chart



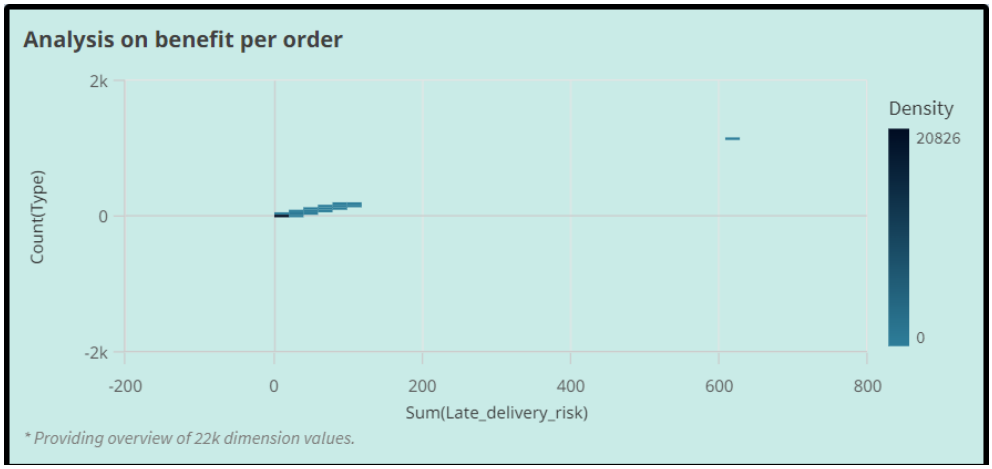
B.)Bar Chart



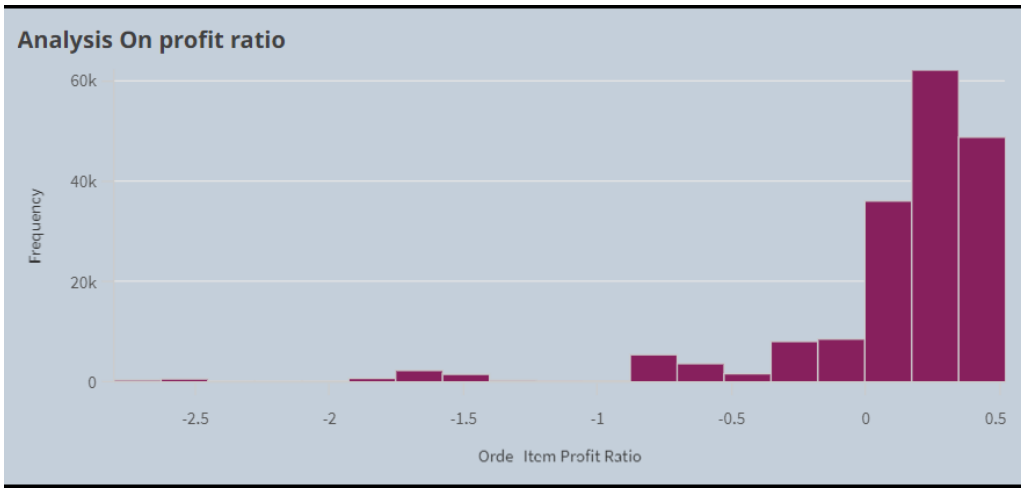
C.) Box Plot



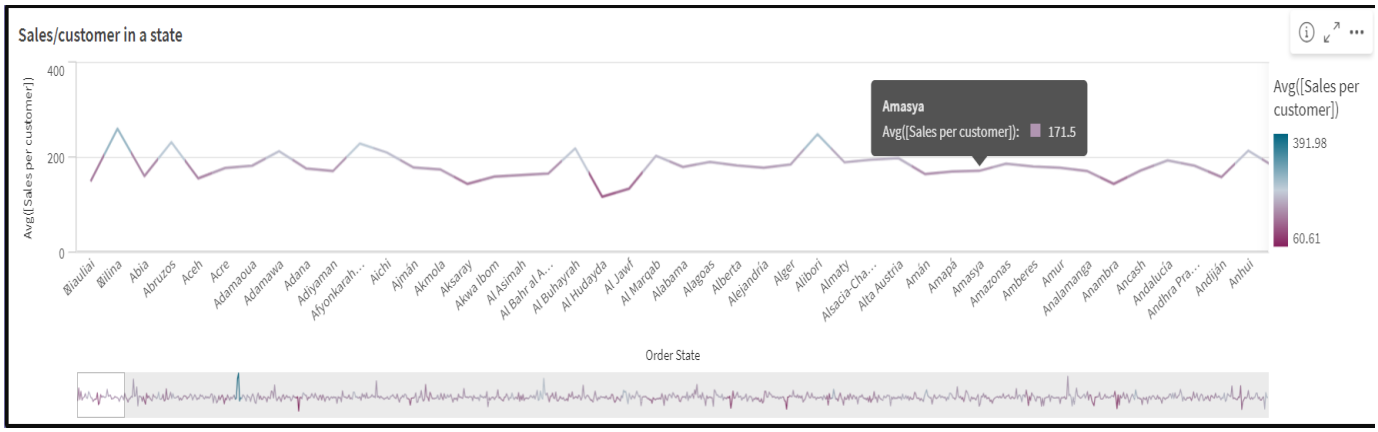
D) Scatter Chart



E.) Histogram



F.)Line Chart



6. Dashboard

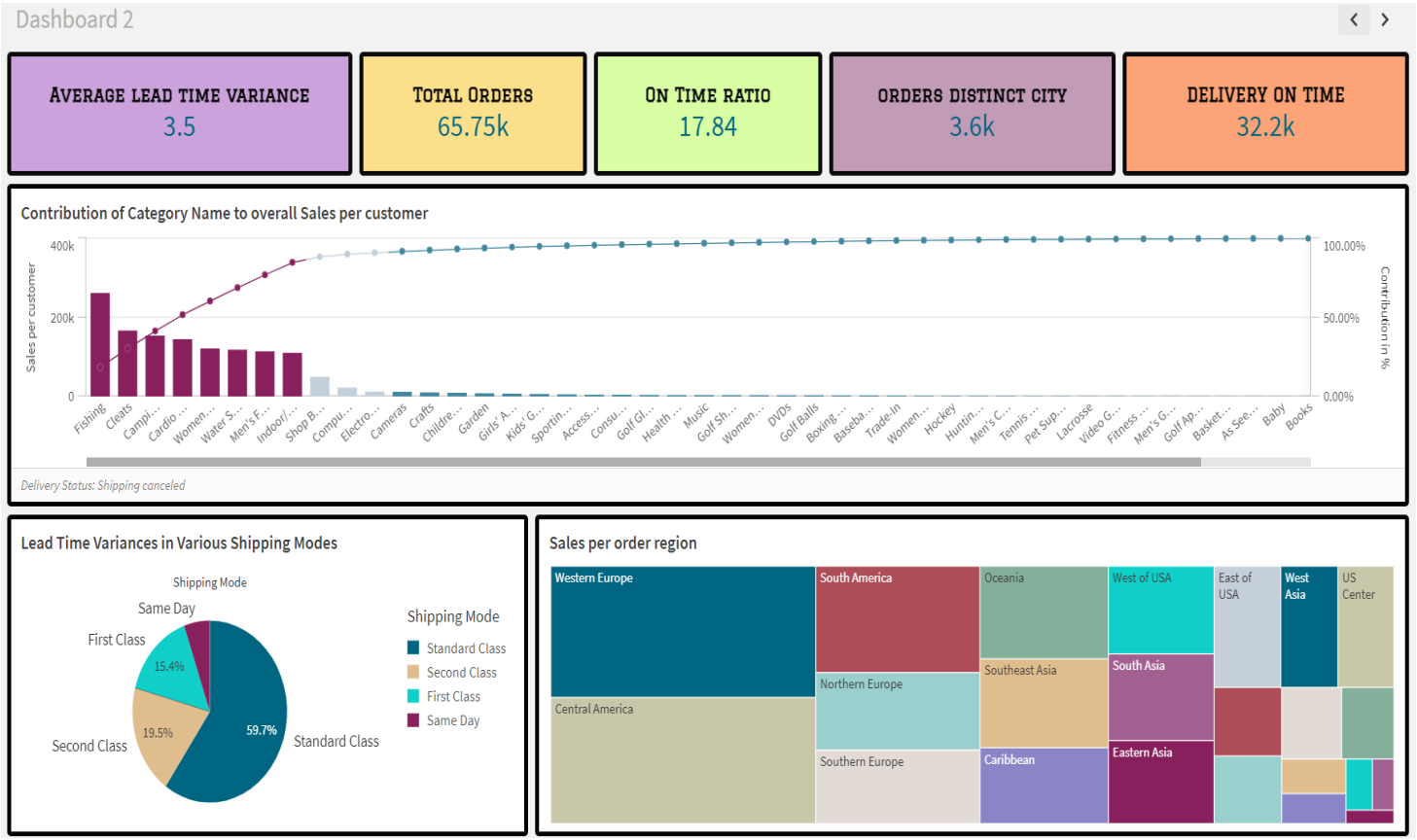
6.1 Responsive and design of dashboard

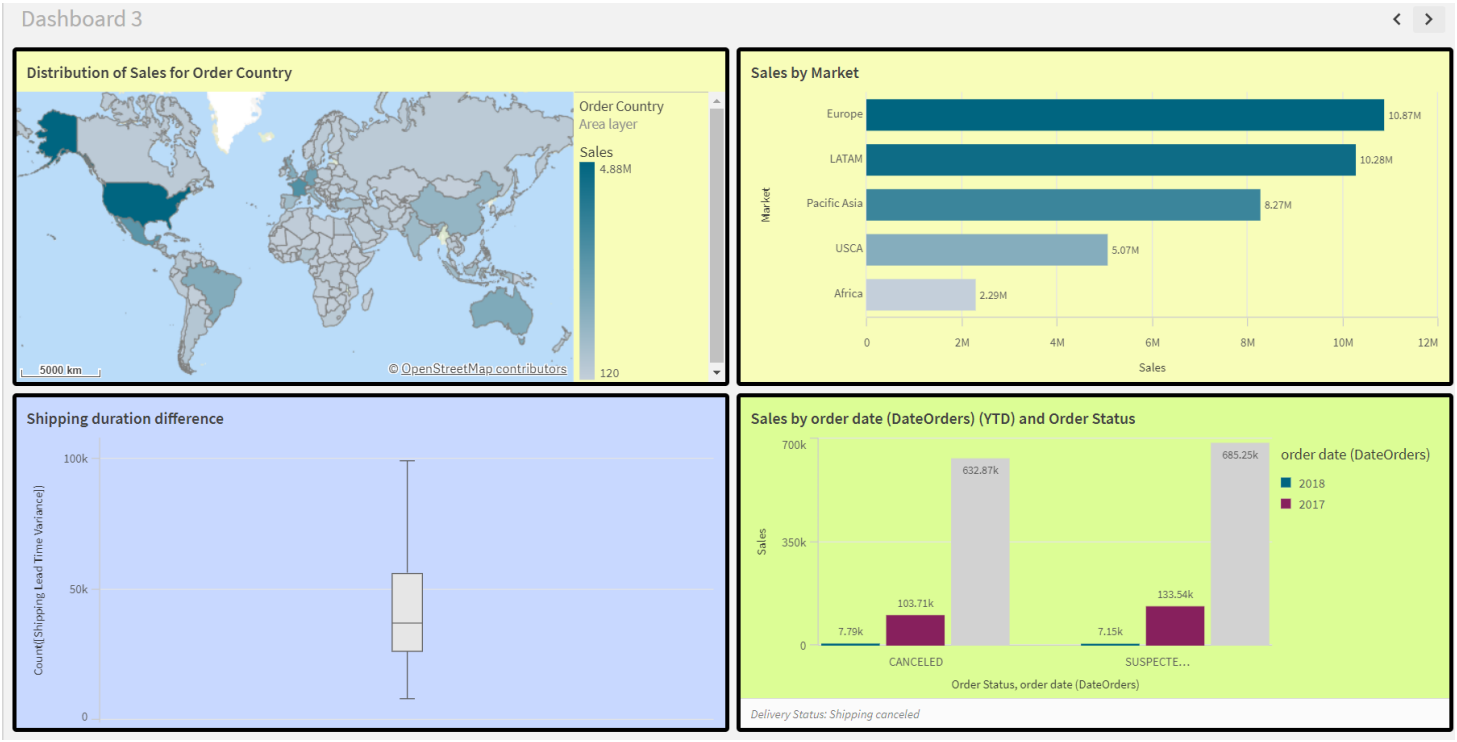
Dashboards provide real-time monitoring and analysis of data. Dashboard explains the user flow for monitoring delivery performance, the dashboards provides the Manager with an overview of distribution origin and destination. It enables them to track the movement of goods in real time, identify deliveries at risk of being delayed, and promptly investigate the underlying causes. By proactively addressing these issues, the Manager can take preventive measures to ensure timely and efficient delivery of orders.Dashboards can be used to track key performance indicators(KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

The dashboard also offers various features and insights that aid the Manager in

strategizing and optimizing delivery performance, empowering them to make informed decisions, streamline processes, and enhance overall operational efficiency.

In this project we have created seven dashboards. Some examples are listed below :




Dashboard 3
Distribution of Sales for Order Country
Order Country
Area layer
Sales
4.88M
120
5000 km
© OpenStreetMap contributors
Sales by Market
Europe
LATAM
Pacific Asia
USCA
Africa
10.87M
10.28M
8.27M
5.07M
2.29M
Market
0
2M
4M
6M
8M
10M
12M
Sales
Shipping duration difference
100k
50k
0
Count([Shipping Lead Time Variance])
Sales by order date (DateOrders) (YTD) and Order Status
700k
350k
0
Sales
7.79k
103.71k
632.87k
7.15k
133.54k
685.25k
CANCELED
SUSPECTE...
Order Status, order date (DateOrders)
order date (DateOrders)
2018
2017
Delivery Status: Shipping canceled


Dashboard 6
ORDER DATE VS SALES
200
170
140
Avg([Sales per cust...
2015
2016
2017
2018
order date (years)
Avg([Sales per customer])
199.47
140.34
Average days taken in each shipping mode
First Class
Same Day
Second Class
Standard Class
2
0.48
3.99
4
Shipping Mode
0
0.5
1
1.5
2
2.5
3
3.5
4
Avg([Days for shipping (real)])
Benefit Per category
Cleats
Men's Footwear
Women's Apparel
Indoor/Outdoor Games
Fishing
Water Sports
Camping & Hiking
Cardio Equipment
Shop By Sport
Electronics
24.55k
22.25k
21.04k
19.3k
17.33k
15.54k
13.73k
12.49k
10.98k
3.16k
Category Name
0
5k
10k
15k
20k
25k
Count([Benefit per order])

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

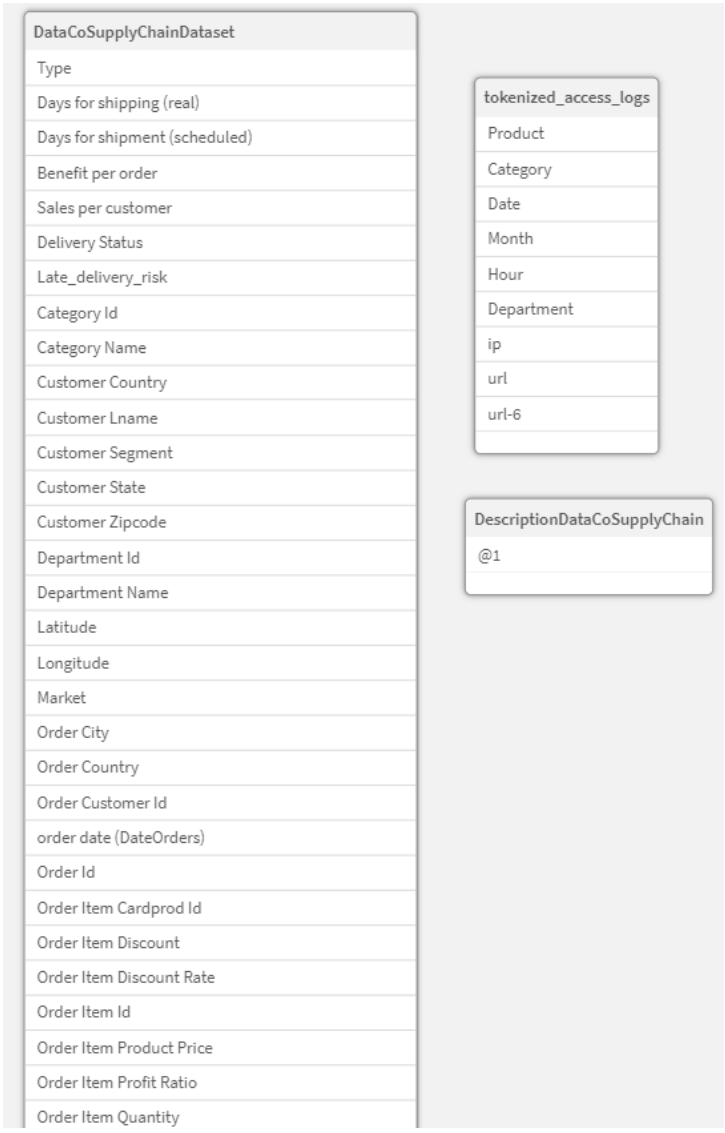
The amount of data rendered is the total number of feilds used creating analytics. The useful fields are the rendered data loaded in qlik sense interface .These fields are used to create visualizations and dashboards.These fields also helps us to create new calculated feilds.

S.no.	Name	Non null value
0	Type	180519 non-null object
1	Days for shipping (real)	180519 non-null int64
2	Days for shipment (scheduled)	180519 non-null int64
3	Benefit per order	180519 non-null float64
4	Sales per customer	180519 non-null float64
5	Delivery Status	180519 non-null object
6	Late_delivery_risk	180519 non-null int64
7	Category Id	180519 non-null int64
8	Category Name	180519 non-null object
9	Customer City	180519 non-null object
10	Customer Country	180519 non-null object
13	Customer Id	180519 non-null int64
16	Customer Segment	180519 non-null object
17	Customer State	180519 non-null object
18	Customer Street	180519 non-null object
19	Customer Zipcode	180516 non-null float64
20	Department Id	180519 non-null int64
21	Department Name	180519 non-null object
22	Latitude	180519 non-null float64
23	Longitude	180519 non-null float64
24	Market	180519 non-null object
25	Order City	180519 non-null object
26	Order Country	180519 non-null object
27	Order Customer Id	180519 non-null int64

28 order date (DateOrders) 180519 non-null object
29 Order Id 180519 non-null int64
30 Order Item Cardprod Id 180519 non-null int64
31 Order Item Discount 180519 non-null float64
32 Order Item Discount Rate 180519 non-null float64
33 Order Item Id 180519 non-null int64
34 Order Item Product Price 180519 non-null float64
35 Order Item Profit Ratio 180519 non-null float64
36 Order Item Quantity 180519 non-null int64
37 Sales 180519 non-null float64
38 Order Item Total 180519 non-null float64
39 Order Profit Per Order 180519 non-null float64
40 Order Region 180519 non-null object
41 Order State 180519 non-null object
42 Order Status 180519 non-null object
44 Product Card Id 180519 non-null int64
45 Product Category Id 180519 non-null int64
48 Product Name 180519 non-null object
49 Product Price 180519 non-null float64
50 Product Status 180519 non-null int64
51 shipping date (DateOrders) 180519 non-null object
52 Shipping Mode 180519 non-null object

New Added feilds
53 customer name 180519 non-null object
54 product category 180519 non-null object
55 shipping time variance 180519 non-null int64

In addition to these we have two more tables tokenizer and description .In tokenizer we create a new feild url6 which shortens the provided url.



Sales
Order Item Total
Order Profit Per Order
Order Region
Order State
Order Status
Product Card Id
Product Category Id
Product Name
Product Price
Product Status
shipping date (DateOrders)
Shipping Mode
Longitude_Latitude
DataCoSupplyChainDataset.Order City_GeoInfo
DataCoSupplyChainDataset.Order Country_GeoInfo
Shipping Lead Time Variance

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.

Name

Shipping Lead Time Variance

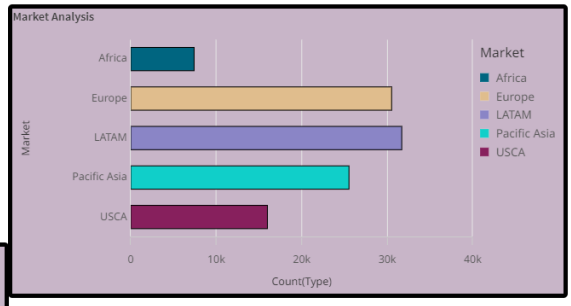
Expression

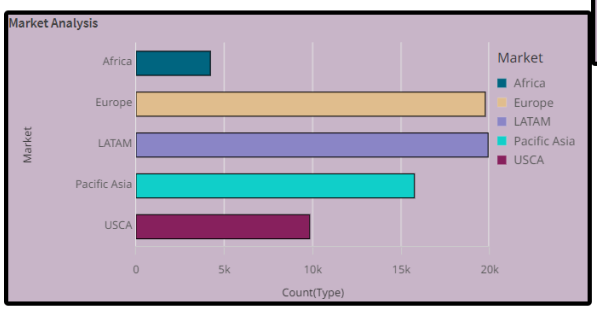
```
[Days for shipping (real)]-[Days
for shipment (scheduled)]
```

Also we can filter data where we need the analysis of a paticular area/region/country

Market share of the company per customer in a paticular country

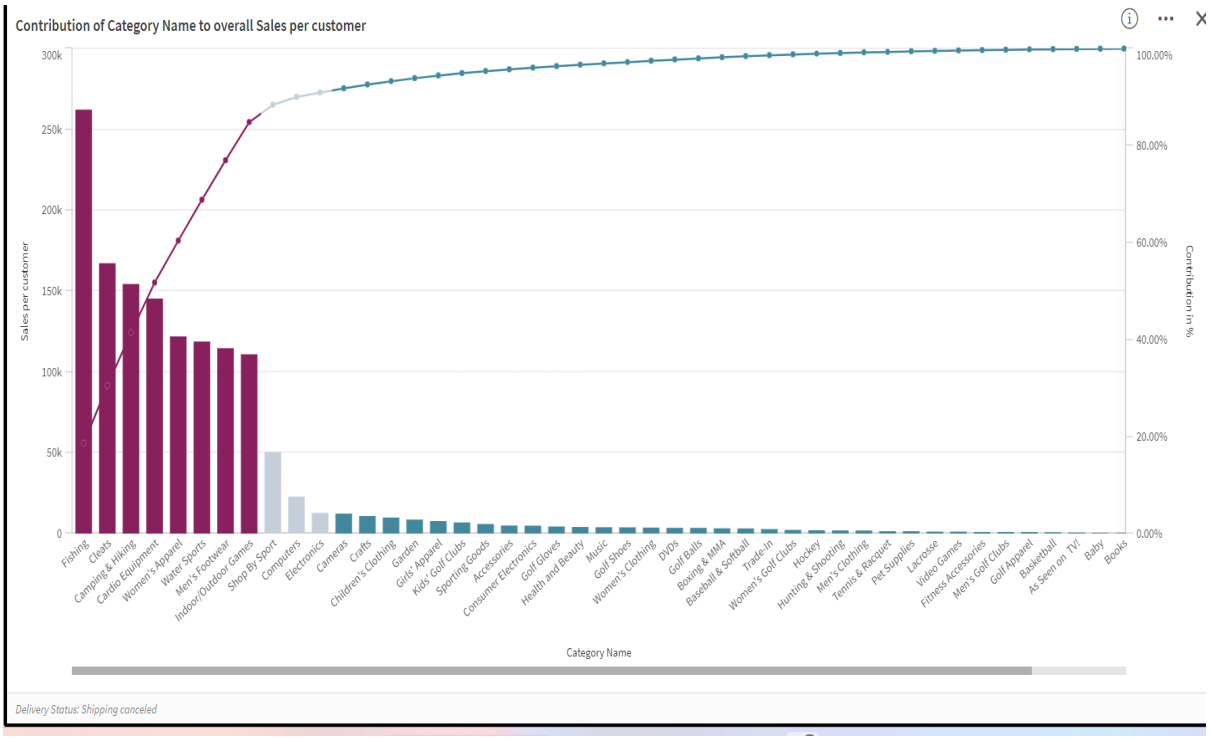
EE. UU.

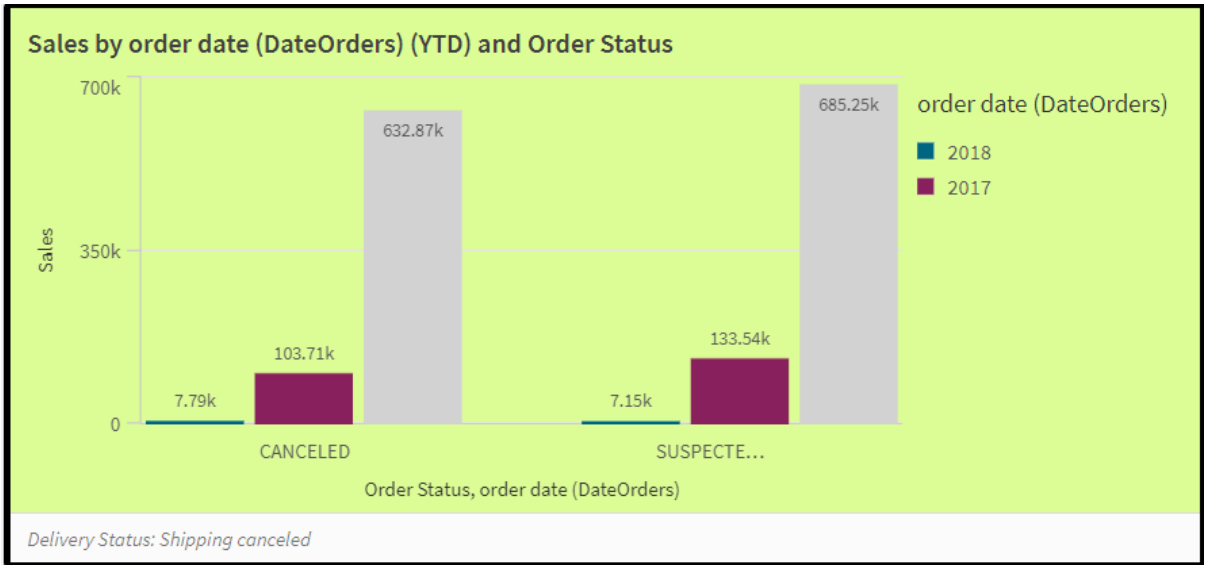




Puerto rico

The above two graphs are drwan from a main graph market analysis where we selected a paticular country to draw market analysis of that country.
Along with this we can also filter directly using second field mesure to a graph as shown in given graphs.





In the given graphs a dimention and measure is already present and delivery status

is used as a second measure to filter items in which shipping is cancelled.

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.