Data-Driven Innovations in Supply Chain Management with Like Insights

Project by: Shaik Karim Basha

Introduction

The project aims to revolutionize supply chain management through data-driven insights using Like Sense. By leveraging advanced analytics, it seeks to optimize logistics, forecasting, and inventory management, thereby enhancing operational efficiency and responsiveness. This includes improving transportation routes and reducing
lead times, and implementing real-time tracking and monitoring solutions.

Business Requirements

1. Operational Efficiency:

● Improve the efficiency of the supply chain by optimizing logistics, reducing lead times, and ensuring timely deliveries.

● Implement real-time tracking and monitoring of goods.

2. Forecasting and Inventory Management:

● Enhance forecasting accuracy to match supply with demand better.

● Optimize inventory levels to reduce costs and avoid stock outs or overstock situations.

3. Data Integration:

● Aggregate and centralize data from diverse supply chain sources for comprehensive analysis.

● Ensure data consistency and accuracy for reliable insights.

4. Advanced Analytics:

● Utilize Like Sense's advanced analytics capabilities to identify patterns and insights from historical data.

● Implement real-time analytics to facilitate quick decision-making in response to changes in demand or unforeseen events.

5. Visualization and Dashboards:

● Create intuitive and dynamic dashboards that provide clear insights into the supply chain ecosystem.

● Enable stakeholders to access easily and interact with the data.
Literature Survey
To provide a robust foundation for this project, we review recent research on data-driven supply chain management. Below are summaries of key findings from relevant research papers:

Research Paper: "Real-Time Supply Chain Management: An Overview"
Source: Journal of Business Logistics, 2017.

Key Findings:
● Real-time data analytics allows companies to respond quickly to disruptions and changes in the supply chain.

● Enhancements in technology, such as IoT and AI, have made real-time tracking and monitoring more accessible.

● Implementing real-time analytics leads to a reduction in lead times and improved customer satisfaction.

Key Findings:
● Predictive analytics helps in anticipating market trends and customer behavior, enabling proactive decision-making.

● Companies using predictive analytics have reported a 15% improvement in forecast accuracy and a 30% reduction in stock outs.

Research Paper: "The Role of Big Data Analytics in Supply Chain Management"
Source: International Journal of Production Economics, 2016.
Key Findings:

● Big Data Analytics (BDA) significantly improves decision-making capabilities in supply chain management.

● BDA helps in predicting demand more accurately, optimizing inventory levels, and improving overall supply chain visibility.

● Case studies indicate that companies adopting BDA in supply chain management have
seen a reduction in operational costs by up to 20% and an increase in efficiency by 25%.

Business Impact

1. Social Impact:

● Efficient Resource Distribution: Enhanced supply chain management ensures timely delivery of essential goods, such as medical supplies and food, especially in emergencies.

● Environmental Benefits: Optimizing transportation routes and reducing lead times can lead to lower fuel consumption and reduced carbon emissions.

● Improved Accessibility: By streamlining logistics, products can be made more accessible to remote areas, improving the quality of life.

2. Business Impact:

● Cost Reduction: By optimizing inventory levels and logistics, companies can significantly reduce operational costs.

● Increased Revenue: Better demand forecasting and timely delivery lead to improved customer satisfaction and potentially higher sales.

● Competitive Advantage: Companies that leverage advanced analytics can gain a competitive edge by being more responsive to market changes and customer needs.

Sector-Specific Impacts:
● Banking: Efficient supply chains can lead to cost savings in cash handling and distribution.

● Telecommunications: Improved logistics for equipment and materials can enhance service delivery.

● E-commerce: Streamlined supply chains can improve delivery times, reducing customer churn and boosting sales.

Data Collection

● Type: Type Count
● Days for shipping (real): Product shipment days
● Days for shipment (scheduled): product getting prepared for shipment
● Benefit per item: profit earned per product
● Sales per customer: No of products purchased by the customer
● Delivery: Products delivery date.
● Late_delivery_risk: percentage of late delivery risk
● Category Id: product category ID
● Category: product category
● Customer City: Customer purchase city
● Customer Country: Customer purchase country
● Customer Email: Customer purchase Email
● Customer Frame: Customer First name.
● Customer ID: Customer order ID
● Customer Lame: Customer's last name
● Customer Segment: Types of Customer

- Customer State: Customer order state
- Customer Street: Customer address
- Customer Zip code: Customer area code.
- Market: top 10 country Market
- Order City: Customer purchase city
- Order Country: Customer purchase country
- Order Customer ID: Customer
- order date (DateOrders): Customer order date
- Order Item Product Price: product price
- Order Item Profit Ratio: profit ratio
- Order Item Quantity: No of orders placed
- Sales: total no of sales
- Order Item Total: total price of the order placed
- Order Profit Per: product
- Order Region: order placed region
- Order State: order placed State
- Order Status: order delivery status
- Order Zip code: customer area code
- Product Card ID: product number
- Product Category Id: a product whose category belongs to
- Product: what product
- Product Image: image of the product
- Product Price: Price of the product.

Data Source: The dataset for this project was sourced from Kaggle. The dataset, named
"DataCoSupplyChain," contains various attributes related to order and customer details, shipping
information, and product categories.

https://www.kaggle.com/datasets/shashwatwork/dataco-smart-supply-chain-for-big-dataanalysis

Data Preparation

Data Cleaning and Transformation:
Splitting Shipping Date and Time:
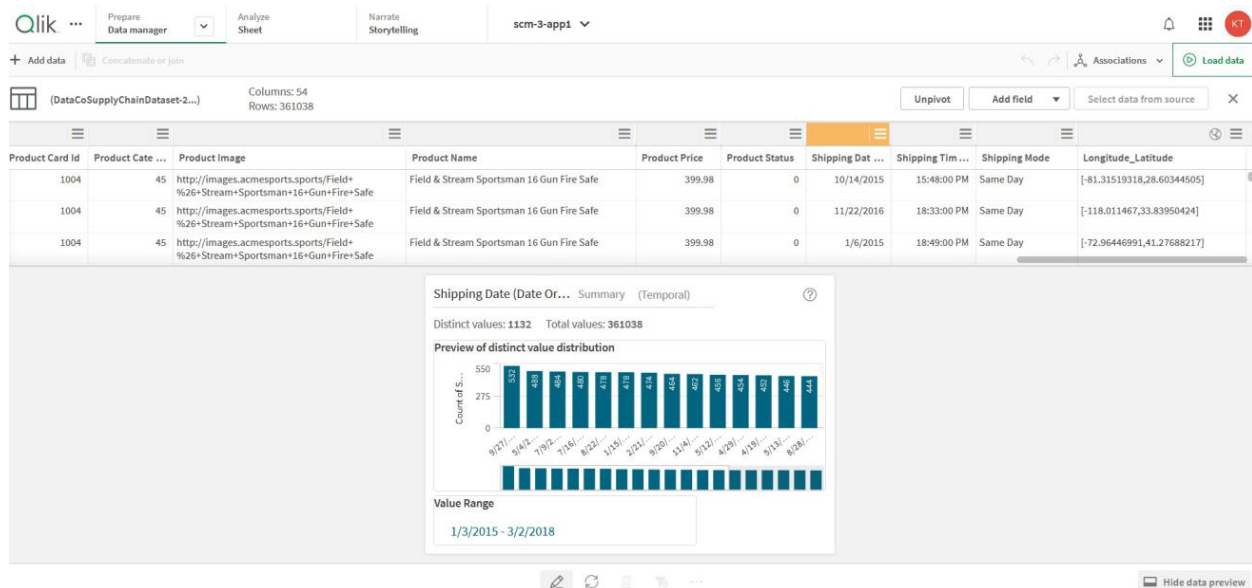
1. The original dataset had shipping dates combined with times. To split them into separate columns, I used the pro processing in Qlik Sense.

2. Same was the case with the Order Time and Date column.

3. Then, I Identify missing values and treat them. I impute missing values for numerical columns using the mean and impute missing values for categorical columns with mode or a specific value.

4. Then, I convert fields to their correct data types

Data Visualization

Order Item Total by Order City (Ranking)

Order City	Order Item Total
New York City	785.19k
Santo Domingo	776.91k
Los Angeles	665.26k
Tegucigalpa	656.1k
Managua	602.8k
Mexico City	534.54k
Manila	490.06k
San Francisco	459.66k
London	459.57k
Philadelphia	459.09k
San Salvador	

Insights found ✕

The total Order Item Total is 66108804.76.

The top Order City is New York City with Order Item Total that is 1.2% of the total.

80% of Order Item Total is represented by top 1.08k Order City.

This shows the count of total order items according to their order cities.

Order Item Total by Customer State (Ranking)

Customer State	Order Item Total
PR	25.42M
CA	10.65M
NY	4.14M
TX	3.36M
IL	2.81M
FL	1.99M
OH	1.5M
MI	1.4M
PA	1.38M
NJ	1.18M
AZ	

Insights found ✕

The total Order Item Total is 66108804.76.

The top Customer State is PR with Order Item Total that is 38.5% of the total.

79.7% of Order Item Total is represented by top 9 Customer State.
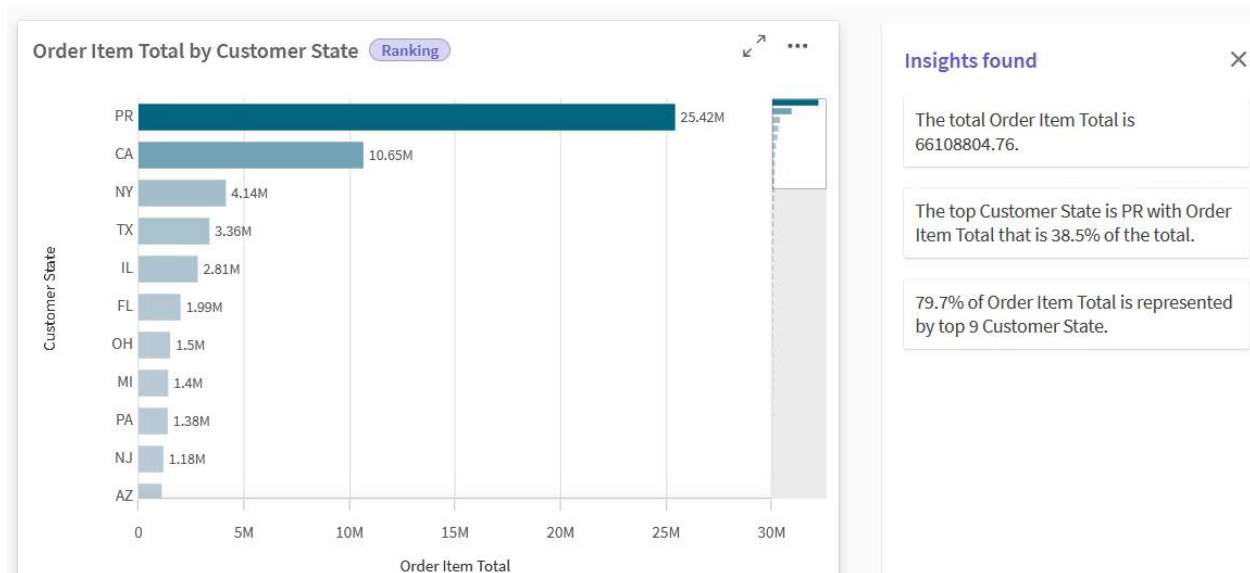
This shows the count of total order items based on Customer States.

Order Item Total by Order Country `Ranking`
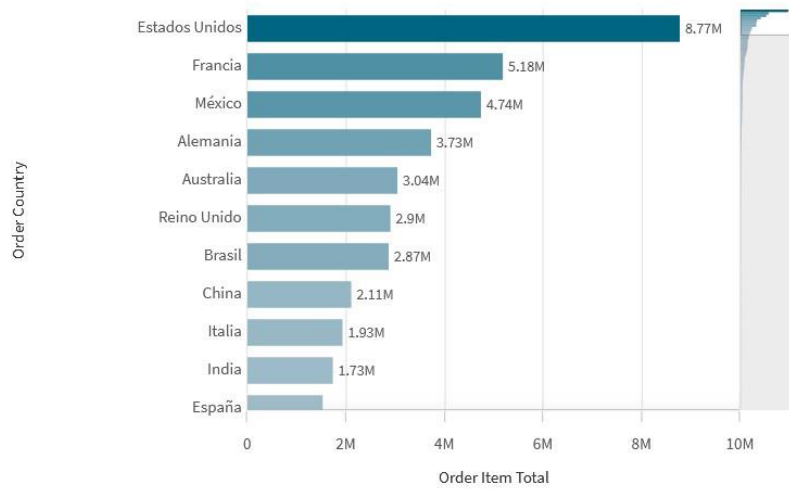
Insights found ✕

The total Order Item Total is 66108804.76.

The top Order Country is Estados Unidos with Order Item Total that is 13.3% of the total.

80% of Order Item Total is represented by top 25 Order Country.

This shows the total order items according to Country.

Sales by Shipping Mode `Ranking`
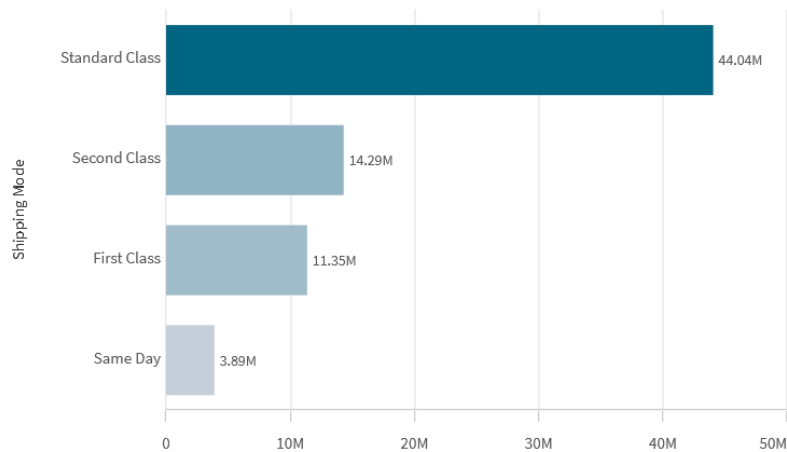
Insights found ✕

The total Sales is 73.57M.

The top Shipping Mode is Standard Class with Sales that is 59.9% of the total.

79.3% of Sales is represented by top 2 Shipping Mode.

This shows the sales as per various shipping modes.

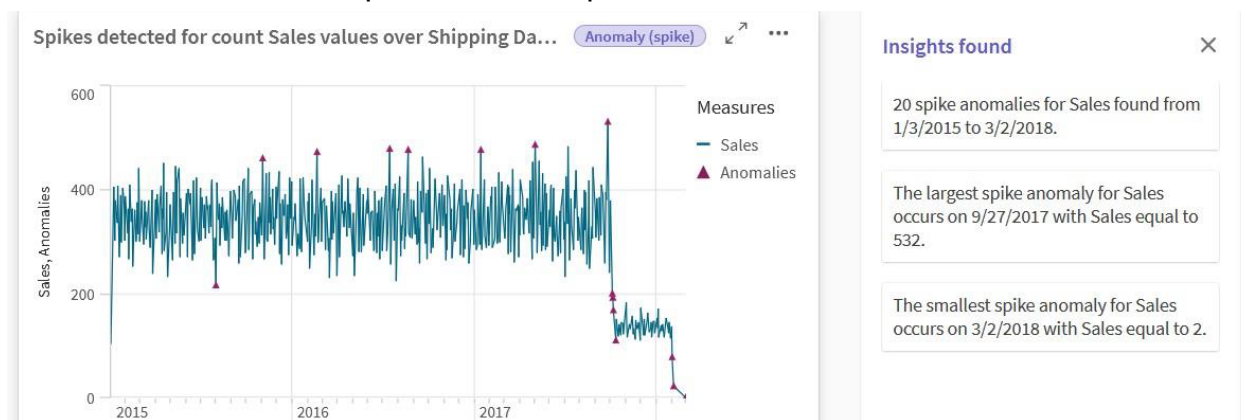**Order Status clustered by count Product Price and co...** (Clustering (k-means))

Cluster
● 1
● 2

Insights found with your current selections ✕

There are 2 cluster(s) for count of Product Price and count of Sales per customer.

The largest cluster contains 6 Order Status.

The smallest cluster contains 3 Order Status.

It clusters data based on price and sales per customer

Spikes detected for count Sales values over Shipping Da... (Anomaly (spike))

Measures
— Sales
▲ Anomalies

Insights found ✕

20 spike anomalies for Sales found from 1/3/2015 to 3/2/2018.

The largest spike anomaly for Sales occurs on 9/27/2017 with Sales equal to 532.

The smallest spike anomaly for Sales occurs on 3/2/2018 with Sales equal to 2.
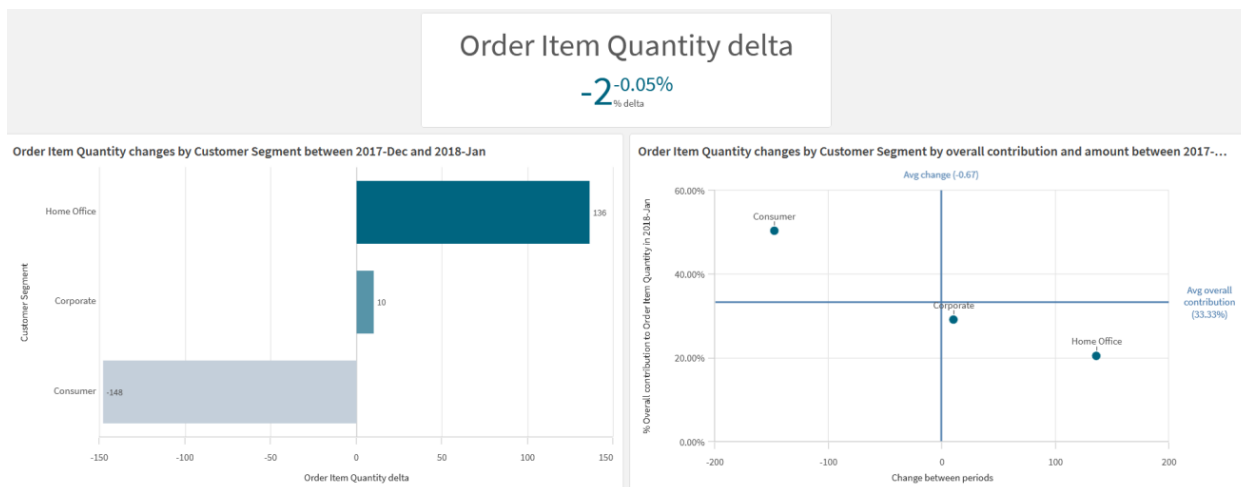
Largest sales occurred on 9/27/2017 with 532 sales.
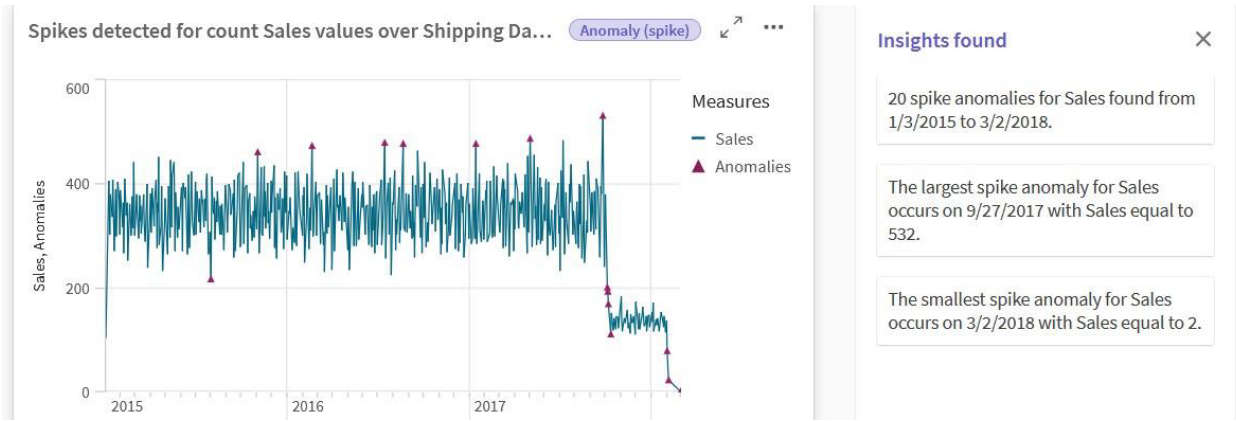
Designing the Dashboard

- Sales Over Time:.
  - Dimensions: Order Date (DateOrders)
  - Measures: Sales
- Profit by Product Category:
  - Dimensions: Category
  - Measures: Benefit per item
- Shipping Performance:
  - Dimensions: Order Region, Order State
  - Measures: Late_delivery_risk
- Customer Segmentation:
  - Dimensions: Customer Segment
  - Measures: Sales per customer

● Market Analysis:
■ Dimensions: Market
■ Measures: Sales

Spikes detected for count Sales values over Shipping Da... Anomaly (spike)

Insights found ✕

20 spike anomalies for Sales found from 1/3/2015 to 3/2/2018.

The largest spike anomaly for Sales occurs on 9/27/2017 with Sales equal to 532.

The smallest spike anomaly for Sales occurs on 3/2/2018 with Sales equal to 2.

Order Item Quantity delta
-2 -0.05% % delta

Order Item Quantity changes by Customer Segment between 2017-Dec and 2018-Jan

Home Office 136
Corporate 10
Consumer -148

Order Item Quantity changes by Customer Segment by overall contribution and amount between 2017-...

Avg change (-0.67)
Consumer
Corporate
Home Office
Avg overall contribution (33.33%)

Actual Sales as percent of target

59.83%
Sales
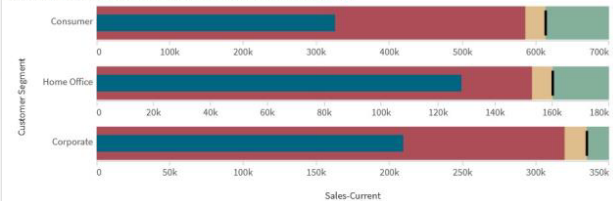
0.00%   150.00%

Customer Segment count by Sales target

Missed target
3

Sales change by Customer Segment in 2017-Dec and 2018-Jan

Customer Segment	Sales-Period 1	Sales-Period 2	Sales-Target	% of target	Status	Target
Totals	1007821.634686	663300.23031388	1108603.7981546	59.83%	▼	Missed
Consumer	557699.54822692	325660.4851121	613469.50304961	53.09%	▼	Missed
Home Office	145659.40212954	128179.36204206	160225.34234249	80.00%	▼	Missed
Corporate	304462.68432958	209460.38315952	334908.95276254	62.54%	▼	Missed

Sales change by Customer Segment in 2017-Dec and 2018-Jan

Consumer / Home Office / Corporate
Sales-Current

Order Profit Per Order by Order Country

Country	Value
Estados Unidos	1.08M
Francia	655.66k
México	606.56k
Alemania	389.65k
Brasil	373.43k
Reino Unido	361.89k
Australia	

Order Profit Per Order

Order Item Total by Delivery Status

Status	Value
Late delivery	36.17M
Advance shippi…	15.31M
Shipping on time	11.81M
Shipping cance…	2.82M

Order Item Total

Distribution of Benefit per order for Order Country

Order Country
Area layer

Benefit per order
1.08M

5000 km   © OpenStreetMap contributors

Order Item Total by Customer State

State	Value
PR	25.42M
CA	10.65M
NY	4.14M
TX	3.36M
IL	2.81M
FL	1.99M
OH	

Order Item Total

Order Item Total by Order Country

Country	Value
Estados Unidos	8.77M
Francia	5.18M
México	4.74M
Alemania	3.73M
Australia	3.04M
Reino Unido	2.9M
Brasil	

Order Item Total

Order Item Total by Order City

City	Value
New York City	785.19k
Santo Domingo	776.91k
Los Angeles	665.26k
Tegucigalpa	656.1k
Managua	602.8k
Mexico City	534.54k
Manila	
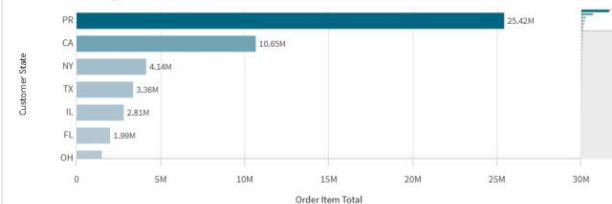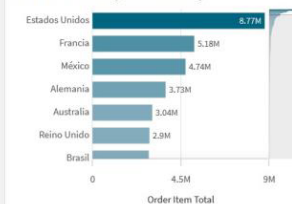
Order Item Total

Sales by Shipping Mode and Shipping Date (Date Orders)

Shipping Mode
— Standard Class

Shipping Date (Date Orders), Shipping Mode

* Currently showing a limited data set.

Order Status clustered by count Product Price and count Sales per customer (K-Means)

Cluster
● 1
● 2

ON_HOLD / PROCESSING / PENDING_PAYMENT / COMPLETE / CLOSED / PAYMENT_REVIEW

count Product Price

Product Price by Delivery Status

Status	Value
Late delivery	27.9M
Advance shipping	11.8M
Shipping on time	9.11M
Shipping canceled	2.17M

Product Price
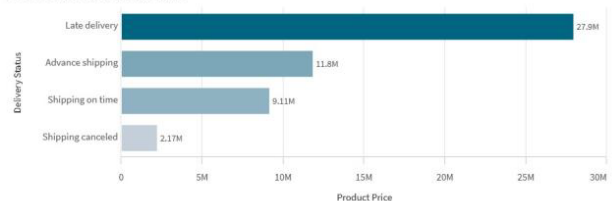
Mutual dependency between Order Item Quantity and selected items

Item	Value
Order Item Quantity and Order Pr…	50.31%
Order Item Quantity and Sales	95.71%
Order Item Quantity and Product …	74.13%
Order Item Quantity and Type	0.00%
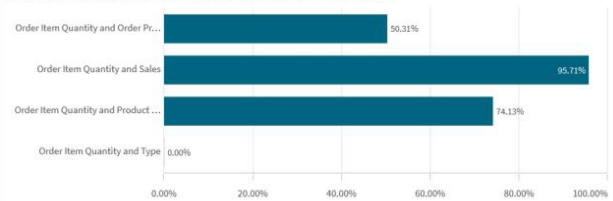
Order Profit Per Order by Order Country (Ranking)
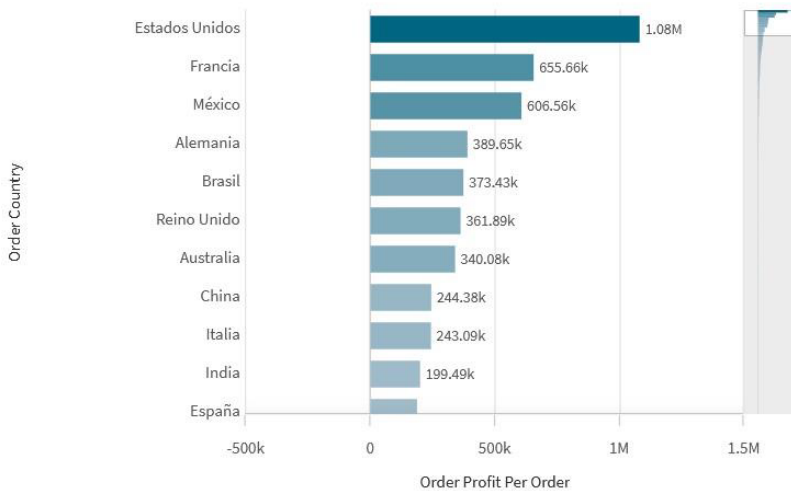
Insights found ✕

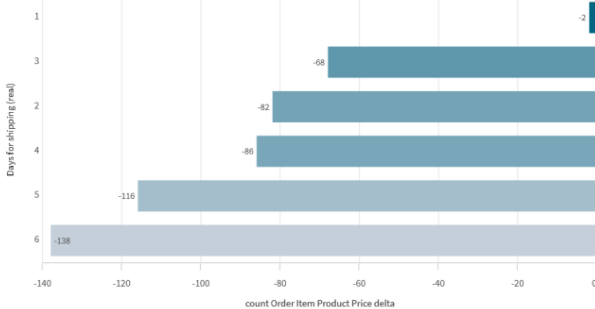The total Order Profit Per Order is 7933805.95.

The top Order Country is Estados Unidos with Order Profit Per Order that is 13.6% of the total.

79.3% of Order Profit Per Order is represented by top 24 Order Country.
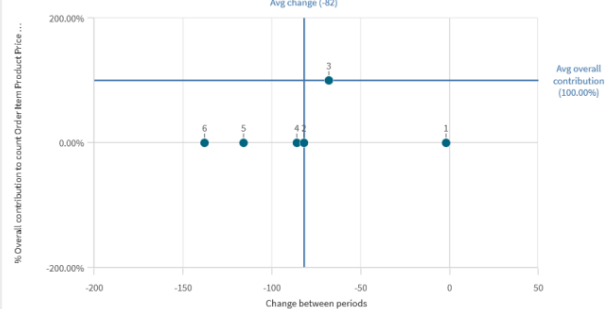
count Order Item Product Pri...
-492 -99.60% % delta

Number of Unique Visualizations: 22

Story

In today's fast-paced business environment, efficient supply chain management is crucial for maintaining competitive advantage. This project leverages Like Sense to transform our supply chain operations through advanced data analytics. By analyzing logistics, forecasting, and inventory management, we aim to enhance operational efficiency and responsiveness, ensuring timely delivery and customer satisfaction.

Amount of Data Loaded

Type	Days for shi...	Days for shi...	Benefit per ...	Sales per cu...	Delivery Status	Late_deliver...	Category Id	Category Name	Customer City	Customer C...	Customer E...	Customer Fn...	C
CASH	0	0	-1088.95	395.98	Shipping on time	0	45	Fishing	Winter Park	EU	XXXXXXXXX	Helen	
CASH	0	0	-854.96	379.98	Shipping on time	0	45	Fishing	Buena Park	EU	XXXXXXXXX	Dylan	
CASH	0	0	-652.77	383.98	Shipping on time	0	45	Fishing	West Haven	EU	XXXXXXXXX	Samantha	
CASH	0	0	-595.17	383.98	Shipping on time	0	45	Fishing	Princeton	EU	XXXXXXXXX	Sarah	
CASH	0	0	-594.97	339.98	Shipping on time	0	45	Fishing	Caguas	Puerto Rico	XXXXXXXXX	Mary	
CASH	0	0	-443.63	260.96	Shipping on time	0	17	Cleats	Caguas	Puerto Rico	XXXXXXXXX	Jennifer	

(DataCoSupplyChainDataset-2...)   Fields: 54

No. of fields: 54

Size of File: 93.3 MB
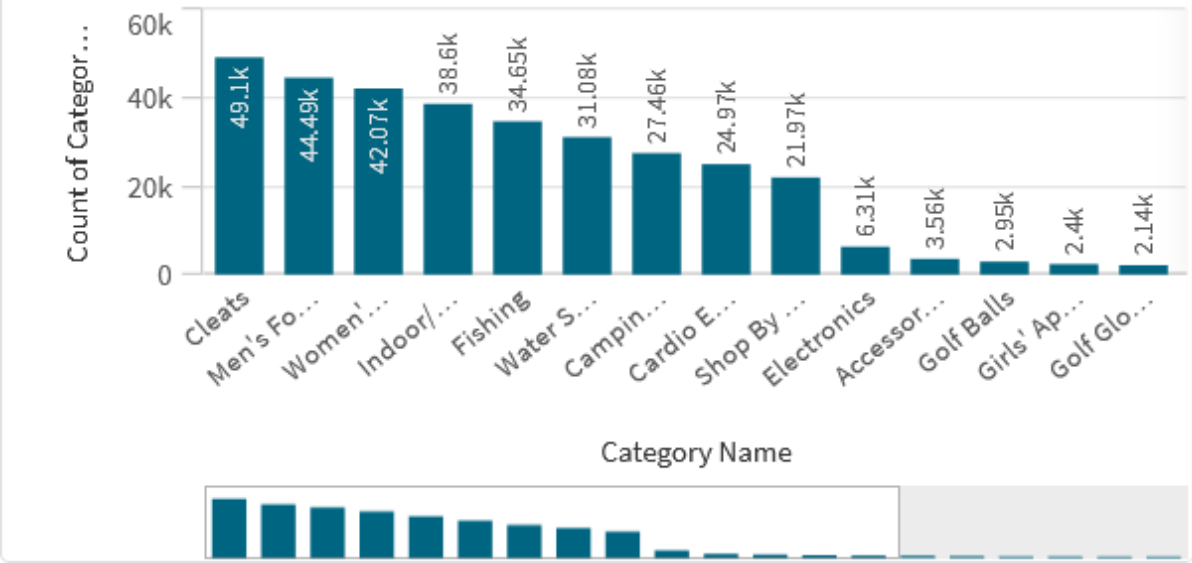
No. of rows: 180520

Utilization of Data Filters

Category Name Summary (Dimension)

Distinct values: **50**   Total values: **361038**

Preview of distinct value distribution

Order Country Summary (Dimension) (?)

Distinct values: **164**   Total values: **361038**

Preview of distinct value distribution

Type Summary (Dimension) (?)

Distinct values: **4**   Total values: **361038**

Preview of distinct value distribution