Data-Driven Innovations In Supply Chain Management With Qlik Insights

1 INTRODUCTION

In today's fast-paced and highly competitive global market, effective supply chain management has become a critical differentiator for organizations seeking to enhance operational efficiency, reduce costs, and deliver superior customer satisfaction. The advent of advanced data analytics and business intelligence tools has revolutionized the way supply chains are managed, bringing forth a new era of data-driven innovations. Leveraging platforms like Qlik Insights, businesses can harness the power of data to transform their supply chain operations, making them more agile, responsive, and resilient.

Data-driven innovations enable supply chain professionals to integrate and analyze vast amounts of data from multiple sources, providing a holistic view of the entire supply chain ecosystem. This comprehensive visibility allows for real-time monitoring, predictive analytics, and informed decision-making, which are crucial for optimizing inventory levels, improving demand forecasting, and mitigating risks. By utilizing data insights, organizations can streamline their supply chain processes, enhance collaboration among stakeholders, and ultimately achieve a competitive edge in the market.

In this exploration of data-driven innovations in supply chain management, we will delve into the key benefits and applications of data analytics tools like Qlik Insights. We will examine how these technologies can enhance data integration and visualization, provide real-time and predictive analytics, improve decision-making, optimize supply chain operations, foster collaboration, manage risks, and boost customer satisfaction. Through these insights, we will uncover how organizations can effectively harness data to drive continuous improvement and innovation in their supply chain management practices.

1.1 Overview: A brief description about the project

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.

This transformative project endeavors to reshape the landscape of supply chain management by harnessing the power of Qlik's data-driven insights. Employing cutting-edge 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.

1.2 Purpose: The use of this project. What can be achieved using this.

The primary purpose of this project is to harness data-driven innovations to significantly enhance supply chain management. By leveraging advanced analytics and business intelligence tools such as Qlik Insights, the project aims to achieve several key outcomes that will lead to more efficient, resilient, and customer-centric supply chain operations.

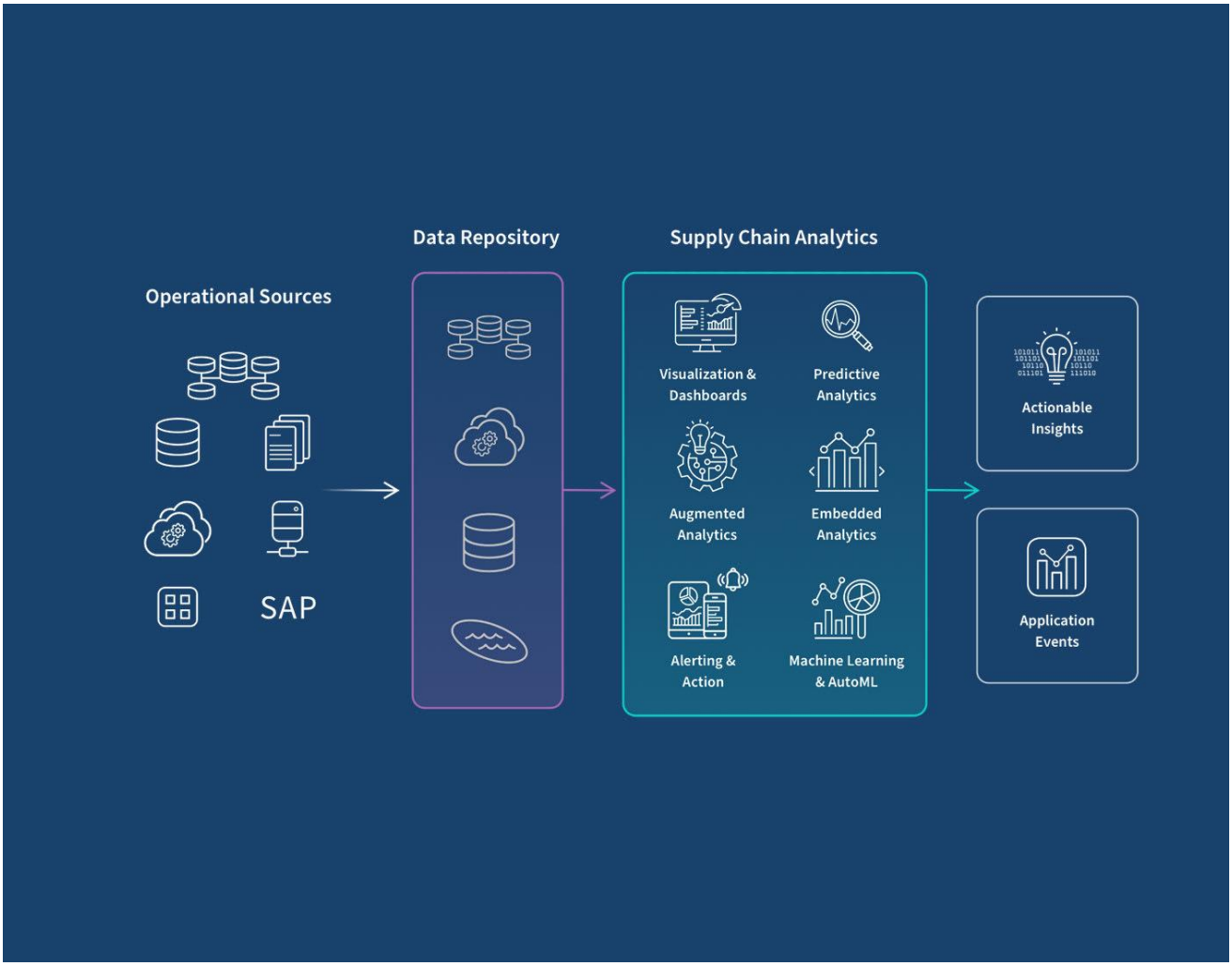
Achievements:

- **Enhanced Operational Efficiency:**
  - Streamlining Processes: The project will identify inefficiencies and bottlenecks within the supply chain and implement solutions to streamline operations, reducing cycle times and operational costs.
  - Optimized Resource Utilization: By analyzing data, the project will help optimize the use of resources, ensuring that inventory levels, production schedules, and logistics are managed effectively to meet demand without excess.
- **Real-Time Monitoring and Responsiveness:**
  - Immediate Insights: Implementing real-time analytics allows for continuous monitoring of supply chain activities, enabling swift responses to disruptions, changes in demand, and other unexpected events.
  - Proactive Management: By providing real-time data, the project empowers managers to proactively address issues before they escalate, maintaining smooth and efficient supply chain operations.
- **Improved Decision-Making:**
  - Data-Driven Decisions: Utilizing comprehensive data analysis and visualization tools, decision-makers will have access to accurate, up-to-date information, leading to more informed and effective decisions.
  - Predictive Analytics: The use of predictive models will enable better forecasting of demand and inventory needs, reducing the risk of stockouts or overstocking and aligning supply with market conditions.
- **Risk Management:**
  - Identifying Risks: Through data analysis, potential risks such as supplier failures, transportation delays, and market fluctuations can be identified early.
  - Mitigating Risks: The project will develop strategies to mitigate these risks, ensuring a more resilient supply chain capable of withstanding disruptions.
- **Increased Collaboration and Transparency**:
  - Unified Data Access: By integrating data from various sources into a single platform, the project fosters better collaboration among different departments and stakeholders.
  - Shared Insights: Enhanced data sharing and visibility ensure that all parties involved in the supply chain are aligned and working towards common goals.
- **Enhanced Customer Satisfaction:**
  - Timely Deliveries: Optimizing the supply chain ensures that products are delivered on time, improving customer satisfaction and loyalty.
  - Responsive Service: Better demand forecasting and inventory management enable the supply chain to respond more effectively to customer needs and preferences.
- **Continuous Improvement:**
  - Ongoing Analysis: The project establishes a framework for continuous monitoring and analysis, allowing for ongoing improvements in supply chain processes.

- Innovation and Adaptation: By staying data-driven, the supply chain can adapt to new challenges and opportunities, maintaining competitiveness in a dynamic market.

1.3 Technical Architecture

The technical architecture for data-driven innovations in supply chain management using Qlik Insights involves several key components and processes. This architecture ensures seamless data integration, real-time analytics, predictive modeling, and effective decision-making. Below is an overview of the technical architecture:



1. Data Sources

Internal Data Sources:

- **Enterprise Resource Planning (ERP) Systems:** Centralized systems managing business processes such as inventory, procurement, and order management.
- **Customer Relationship Management (CRM) Systems:** Data on customer orders, preferences, and interactions.
- **Warehouse Management Systems (WMS):** Information on inventory levels, warehouse operations, and logistics.

External Data Sources:

- **Supplier Systems:** Data from suppliers regarding materials, delivery schedules, and performance.
- **Logistics and Transportation Systems:** Tracking data from carriers and transportation management systems.
- **Market Data Feeds:** Real-time market trends, demand forecasts, and competitor analysis.

2. Data Integration

- **ETL Processes (Extract, Transform, Load):** Tools and processes for extracting data from various sources, transforming it into a suitable format, and loading it into a central data warehouse.
- **APIs and Connectors:** Standardized interfaces to connect disparate systems and facilitate data exchange.

3. Data Storage

- **Data Warehouse:** A central repository where integrated data from multiple sources is stored. It supports large-scale data storage and complex query processing.
- **Data Lakes:** Storage for unstructured and semi-structured data, allowing for flexible data ingestion and retrieval.

4. Data Processing and Analytics

- **Qlik Insights Platform:** The core analytics platform providing data integration, visualization, and analysis capabilities.
    - **Data Integration Engine:** Combines data from multiple sources, ensuring consistency and accuracy.
    - **Visualization Tools:** Interactive dashboards and reports that present data in an easily understandable format.
    - **Analytics Engine:** Performs real-time and predictive analytics, supporting decision-making processes.

5. Predictive Analytics

- **Machine Learning Models:** Algorithms and models that analyze historical data to predict future trends and behaviors, such as demand forecasting and risk assessment.
- **Data Mining:** Techniques to discover patterns and insights from large datasets.

6. Real-Time Monitoring

- **IoT Sensors and Devices:** Collect real-time data from physical assets (e.g., temperature, location, status) and feed it into the analytics platform.
- **Streaming Data Processing:** Handles continuous data streams to provide real-time analytics and alerts.

7. Security and Compliance

- **Access Controls:** Role-based access controls (RBAC) to ensure that only authorized personnel can access sensitive data.
- **Encryption:** Data encryption both at rest and in transit to protect against unauthorized access.
- **Compliance Frameworks:** Adherence to industry standards and regulations such as GDPR, HIPAA, and ISO 27001.

8. User Interface

- **Dashboards and Reports:** User-friendly interfaces that provide insights through visualizations, supporting decision-making at various organizational levels.
- **Mobile Access:** Secure mobile applications enabling users to access data and insights on the go.

9. Collaboration Tools

- **Communication Platforms:** Integration with collaboration tools (e.g., Slack, Microsoft Teams) to share insights and coordinate actions.
- **Shared Workspaces:** Environments where teams can work together on data analysis and decision-making.

2 Define Problem / Problem Understanding

2.1 Specify the business problem

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.

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2.2 Business requirements

Implement a robust data integration strategy to aggregate and centralize relevant data from diverse supply chain sources. Utilize Qlik's advanced visualization capabilities to create intuitive and dynamic dashboards, providing stakeholders with clear insights into the entire supply chain ecosystem. Leverage Qlik's advanced analytics features to analyse historical logistics data, identify patterns, and optimize transportation routes. Implement real-time tracking and monitoring solutions to enhance visibility into the movement of goods, reducing lead times and minimizing transportation costs. Implement real-time analytics to facilitate quick decision-making in response to unforeseen events or changes in demand, ensuring 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 endeavors. 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

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

DataCo SMART SUPPLY CHAIN FOR BIG DATA ANALYSIS

About Dataset

A DataSet of Supply Chains used by the company DataCo Global was used for the analysis. Dataset of Supply Chain , which allows the use of Machine Learning Algorithms and R Software.

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 :

Structured Data : DataCoSupplyChainDataset.csv

Unstructured Data : tokenized_access_logs.csv (Clickstream)

Types of Products : Clothing , Sports , and Electronic Supplies

Understand The Data

Data contains all the meta information regarding the columns described in the CSV files

Column Description of the Dataset:

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 Fname: Customer First name.

Customer ID: Customer order ID

Customer Lname: Customer's last name

Customer Segment: Types of Customer

Customer State: Customer order state

Customer Street: Customer address

Customer Zipcode: 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 Zipcode: 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.

3.2 Connect Data with Qlik Sense

Connecting data with Qlik Sense involves several steps, depending on the data source you are working with. Qlik Sense supports various data sources, including databases, cloud services, files, and more. Below are the general steps to connect data with Qlik Sense:

1. Open Qlik Sense

- Launch Qlik Sense and log in with your credentials.

2. Create a New App

- Click on **"Create new app"**.
- Name your app and click **"Create"**.
- Open the app you just created.

3. Add Data to the App

- Click on **"Add data"** in the Data manager or **"Data load editor"** for more advanced data loading.

4. Select Data Source

- You will be prompted to choose your data source. Qlik Sense supports various data sources like:
    - **Files**: Excel, CSV, XML, etc.
    - **Databases**: SQL Server, Oracle, MySQL, PostgreSQL, etc.
    - **Web Connectors**: REST API, OData, etc.
    - **Cloud Services**: Google Analytics, Salesforce, etc.

5. Connect to Data Source

Depending on your data source, the connection process may vary slightly:

For Files (e.g., Excel, CSV):

1. **Upload the file**:
    - Click on **"Data files"** and then **"Select file"**.
    - Choose the file from your computer and upload it.

2. **Load the data**:
    - After the file is uploaded, select it to load the data into Qlik Sense.

4 Data Preparation

4.1 Prepare the Data for Visualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring 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. Since the data is already cleaned, we can move to visualization.

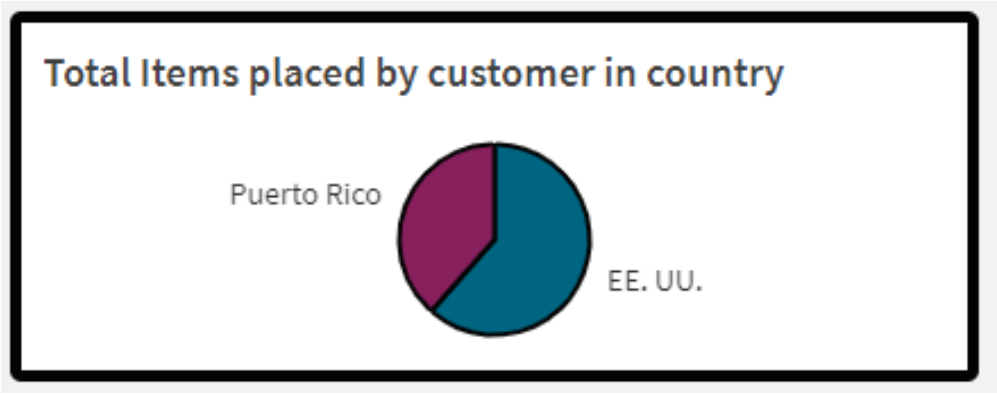
5 Data Visualizations

Data visualization is the process of creating graphical representations of data to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

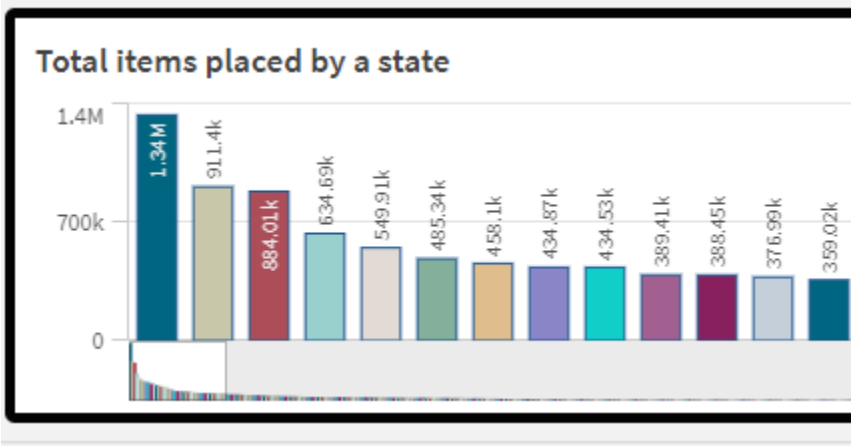
5.1 Visualizations

The number of unique visualizations that can be created with a given dataset. Some common types of visualizations that can be used to analyse the performance and efficiency of banks include bar charts, line charts, heat maps, scatter plots, pie charts, Maps etc. These visualizations can be used to compare performance, track changes over time, show distribution, and relationships between variables, breakdown of revenue and customer demographics, workload, resource allocation and location of banks.

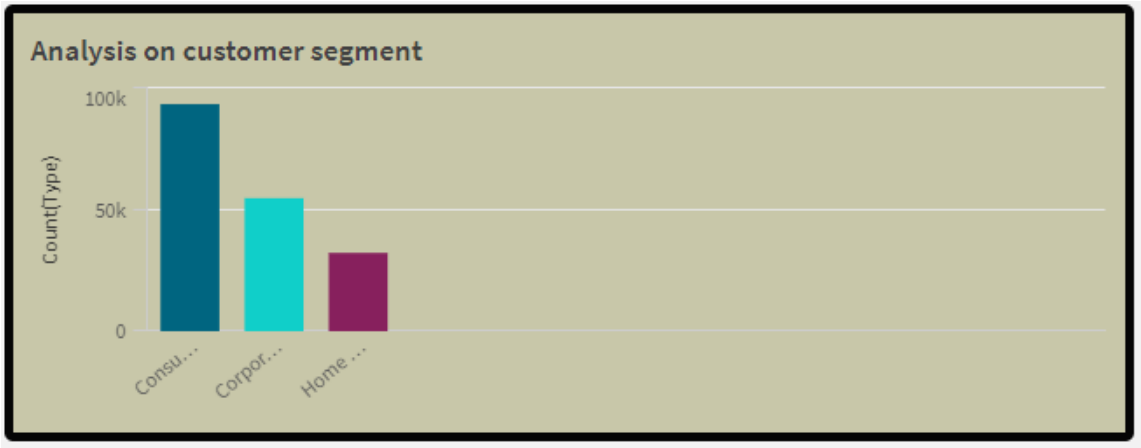
Total Items placed by customer in country



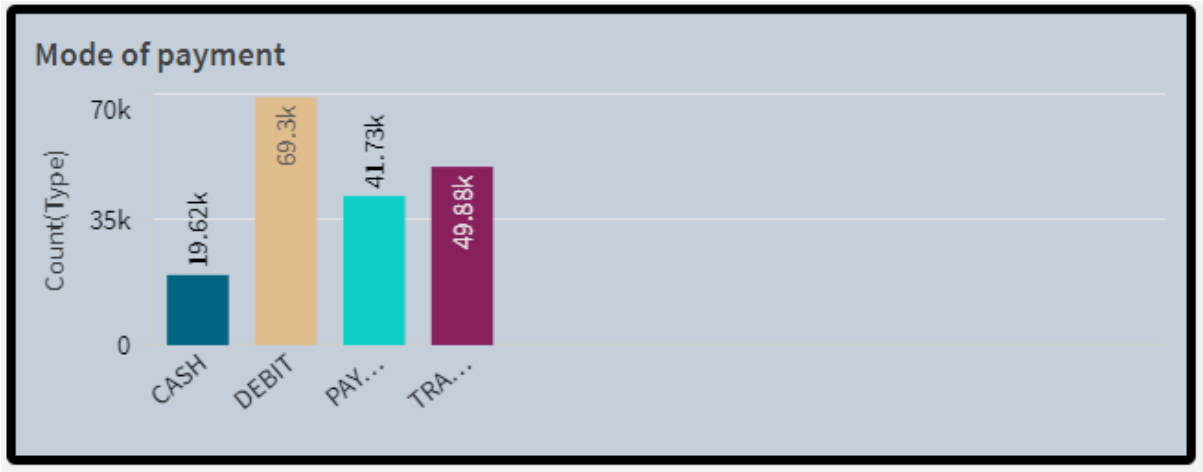
Total Items placed by a state



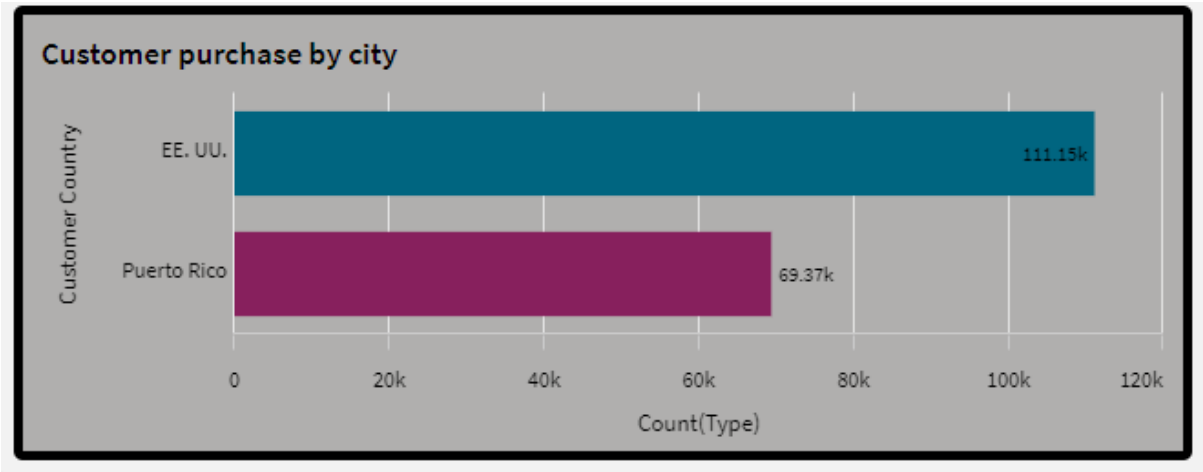
Analysis on customer segment



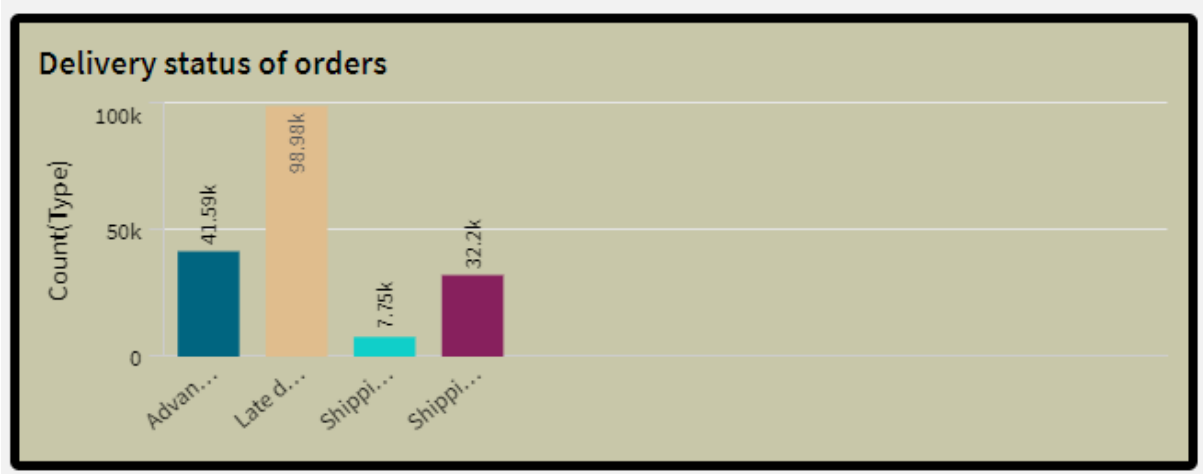
Mode of payment



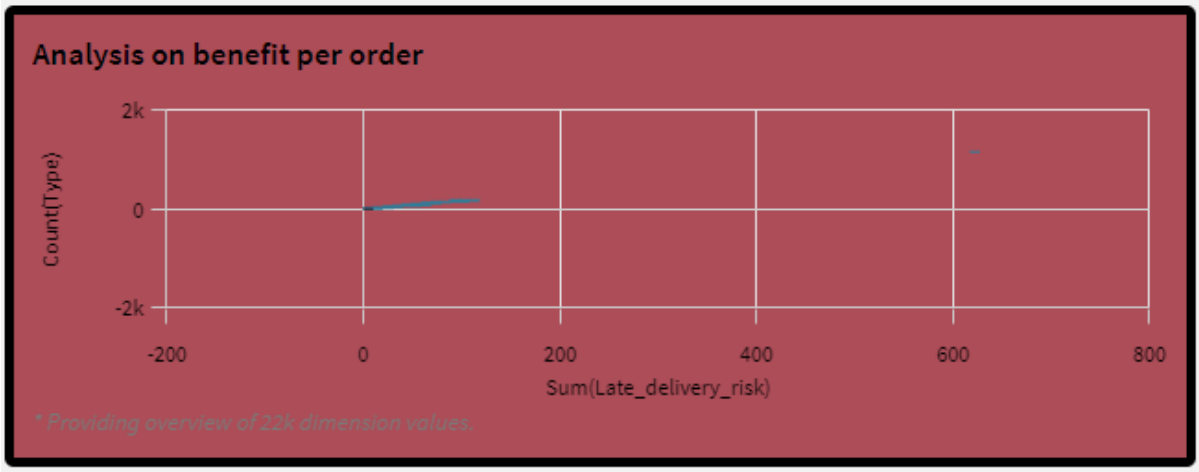
Customer purchase by city



Delivery status of orders

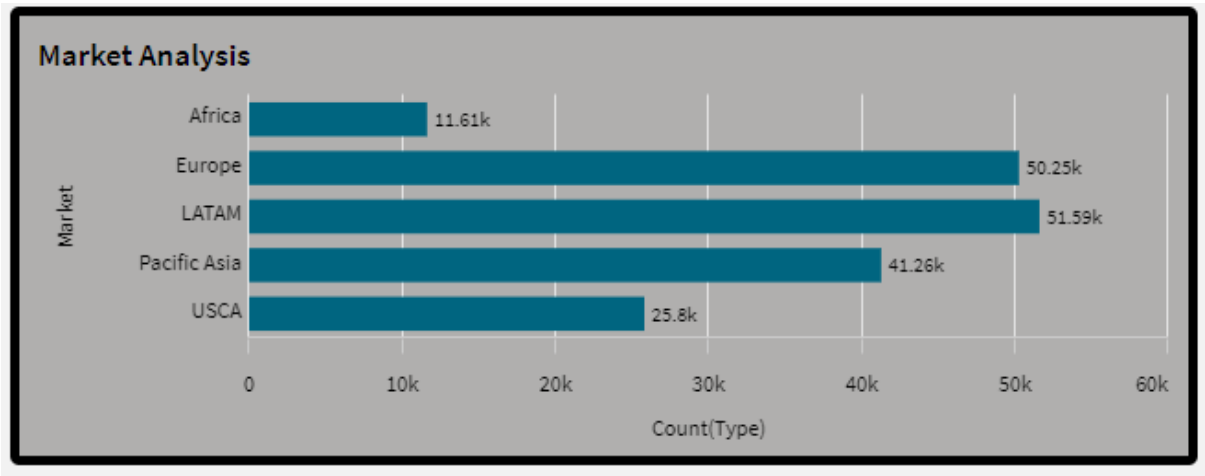


Analysis on benefit per order

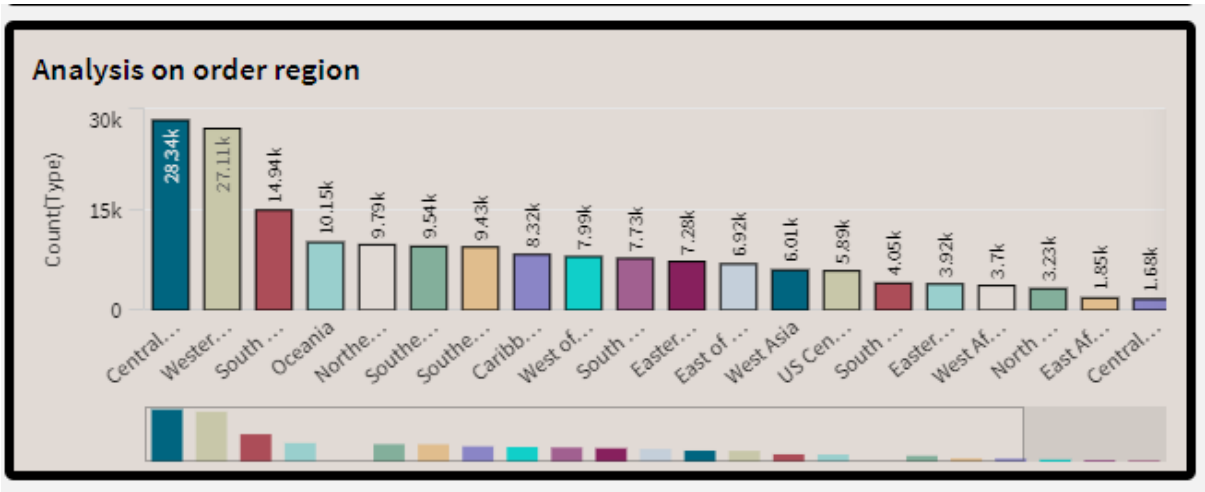


Analysis on profit ratio

Market Analysis



Analysis on order region

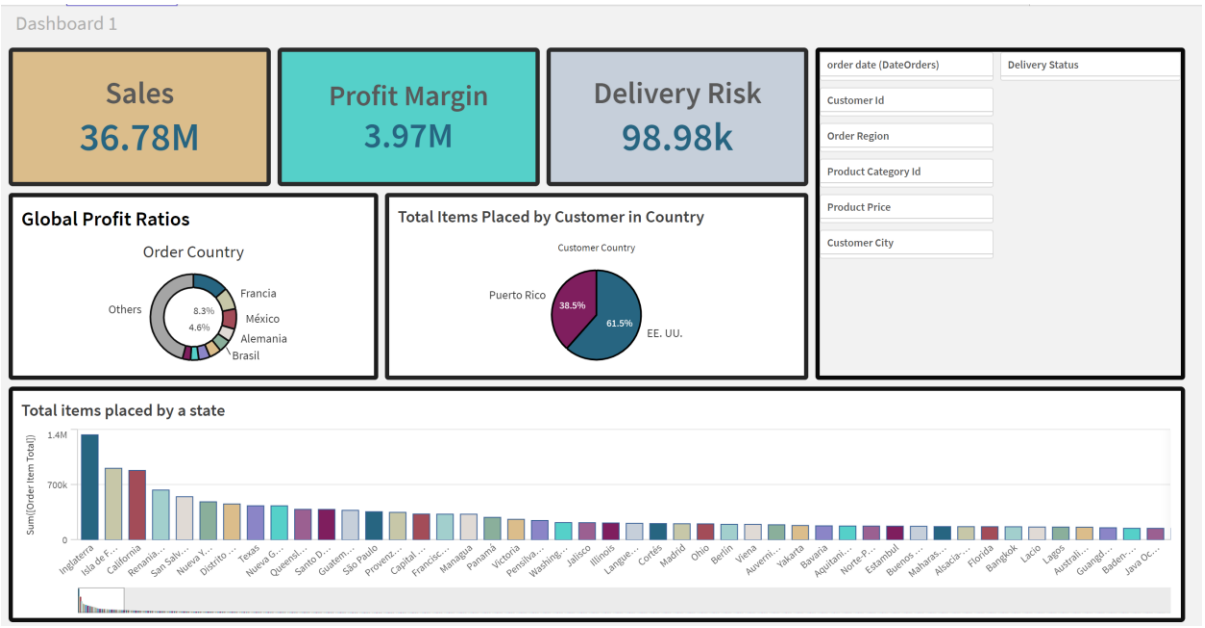


6 Dashboard

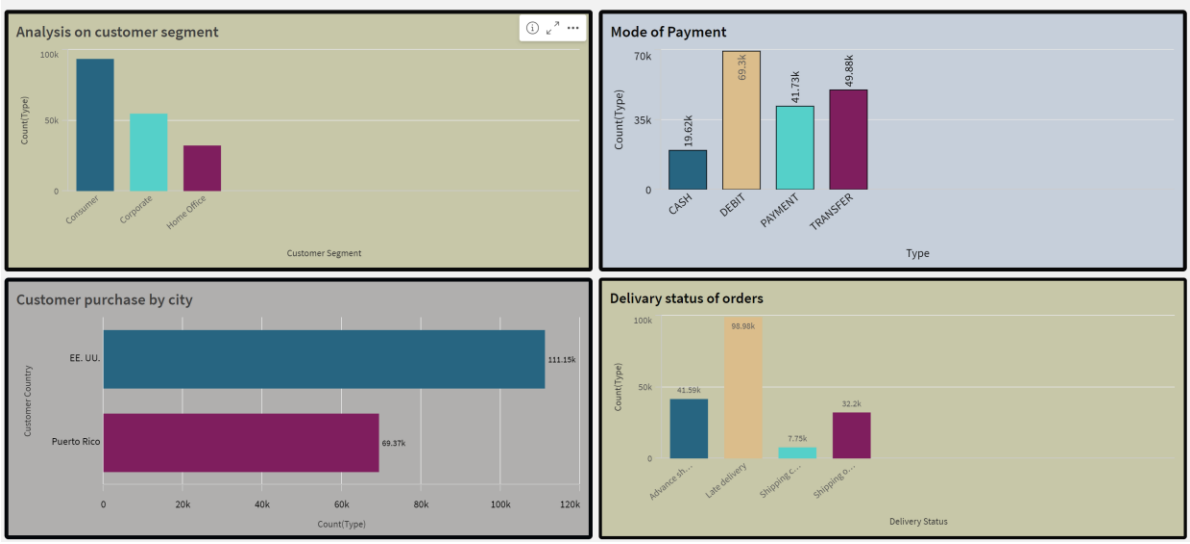
A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

6.1 Responsive and Design of Dashboard

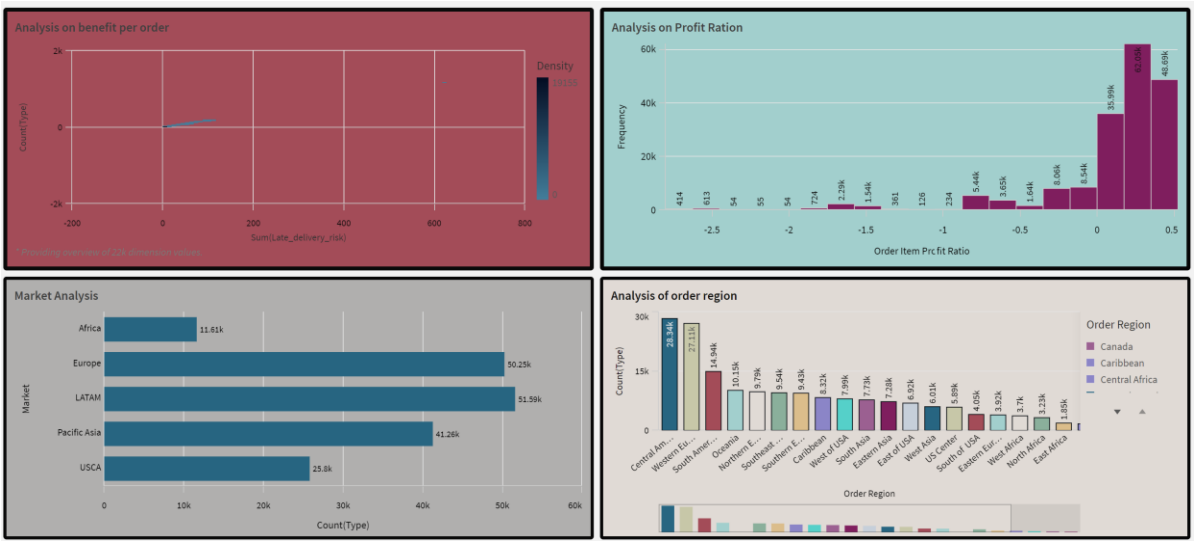
Dashboard 1



Dashboard 2


Analysis on customer segment
Count(Type)
100k
50k
0
Consumer
Corporate
Home Office
Customer Segment
Mode of Payment
70k
35k
0
Count(Type)
19.62k
69.3k
41.73k
49.88k
CASH
DEBIT
PAYMENT
TRANSFER
Type
Customer purchase by city
Customer Country
EE. UU.
111.15k
Puerto Rico
69.37k
0
20k
40k
60k
80k
100k
120k
Count(Type)
Delivary status of orders
100k
50k
0
Count(Type)
41.59k
98.98k
7.75k
32.2k
Advance Sh...
Late delivery
Shipping C...
Shipping D...
Delivery Status

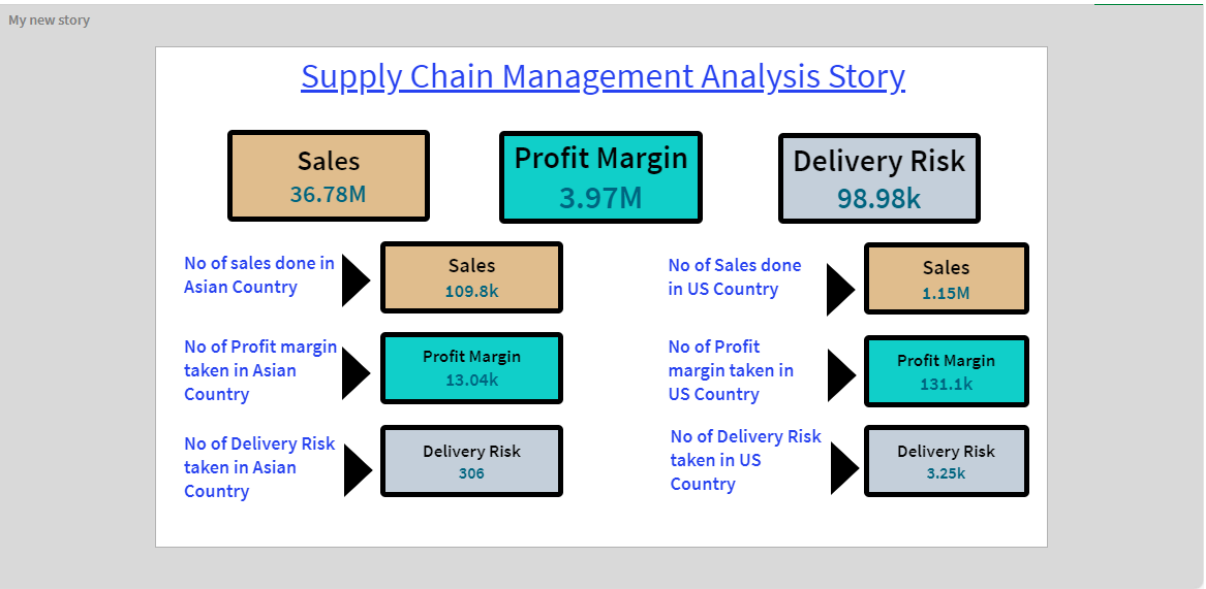
Dashboard 3


Analysis on benefit per order
Count(Type)
2k
0
-2k
-200
0
200
400
600
800
Sum(Late_delivery_risk)
Density
Analysis on Profit Ration
Frequency
60k
40k
20k
0
414
613
54
55
54
724
2.29k
1.54k
361
126
234
5.44k
3.65k
1.64k
8.69k
8.64k
35.99k
63.05k
48.69k
-2.5
-2
-1.5
-1
-0.5
0
0.5
Order Item Prc fit Ratio
Market Analysis
Market
Africa
11.61k
Europe
50.25k
LATAM
51.59k
Pacific Asia
41.26k
USCA
25.8k
0
10k
20k
30k
40k
50k
60k
Count(Type)
Analysis of order region
Count(Type)
30k
15k
0
28.34k
27.11k
14.94k
10.15k
9.79k
9.54k
9.43k
8.32k
7.99k
7.73k
7.23k
6.92k
6.01k
5.89k
4.05k
3.92k
3.7k
3.23k
1.85k
Central Am...
Western Eu...
South Amer...
Oceania
Northern E...
Southeast ...
Southern E...
Caribbean
West of USA
South Asia
Eastern Asia
East of USA
West Asia
US Center
South of USA
Eastern Eur...
West Africa
North Africa
East Africa
Order Region
Order Region
Canada
Caribbean
Central Africa

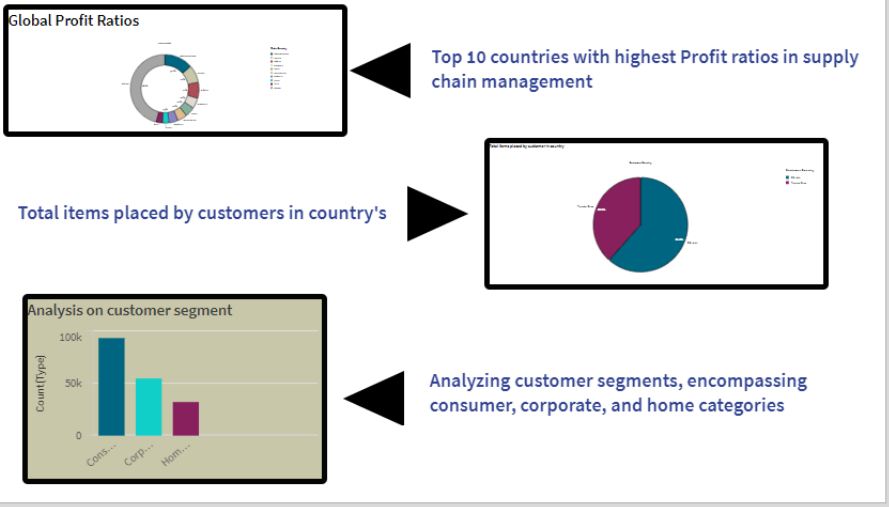
7 Report

7.1 Report Creation

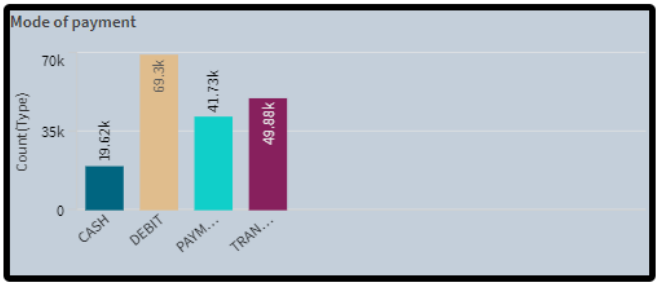
Designing a report in Power BI involves connecting to data sources, creating visualizations like charts and graphs, customizing their appearance and interactivity, organizing them logically on the canvas, formatting elements for consistency and clarity, and optionally creating dashboards for a summarized view. Throughout the process, it's essential to consider the audience's needs and ensure the report effectively communicates insights from the data. Finally, iterate based on feedback to continually improve the report's design and usefulness.



My new story



Mode of Payment for Purchase

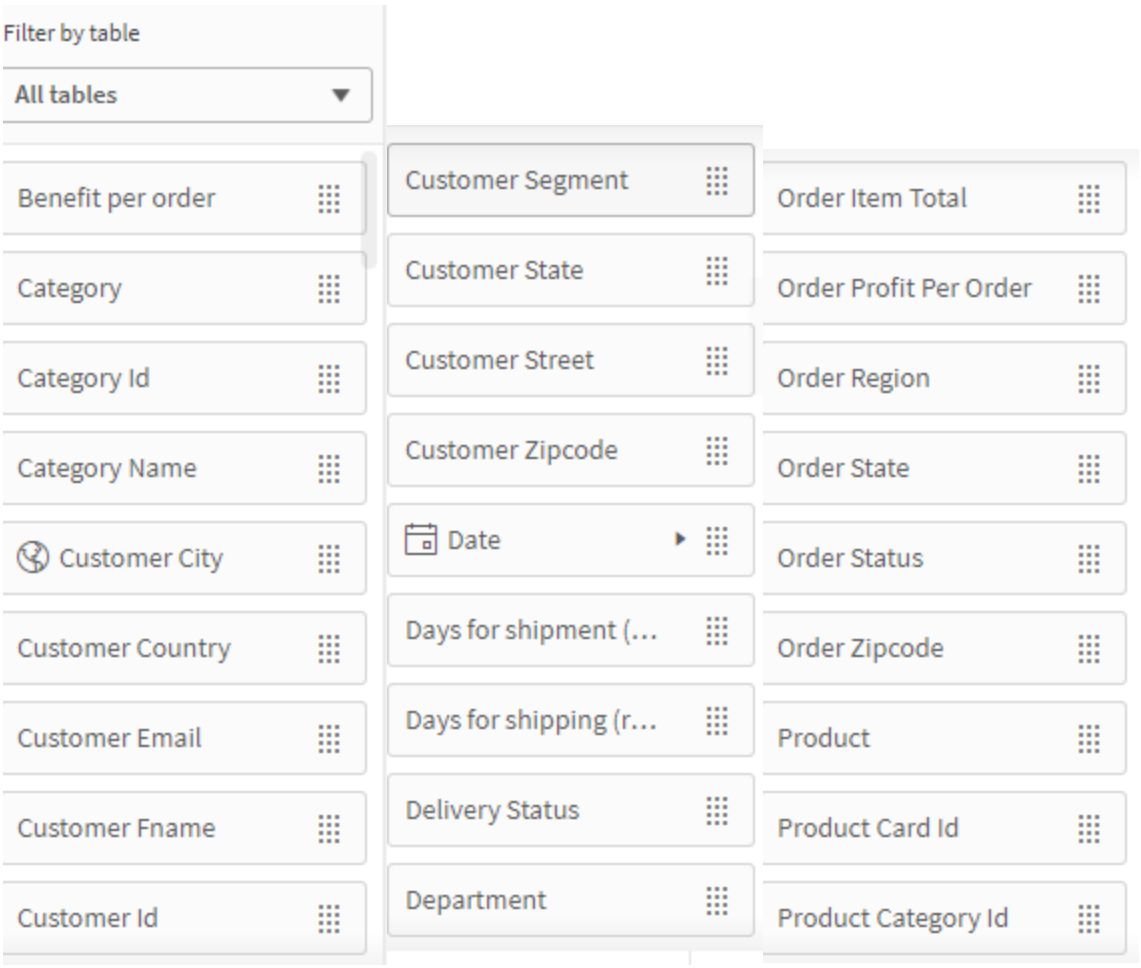


- Cash transactions offer immediate liquidity, providing a straightforward and tangible method of payment.
- Debit payments, directly linked to bank accounts, offer convenience and real-time deduction of funds
- Credit payments provide a deferred payment option, allowing customers to make purchases
- Transfer payments leverage electronic methods for seamless and secure fund

8 Performance Testing

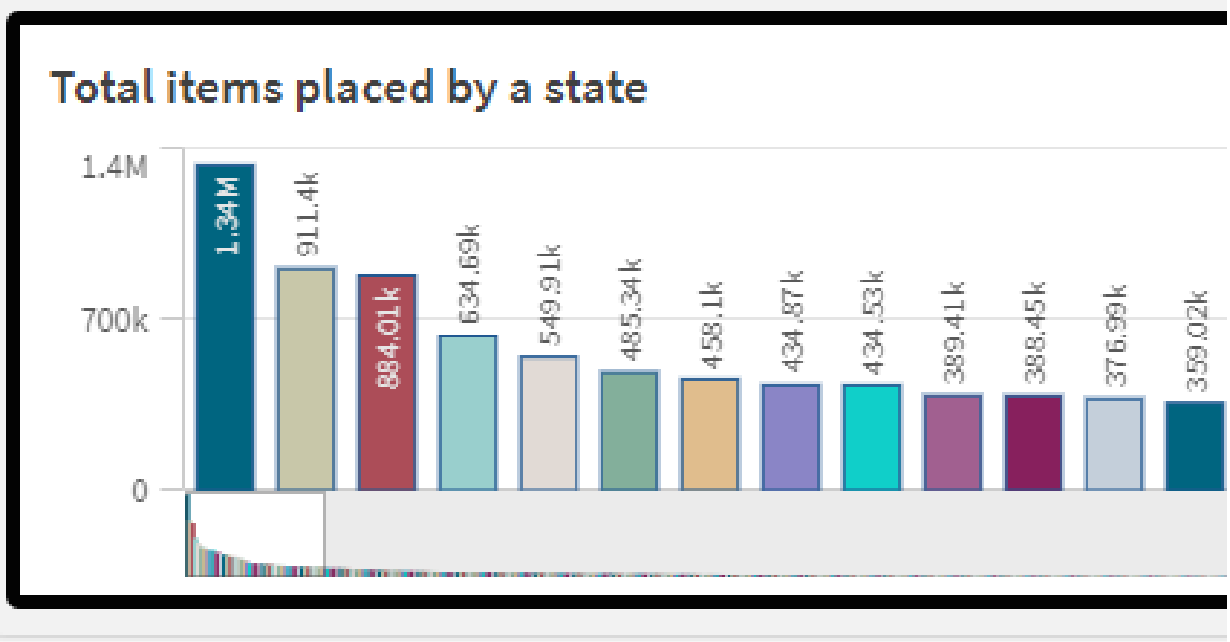
Amount Of Data Loaded

"Amount of Data Loaded" refers to the quantity or volume of data that has been imported, retrieved, or loaded into a system, software application, database, or any other data storage or processing environment. It's a measure of how much data has been successfully processed and made available for analysis, manipulation, or use within the system.



Utilization Of Data Filters

"Utilization of Filters" refers to the application or use of filters within a system, software application, or data processing pipeline to selectively extract, manipulate, or analyze data based on specified criteria or conditions. Filters are used to narrow down the scope of data, focusing only on the relevant information that meets certain predefined criteria.



No Of Visualizations/ Graphs

- Global Profit Ratios
- Total Items placed by customer in country
- Total Items placed by a state
- Analysis on customer segment
- Mode of payment
- Customer purchase by city
- Delivery status of orders
- Analysis on benefit per order
- Analysis on profit ratio
- Market Analysis
- Analysis on order region