

Data-Driven Innovations In Supply Chain Management With Qlik Insights

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Introduction

The objective of supply chain management is to bring out efficiency rather than productivity in the wide aspects of the global market, thus enforcing this method, which has evolved through decades of research and industrial practices. The study encounters detailed analytical insights into supply chain management with real-time data.

Overview:

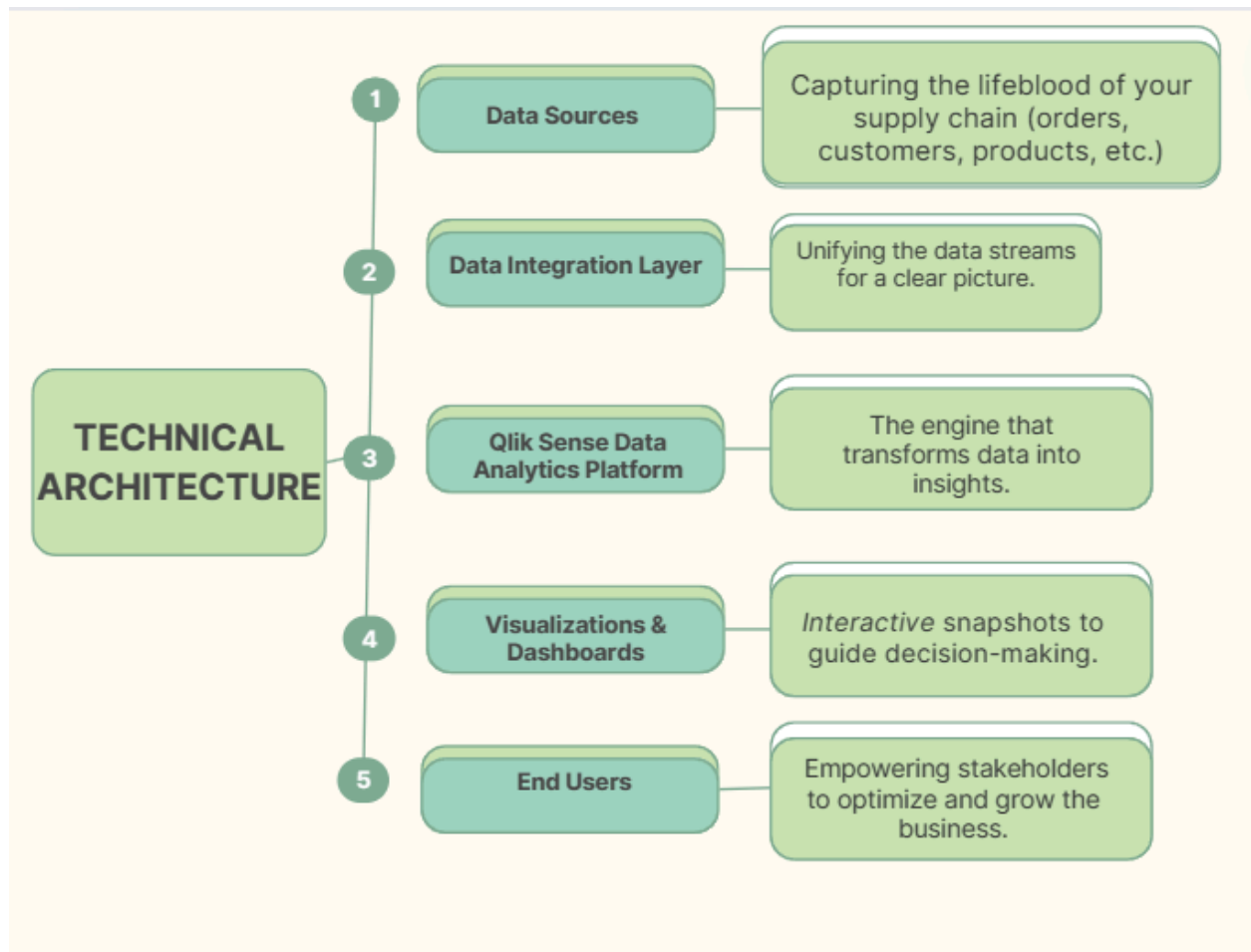
Using Qlik Sense analytics and data visualization, this study provides a thorough overview of supply chain management techniques. It seeks to offer insights into enhancing consumer happiness, streamlining processes, and spotting development prospects in the e-commerce space.

Purpose:

This report's main goal is to discuss the difficulties the e-commerce firm has in making sure that purchases are delivered to clients on time and effectively. Through strategic decision-making, the organization aims to eliminate late deliveries, streamline shipping routes and modes, improve inventory management, and identify new growth prospects by using the potential of data-driven insights.

Technical Architecture:

This report's technological design revolves around Qlik Sense, an effective platform for data analytics and visualization. Secure data connection, real-time data synchronization, and efficient data intake procedures are all made possible with Qlik Sense. Because of the platform's sophisticated data integration features, it is easier to combine data from many sources and provide a complete picture of the supply chain ecosystem. Furthermore, Qlik Sense's interactive dashboard capabilities and strong visualization enable stakeholders to efficiently examine and comprehend data-driven insights.



Problem Understanding

Business Problem:

The business problem at hand revolves around the inconsistencies that impact the company's supply chain operations, resulting in mediocre customer experiences and hindering growth opportunities. Despite possessing a multifaceted dataset spanning orders, customers, products, and logistics, the organization is grappling with challenges such as late deliveries, inefficient shipping routes, and inadequate inventory management.

These issues not only compromise customer satisfaction but also contribute to increased operational costs and potential revenue losses. Addressing these challenges

is paramount to maintaining a competitive edge and fostering long-term sustainability within the e-commerce landscape.

Gaining a comprehensive understanding of the problem is a prerequisite for developing effective solutions. The organization must delve deep into the root causes of late deliveries, whether they stem from logistical inefficiencies, supplier delays, or other bottlenecks within the supply chain. Similarly, identifying the factors contributing to inefficient shipping routes and inferior inventory management practices is vital.

Business Requirements:

To tackle the identified business problem effectively, the organization must establish a clear set of business requirements. Firstly, the company needs to prioritize the reduction of late deliveries by implementing proactive measures informed by data-driven insights. Secondly, optimizing shipping routes and modes of transportation is crucial, considering factors such as cost-effectiveness, speed, and environmental impact.

Furthermore, enhancing inventory management practices through demand forecasting and stock level planning is essential to minimizing stock outs or overstocking scenarios. Improving customer satisfaction by ensuring timely deliveries, accurate inventory availability, and efficient logistics is another critical requirement. Lastly, the organization must utilize data analysis to uncover growth opportunities, enabling strategic decision-making for business expansion based on product demand, customer preferences, and regional trends. Furthermore, analyzing customer feedback, purchase patterns, and satisfaction levels can shed light on the areas that require immediate attention and improvement. Additionally, the organization should investigate regional market dynamics, competitor strategies, and emerging trends to identify potential growth opportunities proactively.

Literature Survey:

In today's fast-paced business environment, effective supply chain management is critical for companies to remain competitive. One key area that has gained significant attention in recent years is the use of data analytics to drive insights and improve supply chain performance. Advanced analytics techniques, combined with the increasing

availability of big data, offer opportunities for companies to optimize their supply chain operations, enhance delivery performance, and ultimately drive business value.

The Role of Data Analytics in Supply Chain Management

The significance of data-driven strategies for supply chain management has been emphasized by a number of studies. Awaysheh et al. (2021), for example, looked into the way human error on the part of front-line supply chain workers affected delivery delays. They discovered that latent circumstances, including managerial, technological, and social elements, might modify the link between individual errors and delivery delays, building on the normal accident theory (NAT). Their multilevel research, which made use of historical shipping data from a Fortune 500 corporation, provided insight into the possible repercussions of human error as well as the function of organizational elements in minimizing it.

Quantifying the Impact of Delivery Performance

While the importance of timely deliveries is well-recognized, quantifying the actual cost of delivery delays has been a challenge. Niemi et al. (2020) addressed this issue by analyzing longitudinal data on orders and deliveries of sports goods over a nine-year period. Using a polynomial distributed lag model, they estimated the impact of delivery delays on sales. Their findings indicated that small delays of up to two weeks could decrease sales by up to 10% over a period of 3–4 weeks, while longer delays of up to 45 days had a more significant negative effect on sales. This study provides a quantitative tool for supply chain managers to estimate the potential lost sales due to delivery delays and assess the profitability of investments in improving supply chain performance.

The scope of the analyzed research papers suggests that integrating real-time data and analytics: Supply chain operations are dynamic, and the ability to incorporate real-time data and analytics can help organizations respond more quickly to disruptions and changing market conditions.

The review of the literature emphasizes how data analytics is becoming more and more important to supply chain management. To fully realize the potential of data analytics in revolutionising supply chain management, more research is still required, even though previous studies have shown how data-driven approaches can optimise delivery

performance, quantify the impact of delays, and comprehend the role of human and organizational factors. Through tackling the obstacles and investigating novel technologies and approaches, scholars and professionals may aid in the advancement of supply chains that are more effective, robust, and focused on the needs of customers.

Data Collection

Data Acquisition and Integration:

The fundamental concept behind this strategy is the reorganization of diverse sources of information from different areas of the supply chain, such as customer data, inventory management, logistics, and procurement. By building strong data connections, it is possible to guarantee the seamless integration and real-time synchronization of data from many systems, providing a thorough understanding of the supply chain ecosystem. Strict standards for data consistency and quality are established to ensure the accuracy and dependability of the data that drives analytics development. The data was sourced from a data analytics resource website, specifically DataCo's Smart Supply Chain for Big Data Analysis.



Data understanding:

Order Information:

The category encompasses attributes that provide details about customer orders, such as order identifiers, dates, regions, states, statuses, zip codes, cities, countries, customer IDs, and profit per order. These attributes are crucial for tracking and analyzing order life cycles, delivery performance, and profitability metrics.

Order Item Details:

This category focuses on the specific items within each order, including item IDs, product IDs, discounts, discount rates, product prices, profit ratios, quantities, and total values. These attributes enable granular analysis of order compositions, pricing strategies, and profitability at the item level.

Product Information:

The product information category includes attributes related to the products themselves, such as product IDs, category IDs, descriptions, images, names, prices, and statuses. These attributes are essential for managing product catalogs, analyzing product performance, and identifying trends and opportunities for optimization.

Shipping Information:

The category encompasses attributes related to the shipping process, including shipping dates, modes, actual and scheduled shipping duration, delivery statuses, and late delivery risk indicators. These attributes are critical for monitoring and optimizing logistics operations, identifying bottlenecks, and ensuring the timely delivery of products.

Customer Information:

The customer information category includes attributes that provide details about individual customers, such as customer IDs, names, emails, passwords, segments, addresses, cities, states, zip codes, and countries. These attributes enable customer

segmentation, targeted marketing strategies, and personalized customer experiences.

Category Information:

This category includes attributes related to product categories, such as category IDs and names. These attributes are useful for organizing and analyzing product offerings, identifying popular categories, and optimizing inventory management based on category performance.

Department Information:

The department information category includes attributes related to different departments within the organization, such as department IDs and names. These attributes may be useful for internal organizational purposes and departmental analysis.

Financial Metrics:

This category includes attributes that represent key financial metrics, such as benefits per order and sales per customer. These attributes are essential for evaluating profitability, identifying revenue streams, and monitoring financial performance.

Geographical Information:

The geographical information category includes attributes related to location data, such as latitudes, longitudes, and markets. These attributes are valuable for optimizing supply chain operations, identifying regional trends, and tailoring strategies based on geographic factors.

Establishing Data Connectivity with Qlik Sense:

Analytics and BI are key facilitators in extracting value from business operations, and they support and facilitate better business decisions. However, extracting relevant insights with traditional BI platforms and self-service BI has become increasingly difficult as data complexity has increased, especially with the introduction of big data analytics. Qlik Sense provides a flexible platform for securely connecting to and adequately managing data sources. Taking advantage of Qlik's data integration capabilities, the organization can streamline the ingestion and transmission of data, optimum performance, and ensuring compliance with data governance standards. Real-time data synchronization capabilities enable prompt reaction to supply chain

disruptions and dynamic market conditions.

Data Preparation

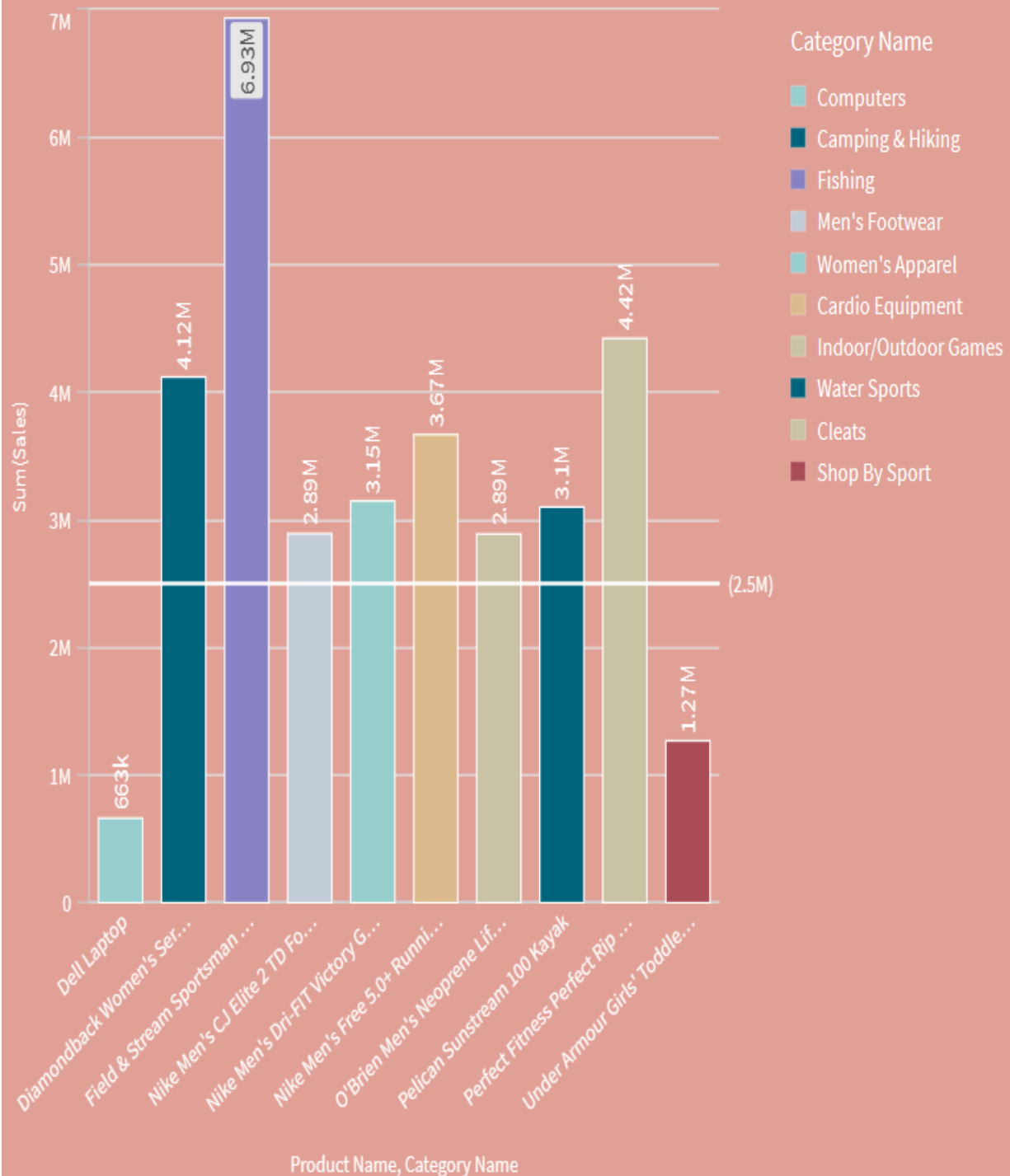
In order to make the data simple to comprehend and available for the creation of visualizations that offer insights into performance and effectiveness, As the data has been through a cleansing procedure to eliminate redundant or missing information, the research proceeds straight to formatting it for use with visual aids. This might entail doing data type conversions, generating derived metrics, or rearranging the data layout. By evaluating the prepared data using descriptive statistics along with basic charts, we can determine any outliers, get an understanding of the features of the data, and find early patterns in the data that need further investigation in graphical form. Filtering the dataset lets us hone in on particular segments or subgroups of interest for more focused analysis and visualization. Along with the data exploration completed, we can map the variables to the appropriate visual encoding required by the chosen visualization software. Ensuring quality through comprehensive data validation is crucial prior to developing the final visualizations. This thorough data preparation method lays a solid basis for producing understandable, knowledgeable visualizations that reveal interesting perspectives on effectiveness and performance.

Data Visualization

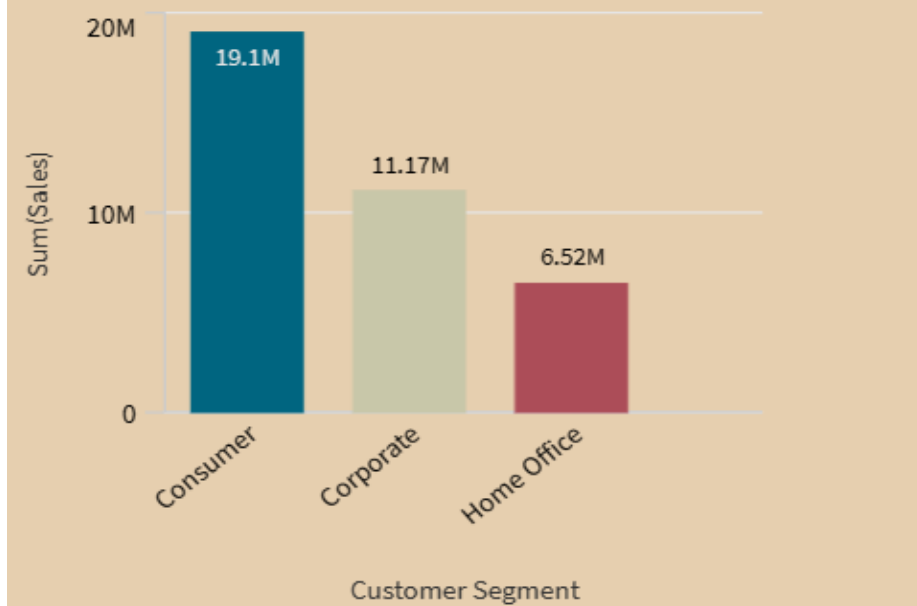
The above operations on data preparation lead to the fundamental part of the report: visualization of real-time data takes a toll on space efficiency and complexity of computational systems, but using the Qlik Sense application, the reports have been drafted for a wide range of perspectives on charts.

Some of them visualize the reports of financial and inventory data of the organization, whereas others compress the detailed view of problems faced by supply chain management.

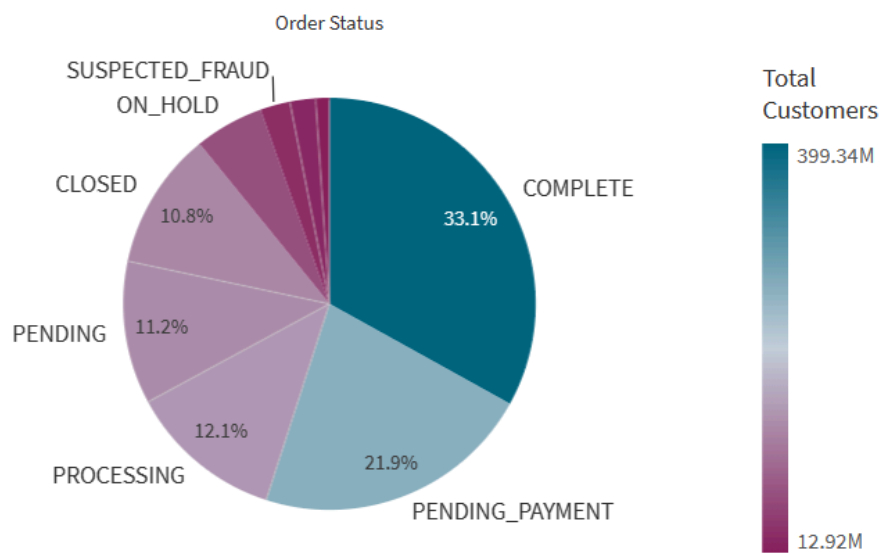
TOP PRODUCTS and TOP CATEGORIES in Sales

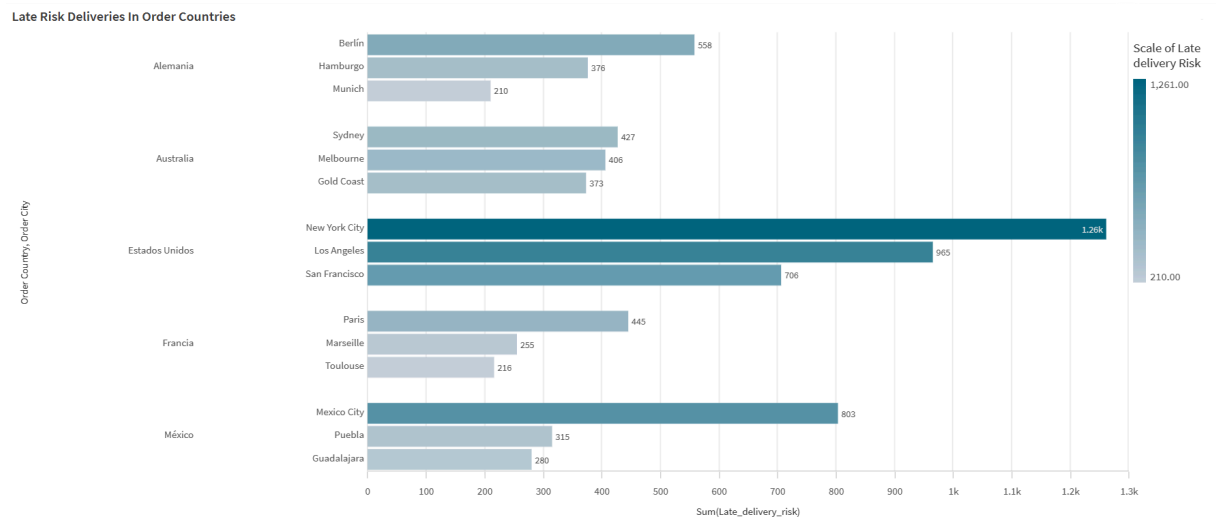


Sales per Customer Segment



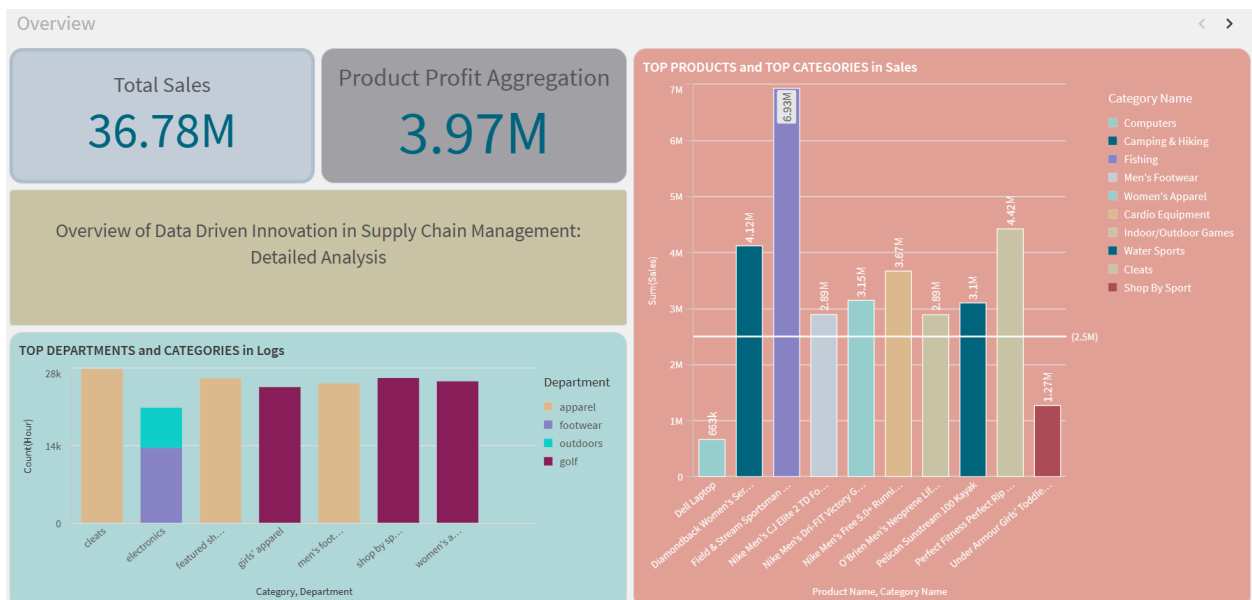
Order Status Distribution

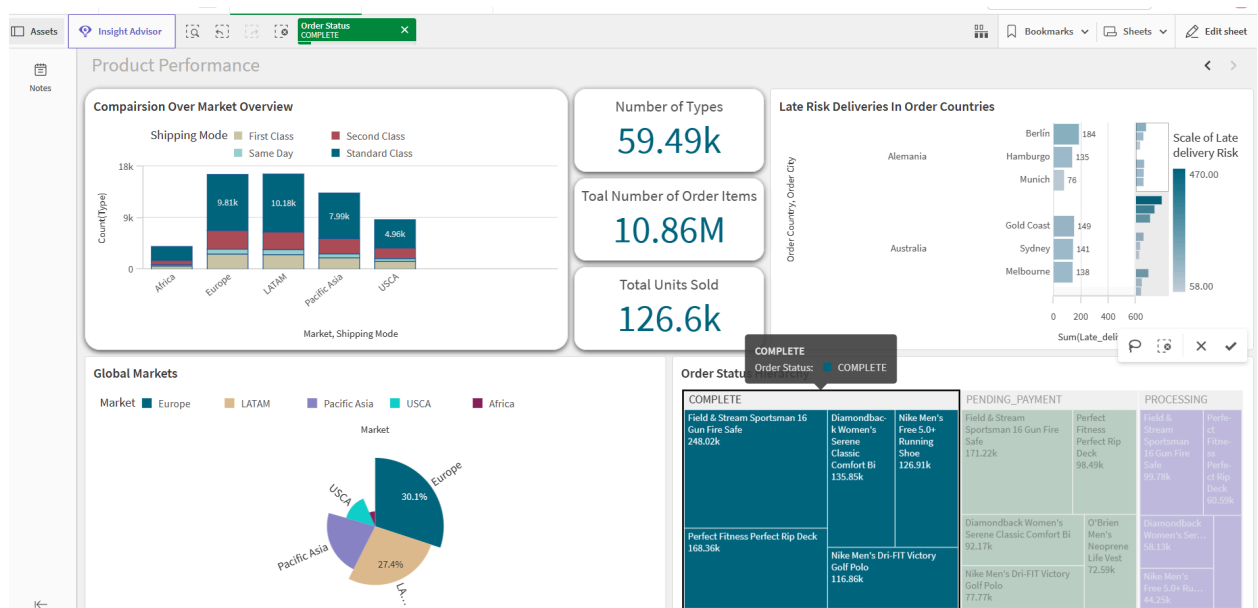
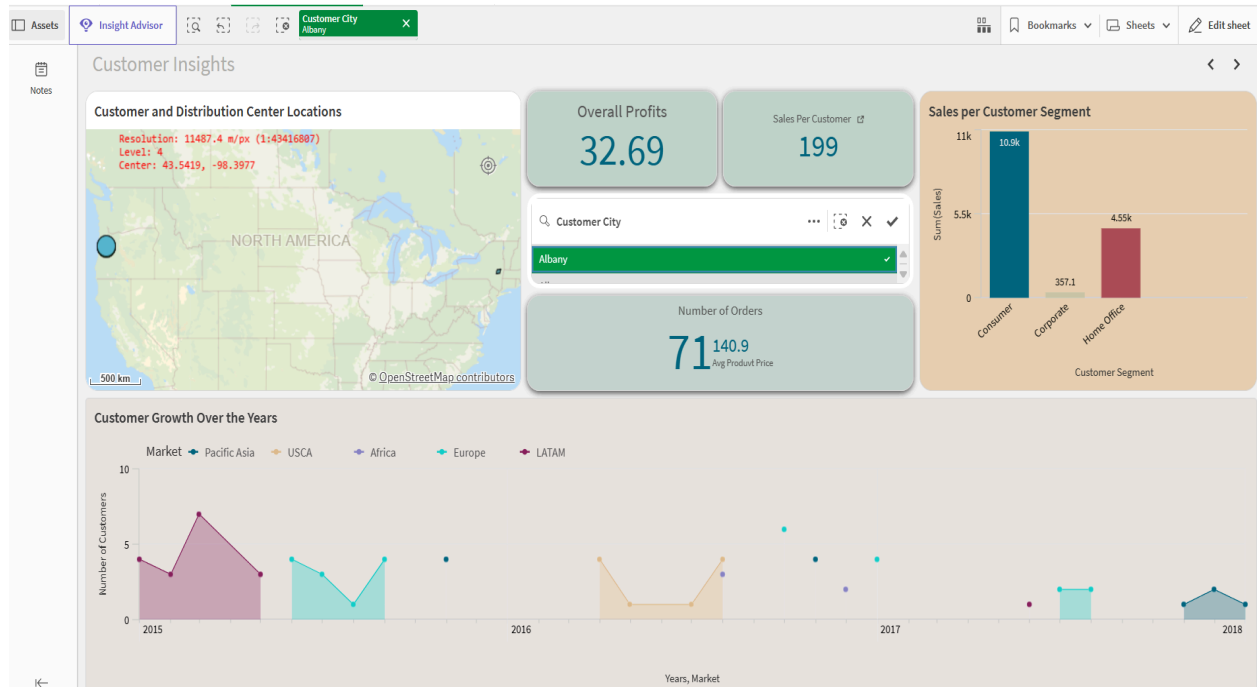


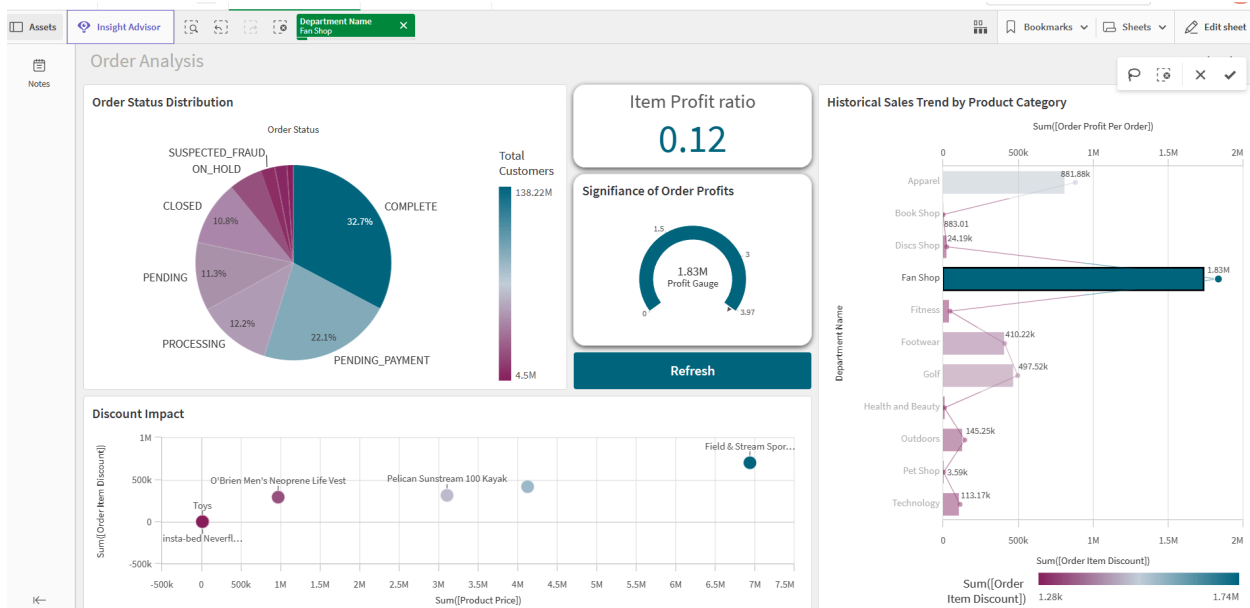


Dashboard:

The report focuses mainly on the aspects of overview and problem analysis of supply chain management through these crucial interactive live dashboards, which are drafted in a user-customisable way to focus on data understanding for clients.

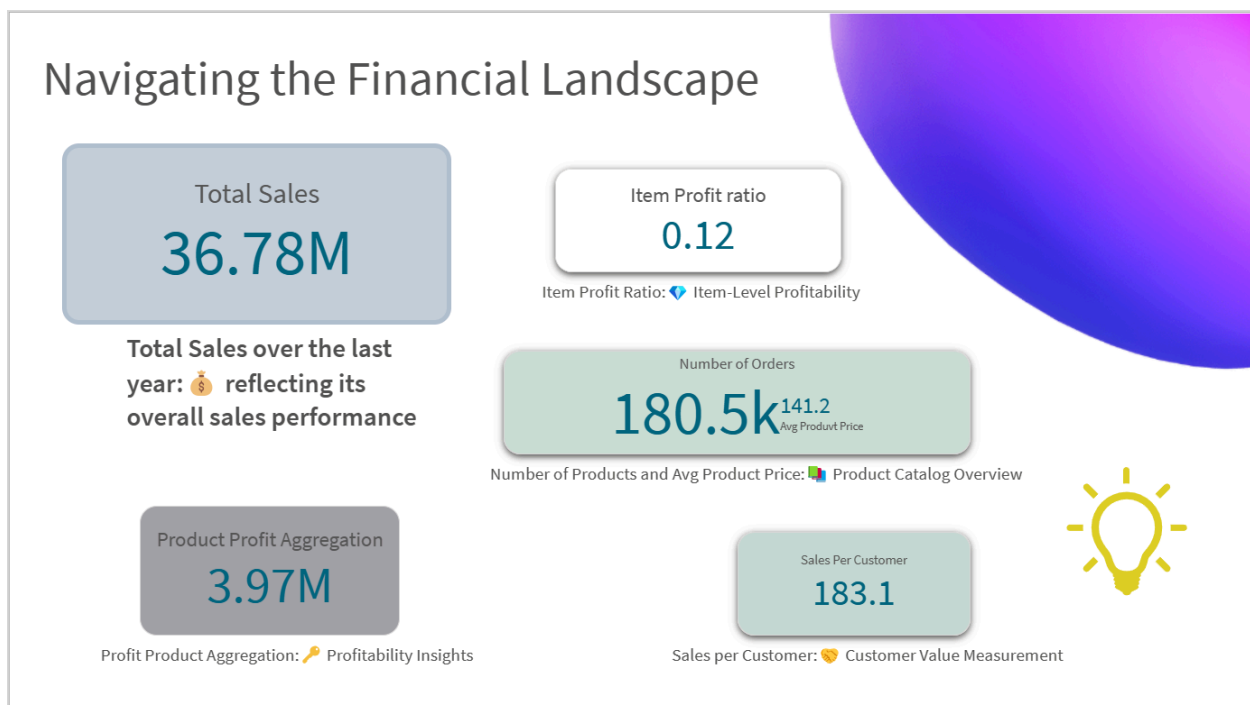






Report

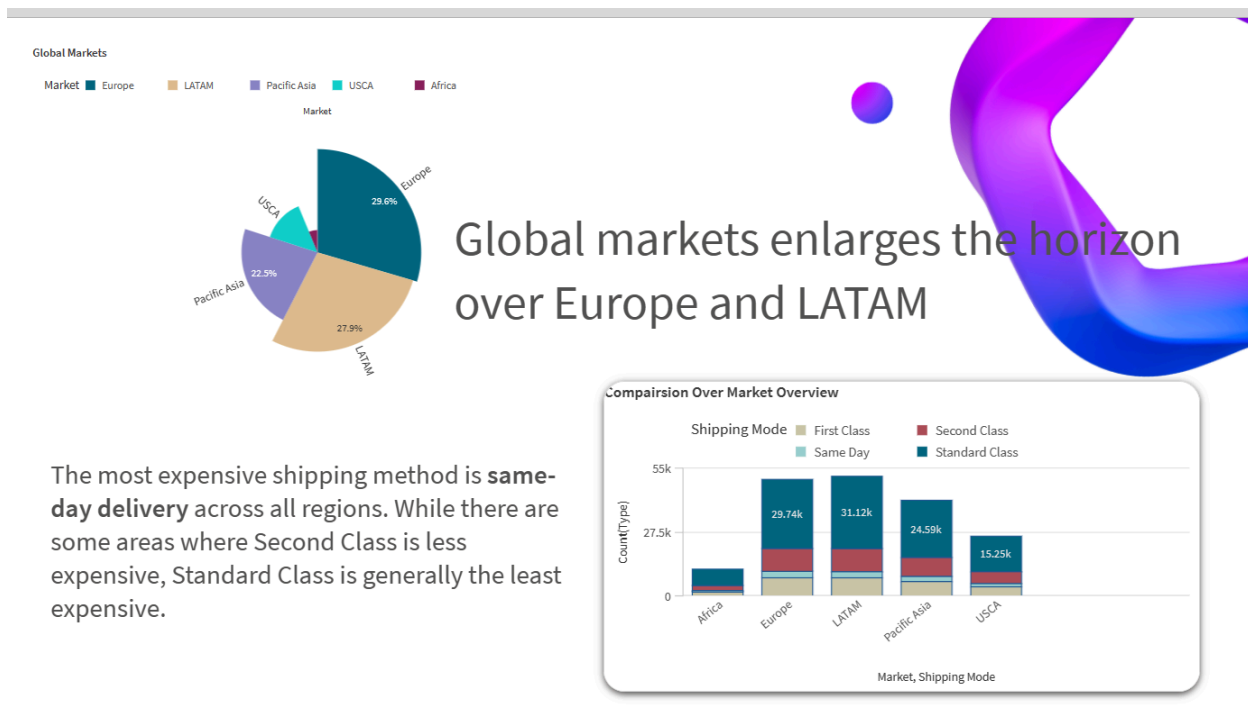
Slide 1 takes the assessments of the Financial Department of Chain Management; some of the crucial metric values are displayed.



Slide 2 shows the growth and wide range of customer bases of the organization.








Slide 3 examines the properties of the global market and late deliveries.



Performance Testing

Data Loaded quantifies the volume of information successfully ingested into a system, application, or database. This metric reflects the availability of processed data for analysis and manipulation. In essence, it represents the foundation upon which insights and informed decisions can be built. A higher "Data Loaded" value signifies a richer pool of information, potentially leading to more robust and valuable discoveries.

Customer State	Benefit per order	Late_delivery_risk
Customer Street	Category	Latitude
Customer Zipcode	Category Id	Longitude
 Date	Category Name	Longitude_Latitude
Days for shipment (...)	 Customer City	Market
Days for shipping (r...	Customer Country	Month
Delivery Status	Customer Email	 Order City
Department	Customer Fname	 Order Country
Department Id	Customer Id	Order Customer Id
Department Name	Customer Lname	 order date (Dat...
Hour	Customer Password	Order Id
ip	Customer Segment	Order Item Cardpro...

Order Item Discount	Product	Shipping Mode
Order Item Discoun...	Product Card Id	Type
Order Item Id	Product Category Id	url
Order Item Product ...	Product Description	
Order Item Profit Ra...	Product Image	
Order Item Quantity	Product Name	
Order Item Total	Product Price	
Order Profit Per Order	Product Status	
Order Region	Sales	
Order State	Sales per customer	
Order Status	📅 shipping date (... ▶	
Order Zipcode	Shipping Mode	

Utilizing Filters:

Using criteria strategically inside a system or data analysis pipeline is known as filter application. This makes it accessible to deliberately extract, manipulate, and analyze specific data subsets. Filters work like a net, carefully removing pertinent data from the larger collection by setting criteria. This attention to relevant details enhances data

exploration's efficacy and efficiency, which ultimately results in more useful insights. Filters, which are used upon the dashboards are accessing the customer city to get better review over the information on inventory management, Delivery Schedules, Profits and Margins.

Dashboards with customer city filters operate as a strong expansion of the business's data. They let customers concentrate on certain city performances, which aids in decision-making. Analyzing data at the city level allows researchers to:

- Maximize inventory: To prevent outages and surplus inventory, stock the appropriate items in the right places.
- Improve delivery schedules: Determine high-demand locations to optimize delivery routes and reduce costs and time.
- Customize the advertising to appeal to the tastes of the target cities, with the goal of boosting sales and customer happiness.

Higher profitability and margins ultimately come from this focused attention to detail, in addition to increased customer satisfaction and efficiency.

Number of Visualization

1. TOP DEPARTMENTS and CATEGORIES in Logs
2. TOP PRODUCTS and TOP CATEGORIES in Sales
3. Customer and Distribution Center Locations
4. Sales per Customer Segment
5. Customer Growth Over the Years
6. Order Status Distribution
7. Historical Sales Trend by Product Category
8. Discount Impact
9. Comparison Over Market Overview
10. Late Risk Deliveries In Order Countries
11. Global Markets
12. Order Status Hierarchy