Data-Driven Innovations in Supply Chain Management with Qlik Insights

➤ Created by Raj Singhaniya

Acknowledgement: I would like to thank the entire team of SmartBridge and Qlik for giving me this opportunity to learn Business Analytics under their guidance.

Problem Statement: The project aims to revolutionize supply chain management through data-driven insights using Qlik 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, 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 stockouts 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 Qlik 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.

Research Paper: "The Impact of Predictive Analytics on Supply Chain Performance" Source: Supply Chain Management Review, 2018.

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 stockouts.

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%.

Social or 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.

3. 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:

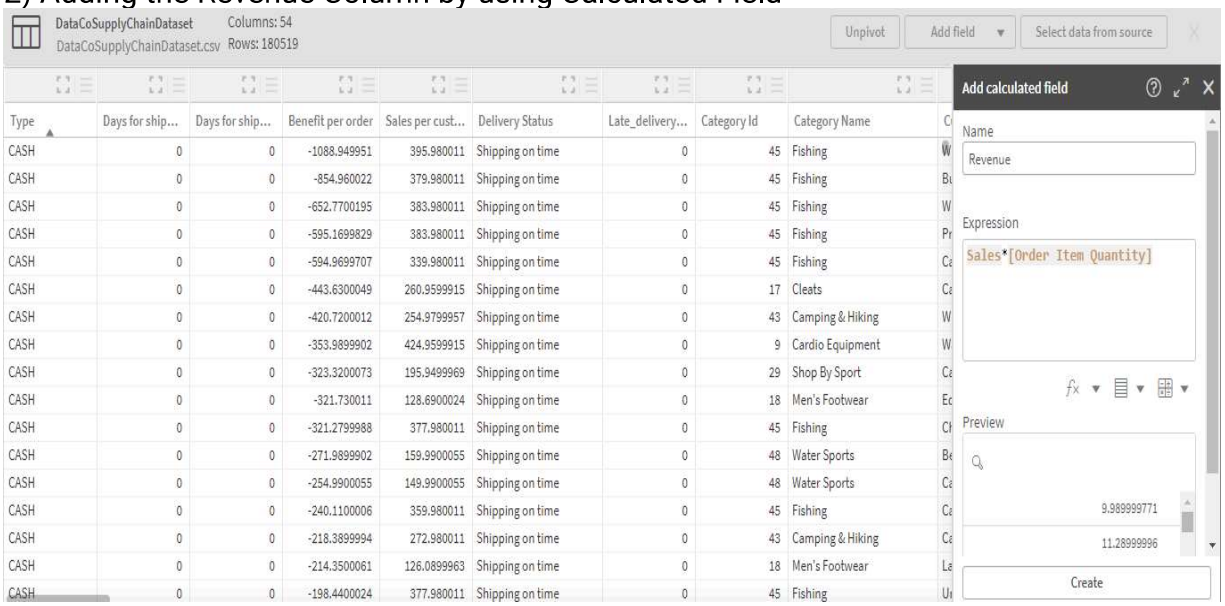
- Type: Type Count
- Days for shipping (real): Product shipment days
- Days for shipment (scheduled): product getting prepared for shipment
- Benefit per item: profit earned per product
- Sales per customer: No of products purchased by the customer
- Delivery: Products delivery date.
- Late_delivery_risk: 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 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 productProduct 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 informations, and product categories.
https://www.kaggle.com/datasets/shashwatwork/dataco-smart-supply-chain-for-big-dataanalysis .

Data Preparation

Data Cleaning and Transformation:
1) Removing the null values
2) Adding the Revenue Column by using Calculated Field



Type	Days for ship...	Days for ship...	Benefit per order	Sales per cust...	Delivery Status	Late_delivery...	Category Id	Category Name
CASH	0	0	-1088.949951	395.980011	Shipping on time	0	45	Fishing
CASH	0	0	-854.960022	379.980011	Shipping on time	0	45	Fishing
CASH	0	0	-652.7700195	383.980011	Shipping on time	0	45	Fishing
CASH	0	0	-595.1699829	383.980011	Shipping on time	0	45	Fishing
CASH	0	0	-594.9699707	339.980011	Shipping on time	0	45	Fishing
CASH	0	0	-443.6300049	260.9599915	Shipping on time	0	17	Cleats
CASH	0	0	-420.7200012	254.9799957	Shipping on time	0	43	Camping & Hiking
CASH	0	0	-353.9899902	424.9599915	Shipping on time	0	9	Cardio Equipment
CASH	0	0	-323.3200073	195.9499969	Shipping on time	0	29	Shop By Sport
CASH	0	0	-321.730011	128.6900024	Shipping on time	0	18	Men's Footwear
CASH	0	0	-321.2799988	377.980011	Shipping on time	0	45	Fishing
CASH	0	0	-271.9899902	159.9900055	Shipping on time	0	48	Water Sports
CASH	0	0	-254.9900055	149.9900055	Shipping on time	0	48	Water Sports
CASH	0	0	-240.1100006	359.980011	Shipping on time	0	45	Fishing
CASH	0	0	-218.3899994	272.980011	Shipping on time	0	43	Camping & Hiking
CASH	0	0	-214.3500061	126.0899963	Shipping on time	0	18	Men's Footwear
CASH	0	0	-198.4400024	377.980011	Shipping on time	0	45	Fishing

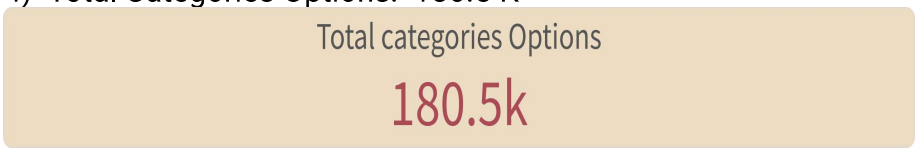
Data Visualization :

1) Total Profit generated : 3.97 M

2) Total Revenue Generated: 81.96 M

3) Total Sales: 36.78 M

4) Total Categories Options: 180.5 K

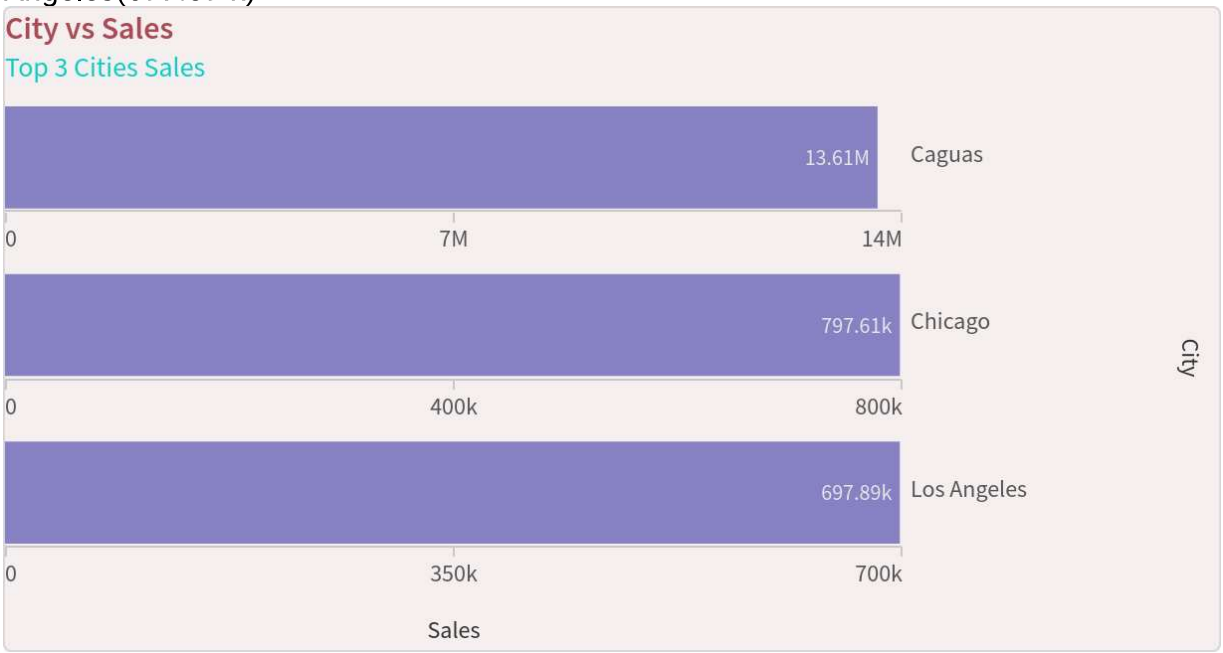


5) Total no. of quantities sold :384.1K

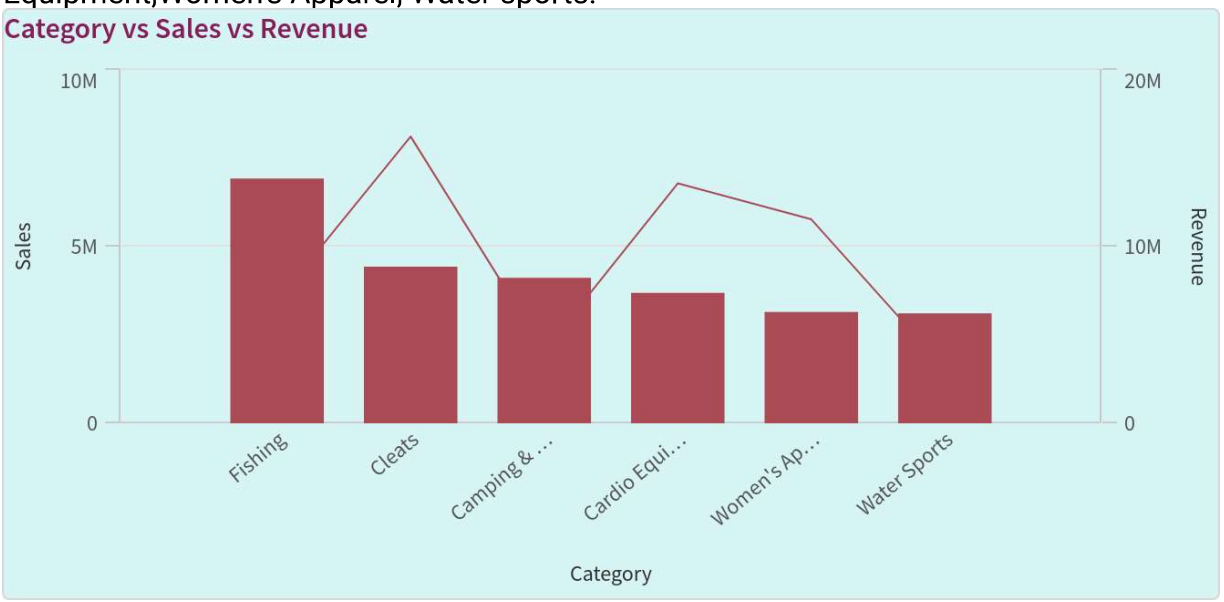
6) Total Discount given : 3.73 M

7) Month vs Sales : (Line Chart): Max in Jan and Min in Dec

8) City vs Sales : Top 3 cities are - Cagaus(13.61M),Chicago(797.61k) and Los Angeles(697.89 k)



9) Category vs Sales Vs Revenue: Order is Fishing , Cleats, Camping&Hiking, Cardio Equipment,Women's Apparel, Water sports.



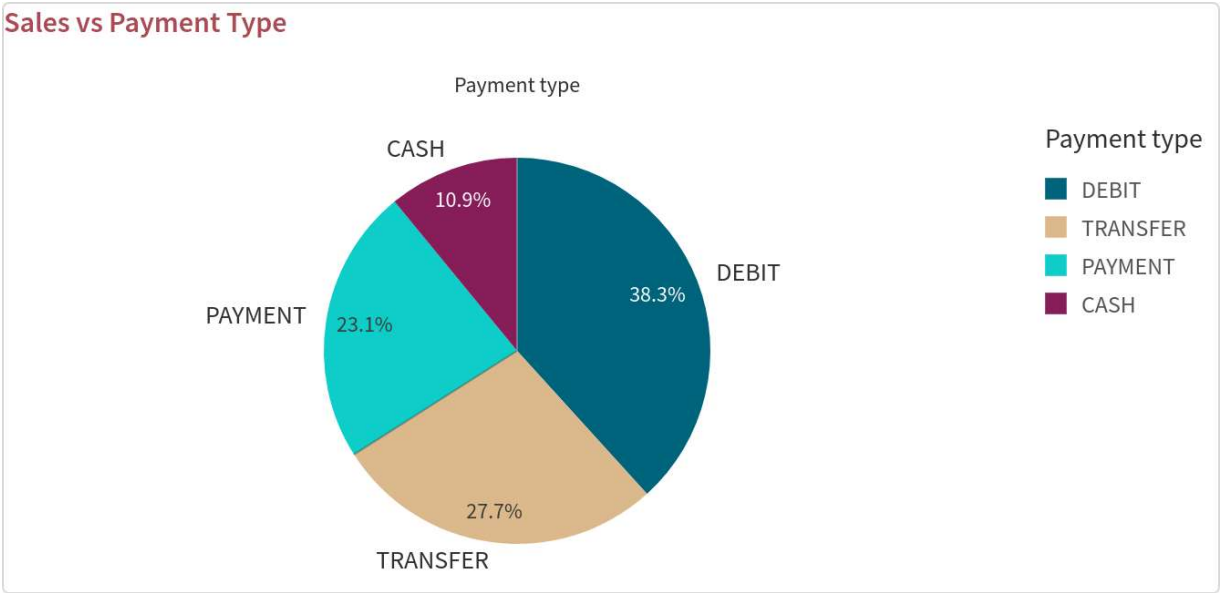
10) Sales vs Payment Type : Using Pie chart :

Debit chard: 38.3%

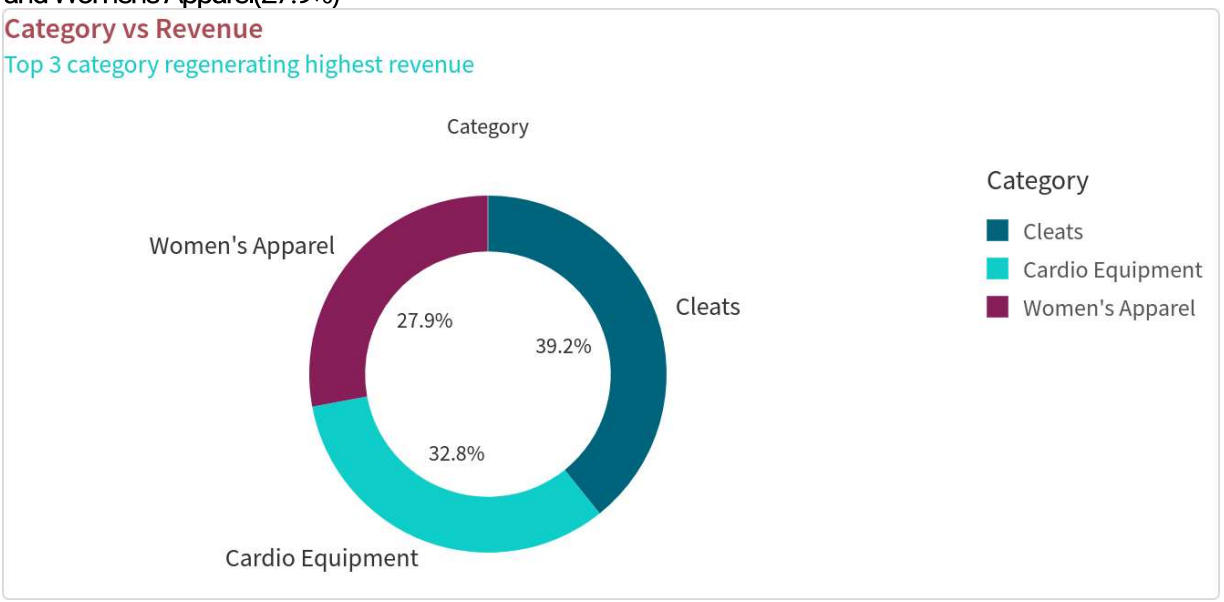
Transfer: 27.7%

Payment : 23.1%

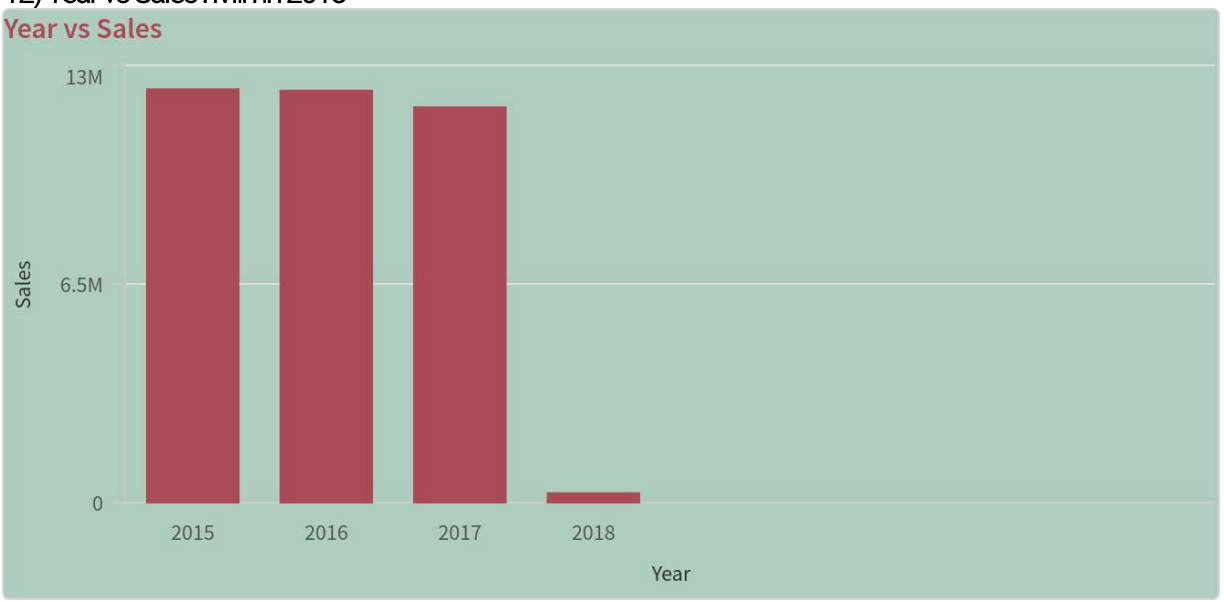
Cash :10.9%



11) Category vs Revenue : Top 3 revenue generated categories are Cleats(39.2%), Cardio Equipment(32.8%), and Women's Apparel(27.9%)

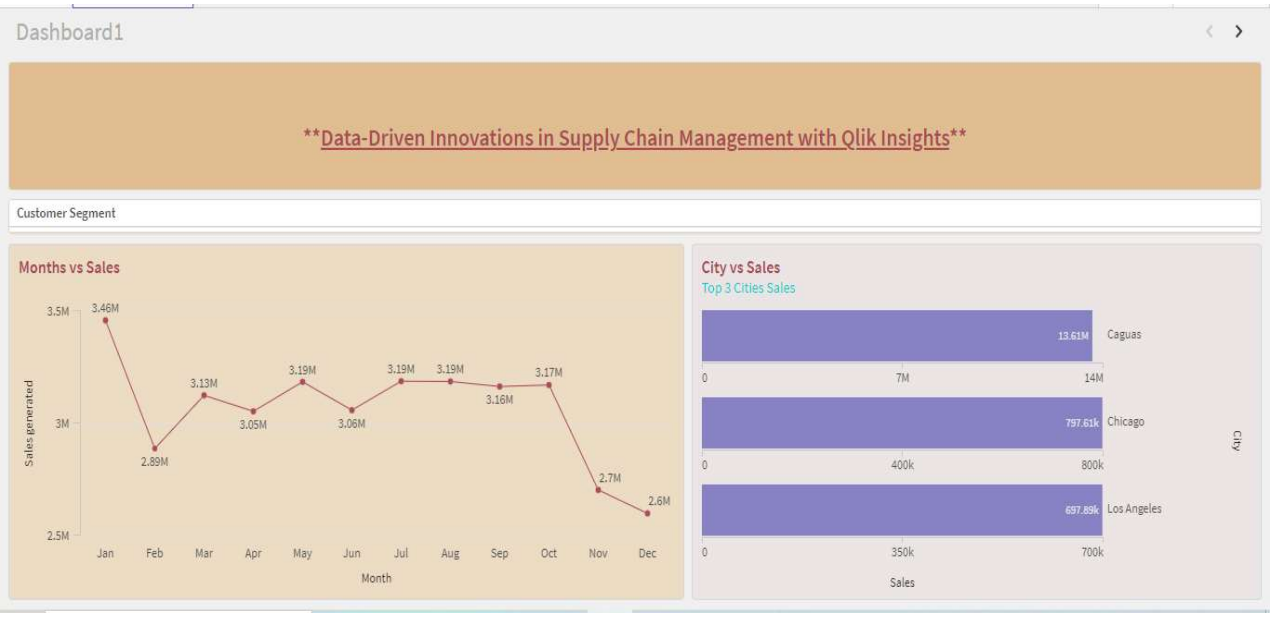


12) Year vs Sales : Min in 2018

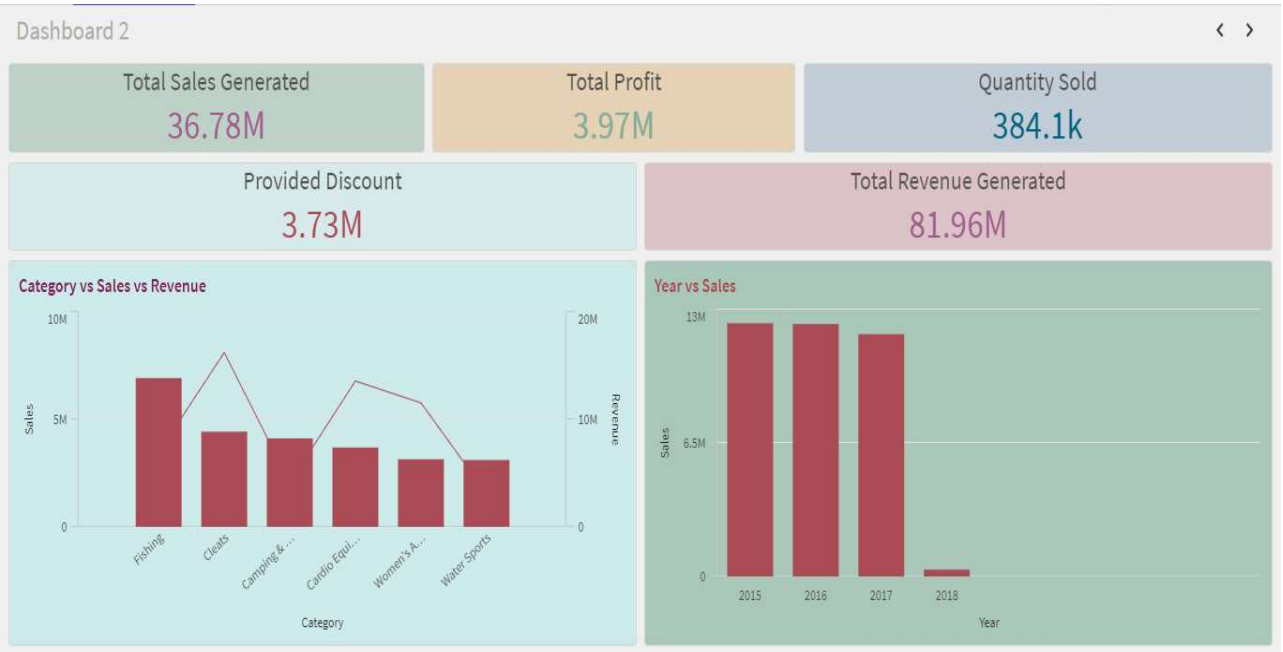


Designing the Dashboards:

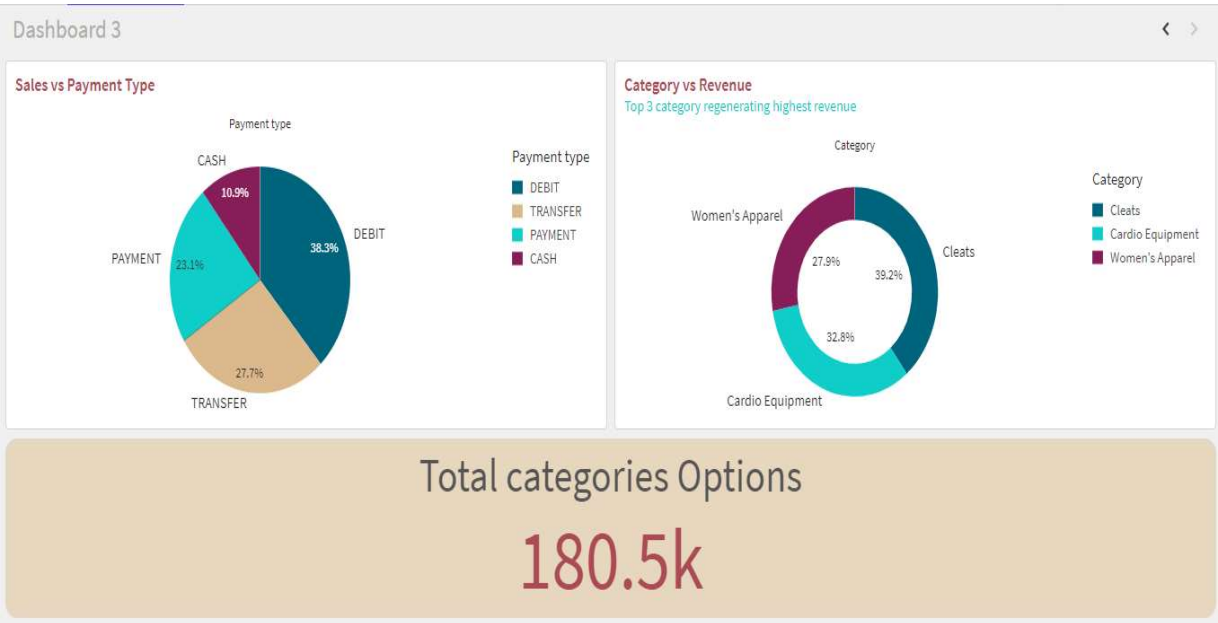
1) Dashboard 1:



2) Dashboard 2:

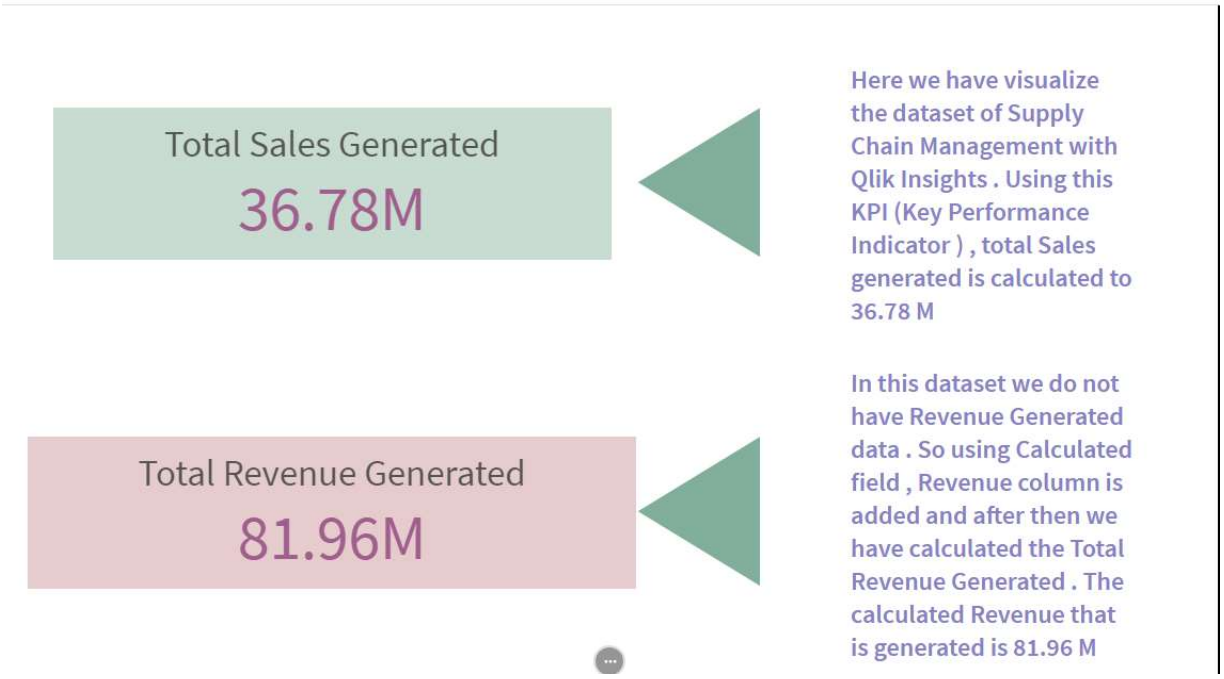


3) Dashboard 3:

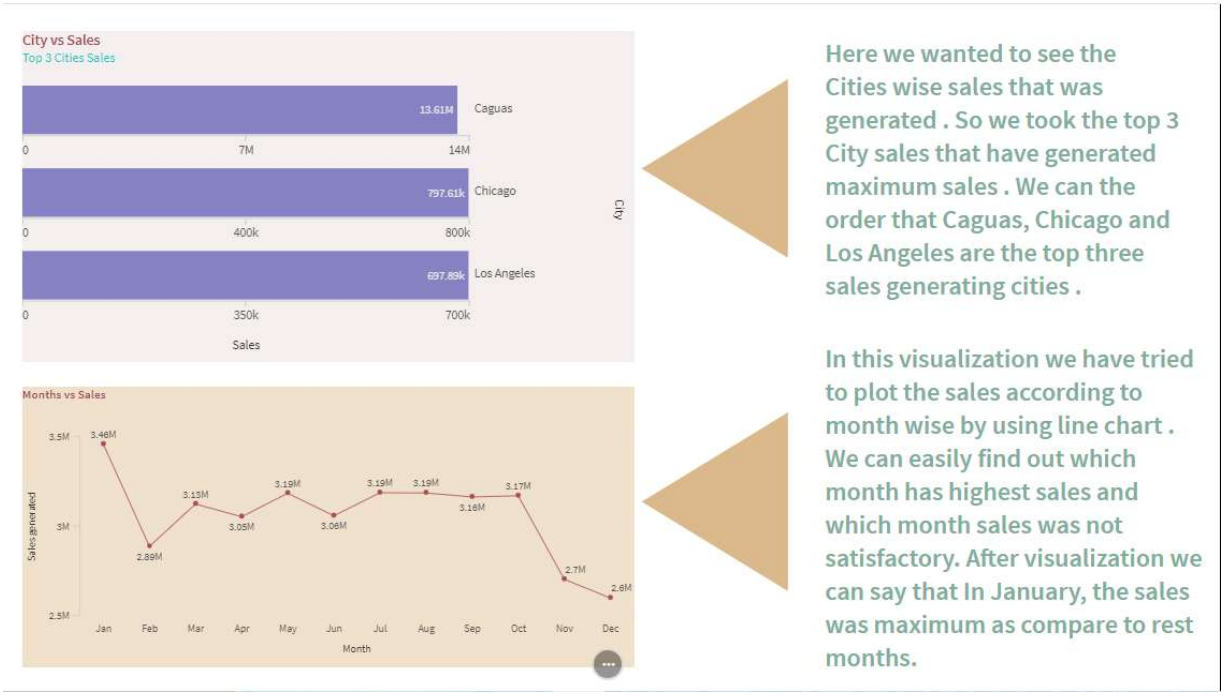


Storytelling :

Storytelling 1:



Storytelling 2:



Performance Testing :-

Amount of data loaded :

- Sales
- Revenue
- Total Categories
- Customer's City
- Order year
- Profit
- Quantities
- Order month

Utilization of data filters:

Customer Segment is used as a filter .

-> Consumer

-> Corporate

-> Home Office

No. of Visualizations :
Total 12 visualizations are used .

Project Demonstration and document link:

Project Demonstration :
https://drive.google.com/file/d/1p5pIK9M4gfzzmqQEBb_MO6vvLq_Q1v6U/view?usp=drive_link

Document link:
https://drive.google.com/drive/folders/1CFs0VCBa1bRpbTOdds2A1_eW0AjPKCkI?usp=drive_link

Project link :
https://kr4gy6cbc8sslyy.sg.qlikcloud.com/sense/app/6606d31b-be88-48e1-9097-ab3b1c8d2b96