Data-Driven Innovations in Supply Chain Management with Qlik Insights

The business problem:

This project aims to understand the link between decline of sale ,reduction in profit , changes of trends in market and overall improvement if needed for the company. To understand 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.

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 .

Literature survey:

Data-driven innovations in supply chain management significantly enhance operational efficiency and facilitate cost reduction through various advanced technologies. These innovations leverage IoT, big data, machine learning, and blockchain to optimize processes and improve decision-making.

IoT and Data Analytics

- IoT devices and data analytics improve real-time visibility, streamline inventory management, and reduce operational delays, leading to enhanced efficiency and performance.
- The integration of edge computing and AI further supports agile supply chains, fostering resilience and sustainability.

Big Data and Predictive Analytics

- Big data analytics enables predictive demand forecasting and inventory optimization, as demonstrated by JD E-commerce, which reduced turnover days and costs through AI-driven insights.
- This technology also enhances transparency and mitigates risks in cross-border logistics, addressing complexities in global supply chains.

Machine Learning Applications
- Machine learning optimizes various supply chain functions, including demand forecasting and route optimization, resulting in reduced operational costs and improved customer service.
- Successful implementations showcase the transformative potential of machine learning in making data-driven decisions.

While these innovations promise substantial benefits, challenges such as data security, integration complexities, and skills shortages remain significant barriers to widespread adoption. Addressing these issues is crucial for organizations aiming to fully leverage data-driven technologies in supply chain management.

Social or Business Impact:
- Created visualizations to showcase the demographic distribution of Supply chain management
  - Example : Analysis on customer purchase country by sale
- Explore any correlations both positive and negative to understand the impact on both social and business
  - Example : correlation between Late Delivery and reduction in sales
- Evaluate the impact of data-driven innovations in supply chain management on sales, customer onboarding, and operational efficiency.

Data Collection & Extraction from Database:

Data Collection is done from kaggle

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

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.

DATA PREPARATION FOR VISUALIZATION:

STEP 1: Loaded the data on Qlik Platform(Add New -> Create a new app-> Create->
Files and other resourses->Drop a file here or select a file)

STEP 2: Hided the unwanted columns.(Customer Email: Customer purchase Email,
Customer Zipcode: Customer area code,Order Zipcode: customer area code ,etc)

STEP 3: Checked for null values and found them but in hided columns.So didn't filled
any as not needed.

STEP 4: Checked for duplicate values and found none.

STEP 5: Using split I have splitted shipping date (DateOrders) column into order date
and order time columns to make the data easily understandable.

STEP 6: Added calculated fields using the dataset provided.(Cost Price and
Profit/Loss).

STEP 7: After cleaning the data , it is uploaded on QLIK platform for Visualization.
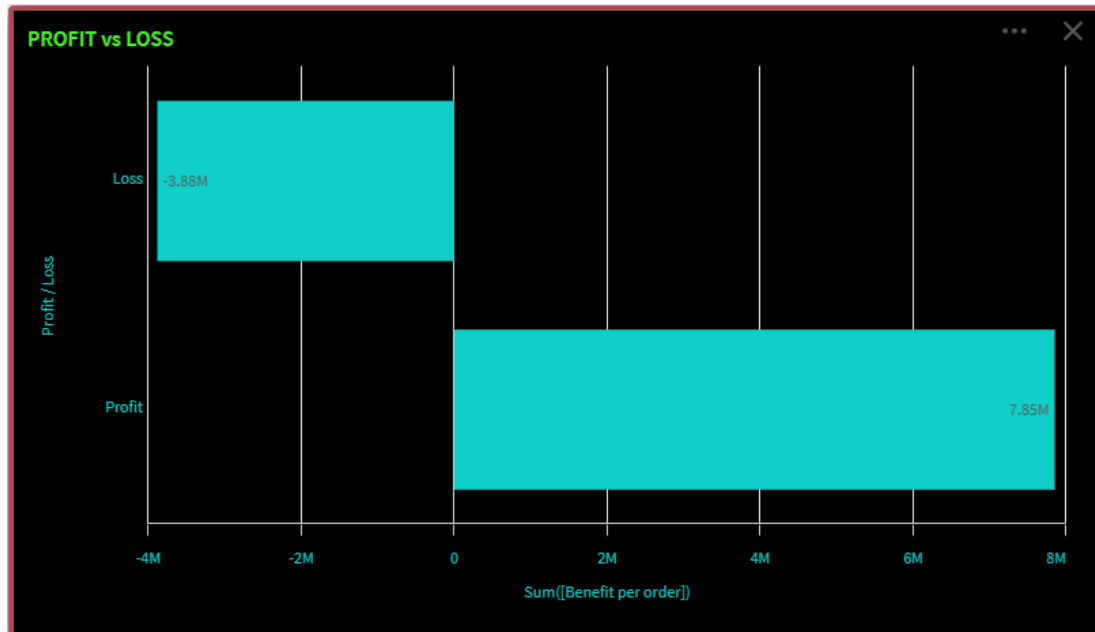
Technical Architecture:

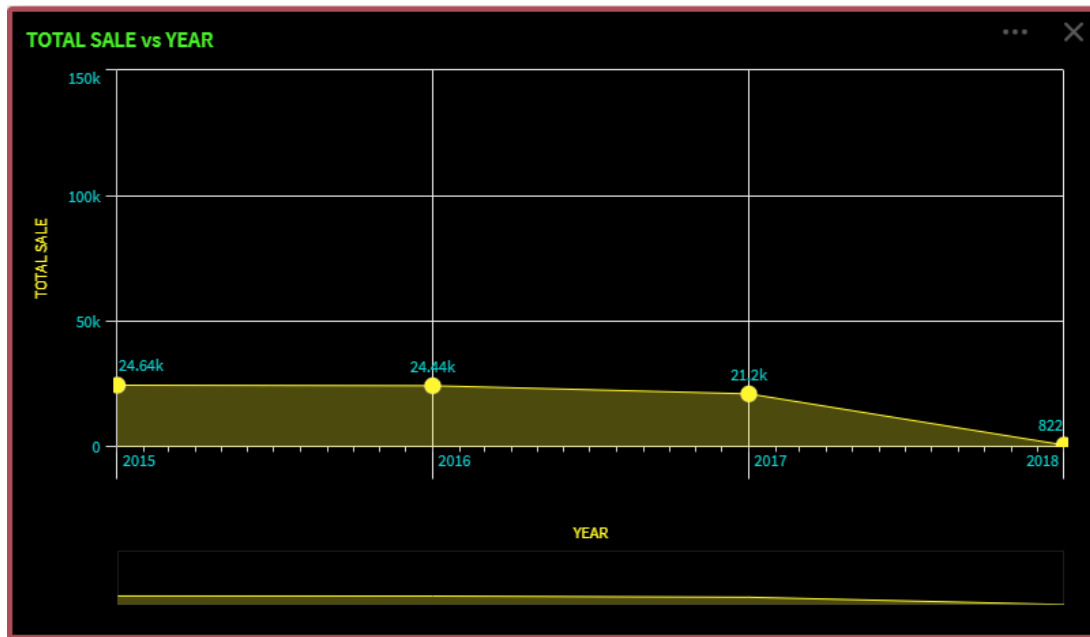# Data Visualisations:

Number of Unique Visualizations:

- bar charts
- line charts
- pie charts
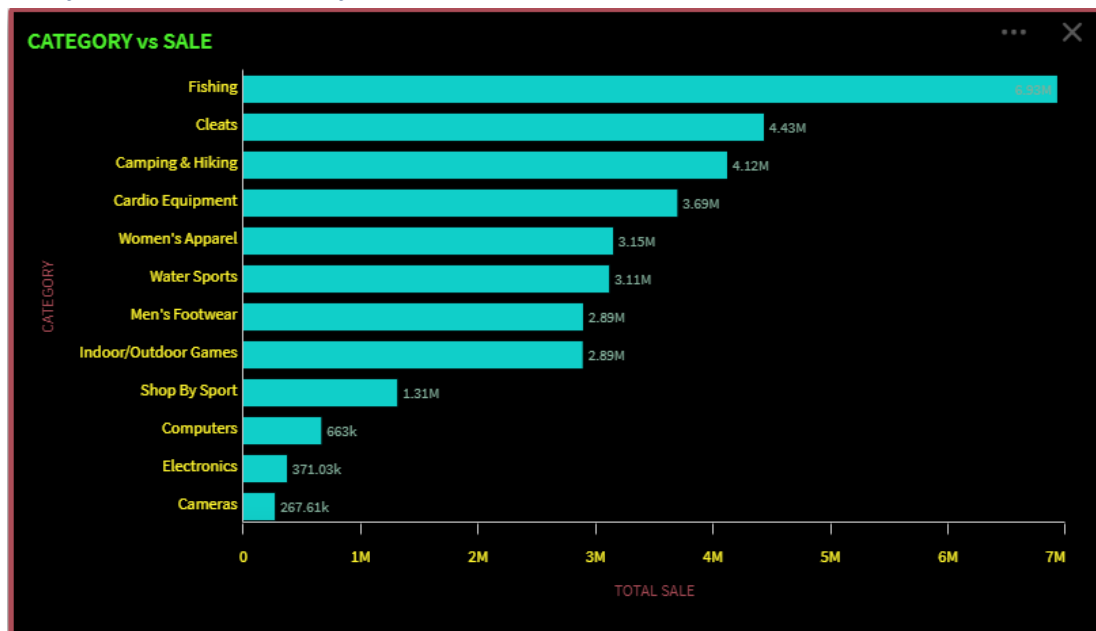- KPI's
- Pivot charts

Visualizations:

OVERALL TOTAL PROFIT vs LOSS FACED BY THE COMPANY

TOTAL SALE as per YEAR

TOTAL SALE vs YEAR

YEAR	TOTAL SALE
2015	24.64k
2016	24.44k
2017	21.2k
2018	822

Analysis on CATEGORY by SALE

CATEGORY vs SALE

CATEGORY	TOTAL SALE
Fishing	6.xxM
Cleats	4.43M
Camping & Hiking	4.12M
Cardio Equipment	3.69M
Women's Apparel	3.15M
Water Sports	3.11M
Men's Footwear	2.89M
Indoor/Outdoor Games	2.89M
Shop By Sport	1.31M
Computers	663k
Electronics	371.03k
Cameras	267.61k

Analysis on CUSTOMER PURCHASE COUNTRY by SALE

Analysis on CUSTOMER SEGMENT

Analysis on CONTINENTS by SALE

CONTINENTS vs TOTAL SALE
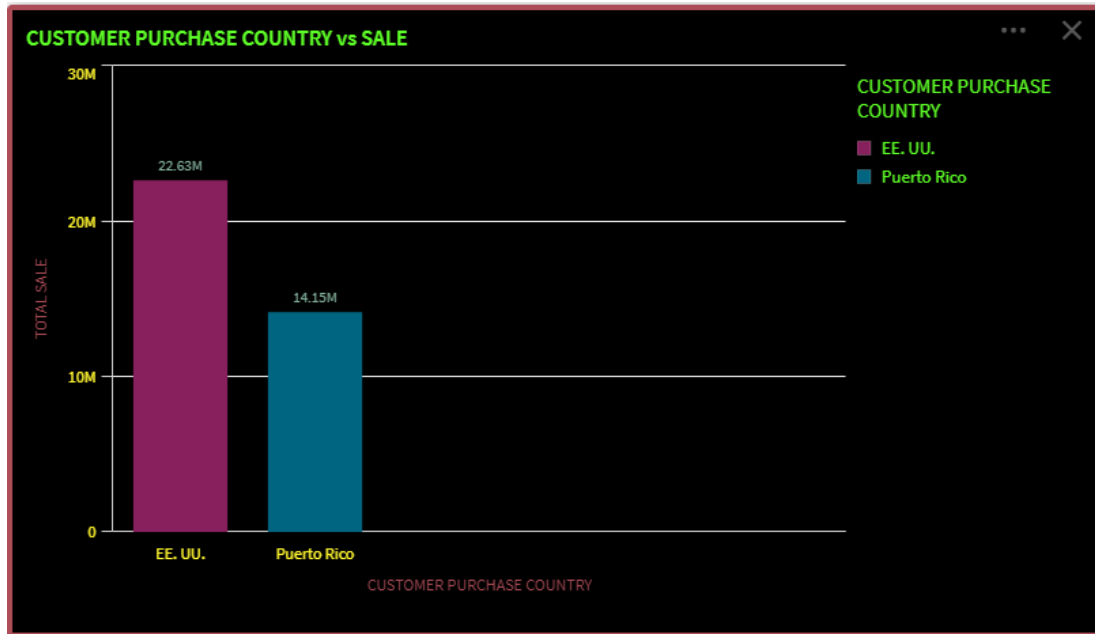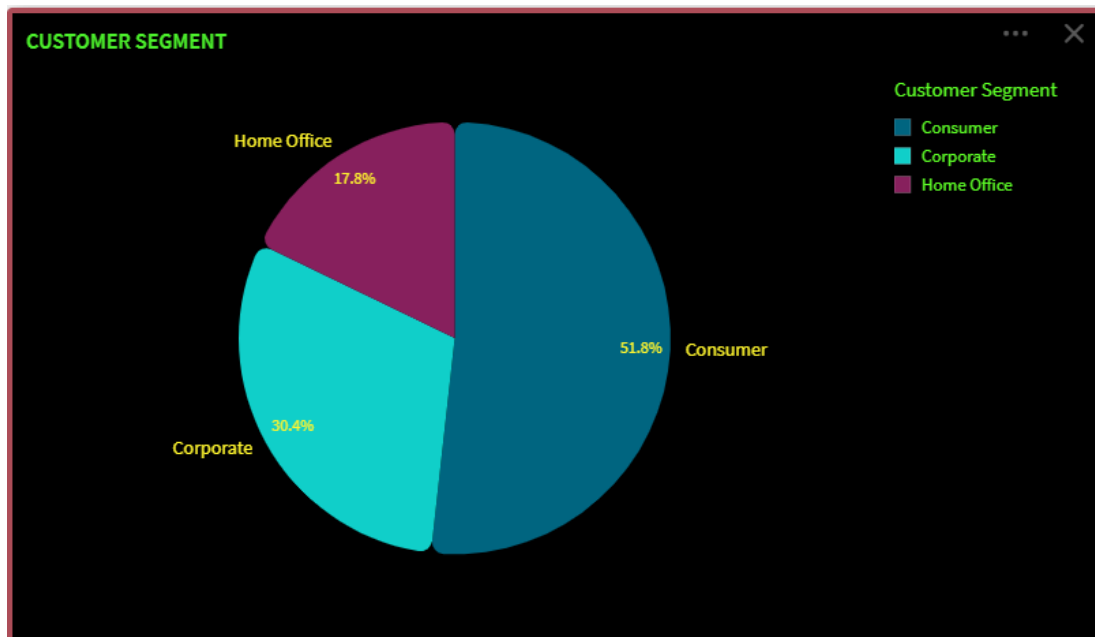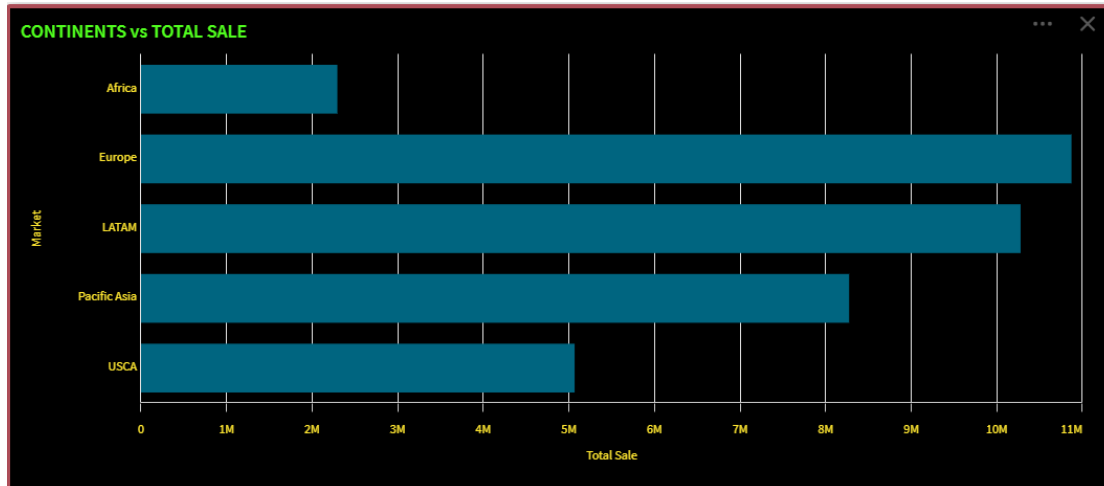
Analysis on DELIVERY STATUS

DELIVERY STATUS
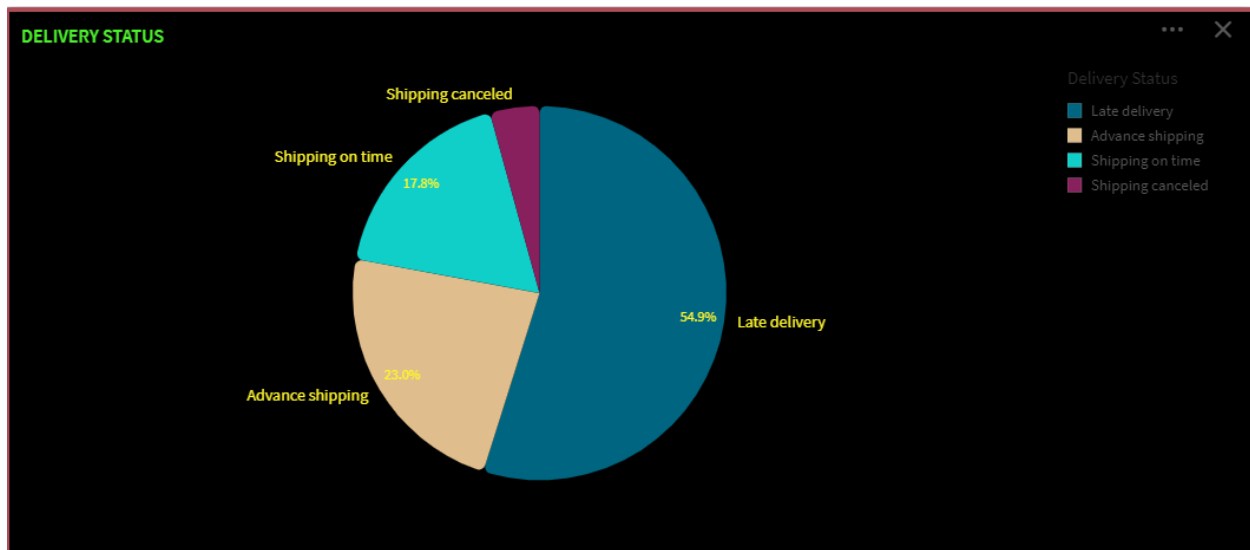
DASHBOARDS:
Responsive and Design Of Dashboard

Dashboard 1:

Data-Driven Innovations in Supply Chain Management with Qlik Insights

TOTAL COST

29.09M

TOTAL REVENUE

33.05M

YEAR

2015
2016
2017
2018

TOTAL DISCOUNT

3.73M

TOTAL PROFIT

3.97M

PROFIT vs LOSS

Profit / Loss

Loss -3.88M

Profit 7.85M

-4M   -2M   0   2M   4M   6M   8M

OVERALL PROFIT AND LOSS

Profit / Loss 🔍

Loss	-3883547.3457686
Profit	7850450.3198192

Dashboard 2:

YEAR

▶ ▯
YEAR 2015

TOTAL COST

29.09M

TOTAL DISCOUNT

3.73M

TOTAL SELLING PRICE

25.5M

TOTAL SALE vs YEAR

TOTAL SALE

110k

50k   24.84k   24.84k   212k

0
2015   2016   2017   2018

822

Dashboard 3:

YEAR

CATEGORY vs SALE

CATEGORY

Fishing	6.53M
Cleats	4.43M
Camping & Hiking	4.12M
Cardio Equipment	3.69M
Women's Apparel	3.15M
Water Sports	3.11M
Men's Footwear	2.89M
Indoor/Outdoor Games	2.89M
Shop By Sport	1.31M

TOTAL SALE

CUSTOMER SEGMENT

Home Office

51.8% Consumer

30.4% Corporate

CUSTOMER PURCHASE COUNTRY vs SALE

TOTAL SALE

22.63M — EE. UU.

14.15M — Puerto ...

Dashboard 4:

DELIVERY STATUS

Shipping on time

54.9% Late delivery

Advance shipping

YEAR

🔍 YEAR

2015
2016
2017

CATEGORY NAME

🔍 CATEGORY NAME

Accessories
As Seen on TV!
Baby
Baseball & Softball

CONTINENTS vs TOTAL SALE

Market

Africa	
Europe	
LATAM	
Pacific Asia	
USCA	

Total Sale

PRODUCT DELIVERED CONTINENTS

🔍 Market
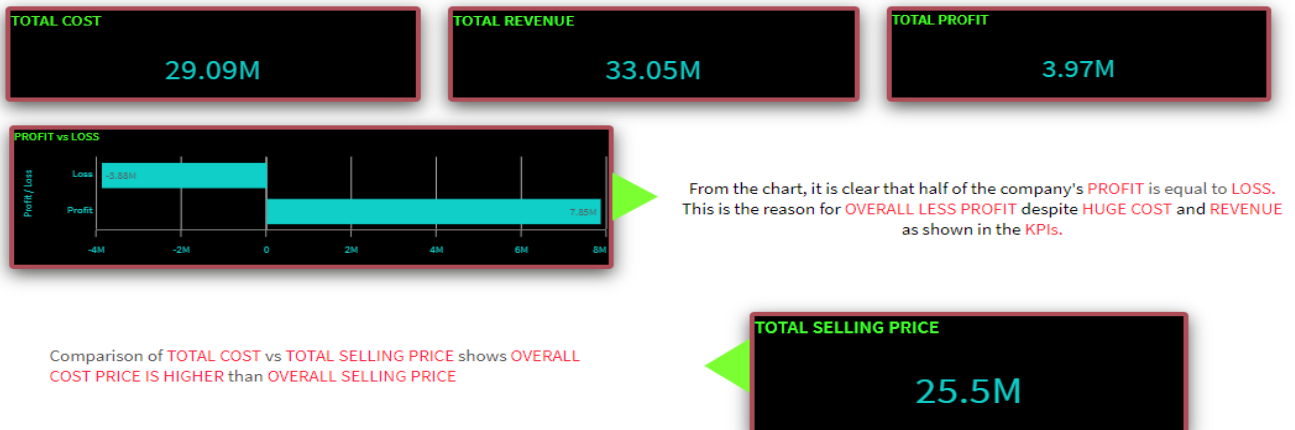
Africa
Europe
LATAM
Pacific Asia

STORY :

Design of story :

Data-Driven Innovations in Supply Chain Management with Qlik Insights

TOTAL COST
29.09M

TOTAL REVENUE
33.05M

TOTAL PROFIT
3.97M

PROFIT vs LOSS

Loss -3.88M
Profit 7.85M

From the chart, it is clear that half of the company's PROFIT is equal to LOSS. This is the reason for OVERALL LESS PROFIT despite HUGE COST and REVENUE as shown in the KPIs.

Comparison of TOTAL COST vs TOTAL SELLING PRICE shows OVERALL COST PRICE IS HIGHER than OVERALL SELLING PRICE
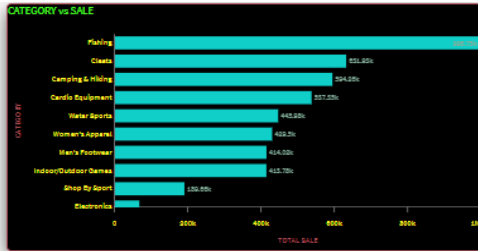
TOTAL SELLING PRICE
25.5M
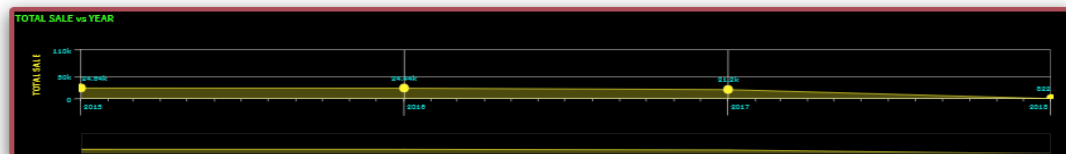
TOTAL SALE vs YEAR

The above chart is the comparison of TOTAL SALE vs YEAR, which shows that there is a HUGE DECLINE in SALE from (2017 - 2018).

CUSTOMER SEGMENT
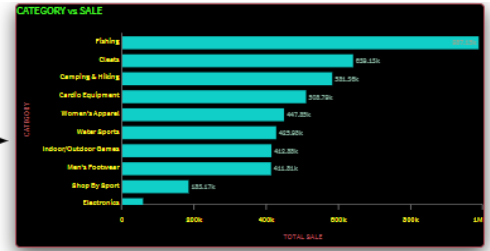
Home Office
Consumer 50.0%
Corporate 32.4%

CUSTOMER PURCHASE COUNTRY vs SALE

EE.UU. 120.72k
Puerto ... 80.79k
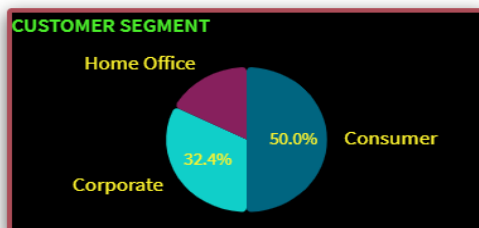
Though there is a DECLINE in SALE from(2017 - 2018) ,but there is no change in customer purchase country and customer segment .

This shows that customers from 2017 to 2018 are from the same countries as previously with the same customer segment, but maybe preferences of customers have changed.

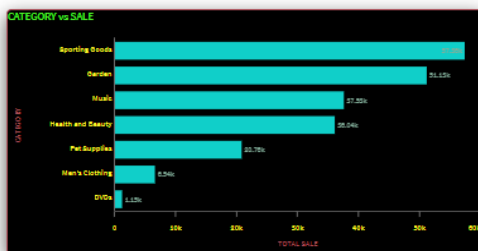**CATEGORY vs SALE** (2015-2016)

Fishing, Cleats 551.95k, Camping & Hiking 504.26k, Cardio Equipment 557.55k, Water Sports 445.95k, Women's Apparel 439.5k, Men's Footwear 414.02k, Indoor/Outdoor Games 415.76k, Shop By Sport 159.65k, Electronics

2015 -2016

CATEGORY vs SALE (2016-2017)

Fishing, Cleats 559.15k, Camping & Hiking 531.55k, Cardio Equipment 508.79k, Women's Apparel 447.85k, Water Sports 413.95k, Indoor/Outdoor Games 412.55k, Men's Footwear 411.51k, Shop By Sport 185.17k, Electronics
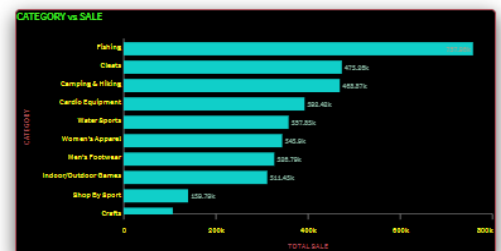
2016-2017

All the charts portray customer preference over time(every year).
IN (2015 -2016 -2017)there is NO DRASTIC CHANGE of preference. However, from 2017 to 2018, there was a DRASTIC CHANGE
IN THE customer's choice, which could be one of the reasons for the drop in sales.

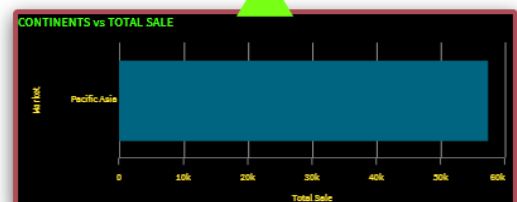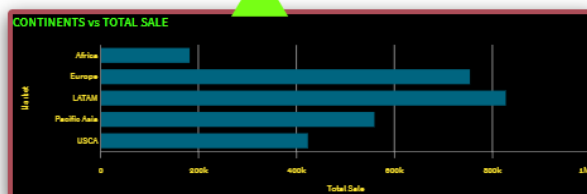**CATEGORY vs SALE** (2017-2018)

Sporting Goods, Garden 51.13k, Music 37.55k, Health and Beauty 55.04k, Pet Supplies 25.76k, Men's Clothing 6.54k, DVDs 1.15k

2017 -2018

CATEGORY vs SALE

Fishing, Cleats 473.25k, Camping & Hiking 455.57k, Cardio Equipment 531.45k, Water Sports 557.55k, Women's Apparel 345.9k, Men's Footwear 505.79k, Indoor/Outdoor Games 311.45k, Shop By Sport 152.79k, Crafts

DELIVERY STATUS

Shipping on time
Advance shipping
Late delivery 54.6%

DELIVERY STATUS

Shipping on time
Advance shipping
Late delivery 58.3%

From (2015 to 2017) there were HIGH SALES OF the TOP DEMANDED
CATEGORY "FISHING"PRODUCT but with 54.6% OF LATE DELIVERY

From (2017 TO 2018) there was a DROP IN SALES of the TOP
DEMANDED CATEGORY "SPORTING GOODS" products with 58.3% OF
LATE DELIVERY

THIS INDICATES THAT DESPITE HAVING HIGH OR LOW SALES COMPANY
HAD BAD LOGISTICS WHICH RESULTED IN MORE THAN HALF OF IN-
DEMAND PRODUCTS TO BE LATE DELIVERED.

CONTINENTS vs TOTAL SALE

Africa, Europe, LATAM, Pacific Asia, USCA

CONTINENTS vs TOTAL SALE

Pacific Asia

PERFORMANCE TESTING -

Amount of Data Loaded

Search

Benefit per order

Category Id

Category Name

Cost price

Customer City

Customer Country

Customer Email

Customer Fname

Customer Id

Department Id

Department Name

Late_delivery_risk

Latitude

Longitude

Longitude_Latitude

Market

Order City

Order Country

Customer Lname

Customer Password

Customer Segment

Customer State

Customer Street

Customer Zipcode

Days for shipment (sc...

Days for shipping (real)

Delivery Status

Order Customer Id

Order date

order date (Date...

order day

Order Id

Order Item Cardprod Id

Order Item Discount

Order Item Discount R...

Order Item Id

- Order Item Product Pr...
- Order Item Profit Ratio
- Order Item Quantity
- Order Item Total
- Order Profit Per Order
- Order Region
- Order State
- Order Status
- Order Zipcode

- Product Card Id
- Product Category Id
- Product Description
- Product Image
- Product Name
- Product Price
- Product Status
- Profit / Loss
- Sales

- Sales per customer
- Shipping data
- 📅 shipping date (Da... ▸
- Shipping Mode
- Shipping time
- Type

Utilization of Data Filters

FILTER by YEAR:

YEAR
2015
2016
2017
2018

FILTER by CATEGORY NAME:

CATEGORY NAME
🔍 CATEGORY NAME
Accessories
As Seen on TV!
Baby
Baseball & Softball

FILTER by PRODUCT DELIVERED CONTINENTS:

PRODUCT DELIVERED CONTINENTS
🔍 Market
Africa
Europe
LATAM
Pacific Asia

No of Visualizations/ Graphs:

- OVERALL TOTAL PROFIT vs LOSS FACED BY THE COMPANY
- TOTAL SALE as per YEAR
- Analysis on CATEGORY by SALE
- Analysis on CUSTOMER PURCHASE COUNTRY by SALE
- Analysis on CUSTOMER SEGMENT
- Analysis on CONTINENTS by SALE
- Analysis on DELIVERY STATUS

Project Demonstration Video :

https://drive.google.com/file/d/1GnLJtip57YUX1N-MgyNCajUWuHsikWBk/view?usp=sharing