Sales Performance Analysis Dashboard using Power BI

Abstract

This project focuses on utilizing Power BI to analyze and visualize e-commerce sales data, providing businesses with actionable insights to enhance performance and drive growth. The dashboard highlights key metrics including sales revenue, product performance, customer behavior, and marketing effectiveness. Power BI's interactive features, such as dynamic dashboards and real-time analytics, enable businesses to make informed decisions quickly. The analysis helps optimize inventory management, marketing strategies, and customer engagement, ultimately improving profitability.

Introduction

The E-commerce sales data, enabling businesses to gain valuable insights into their performance. By integrating data from various sources like customer, product, and order tables, Power BI helps track key metrics such as sales revenue, product performance, and customer behavior. The platform's interactive dashboards and rich visualizations allow decision-makers to make data-driven decisions in real time, optimizing marketing, inventory, and sales strategies for business growth.

Objectives:

1. **Analyze E-Commerce Sales Performance**: To track and visualize key sales metrics such as Average Sale Price, Average Customer Rating, sales growth over time using Power BI.
2. **Optimize Marketing Campaign Effectiveness**: To assess the impact of promotions, discounts, and advertising campaigns on sales performance and ROI.
3. **Enhance Decision-Making**: To provide interactive, real-time dashboards that enable business stakeholders to make data-driven decisions on inventory management, marketing initiatives, and overall sales strategy.
4. **Improve Regional and Demographic Sales Insights**: To visualize and analyze sales performance by region, customer segment, and product category to optimize market penetration and target specific customer groups more effectively.

Analysis Approach

The Main aim is to gain actionable insights that drive business decisions.

Task 1: Analysis of the Requirements regarding the project.

Analyzing the requirements for a project involving an e-commerce sales dataset involves identifying the key business goals, understanding the dataset structure, and determining the analytical tools and techniques required to meet those goals.

Task2- Collecting a Dataset

Customer Table

CustomerName	CustomerID	CustomerLocation	LastPurchaseDate	FirstPurchaseDate	PurchaseFrequency	CustomerRegion
John Smith	CUST00001	Chicago	09-09-2022 00:00:00	27-10-2020 00:00:00	34	West
Emily Johnson	CUST00002	New York	16-07-2022 00:00:00	16-01-2021 00:00:00	8	North
Michael Brown	CUST00003	New York	27-07-2022 00:00:00	07-10-2019 00:00:00	36	South
Sarah Davis	CUST00004	Houston	04-08-2022 00:00:00	15-06-2021 00:00:00	30	South
David Wilson	CUST00005	Chicago	05-09-2022 00:00:00	29-06-2019 00:00:00	36	East
Laura Miller	CUST00006	Houston	24-04-2022 00:00:00	01-01-2019 00:00:00	42	East
James Taylor	CUST00007	Houston	30-12-2022 00:00:00	29-04-2021 00:00:00	34	North
Sophia Anderson	CUST00008	New York	21-12-2022 00:00:00	04-01-2019 00:00:00	42	East
Robert Thomas	CUST00009	Houston	08-12-2022 00:00:00	11-05-2021 00:00:00	8	North
Jessica Martinez	CUST00010	New York	11-07-2022 00:00:00	03-02-2019 00:00:00	13	West
Daniel Hernandez	CUST00011	Los Angeles	22-03-2022 00:00:00	23-09-2019 00:00:00	19	South
Olivia Garcia	CUST00012	Chicago	01-10-2022 00:00:00	16-11-2020 00:00:00	30	West
Ryan Martinez	CUST00013	Los Angeles	29-08-2022 00:00:00	03-02-2020 00:00:00	49	West
Ella Gonzalez	CUST00014	Los Angeles	31-08-2022 00:00:00	02-03-2019 00:00:00	22	South
Ethan Rodriguez	CUST00015	Los Angeles	24-04-2022 00:00:00	27-02-2019 00:00:00	9	South
Mia Lee	CUST00016	New York	03-01-2022 00:00:00	14-11-2019 00:00:00	7	East
Liam Harris	CUST00017	Chicago	04-07-2022 00:00:00	15-03-2020 00:00:00	6	West
Chloe Clark	CUST00018	Los Angeles	10-03-2022 00:00:00	15-10-2021 00:00:00	23	North
Noah Lewis	CUST00019	Houston	28-12-2022 00:00:00	08-07-2020 00:00:00	15	West
Grace Young	CUST00020	Los Angeles	17-05-2022 00:00:00	30-10-2020 00:00:00	23	South
Lucas Allen	CUST00021	Chicago	16-07-2022 00:00:00	25-09-2019 00:00:00	9	West
Isabella King	CUST00022	Chicago	29-01-2022 00:00:00	01-08-2019 00:00:00	39	West
Jacob Wright	CUST00023	New York	16-12-2022 00:00:00	25-05-2019 00:00:00	45	North
Amelia Scott	CUST00024	Los Angeles	17-10-2022 00:00:00	10-03-2021 00:00:00	11	West
Mason Hall	CUST00025	Houston	23-09-2022 00:00:00	19-09-2020 00:00:00	5	West
Avery Green	CUST00026	New York	09-12-2022 00:00:00	12-12-2019 00:00:00	7	West
Logan Adams	CUST00027	New York	17-07-2022 00:00:00	13-12-2020 00:00:00	43	East

Product Table

Product Name	Product ID	Product Category	Product Price	ReleaseDate
Wireless Headphones	PROD00001	Electronics	100	01-07-2022 00:00:00
Smartwatch	PROD00002	Electronics	250	01-01-2021 00:00:00
Bluetooth Speaker	PROD00003	Electronics	75	01-10-2020 00:00:00
Laptop Sleeve	PROD00004	Accessories	30	01-01-2022 00:00:00
Phone Case	PROD00005	Accessories	20	01-04-2019 00:00:00
Fitness Tracker	PROD00006	Wearable	150	01-04-2019 00:00:00
Wireless Mouse	PROD00007	Computer Accessories	25	01-01-2021 00:00:00
Portable Charger	PROD00008	Electronics	40	01-01-2021 00:00:00
USB-C Cable	PROD00009	Electronics	15	01-07-2022 00:00:00
Laptop Stand	PROD00010	Office Supplies	35	01-04-2021 00:00:00
Gaming Keyboard	PROD00011	Computer Accessories	80	01-01-2022 00:00:00
Noise-Cancelling Headphones	PROD00012	Electronics	120	01-01-2020 00:00:00
Tablet Cover	PROD00013	Accessories	25	01-04-2021 00:00:00
Ergonomic Mouse	PROD00014	Computer Accessories	45	01-07-2020 00:00:00
Smart Light Bulb	PROD00015	Home Automation	10	01-07-2019 00:00:00
4K Monitor	PROD00016	Computer Accessories	400	01-07-2022 00:00:00
Smart Thermostat	PROD00017	Home Automation	150	01-01-2022 00:00:00
External Hard Drive	PROD00018	Electronics	70	01-07-2022 00:00:00
Portable SSD	PROD00019	Electronics	150	01-10-2022 00:00:00
Smart Doorbell	PROD00020	Home Automation	200	01-04-2022 00:00:00
Wireless Earbuds	PROD00021	Electronics	60	01-10-2019 00:00:00
Digital Camera	PROD00022	Cameras	500	01-01-2019 00:00:00

Salesperson Table

SalespersonID	Salesperson	Supervisor	Manager
102	Gustavo Barros	Emily Rocha	Victor Castro
125	Gustavo Gomes	Diogo Carvalho	Gabriel Azevedo
144	Felipe Goncalves	Sofia Ribeiro	Gabriel Azevedo
183	Isabella Sousa	Emily Rocha	Victor Castro
194	Estevan Souza	Diogo Carvalho	Gabriel Azevedo
196	Leonardo Cardoso	Diego Araujo	Victor Castro
215	Carla Ferreira	Diego Araujo	Victor Castro
265	Julio Lima	Diogo Carvalho	Gabriel Azevedo
285	Mateus Costa	Sofia Ribeiro	Gabriel Azevedo
660	Julieta Gomes	Emily Rocha	Victor Castro
669	Kaua Araujo	Fernando Silva	Victor Castro
326	Julia Silva	Sofia Ribeiro	Gabriel Azevedo

Sales Table

OrderDate	OrderID	CustomerID	ProductID	SalespersonID	Channel	Quantity	UnitPrice	UnitAmount	SalePrice	SaleAmount	DiscountPercentage
09 January 2020	1779620	CUST00046	PROD00033	265	Distributor	6	100	600	129	2945093	1
11 January 2020	1780864	CUST00029	PROD00049	265	Distributor	6	100	600	120	4927449	12
21 January 2020	1861874	CUST00037	PROD00027	265	Distributor	6	100	600	123	3492289	10
23 January 2020	1771797	CUST00014	PROD00047	265	Distributor	6	100	600	110	4845861	16
24 January 2020	1788169	CUST00007	PROD00047	265	Distributor	6	100	600	117	2102671	11
18 February 2020	1865022	CUST00027	PROD00033	265	Distributor	6	100	600	122	4839671	5
08 March 2020	1908697	CUST00032	PROD00018	265	Distributor	6	100	600	113	2402713	19
09 March 2020	1908621	CUST00038	PROD00027	265	Distributor	6	100	600	118	3882670	7
11 March 2020	1819580	CUST00001	PROD00047	265	Distributor	6	100	600	117	3500133	10
28 March 2020	1847538	CUST00049	PROD00042	265	Distributor	6	100	600	128	4916326	1
16 April 2020	1876584	CUST00040	PROD00033	265	Distributor	6	100	600	114	2123336	7
22 April 2020	1864723	CUST00039	PROD00049	265	Distributor	6	100	600	121	4705535	19
29 April 2020	1938293	CUST00035	PROD00033	265	Distributor	6	100	600	116	1653274	4
02 May 2020	1928771	CUST00009	PROD00020	265	Distributor	6	100	600	115	3018791	3
05 May 2020	1928829	CUST00007	PROD00049	265	Distributor	6	100	600	113	1442685	6
18 May 2020	1864900	CUST00019	PROD00047	265	Distributor	6	100	600	123	3338038	7
25 May 2020	1932731	CUST00039	PROD00042	265	Distributor	6	100	600	120	4905983	13
28 May 2020	1932748	CUST00027	PROD00027	265	Distributor	6	100	600	128	3380628	20
28 May 2020	1971819	CUST00012	PROD00047	265	Distributor	6	100	600	118	3294159	8
29 May 2020	1912914	CUST00044	PROD00033	265	Distributor	6	100	600	113	1215580	9
31 May 2020	1912828	CUST00048	PROD00027	265	Distributor	6	100	600	121	4631371	19
01 June 2020	1978688	CUST00033	PROD00047	265	Distributor	6	100	600	130	4374459	19
05 June 2020	1884615	CUST00015	PROD00020	265	Distributor	6	100	600	126	2135386	17
07 June 2020	1899509	CUST00038	PROD00033	265	Distributor	6	100	600	122	4098178	6
11 June 2020	1942608	CUST00023	PROD00047	265	Distributor	6	100	600	112	2671134	12
14 June 2020	1998161	CUST00003	PROD00049	265	Distributor	6	100	600	115	3217170	2
21 June 2020	1986313	CUST00026	PROD00047	265	Distributor	6	100	600	125	1064859	11

Task 3-Working with the Dataset using DAX Formulas-

Working with a dataset using DAX (Data Analysis Expressions) formulas involves creating calculated columns, measures, or tables that enable dynamic data analysis.

- **Total Sales (Measure)**: Total Sales = SUM(Sales_Orders[Sales_Amount])
- **CLTV by Product Category** = CALCULATE(

SUM(SalesTable[SaleAmount]), ALLEXCEPT(ProductTable, ProductTable[Product Category]))

Product Sales Cannibalization Analysis

- **Product Status =** IF(DATEDIFF(ProductTable[ReleaseDate], TODAY(), YEAR) <= 2, "New", "Existing")

- **Customer Lifetime Value (CLTV) Trend**
  CLTV by Product Category =
  CALCULATE(
  SUM(SalesTable[SaleAmount]),
  ALLEXCEPT(ProductTable, ProductTable[Product Category])
)

- **Churn Prediction and Retention Insights**

  Recency = DATEDIFF(MAX(CustomerTable[LastPurchaseDate]), TODAY(), DAY)

- **Customer Count by Category** =
  CALCULATE(
  DISTINCTCOUNT(CustomerTable[CustomerID]),
  FILTER(
  CustomerTable,
  CustomerTable[Churn Risk Category] = SELECTEDVALUE(CustomerTable[Churn Risk Category])
)
)

Task4: Customer Segmentation using DAX Data Transformation

Used IF condition to categorize the data in different segments such as:

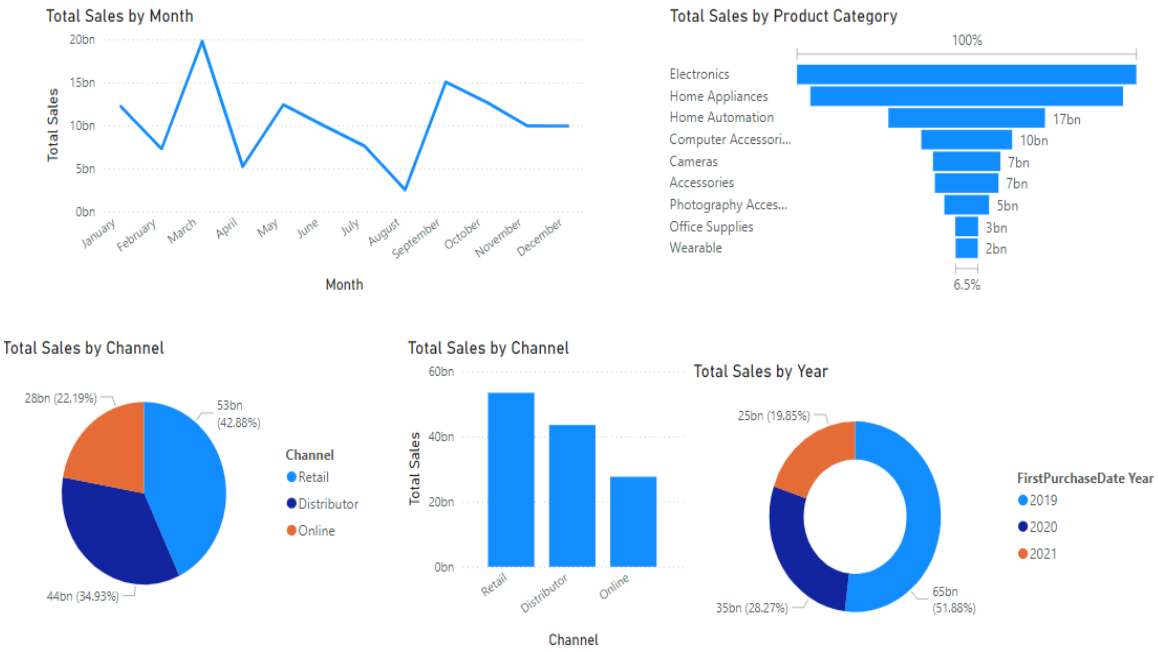
- **Churn Risk Category** =
  SWITCH(
  TRUE(),
  [Recency] > 980, "Inactive",
  [Recency] > 750 && CustomerTable[PurchaseFrequency] <= 28, "At Risk",
  [Recency] <= 750 && CustomerTable[PurchaseFrequency] > 28, "Retained",
  TRUE(), "Potential"
)

- **Customer Sentiment Analysis**
  Average Customer Rating = AVERAGE(SalesTable[CustomerRating])

- **New vs. Repeat Customer Sales Trends**
  Customer Type =
  VAR FirstPurchaseDate =
  CALCULATE(
  MIN(CustomerTable[FirstPurchaseDate]),

```
    FILTER(
        CustomerTable,
        CustomerTable[CustomerID] = SalesTable[CustomerID]
    )
  )
RETURN
IF(
  SalesTable[OrderDate] <= FirstPurchaseDate + 365,
  "New",
  "Repeat"
)
```

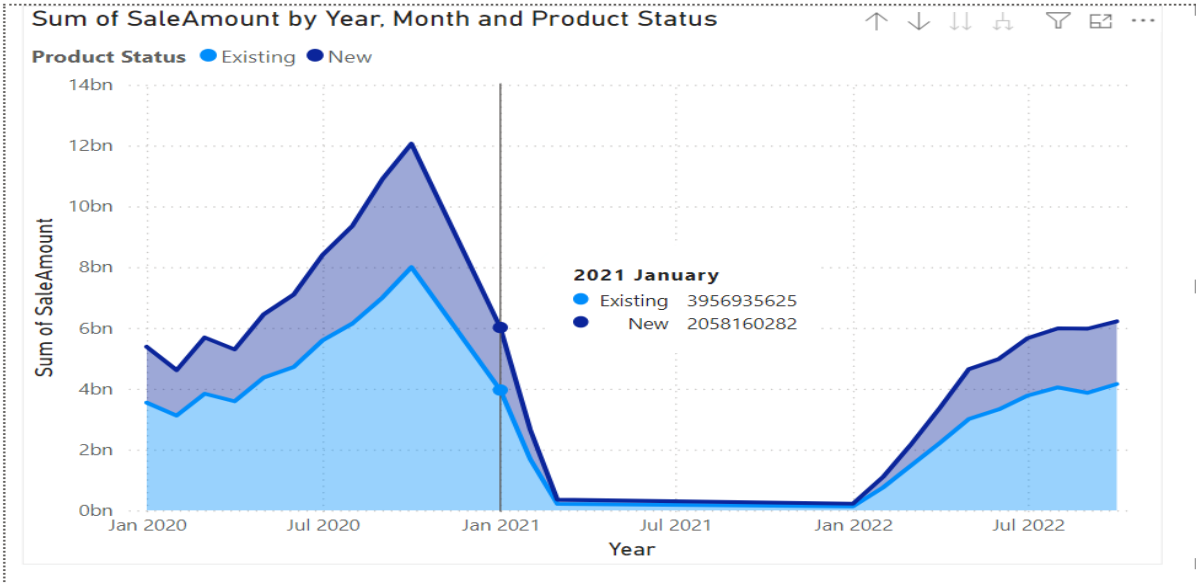
Task5: Making a visual for displaying the sales trend



Proposals

Part 1 - Product Sales Cannibalization Analysis

Product Sales Cannibalization Analysis involves evaluating the impact of a new product on the sales of existing products. It assesses whether the new product is taking away sales from existing products, rather than attracting new customers or increasing overall revenue. This analysis helps businesses understand and mitigate potential losses due to internal competition.

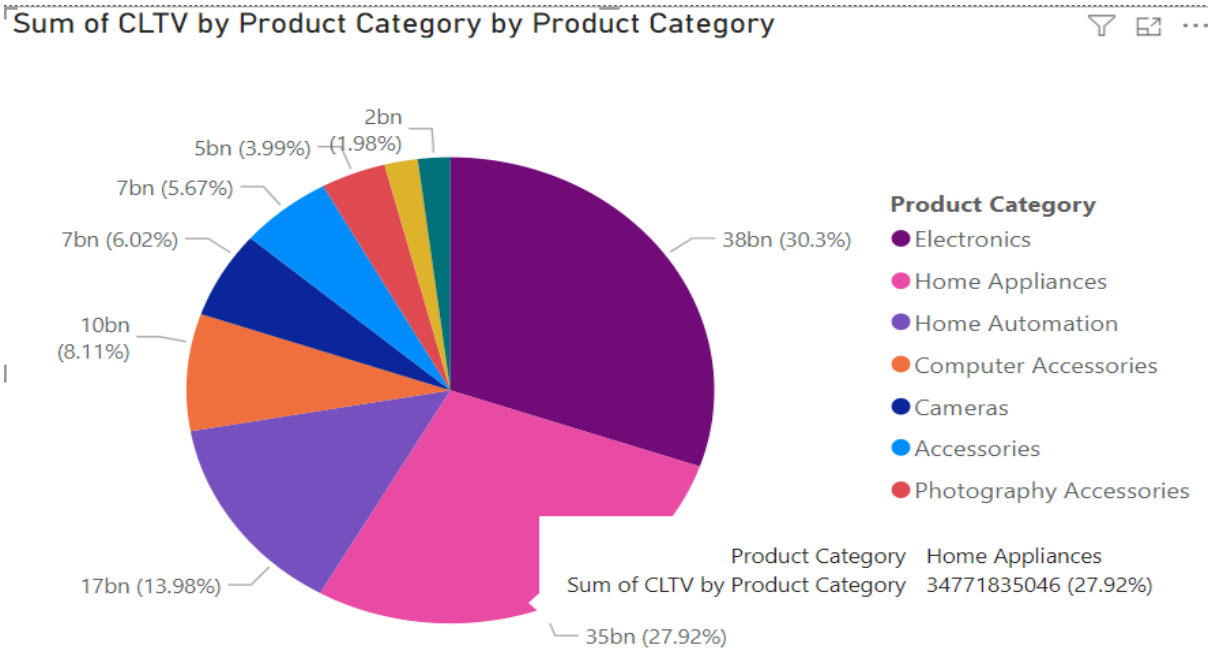


Key Insight: If "Existing" product sales decline as "New" product sales increase, this indicates possible cannibalization.

This chart shows fluctuations in sales, particularly during new product introductions helping their impact on existing products.

Part 2 - Customer Lifetime Value (CLTV) Analysis

Customer Lifetime Value (CLTV) Analysis calculates the total revenue a business can expect from a customer over the entire duration of their relationship. It helps businesses identify high-value customers, optimize marketing strategies, and make data-driven decisions for long-term profitability.

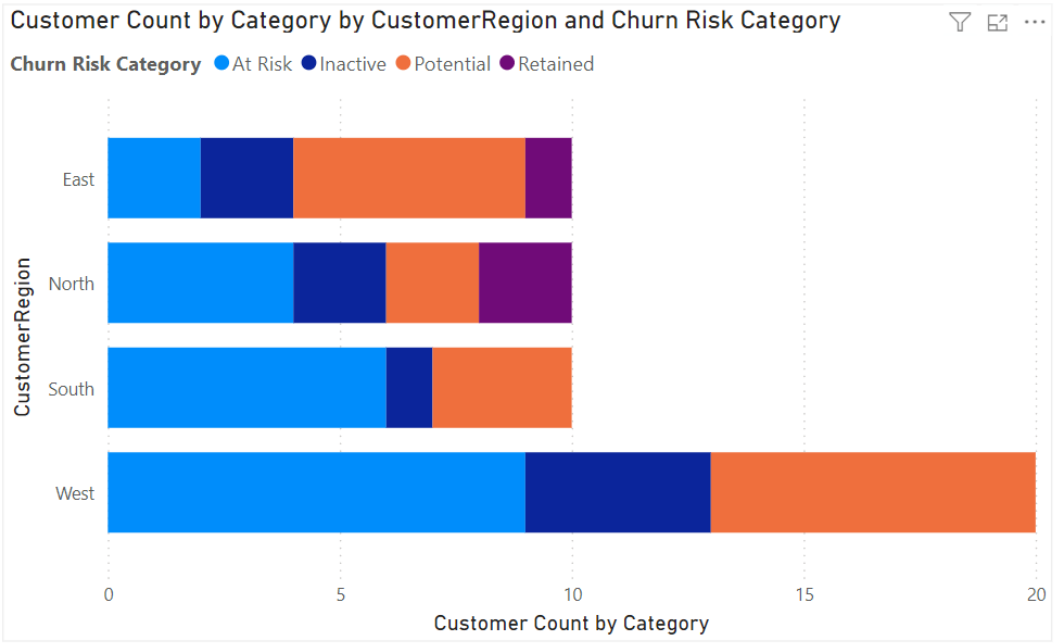


Key Insight: Identify high-value product categories that generate sustained customer revenue, supporting strategic focus.

This chart shows Electronics and Home Appliances as top contributors to CLTV, helping prioritize resource allocation.

Proposal Part 3 - Churn Prediction and Retention Insights

Churn Prediction involves identifying customers who are likely to stop using a product or service, allowing businesses to take proactive measures. Retention Insights focus on understanding the factors that influence customer loyalty and satisfaction, enabling strategies to reduce churn and improve long-term engagement.



Key Insight: Regional churn analysis helps to understand areas with higher risk, guiding targeted retention strategies.

The chart reveals that the West region has the highest number of at-risk customers, prompting potential focus on engagement initiatives in that area.

Proposal Part 4 - Customer Sentiment Analysis

It helps businesses understand customer satisfaction, identify areas for improvement, and tailor marketing strategies based on customer emotions and feedback.

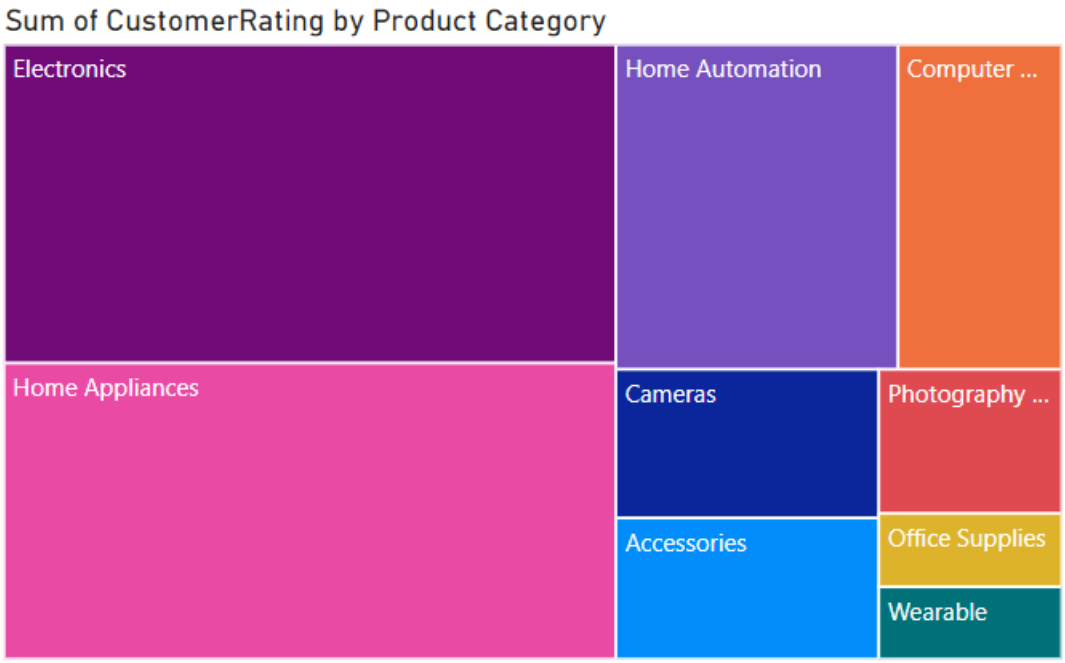
Product Name	Average Customer Rating	Sum of CustomerRating
4K Monitor	2.99	2522
Air Purifier	2.96	2607
Blender	3.02	2454
Bluetooth Speaker	3.01	2475
Coffee Maker	2.96	2519
Dehumidifier	2.95	2365
Digital Assistant Speaker	3.01	2498
Digital Camera	3.01	2516
Dishwasher	2.94	2360
Drone	3.00	2462
Electric Grill	2.98	2431
Electric Kettle	2.98	2407
Ergonomic Mouse	3.07	2519
External Hard Drive	2.97	2378
Fitness Tracker	3.03	2522
Total	**2.99**	**124494**

Key Insight: Tracking feedback trends to improve strategies and customer experience.

Average customer ratings were calculated and summarized by product categories to identify high- and low-performing segments

Part 4 - Customer Sentiment Analysis

Customer Sentiment Analysis visually represents customer feedback by categorizing sentiments (positive, negative, neutral) across different attributes or products. It uses color coding and size variations to highlight sentiment trends, helping businesses quickly identify areas of strength, issues, and emerging patterns in customer opinions.

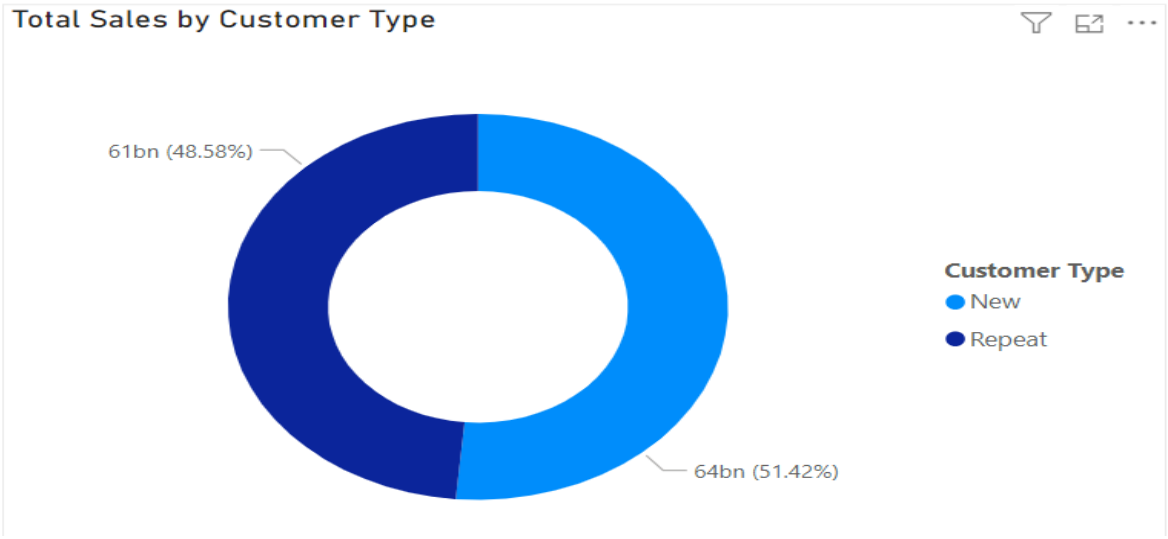


Key Insight: Visual overview of sentiment distribution, enabling businesses to quickly pinpoint areas with the most positive or negative feedback, and prioritize improvements or marketing strategies accordingly**.**

Positive customer sentiment in key categories may drive higher sales, aiding in prioritizing product improvement efforts for lower-rated categories.

Part 5 - New vs. Repeat Customer Sales Trends

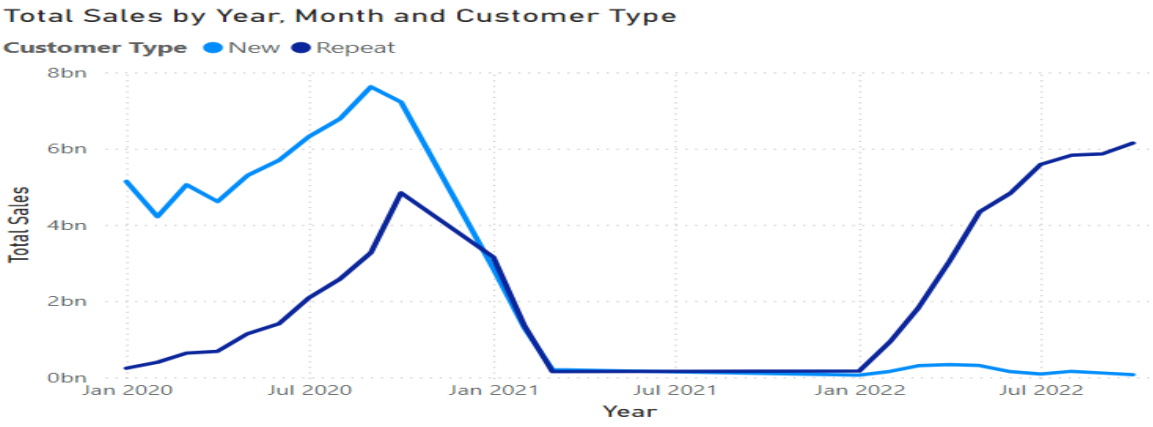
Differentiate sales trends between new and returning customers to analyze customer loyalty and acquisition effectiveness



Key Insight: Shows total sales proportion contributed by new vs. repeat customers.

Displays the proportion of total sales between new and repeat customers

Line Chart: Tracks monthly sales trends for both customer types over time, highlighting sales performance peaks and customer retention success.



Part 6 - Geo-Spatial Sales Trends

Map sales distribution by customer location to identify regions with high sales potential and growth trends.

Key Insight: Helps identify regions with significant sales contributions, enabling targeted marketing strategies.

Displays sales volume by geographic location with bubble size representing total sales. Allows users to observe monthly sales patterns across regions.

Conclusion

- The Sales Performance Dashboard provides a comprehensive view of sales dynamics, customer behavior, and product trends.
- Key analyses, including CLTV, churn risk, and product sales cannibalization, offer actionable insights to drive business growth and customer retention.
- Visualizations like dual-axis charts, pie charts, and geographic mapping make complex data easily interpretable.
- This dashboard enables data-driven decision-making, supporting strategies for targeted marketing, improved customer satisfaction, and optimal resource allocation.

Future Enhancements

- Advanced Customer Segmentation
- Sales Forecasting and Predictive Analytics
- Marketing Campaign Impact Analysis
- Enhanced Geo-Spatial Sales Analysis
- Product Sales Velocity
- Improved Customer Lifetime Value (CLTV) Metrics