



CAPSTONE PROJECT REPORT

Retail Marketing Analysis
Trends and Strategies



PREAPARED BY
GROUP 1

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EXECUTIVE SUMMARY

Objective:

The primary objective of this project was to analyze customer behavior, sales performance, and marketing effectiveness to support data-driven decision-making for the retail business. This project specifically focused on the following goals:

- **Identify Key Revenue Drivers:** To dissect product categories, sales channels, and regions contributing to revenue growth.
- **Enhance Customer Segmentation and Loyalty:** Segment customers based on purchase behavior, loyalty points, and feedback scores.

Key Steps Taken:

- **Data Acquisition:** Gathered comprehensive data from Kaggle.
- **Data Cleaning:** Improved data quality by correcting inconsistencies and standardizing formats.
- **Exploratory Data Analysis:** Used dashboards to analyze customer demographics, product performance, and engagement trends.
- **Recommendations:** Developed strategies to maximize revenue, target key demographics, and optimize marketing efforts.

Tools Used:

- **Excel, Power Query, Python, and Power BI:** Used for data processing and visualization.
- **Microsoft Power Virtual Agents:** Utilized to create the chatbot (RetailIQ).
- **HTML:** Applied for integrating the dashboard with the chatbot

Key Findings:

- Electronics and Grocery are the most profitable categories.
- Social Media campaigns reach the broadest audience.
- The 20-25 age group generates the most revenue.
- Customer engagement peaks between 12 PM - 2 PM and 8 PM - 10 PM.

Recommendations:

- Focus marketing on high-profit product categories.
- Target the 20-25 age group with customized promotions.
- Increase the budget for social media campaigns.
- Schedule promotional offers during peak engagement times.

INTRODUCTION

BACKGROUND

In an increasingly competitive retail landscape, understanding customer behavior, optimizing sales performance, and evaluating marketing effectiveness are paramount. Retailers face the challenge of adapting to rapidly changing market dynamics and consumer preferences to stay relevant and profitable.

PROBLEM STATEMENT

The business faces challenges in understanding the factors driving its revenue growth and struggles to effectively retain high-value customers. The lack of insights into which products, regions, or channels are most profitable results in inefficient resource allocation and marketing spend.

OBJECTIVES

This report aims to:

Analyze Customer Behavior: To understand the preferences and buying patterns of different customer segments.

Assess Sales Performance: To identify which products, categories, and sales channels are the most profitable and why.

Evaluate Marketing Effectiveness: To determine which marketing channels and campaigns are most effective in reaching and engaging customers.

Support Data-Driven Decision Making: To provide actionable insights that can help refine marketing strategies, enhance customer segmentation, and improve overall business operations.

METHODOLOGY

The methodology outlines the steps taken in our retail analytics project, starting with industry research, followed by data acquisition, cleaning, and exploratory analysis. We used Excel, Power Query, Python, and Power BI to ensure data accuracy and extract insights into customer behavior, sales performance, and marketing strategies, all aimed at supporting informed, data-driven decisions aligned with our business goals.

INDUSTRY RESEARCH AND UNDERSTANDING

We began by thoroughly researching the retail and digital marketing industry to understand key trends, challenges, and opportunities. This step was crucial for framing our analysis and aligning it with relevant business objectives.

DATASET ACQUISITION

The dataset for this project was sourced from Kaggle, containing customer demographics, sales transactions, product details, and marketing engagement metrics, enabling detailed analysis without additional data collection.

DATA CLEANING AND PREPARATION

After acquiring the dataset, we performed extensive data cleaning using Python and Power Query to ensure accuracy and consistency across all metrics:

- Handling Missing Values: Addressed missing data in demographics, transactions, and product categories.
- Standardizing Formats: Harmonized date and time formats for seamless time-based analysis.
- Categorization and Binning: Grouped continuous variables (e.g., age, purchase amounts) into defined ranges like "Age Range" for more meaningful analysis.
- Custom Time Intervals: Created time bins (e.g., "00:00 - 02:00") to categorize customer activity by time, facilitating the identification of peak engagement hours.

EXPLORATORY DATA ANALYSIS (EDA)

We conducted an Exploratory Data Analysis (EDA) to uncover key patterns and trends in the dataset.

- Customer Interactions: Analyzed customer engagement with the business across different marketing channels and timeframes.
- Sales Transactions: Examined sales performance, identifying the best-performing products, peak purchasing times, and customer purchase behaviors.
- Market Trends: Investigated broader market trends based on product categories, pricing strategies, and consumer preferences.

DATA OVERVIEW

The dataset represents detailed retail transactional data, capturing essential aspects of customer profiles, purchasing behavior, product details, and transactional specifics. This rich dataset supports analysis for understanding customer behavior, optimizing sales strategies, and enhancing marketing effectiveness.



Customer Information:

- Customer_ID
- Name
- Email
- Phone
- Age
- Age Group (Calculated Field)
- Gender
- Income
- Customer_Segment
- Loyalty_Points
- Customer Lifetime Value (CLV)



Customer Satisfaction Metrics:

- Feedback
- Ratings



Transaction Details:

- Transaction_ID
- Amount
- Product_Cost
- Total_Purchases
- Previous_Purchases
- Shipping_Method
- Payment_Method
- Revenue (Calculated Field)
- Profit (Calculated Field)
- Order_Status



Product Information:

- Product_Category
- Product_Brand
- Product_Type
- Product_Name



Marketing and Engagement:

- Campaign_Channel
- Engagement_Score
- Time_On_Website



Geographic and Temporal Information:

- City
- Country
- State
- Address
- Zip Code
- Date
- Year
- Time

DATA PREPARATION

To ensure the dataset was ready for meaningful analysis, we applied a series of data cleaning and preparation steps. These steps were designed to address any inconsistencies, enhance data quality, and generate additional insights through calculated fields. By thoroughly cleaning and organizing the data, we created a reliable foundation for analyzing customer behavior, sales trends, and other key metrics in the retail dataset.

- Remove Duplicates
- Correct Data Types
- Handling Missing Values:

```
Columns with missing values:
Zipcode          92
Country          89
Income           96
Customer_Segment 90
Date             88
Year              93
Month             66
Time              101
Amount            119
Product_Category 79
Feedback          52
Shipping_Method   91
dtype: int64

# Fill Customer_Segment with the most frequent value
df['Customer_Segment'] = df['Customer_Segment'].fillna(df['Customer_Segment'].mode()[0])

# Fill Shipping_Method with the most frequent value
df['Shipping_Method'] = df['Shipping_Method'].fillna(df['Shipping_Method'].mode()[0])

# Fill Feedback with "No Feedback"
df['Feedback'] = df['Feedback'].fillna('No Feedback')

# Drop rows with missing values in other columns
columns_to_drop_missing = ['Zipcode', 'Country', 'Income', 'Date', 'Year', 'Month', 'Time', 'Amount', 'Product_Category']
df = df.dropna(subset=columns_to_drop_missing)

# Verify that no missing values remain
print("Missing values after processing:")
print(df.isnull().sum())
```

- Adding Key Metrics

- Revenue (Represents total income from each transaction)

New column name

 Custom column formula ⓘ

- Profit (Indicates net earnings from each sale after costs)

New column name

 Custom column formula ⓘ

- Star (Displays customer ratings as stars)

New column name

 Custom column formula ⓘ

- Age Group (Groups ages into ranges)

```
1 Age Range =
2 SWITCH(
3   TRUE(),
4   'RetailTheFinalOne'[Age] >= 20 && 'RetailTheFinalOne'[Age] <= 25, "20-25",
5   'RetailTheFinalOne'[Age] >= 26 && 'RetailTheFinalOne'[Age] <= 30, "26-30",
6   'RetailTheFinalOne'[Age] >= 31 && 'RetailTheFinalOne'[Age] <= 35, "31-35",
7   'RetailTheFinalOne'[Age] >= 36 && 'RetailTheFinalOne'[Age] <= 40, "36-40",
8   'RetailTheFinalOne'[Age] >= 41 && 'RetailTheFinalOne'[Age] <= 45, "41-45",
9   'RetailTheFinalOne'[Age] >= 46 && 'RetailTheFinalOne'[Age] <= 50, "46-50",
0   'RetailTheFinalOne'[Age] >= 51 && 'RetailTheFinalOne'[Age] <= 55, "51-55",
1   'RetailTheFinalOne'[Age] >= 56 && 'RetailTheFinalOne'[Age] <= 60, "56-60",
2   'RetailTheFinalOne'[Age] >= 61 && 'RetailTheFinalOne'[Age] <= 65, "61-65",
3   'RetailTheFinalOne'[Age] >= 66 && 'RetailTheFinalOne'[Age] <= 70, "66-70",
4   'RetailTheFinalOne'[Age] > 70, "Above 70"
5 )
```

DASHBOARD OVERVIEW



DASHBOARD OVERVIEW

BUSINESS OVERVIEW DASHBOARD

KEY FINDINGS

Total Customers
85.74K

Total Customers (85.74K):

This represents the aggregate number of customers who have interacted with the business, emphasizing the extensive reach and impact of the company.

Total Product Categories
5

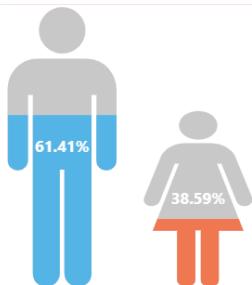
Total Product Categories (5):

Showcases the variety in the company's offerings, potentially appealing to a broad customer base with diverse needs and preferences.

Total Brands
18

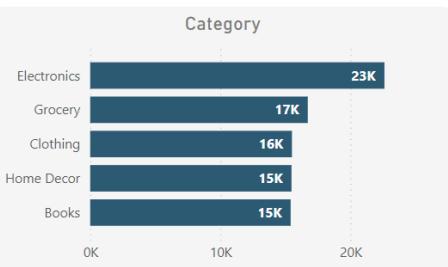
Total Brands (18):

Indicates a robust selection of brands, suggesting strategic partnerships and a wide range of choices for consumers.



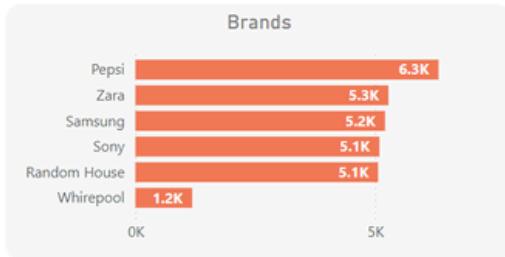
Gender Distribution:

The gender distribution is represented with a male (61.41%) and female (38.50%) icon, indicating a significant skew towards male customers. This could influence product offerings and marketing strategies to better cater to the dominant male demographic.



Product Categories:

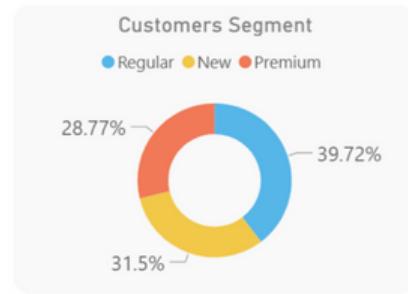
Electronics and clothing are the most popular categories, suggesting strong consumer interest and potential areas for promotional focus.

**Top-Performing Brands:**

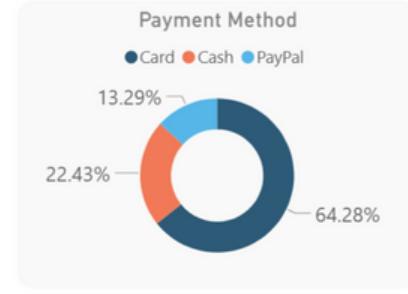
Pepsi and Zara are the leading brands in sales, which might be attributed to successful brand positioning and customer loyalty within these brands.

**Shipping Preferences:**

A significant majority (71.06%) of customers prefer standard shipping over express options, which might reflect sensitivity to shipping costs or a lack of urgency in product delivery.

**Customer Segments:**

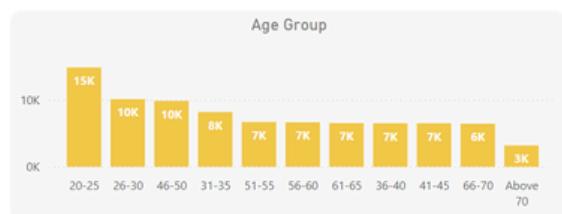
Regular customers form the largest segment, followed by new and premium, suggesting effective customer retention strategies and areas for growth in attracting and upgrading new customers.

**Payment Methods:**

Card payments dominate with 54.22%, followed by PayPal at 32.39%. This preference for digital and card payments over cash could reflect a trend toward more secure and convenient transaction methods.

**Predominant Country:**

The United States has the highest number of customers among the countries listed, indicating a strong market presence and significant consumer engagement in this region.

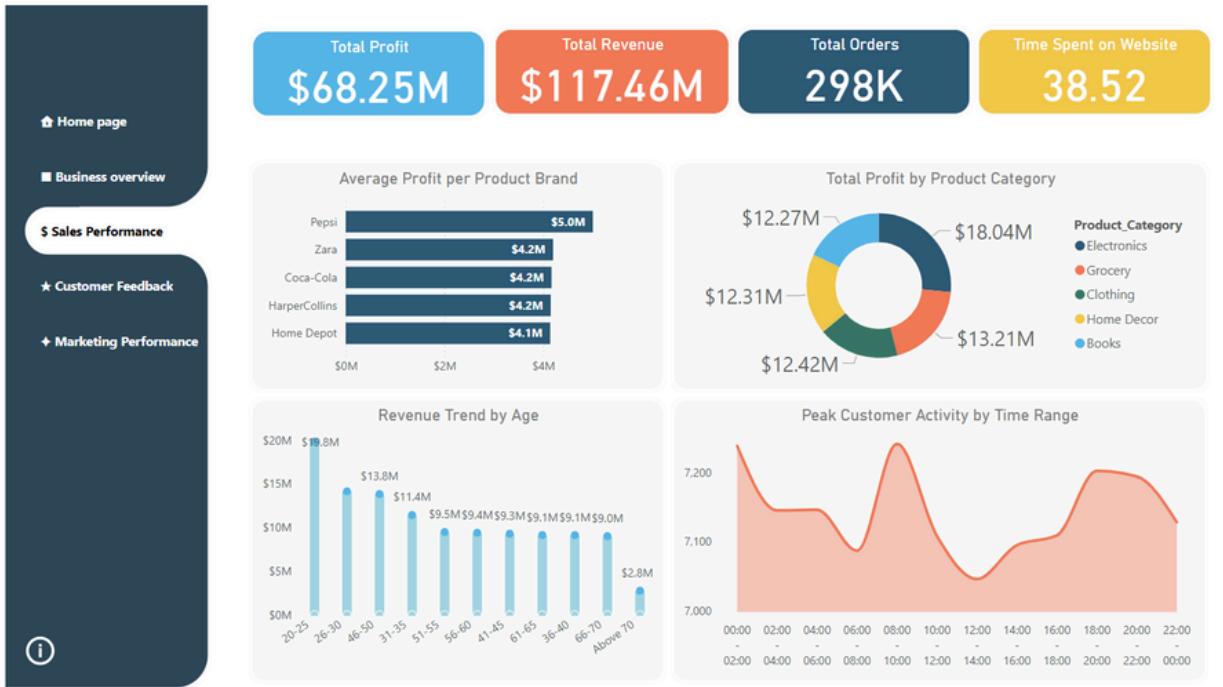
**Predominant Age Group:**

The age group with the largest number of customers falls within the 20-25 range, suggesting that younger adults are the primary consumers. This age group is likely more responsive to digital marketing campaigns and may have different purchasing patterns compared to older segments.

DASHBOARD OVERVIEW

SALES PERFORMANCE DASHBOARD

DESCRIPTION



This dashboard provides a comprehensive analysis of total revenue, profit margins, and customer activity, capturing the essential metrics of sales performance across different product brands and categories. It also examines the purchasing behaviors segmented by age and evaluates the timing of peak customer activity, offering insights that can guide strategic planning and operational adjustments.

DASHBOARD OVERVIEW

SALES PERFORMANCE DASHBOARD

KEY FINDINGS

Total Profit

\$68.25M

Total Profit (\$68.25M):

Highlights effective profit generation capabilities.

Total Revenue

\$117.46M

Total Revenue (\$117.46M):

Indicates strong sales across the company.

Total Orders

298K

Total Orders (298K):

Reflects a healthy volume of transactions, suggesting high customer engagement.

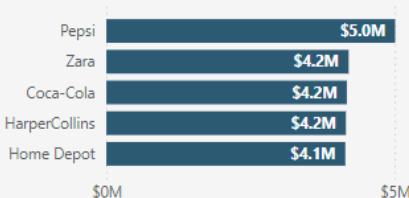
Time Spent on Website

38.52

Time Spent on Website (38.52 minutes):

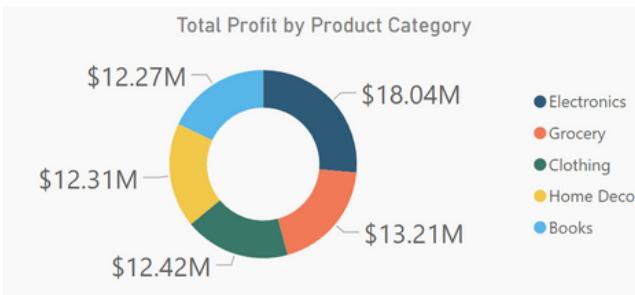
Average duration indicates effective content and user experience that retain customers.

Average Profit per Product Brand

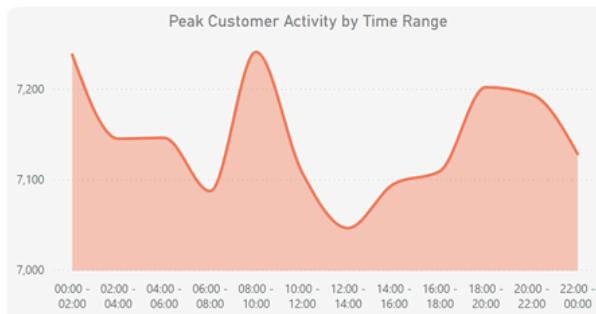


Top-Performing Brands:

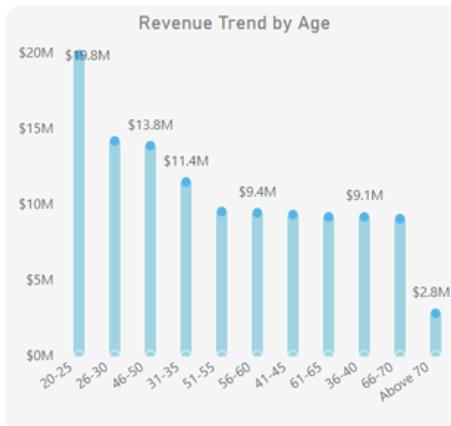
Pepsi leads with \$5.00M in profit, followed by Zara, Samsung, and others, demonstrating their profitability and market acceptance.



Electronics Leads in Profitability:
Dominating with the highest share of total profit, which underscores its popularity and profitability.



Peak Times for Customer Activity:
Late morning and late afternoon are peak times, useful for timing promotions and customer support.



Peak Revenue in Younger Demographics:
Specifically, the 20-25 age group shows the highest revenue, indicating their pivotal role in sales strategies.

DASHBOARD OVERVIEW



This dashboard explores customer satisfaction, loyalty metrics, and profiles. It analyzes ratings, feedback, and loyalty points to gauge customer satisfaction and retention. The page also highlights top customers by loyalty points and details feedback trends, aiding in the enhancement of customer service and engagement strategies.

DASHBOARD OVERVIEW

CUSTOMER FEEDBACK DASHBOARD

KEY FINDINGS

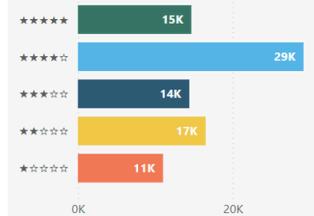
Ratings Average

3.2 

Ratings Average (3.2):

Indicates a moderate level of customer satisfaction, suggesting potential areas for improvement to enhance customer experience.

Total Ratings by Star Level



Total Ratings by Star Level:

Displays a spread of customer satisfaction. With 29K ratings at 4 stars leading, there is a notable opportunity to boost the 15K ratings at 3 stars to higher satisfaction levels.



Feedback Distribution:

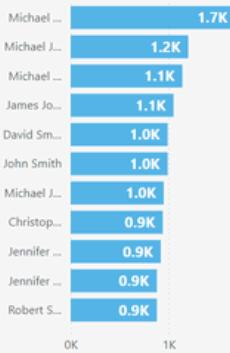
A significant majority of the feedback is 'Excellent' (67.91%), demonstrating high levels of customer satisfaction.

Customer_ID	Name	Email	Age Range	Gender	Country	Customer_Segment	products	Rating	Feedback
10000	Teresa Cole	Mollyk@gmail.com	20-25	Male	Germany	Premium	Guitar	★★★★½	Excellent
10001	Cynthia Simmons	Danielle17@gmail.com	51-55	Female	Australia	Regular	Pomegranate juice	★★★★½	Excellent
10002	Taylor Lopez	Elizabeth8@gmail.com	20-25	Male	Australia	Premium	Iced tea	★★★★½	Excellent
10003	Snead Hamilton	Maurice1@gmail.com	20-25	Female	USA	Regular	High heels	★★★★½	Good
10004	April Smith	Robert11@gmail.com	20-25	Male	Canada	Premium	Decorative pillows	★★★★½	Bad
10005	Theresa Shepard	Carla31@gmail.com	20-25	Male	USA	Regular	Acer Swift	★★★★½	Excellent
10006	Lindsey Calderon	Vivette1@gmail.com	51-55	Female	UK	Regular	Trench coat	★★★★½	Good
10007	Scott Carson	Kristine52@gmail.com	61-65	Female	Germany	Regular	Mini-split AC	★★★★½	Excellent
10008	Erica Parker	Christina43@gmail.com	36-40	Male	USA	Regular	Smartwatch	★★★★½	Good

Detailed Customer Profiles:

Showcases individual customer details providing deeper insights into the demographics of top-engaged customers. This information can be instrumental in tailoring personalized marketing and service approaches.

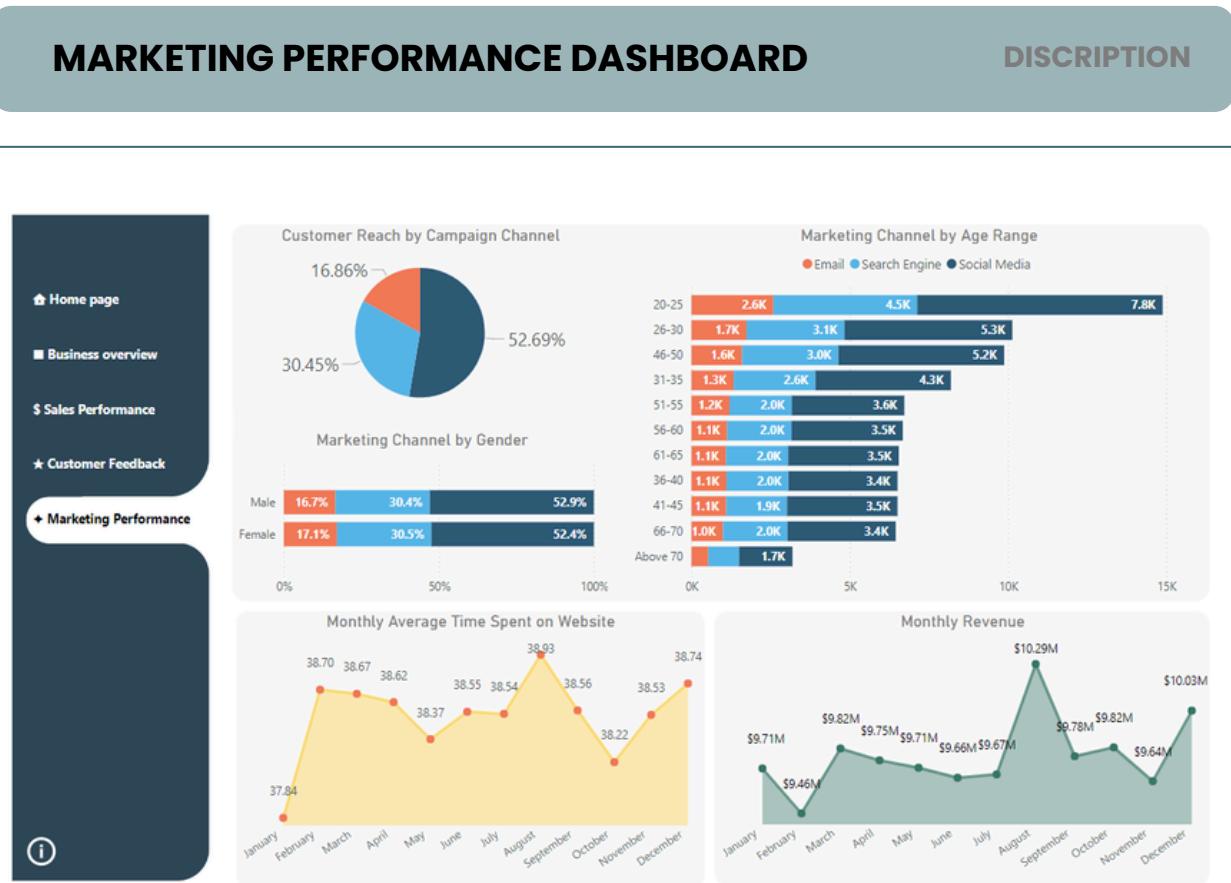
Top 10 Customers by Loyalty Points



Top 10 Customers by Loyalty Points:

Identifies the customers with the highest engagement, useful for targeting high-value customer retention strategies.

DASHBOARD OVERVIEW

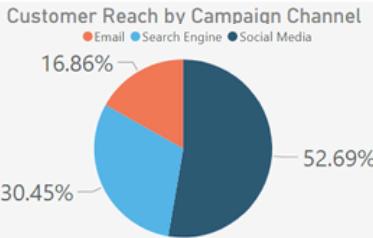


This dashboard analyzes marketing effectiveness by assessing customer reach and engagement across various channels, and their impact on revenue. It tracks performance by gender and age, website engagement time, and monthly revenue trends, providing essential insights for refining marketing strategies and enhancing business performance.

DASHBOARD OVERVIEW

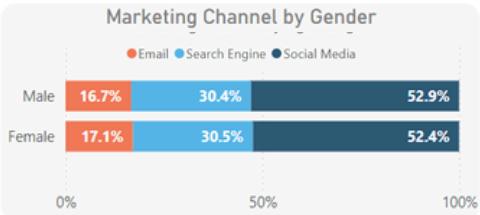
MARKETING PERFORMANCE DASHBOARD

KEY FINDINGS



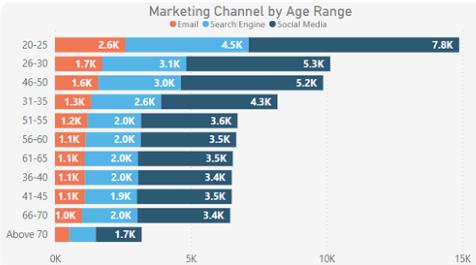
Social Media Dominance:

Social media is the most effective campaign channel with 52.69% of customer reach, indicating a strong platform for engagement.



Uniform Preferences:

Both males and females primarily engage through social media (males at 52.9%, females at 52.4%), with nearly equal distribution in preferences for search engines and email, suggesting gender does not significantly influence channel effectiveness.



Youth Engagement:

The 20-25 age group is most active on social media with the highest engagement at 7.8K, highlighting its appeal to younger consumers.



Stable Engagement:

Users spend an average of about 38 minutes on the site per visit throughout the year, with minor peaks during mid-year, suggesting steady interest and engagement with the site's content.



Revenue Fluctuations:

Demonstrates a significant peak in June (\$10.29M) and a steady increase towards the end of the year, suggesting effective alignment of marketing efforts with seasonal buying patterns.

WEBSITE OVERVIEW



This website serves as a comprehensive platform for retail marketing analysis, providing users with detailed insights into key retail metrics through an interactive Power BI dashboard. The dashboard spans the full page, offering a seamless view of dynamic analytics related to customer behavior, sales trends, and marketing performance. Built using HTML the site integrates powerful visualizations that enable users to explore critical data points and make informed decisions based on real-time information.

In addition to the dashboard, the platform includes an integrated chatbot, "RetailIQ," designed to enhance user experience by providing on-demand support. Positioned as a floating icon in the bottom-right corner, the chatbot offers interactive assistance, answering specific questions and guiding users through data interpretation directly within the page. By clicking on the chatbot icon, users open an overlay that displays the "Ask RetailIQ" prompt, making expert guidance readily accessible.

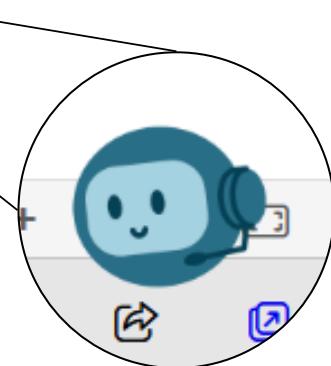
This blend of data analytics and real-time support makes the platform a valuable tool for retail professionals looking to leverage insights in customer engagement and marketing effectiveness. The website's responsive design ensures accessibility and ease of use, enhancing its role as a reliable resource for comprehensive retail marketing analysis.

Website built using HTML

```

1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="UTF-8">
5     <meta name="viewport" content="width=device-width, initial-scale=1.0">
6     <title>Power BI Dashboard with Chatbot Integration</title>
7     <style>
8       /* Basic styling for the whole page */
9       body, html {
10         margin: 0;
11         padding: 0;
12         overflow: hidden;
13         height: 100%;
14         font-family: Arial, sans-serif;
15     }
16 
```

Website Interface



RetailIQ Chatbot

CHATBOT OVERVIEW



In our comprehensive Power BI analysis, we aimed to enhance the user experience by integrating an intelligent chatbot called RetailIQ alongside our dashboards. RetailIQ chatbot was developed using Microsoft Power Virtual Agents and is designed to provide interactive support, answering queries based on the data within our dashboards. With knowledge extracted and created based on the dataset, RetailIQ enables users to engage in conversations and receive relevant information that deepens their understanding of key business metrics and trends. Whether users need clarification on sales figures, customer segmentation, or marketing performance, RetailIQ delivers data-driven insights that support better decision-making.

To seamlessly integrate the chatbot with the dashboards, we developed a simple website that hosts both components on a single platform. This unified approach improves user accessibility, allowing them to explore the dashboards and receive tailored insights from RetailIQ in one environment. The interactive design encourages user engagement, making complex data more approachable and actionable. The images below showcase examples of RetailIQ's responses based on various contexts.

The screenshots illustrate the following interactions:

- Screenshot 1:** The bot asks for a greeting and provides information about the top selling brand and peak customer activity times.
- Screenshot 2:** The bot provides details about the project objectives, mentioning customer behavior analysis, sales performance, and data-driven decision making.
- Screenshot 3:** The bot clarifies a question about the number of customers and provides the total record count.
- Screenshot 4:** The bot generates recommendations based on project data, focusing on high-profit categories like electronics and grocery.
- Screenshot 5:** The bot handles a request for repeat information and ends the conversation with a "thank you" message.
- Screenshot 6:** The bot asks for a rating and receives a 5-star feedback response.

RECOMMENDATIONS

Based on our analysis and the real-life problems this industry faces, we recommend the following:

● OPTIMIZE MARKETING CHANNEL ALLOCATION

- **Focus on High-Performing Channels:** Based on the dashboard's insights, prioritize investment in social media and search engine marketing for younger audiences, while using email campaigns for a broader reach across demographics. Targeted campaigns based on this segmentation can lead to better engagement and conversion rates.
- **Hyper-Personalized Campaigns:** Utilize machine learning models to dynamically segment customer behavior in real-time, targeting micro-segments based on age, activity, and seasonal trends.
- **Event-Driven Campaigns:** The segmentation can help in tailoring campaigns specific to regional preferences, syncing with local events that appeal to customers in each area.

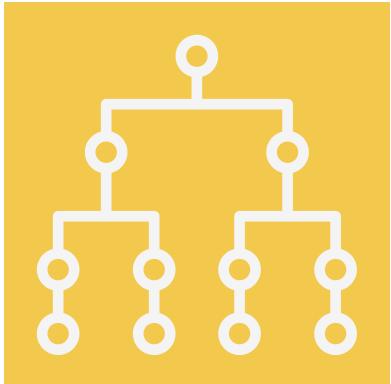
● ELEVATE CUSTOMER LOYALTY AND RETENTION TACTICS

- **Develop Loyalty Programs:** Offer loyalty incentives and rewards for customers with high lifetime value or frequent purchases, particularly those in the 26-45 age group, to improve retention.
- **Predictive Retention Strategy:** Use predictive analytics to identify early signs of churn among frequent customers. Intervene with customized retention tactics—like re-engagement emails, targeted discounts, or loyalty perks—aimed at addressing specific customer concerns or behaviors.
- **Analyze Negative Feedback:** Investigate areas where negative feedback is prominent to improve customer satisfaction and minimize churn.

● PRODUCT STRATEGY AND INVENTORY OPTIMIZATION

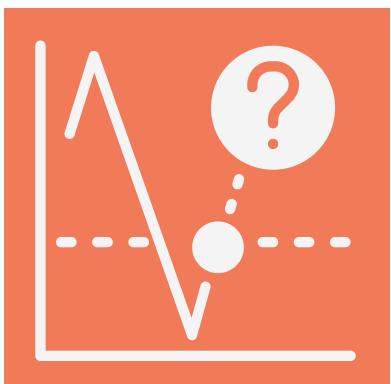
- **Demand-Driven Inventory:** Implement a real-time inventory monitoring system that uses predictive analytics to track product demand by category. For instance, if electronics are trending, prioritize restocking and expanding this category, especially with in-demand accessories like headphones, chargers, or smart home devices.
- **Innovate Through Product Bundles:** Based on the success of high-profit categories, create bundled offers that pair top-selling electronics with complementary items, or offer "holiday bundles" in peak shopping seasons.

LIMITATIONS



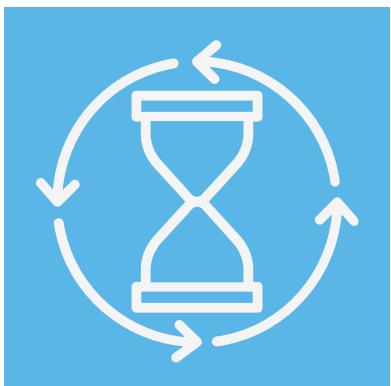
DATA GRANULARITY

The current dashboard relies on aggregated data, providing a high-level overview. Adding more granular data points would enable deeper insights and more targeted analysis. For instance, exploring individual product sales figures within categories or analyzing customer demographics in more detail would be beneficial.



LIMITED PREDICTIVE ANALYTICS

The current dashboard focuses on descriptive analysis of past data. Integrating predictive analytics capabilities would provide valuable insights into future trends, allowing for proactive strategy adjustments. This could include forecasting sales, predicting customer churn, or identifying potential product opportunities.



LACK OF REAL-TIME UPDATES

The dashboard currently displays static data. Implementing real-time data updates would allow for more dynamic and timely insights, enabling quicker decision-making based on current trends.

FUTURE IMPLEMENTATION

1

ENRICHING DATA

Integrating additional data sources, such as customer surveys, web analytics, or social media data, can provide a more holistic view of the business and uncover hidden patterns.

2

DYNAMIC DATA REFRESH

Implementing real-time data updates using data streaming technologies would enable dynamic insights and quicker responses to changing market conditions.

3

PREDICTIVE MODELS

Using machine learning algorithms to predict future trends, customer behavior, and sales performance would enhance decision-making and strategic planning.

4

ADVANCED ANALYTICS

Exploring advanced statistical methods, such as cluster analysis or time series forecasting, can provide deeper insights and uncover complex relationships within the data.

CONCLUSION

This project has yielded valuable insights regarding customer behavior, sales performance, and marketing effectiveness within the retail sector. By examining the most lucrative product categories, significant demographic segments, and optimal marketing channels, this report identifies opportunities for targeted strategies that can enhance profitability, improve customer satisfaction, and increase engagement.

Key recommendations include prioritizing high-revenue products, utilizing social media to reach younger demographics, and optimizing resource allocation during peak engagement periods. These actionable steps are designed to drive growth. By implementing these insights, the business can make data-driven decisions, align marketing efforts with customer preferences, and achieve greater operational efficiency.

Looking ahead, the integration of predictive analytics and recommendation systems and real-time updates could further enhance the business's adaptability, allowing for proactive responses to market fluctuations. Such improvements will not only help meet current objectives but also ensure competitiveness in the evolving retail landscape.

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APPENDIX

● DATASET

- [Click Here for the Dataset \(Drive\)](#)

● METADATA

- [Click Here for the Metadata](#)

● DASHBOARD (GITHUB)

- [Click Here for the Dashboard](#)