Analyzing Customer Purchase Behavior

Insights into Influences on Satisfaction and Loyalty

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ABSTRACT

This project focuses on understanding consumer purchasing patterns to expose useful patterns. It focuses on three critical areas: customer loyalty across age groups, the effect of discounts on purchase amounts, and seasonal trends in product categories. The goal is to help businesses optimize their marketing, inventory, and pricing strategies by leveraging data-driven insights.

KEYWORDS

Customer Loyalty, Discounts, Seasonal Trends, Consumer Behavior, Data Analysis.

1 Introduction

Understanding consumer behavior is a cornerstone of modern business success. By analyzing purchasing patterns, businesses can create personalized marketing strategies, boost customer loyalty, and improve sales through targeted discounts and seasonal campaigns.

This project focuses on answering the following questions:

1. Which age groups demonstrate the highest loyalty, and why?
2. How do discounts influence customer purchases?
3. What are the seasonal revenue trends across different product categories?

By addressing these questions, the project aims to provide businesses with practical insights to enhance their operations and drive growth.

2 Data

2.1 Source of dataset

I downloaded the dataset from Kaggle, a reputable platform widely recognized for hosting credible datasets shared by organizations, researchers, and individuals. Kaggle ensures contributors provide sufficient metadata and maintain data quality, making it a reliable source for analytics projects. The dataset I used, titled 'Customer Purchase Data,' was last updated a year ago. According to the description on Kaggle, the dataset was generated using transaction logs from an e-commerce platform and includes customer demographics, product categories, and purchase details. While the exact methods of data generation were not specified, the dataset appears to reflect real-world scenarios based on its structure and attributes. I did not create the dataset; all credit for its creation goes to the original contributor, and it is publicly accessible on Kaggle at [[Consumer Behavior and Shopping Habits Dataset:](https://www.kaggle.com/datasets/zeesolver/consumer-behavior-and-shopping-habits-dataset)]

2.2 Characters of the datasets

The dataset is in CSV (Comma-Separated Values) format and contains [N rows] and 19 columns, including parameters such as Age (in years), Gender (Male/Female), Purchase Amount (in USD), Item Purchased (categorical), Product Category (categorical), and Payment Method (categorical). These columns provide information on customer demographics, purchasing behaviors, product preferences, payment and shipping options, and promotional activity. Missing values were handled by using forward fill for categorical data (such as Gender, Item Purchased, Payment Method) and mean imputation for numerical fields like Purchase Amount (USD). Additionally, units were standardized by ensuring the Purchase Amount was already in USD. Two new categories were created for analysis: (1) Age Group, which grouped customers into categories such as Teen, Young Adult, Adult, Middle Age, and Senior using defined age bins, and (2) Purchase Channel, which categorized purchases into Online and Offline. These transformations enabled more detailed insights into customer behavior and purchasing patterns, which were critical for the analysis.

3 Methodology

**3.1 Measuring Loyalty by Age Group**

Customer loyalty was calculated using a simple formula:

Loyalty Score=Current PurchasesPrevious Purchases\text{Loyalty Score} = \frac{\text{Current Purchases}}{\text{Previous Purchases}}Loyalty Score=Previous PurchasesCurrent Purchases​

This score helped identify which age groups are most loyal, guiding businesses toward effective engagement strategies.

**3.2 Analyzing Discounts and Purchases**

The relationship between discounts and purchase amounts was explored using box plots. This approach revealed whether customers spend more when discounts are applied.

**3.3 Understanding Seasonal Trends**

Seasonal trends across product categories were visualized through grouped bar charts. These insights highlighted which product categories generate higher revenues during specific seasons, helping businesses align inventory with demand.

4 Results

**4.1 Loyalty Insights**

The analysis showed that the 18-25 and 51-65 age groups had the highest loyalty scores. This finding suggests that these groups value consistent engagement and personalized offers.

**4.2 Impact of Discounts**

Discounts have a clear and measurable impact on purchase amounts. Customers tend to spend more when discounts are applied, reinforcing the importance of well-timed promotions.

**4.3 Seasonal Patterns**

Seasonal analysis revealed predictable trends, such as increased revenue for winter apparel during winter months. These trends emphasize the need for businesses to plan their inventory and marketing efforts around seasonal demand.

5 Discussion

This project highlights the power of data in understanding consumer behavior. However, it also posed challenges, including handling missing data and ensuring accurate transformation of categorical fields.

Looking ahead, further analysis could include additional features like payment preferences, shipping methods, or customer reviews. Advanced modeling techniques could also provide deeper insights.

6 Conclusion

In conclusion, this project provides practical insights into consumer purchasing behavior:

1. Certain age groups, like 18-25 and 51-65, show higher loyalty, making them prime candidates for targeted marketing.
2. Discounts play a crucial role in boosting purchase amounts, reinforcing their value as a sales tool.
3. Seasonal trends offer opportunities for businesses to optimize their stock and promotions.

By acting on these insights, businesses can better understand their customers and enhance both engagement and profitability.

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