E-commerce Marketing and Sales Case Study: Approach Document

This document provides a structured approach for navigating the E-commerce Marketing and Sales Case Study.

Case Study Overview

The core challenge of this case study is to leverage data-driven insights to enhance customer acquisition, retention, and revenue optimization. You will analyze key business trends and formulate data-backed recommendations

Datasets:

You will be working with several datasets:

1. Customers.csv
2. Discount_Coupon.csv
3. Marketing_Spend.csv
4. Online_Sales.csv
5. Tax_amount.csv

General Approach & Data Preparation Hints

Before tackling specific business questions, a thorough understanding and preparation of your data is essential.

1. Load and Inspect Data:

Consider loading all provided CSV files into appropriate data structures
Hint: Begin by inspecting the structure and characteristics of each

dataset. Pay attention to data types and consider if any conversions are necessary for analysis (e.g., for identifiers like CustomerID or Transaction_ID)

Hint: Check for and address any missing values that might impact your calculations

2. Date Handling:

Hint: Ensure that date-related columns are in a format suitable for time-series analysis. Extracting components like Month might be useful

3. Data Merging:

Hint: You will likely need to combine information from different datasets to answer the business questions. Think about common keys that can link these datasets. Consider the type of join that best suits your analytical needs.

4. Calculate Core Metrics:

Hint: The Invoice Value (or revenue) is a fundamental metric. You can calculate it as follows:

Invoice Value = ((Quantity * Avg_price) * (1 - Discount_pct) * (1 + GST)) + Delivery_Charges.

Ensure all necessary components are available and correctly formatted for this calculation (e.g., Discount_pct in decimal form).

Business Questions & Hints

Let's explore each business question with hints designed to guide your analytical process.

1. Identify the months with the highest and lowest customer acquisition count. What strategies could be implemented to address the fluctuations and ensure consistent growth throughout the year?

Hint: Think about what "acquisition" really means — it's the first time a customer makes a purchase. You'll need to find the earliest transaction date for each unique customer using appropriate grouping and aggregation methods. This will help you isolate the first purchase instance for each customer in the dataset.

Hint: Once you've identified each customer's first transaction date, extract the month from that date. Use this to group customers by their acquisition month and count how many customers fall into each group. This will give you the monthly trend of customer acquisition.

2. Analyze the data to determine if certain months consistently show higher or lower acquisition. How can the company capitalize on high-performing months and improve performance during slower periods?

Hint: Building on your analysis from Question 1, look for recurring patterns or anomalies in monthly acquisition count.

Hint: Consider how to leverage insights from high-performing months (e.g., specific marketing efforts, product launches) and what targeted interventions might stimulate demand during slower periods.

3. Identify periods with the strongest and weakest retention rates. What strategies could be implemented to improve retention during weaker months?

Hint: Retention isn't just about who appeared again — it's about how many of this month's customers returned the next month, as a percentage of the original month's customers. Think about comparing each month's customer list to the next month's, and calculate what fraction was retained.

Monthly Retention rate = (Customers in Month X who returned in Month X+1) / (total number of customers in month X)

Hint: For periods with weaker retention, consider what might lead to customer churn and what proactive measures could re-engage them.

4. Analyze customer behavior during high-retention months and suggest ways to replicate this success throughout the year.

Hint: For periods identified with strong retention, delve into the characteristics of purchases made during those times. What product types, discount applications, or transaction values were common?

Hint: Think about how these successful behaviors or conditions could be fostered in other months.

5. Compare the revenue generated by new and existing customers month-over-month. What does this trend suggest about the balance between acquisition and retention efforts?

Hint: To compare behavior between newly acquired and retained users, you first need to identify for each month which customers are visiting for the first time, and which ones are repeat visitors. This can be done by maintaining a rolling list of previously seen customers and checking for presence.

Hint: Once you've split customers into new and existing for each month, use this classification to filter the dataset and sum up the

revenue (e.g., invoice amounts) generated by each group. Visualizing this trend can help you assess whether your growth is being driven by acquisition or loyalty.

6. Analyze the relationship between coupon usage and revenue generation. How can discount strategies be optimized to maximize revenue while maintaining profitability?

Hint: Analyze the overall revenue share from transactions involving coupons versus those without.
Hint: Consider if coupon usage impacts the *value* of individual transactions, not just the volume. This might involve comparing average transaction values between coupon users and non-users using a statistical test.

7. Identify the top-performing products and analyze the factors driving their success. How can this insight inform inventory management and promotional strategies?

Hint: Identify products that excel in terms of both quantity sold and total revenue.
Hint: Explore their categories and descriptions to understand what might contribute to their success. Think about how this information can guide stocking and marketing efforts.

8. Analyze the relationship between monthly marketing spend and revenue. Are there any months where marketing efforts yielded disproportionately high or low returns? How can marketing strategies be adjusted to improve ROI?

Hint: Examine the correlation between total marketing expenditure and generated revenue.

ROI = (Revenue - Marketing spend) *100 / (Marketing spend)

Hint: Look for months where this relationship appears particularly strong or weak, indicating varying efficiency of marketing efforts.

9. Evaluate the effectiveness of marketing campaigns by comparing marketing spend to revenue generated. Are there opportunities to reallocate resources for better results?

Hint: Building on marketing spend analysis, consider how to quantify the efficiency of marketing efforts (e.g., marketing spend as a percentage of revenue).

Market spend % = Total spend *100 / Revenue generated

Hint: Think about how insights from high-efficiency periods could inform future resource allocation.

10. Segment customers into groups such as Premium, Gold, Silver, and Standard. What targeted strategies can be developed for each segment to improve retention and revenue? (Use RFM segmentation techniques)

Hint: Apply RFM (Recency, Frequency, Monetary) principles to categorize customers.
Hint: Define thresholds for Recency (how recently they purchased), Frequency (how often they purchase), and Monetary (how much they spend) to group customers into the specified segments.
Refer to this doc for more details on RFM: [Link](#)

11. Analyze the revenue contribution of each customer segment. How can the company focus its efforts on high-value segments while nurturing lower-value segments?

Hint: Once segments are defined, quantify the revenue generated by each group.

Hint: Consider how this understanding can help prioritize efforts and tailor strategies for maximizing value from high-tier customers while encouraging growth in lower tiers.

12. Group customers by their month of first purchase and analyze retention rates over time. Which cohorts exhibit the highest and lowest retention rates? What strategies can be implemented to improve retention for weaker cohorts?

Hint: Define cohorts based on the month of a customer's first purchase.

Hint: Track the activity of these cohorts over subsequent months to observe retention patterns and identify which groups show stronger or weaker loyalty.

13. Analyze the lifetime value of customers acquired in different months. How can this insight inform acquisition and retention strategies?

Hint: Consider how to estimate the long-term value that customers acquired in different periods bring to the company.

Hint: Think about how this insight can guide decisions on customer acquisition costs and retention investments.

14. Identify seasonal trends in sales by category and

location. How can the company prepare for peak and off-peak seasons to maximize revenue?

Hint: Analyze sales patterns across different product categories and locations throughout the year to identify recurring peaks and troughs.
Hint: Consider how these seasonal insights can inform inventory management and promotional planning.

15. Analyze daily sales trends to identify high-performing and low-performing days. What strategies can be implemented to boost sales on slower days?

Hint: Identify high-performing and low-performing days by analyzing daily sales data.
Hint: Think about specific strategies that could stimulate sales during identified slower periods.