

# **CASE STUDY**

## **SALES PERFORMANCE ANALYSIS**

### **PATTERN PATROLLERS**

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# Comprehensive Sales Performance Analysis

## INTRODUCTION

In the highly competitive retail environment, understanding various facets of sales performance is crucial for making informed business decisions and enhancing customer satisfaction. Carlos, a data analyst at Amazon Inc., has been tasked with analyzing sales data to provide actionable insights that can help the management improve business strategies. This case study report aims to provide a comprehensive analysis of the provided datasets, focusing on several key areas: total sales and profit, geographical distribution of sales, customer behavior, sales trends, and product category performance.

## DATA OVERVIEW AND THE ATTRIBUTES

### The orders.csv file contains the following columns:

Order ID: Unique identifier for each order.

Order Date: Date when the order was placed.

CustomerName: Name of the customer who placed the order.

State: State where the order was placed.

City: City where the order was placed.

### Here are the first few rows of the orders.csv:

	<i>Order ID</i>	<i>Order Date</i>	<i>CustomerName</i>	<i>State</i>	<i>City</i>
0	B-26055	10/3/2018	Harivansh	Uttar Pradesh	Mathura
1	B-25993	3/2/2018	Madhav	Delhi	Delhi
2	B-25973	24-01-2018	Madan Mohan	Uttar Pradesh	Mathura
3	B-25923	27-12-2018	Gopal	Maharashtra	Mumbai
4	B-25757	21-08-2018	Vishakha	Madhya Pradesh	Indore

### The details.csv file contains the following columns:

Order ID: Unique identifier for each order (same as in orders.csv).

Amount: Amount of money for the order.

Profit: Profit made from the order.

Quantity: Quantity of items in the order.

Category: Category of the items in the order.

Sub-Category: Sub-category of the items in the order.

PaymentMode: Mode of payment used for the order.

**The first few rows of the details.csv are as follows:**

	<i>Order ID</i>	<i>Amount</i>	<i>Profit</i>	<i>Quantity</i>	<i>Category</i>	<i>Sub-Category</i>	<i>PaymentMode</i>
0	B-25681	1096	658	7	Electronics	Electronic Games	COD
1	B-26055	5729	64	14	Furniture	Chairs	EMI
2	B-25955	2927	146	8	Furniture	Bookcases	EMI
3	B-26093	2847	712	8	Electronics	Printers	Credit Card
4	B-25602	2617	1151	4	Electronics	Phones	Credit Card

## **DATA PREPARATION**

Data preparation is a crucial step in data analysis that involves cleaning and transforming raw data into a format suitable for analysis. For the given details.csv and orders.csv datasets, data preparation involves the following steps:

### **1. Loading the Data**

- Import the datasets into pandas DataFrames for easy manipulation.

### **2. Inspecting the Data**

- View the first few rows of each dataset to understand the structure and contents.
- Check the data types of each column to ensure they are appropriate for analysis.

### **3. Handling Missing Values**

- Identify any missing values in both datasets.
- Decide on a strategy to handle missing values (e.g., removing rows with missing values or imputing them with appropriate values).

### **4. Identifying Inconsistencies**

- Check for inconsistencies between the datasets, such as Order ID values present in one dataset but not the other.
- Ensure that each Order ID in details.csv exists in orders.csv.

### **5. Cleaning the Data**

- Remove or impute rows with missing values.
- Remove rows with inconsistent Order ID values.

### **7. Saving the Cleaned Data**

- Save the cleaned and transformed datasets to new CSV files for further analysis.

## **DATA ANALYSIS**

### **1.Total sales and total profit**

*"The total sales amount for the given period is 437,771, and the total profit is 36,963."*

## 2. Distribution of Sales and Profit by State and City: Top Five States and Cities

To examine the distribution of sales and profit by state and city, and to identify the top five states and cities in terms of sales and profit, you can follow these steps:

- **Merging the datasets**
- **Grouping them by city and state**
- **Identifying the top cities and states**

### *Top 5 States by Sales:*

*State*

Maharashtra	102498
Madhya Pradesh	87463
Uttar Pradesh	38362
Delhi	22957
Rajasthan	22334

### *Top 5 States by Profit:*

*State*

Madhya Pradesh	7382
Maharashtra	6963
Uttar Pradesh	3358
Gujarat	3001
Tamil Nadu	2602

### *Top 5 Cities by Sales:*

*City*

Indore	63680
Mumbai	58886
Pune	43612
Mathura	28747
Bhopal	23783

### *Top 5 Cities by Profit:*

*City*

Indore	6763
Pune	6160
Mathura	3335
Chandigarh	2778
Chennai	2602

## 3. Investigating Repeat Purchase Behavior and Average Profit from Repeat Customers

To investigate the repeat purchase behavior of customers, determine how many customers have made multiple orders, and calculate the average profit from these repeat customers, we can follow the below steps:

- **Calculate the number of orders per customer.**
- **Identify repeat customers and count them.**
- **Calculate the total and average profit from these repeat customers.**

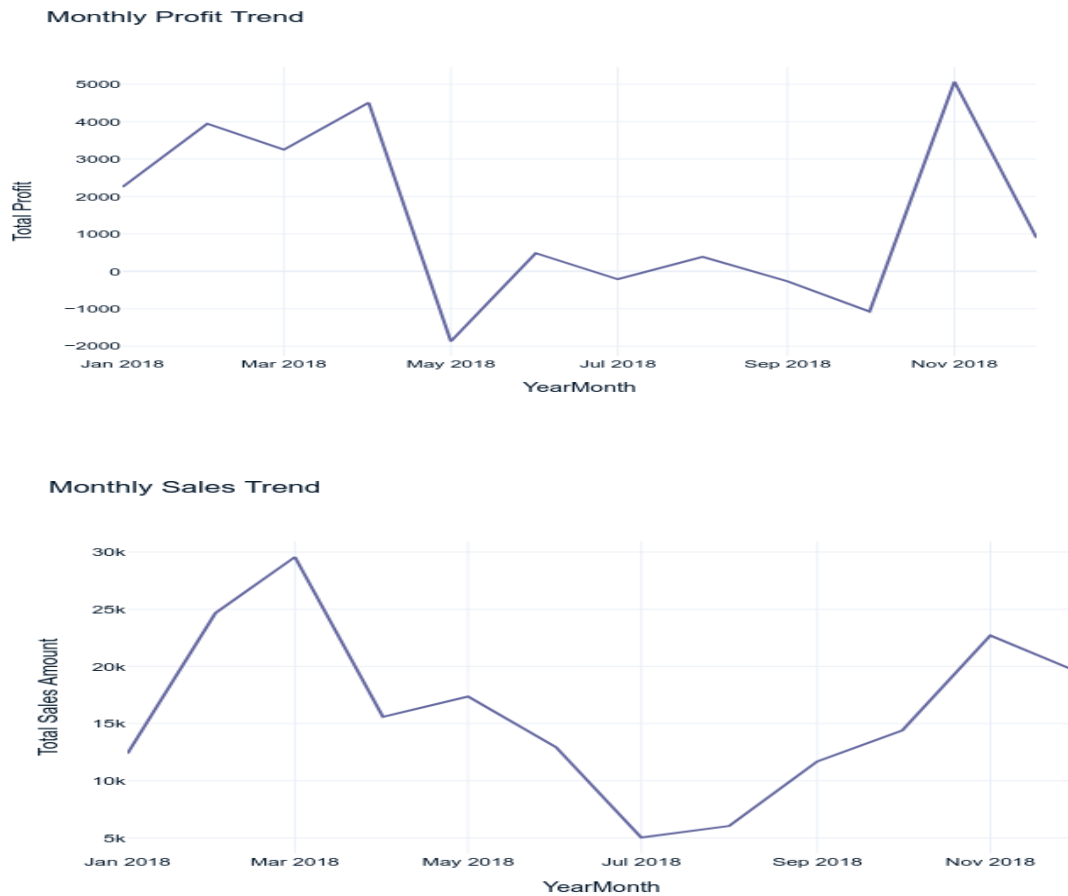
*"The number of repeat customers is 107, with an average profit of 249.05 per repeat customer."*

## 4. Analyzing Sales Trends and Identifying Seasonal Patterns

To analyze the sales trends over time (by month, quarter, or year) and identify any seasonal patterns or trends in the data, we can follow below steps.

- **Convert 'Order Date' to datetime format with dayfirst=True and handle errors**
- **Drop rows with invalid 'Order Date'**
- **Merge the datasets on 'Order ID'**
- **Extract year and month from 'Order Date'**
- **Group by year and month to calculate total sales and profit**

- **Plot the sales and profit trends over time**

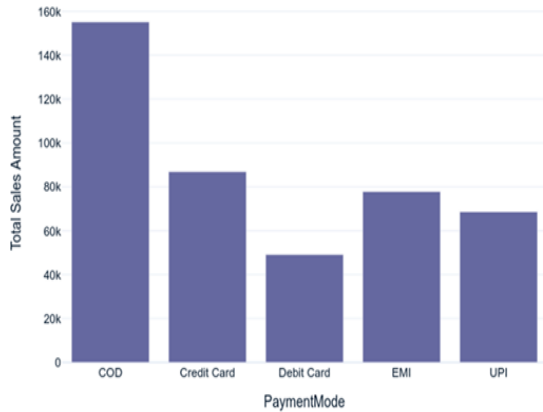


## **5. Distribution of Sales by Payment Mode: Most Commonly Used Payment Methods**

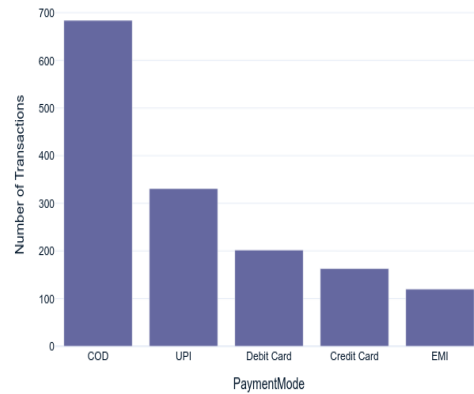
To examine the distribution of sales by payment mode and which payment modes are most commonly used by customers, we can follow the below steps.

- **Group by payment mode to calculate total sales**
- **Identify the most commonly used payment modes**
- **Plot the distribution of sales by payment mode**

Sales Distribution by Payment Mode



Most Commonly Used Payment Modes

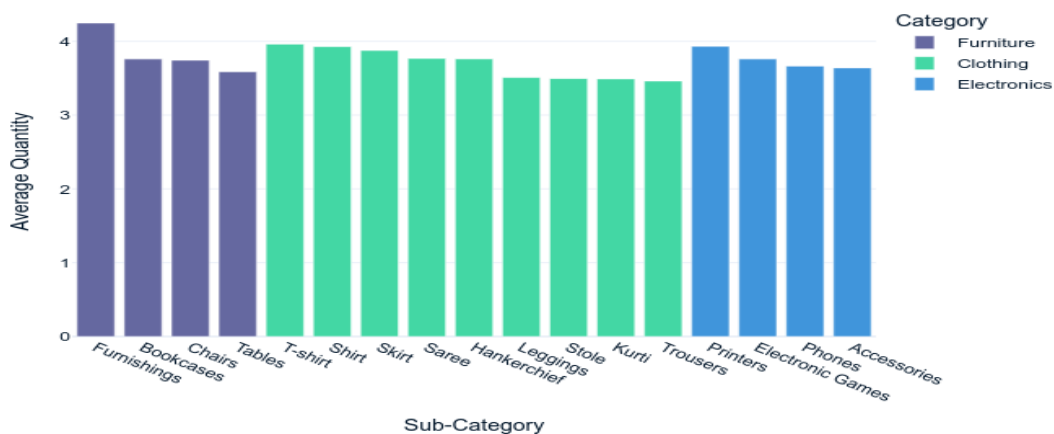


## 6. Average Item Quantity by Product Category and Sub-category

To analyze the average quantity of items per order by product category and sub-category and to identify categories and subcategories with higher average quantities, we can follow the below steps

- **Group by category and sub-category to calculate average quantity per order**
- **Sort the results to identify categories and sub-categories with higher average quantities**
- **Plot the average quantity of items per order by product category and sub-category**

Average Quantity of Items per Order by Product Category and Sub-Category



*Detailed Data: Average Quantity of Items per Order by Product Category and Sub-Category*

*Category: Furniture, Sub-Category: Furnishings, Quantity: 4.25*

*Category: Clothing, Sub-Category: T-shirt, Quantity: 3.96*

*Category: Electronics, Sub-Category: Printers, Quantity: 3.93*

*Category: Clothing, Sub-Category: Shirt, Quantity: 3.93*

*Category: Clothing, Sub-Category: Skirt, Quantity: 3.88*

*Category: Clothing, Sub-Category: Saree, Quantity: 3.77*

*Category: Clothing, Sub-Category: Hankerchief, Quantity: 3.76*

*Category: Furniture, Sub-Category: Bookcases, Quantity: 3.76*

*Category: Electronics, Sub-Category: Electronic Games, Quantity: 3.76*

*Category: Furniture, Sub-Category: Chairs, Quantity: 3.74*

*Category: Electronics, Sub-Category: Phones, Quantity: 3.66*

*Category: Electronics, Sub-Category: Accessories, Quantity: 3.64*

*Category: Furniture, Sub-Category: Tables, Quantity: 3.59*

*Category: Clothing, Sub-Category: Leggings, Quantity: 3.51*

*Category: Clothing, Sub-Category: Stole, Quantity: 3.49*

*Category: Clothing, Sub-Category: Kurti, Quantity: 3.49*

*Category: Clothing, Sub-Category: Trousers, Quantity: 3.46*

## **CONCLUSIONS & RECOMMENDATIONS:**

### **1. Repeat Purchase Behaviour Analysis**

#### **Conclusions:**

- The business has a relatively small but significant group of repeat customers, indicating a level of customer loyalty.
- Repeat customers contribute significantly to the overall profit, with an average profit of \$331.48 per repeat customer.

#### **Recommendations:**

- Create programs to reward repeat customers with discounts, exclusive offers, or points.
- Send tailored offers and recommendations to repeat customers based on their past purchases.
- Gather feedback from repeat customers to better understand and improve products and services.

## **2. Sales Trends Over Time**

### **Conclusions:**

- The monthly sales and profit trends provide insights into the business's performance over time, highlighting peak sales months and potential seasonal trends.

### **Recommendations:**

- Plan promotions during peak sales months to increase revenue.
- Use sales data to predict demand and stock up for busy times.
- Regularly check sales trends to spot and investigate any drops in performance.

## **3. Distribution of Sales by Payment Mode**

### **Conclusions:**

- The distribution of sales by payment mode helps understand customer preferences for different payment methods.

### **Recommendations:**

- Make popular payment methods easy, secure, and quick to use.
- Highlight the most used payment methods on the website and at checkout to encourage customers to use them.
- Add new payment methods like digital wallets or buy-now-pay-later to attract more customers.

## **4. Average Quantity of Items per Order by Product Category and Sub-Category**

### **Conclusions:**

- Certain sub-categories, such as "Furnishings" and "T-shirt," have higher average quantities per order, indicating strong demand and bulk purchasing behavior.
- Categories with higher average quantities may require more careful inventory management and stock replenishment.

### **Recommendations:**

- Keep enough stock of popular items like "Furnishings" and "T-shirts" to avoid running out.
- Use promotions, like discounts and special offers, to boost sales of less popular items like "Trousers" and "Kurtis."
- Offer bundles of popular items to encourage larger purchases and increase sales.
- Use data to understand customer preferences and create marketing campaigns for popular items like "Printers" and "Electronic Games."



## **SUMMARY**

This report offers valuable insights into customer behavior, sales trends, and product demand, providing a solid foundation for strategic decision-making at Amazon Inc. By understanding the distribution of sales and profit across various states and cities, the business can identify high-performing regions and allocate resources more efficiently. Analyzing repeat purchase behaviour highlights the importance of fostering customer loyalty, revealing that customers with multiple orders contribute significantly to overall profit. Recognizing seasonal sales trends and preferred payment modes allows for better inventory management and targeted promotional efforts, ensuring stock availability aligns with peak demand periods. Furthermore, examining the average quantity of items per order by product category and sub-category helps in optimizing product offerings and marketing strategies. Implementing these insights can enhance customer satisfaction, drive sales across different product categories, and ultimately lead to improved business performance. Effective marketing based on customer preferences and purchasing behaviour will bolster customer engagement and retention, paving the way for sustained growth and profitability.