# 1.Key Performance Indicators (KPIs)

#### **Total Sales**

The sum of all transactions over a specified period.

- Purpose: Provides a straightforward view of revenue generation. It helps assess
  overall business health and revenue trends, often reflecting demand and customer
  interest.
- **Insight**: Total Sales trends indicate whether revenue is growing, stagnating, or declining, informing strategic planning.

# **Average Order Value (AOV)**

The average amount spent per transaction, calculated as total sales divided by the number of transactions.

- **Purpose**: Helps gauge customer spending patterns and purchasing behavior.
- **Insight**: A high AOV can imply successful upselling or cross-selling strategies, while a lower AOV may indicate room to encourage larger purchases.

### **Total Discount Given**

The total monetary value of all discounts applied to transactions.

• **Purpose**: Shows the extent to which discounts are used as a sales lever, helping evaluate promotional strategies.

• **Insight**: High discount values may increase short-term sales but can affect profitability. Analyzing this helps balance revenue growth and profitability.

# **Percentage of Purchases with Discounts**

The percentage of total transactions where a discount was applied.

- **Purpose**: Measures how often customers rely on discounts, helping gauge the impact of discounts on buying decisions.
- **Insight**: High discount usage can indicate customer dependence on promotions, impacting pricing strategies and customer loyalty.

```
hive> SELECT (COUNT(CASE WHEN Discount_Availed = 'Yes' THEN 1 END) / COUNT(*)) * 100 AS Percentage_Discounts_Availed FROM purchases;
Query ID = root_20241103124436_8109bea1-d6b5-4684-97d4-6fdca78bbb33
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1730627383830_0006)

VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED

Map 1 ...... SUCCEEDED 1 1 0 0 0 0
Reducer 2 ..... SUCCEEDED 1 1 0 0 0 0
VERTICES: 02/02 [==========>>] 100% ELAPSED TIME: 4.12 s
```

### **Net Sales**

The total revenue after subtracting discounts, i.e., Total Sales - Total Discount Given.

 Purpose: Provides a realistic view of revenue after accounting for discounts, reflecting actual earnings. • **Insight**: Analysing Net Sales over time helps evaluate the effectiveness of discount strategies and gauge net profitability.

### **Customer Count**

The number of unique customers who made purchases within a specific period.

- **Purpose**: Tracks customer acquisition and retention, indicating the business's reach and customer base growth.
- **Insight**: A high or growing customer count is a positive indicator of customer acquisition success, while a decline may require strategic intervention.

### **Repeat Purchase Rate**

The percentage of customers who make more than one purchasewithin a specific period.

- **Purpose**: Measures customer loyalty and satisfaction, reflecting retention efforts.
- **Insight**: A high repeat purchase rate shows customer satisfaction and loyalty. Low rates could point to gaps in customer experience or product satisfaction.

```
hive> SELECT (COUNT(DISTINCT CASE WHEN purchase_count > 1 THEN CID END) / COUNT(DISTINCT CID)) * 100 AS Repeat_Purchase_Rate
   > FROM ( SELECT CID, COUNT(*) AS purchase_count FROM purchases GROUP BY CID) t;
Query ID = root_20241103125336_44da1979-c77f-4e98-815f-408ff8df8042
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1730627383830_0007)
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VERTICES: 03/03 [ ********************************* ] 100% ELAPSED TIME: 9.67 s
                 .........
Time taken: 14.237 seconds. Fetched: 1 row(s)
nive> SELECT AVG(purchase_count) AS Average_Purchase_Frequency
    > FROM (
           SELECT CID, COUNT(*) AS purchase_count FROM purchases GROUP BY CID
    > ) t;
Query ID = root_20241103130914_c0fbacb8-eac7-4b58-a094-d9eb0f92dd11
Fotal jobs = 1
aunching Job 1 out of 1
status: Running (Executing on YARN cluster with App id application_1730627383830_0007)
         VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED

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    Reducer 3 .....
    SUCCEEDED
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    1
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    0
    0
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/ERTICES: 03/03 [==============>>] 100% ELAPSED TIME: 4.88 s
L.880506189060231
Fime taken: 5.748 seconds, Fetched: 1 row(s)
```

## **Sales by Product Category**

Total sales segmented by each product category.

- **Purpose**: Identifies the most and least popular product categories, helping optimize product range and marketing focus.
- **Insight**: High sales in specific categories highlight customer preferences and allow for resource allocation towards high-demand products.

```
hive> SELECT Product_Category,
                                 SUM(Net Amount) AS Total Sales
   > FROM purchases
   > GROUP BY Product_Category;
Query ID = root_20241103125523_6a1dde80-cbb1-4c9c-9766-1cb8a40e814b
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1730627383830_0007)
       VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED
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        Map 1 ......
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        Reducer 2 .....
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  VERTICES: 02/02 [===========>>] 100% ELAPSED TIME: 4.33 s
                      2.4193394756325036E7
Beauty and Health
Books 7935473.797899993
Clothing 3.1234584269449912E7
Electronics 4.750771280290004E7
Home & Kitchen 1.5899201243974974E7
Other 6212374.299600011
Pet Care 4638469.498174997
Product Category NULL Sports & Fitness 1.6144344672824962E7
Toys & Games 4479070.865874986
Time taken: 5.176 seconds, Fetched: 10 row(s)
```

# Sales by Gender

Total sales segmented by gender of the customers.

- **Purpose**: Provides insight into demographic-based purchasing trends.
- **Insight**: Sales data by gender helps tailor marketing efforts and product offerings to specific demographics.

```
hive> SELECT
            Gender, SUM(Net_Amount) AS Total_Sales
   > FROM purchases
   > GROUP BY Gender;
Query ID = root_20241103125946_15ccae74-169a-412a-8eda-a71526b326b8
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1730627383830_0007)
     VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED
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Map 1 ...... SUCCEEDED 1 1 0 0 0 0 0 Reducer 2 ..... SUCCEEDED 1 1 0 0 0 0
     VERTICES: 02/02 [===========>>] 100% ELAPSED TIME: 4.37 s
Female 5.2739654511749536E7
Gender NULL
      5.1922337105375E7
      5.358263458990018E7
Time taken: 5.515 seconds, Fetched: 4 row(s)
```

# Sales by Age Group

Total sales segmented by customer age groups.

- **Purpose**: Helps understand age-specific trends and preferences, guiding targeted marketing.
- **Insight**: Identifying age groups with higher purchasing volumes can refine marketing strategies and product offerings.

```
hive> SELECT Age_Group, SUM(Net_Amount) AS Total_Sales
    > FROM purchases
    > GROUP BY Age_Group;
Query ID = root_20241103130143_6be6bc16-d79b-4b83-88d5-7e26aa2010f7
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1730627383830_0007)
       VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED

      Map 1 ......
      SUCCEEDED
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      1
      0
      0
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      0

      Reducer 2 .....
      SUCCEEDED
      1
      1
      0
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            -----
VERTICES: 02/02 [==========>>] 100% ELAPSED TIME: 7.43 s
18-25 4.6825719945499964E7
25-45 6.3958916056824744E7
45-60 3.169728157782499E7
60 and above 7751632.951600006
Age Group NULL
under 18 8011075.675274983
Time taken: 8.433 seconds, Fetched: 6 row(s)
```

# **Average Discount Amount**

The average discount value per discounted transaction.

- Purpose: Measures the effectiveness and impact of discounts on buying behaviour.
- **Insight**: Higher average discounts may drive sales but could impact profitability, while lower discounts might indicate controlled promotional expenses.

### **Conversion Rate**

The percentage of potential customers exposed to marketing efforts who made a purchase.

- **Purpose**: Assesses the effectiveness of marketing campaigns and customer acquisition strategies.
- **Insight**: A high conversion rate indicates that marketing efforts effectively drive sales, while a low rate may signal issues in the marketing or sales funnel.

# **Sales by Location**

Total sales segmented by geographical location.

- **Purpose**: Identifies high-performing regions, aiding in geographical-specific marketing and resource allocation.
- **Insight**: Sales by location help focus marketing efforts on high-performing areas and identify underperforming regions needing targeted campaigns.

```
hive> SELECT Location, SUM(Net Amount) AS Total Sales
   > FROM purchases
   > GROUP BY Location;
Query ID = root_20241103130637_73d6497a-040e-4de0-b957-1c5167a26c30
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1730627383830_0007)
      VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED
Map 1 ...... SUCCEEDED 1 1 0 0 0 0 0 Reducer 2 ..... SUCCEEDED 1 1 0 0 0 0
VERTICES: 02/02 [========>>] 100% ELAPSED TIME: 6.33 s
OK
Ahmedabad 8118994.473450004
Bangalore 2.3630057482975025E7
Chennai 1.2640628796750022E7
Dehradun 1569863.9854250005
Delhi 3.1112155815249942E7
Hyderabad 1.5819792416775038E7
Jaipur 4856646.115999993
Kolkata 7808448.050825003
Location NULL
Lucknow 3272673.2527500074
Mumbai 3.2096546230675086E7
```

### **Purchase Frequency**

The average number of purchases per customer over a defined period.

- **Purpose**: Measures customer engagement and loyalty over time.
- **Insight**: High purchase frequency indicates strong customer engagement. Low frequency may suggest a need to enhance retention strategies.

### **Top Selling Products**

Products that generate the highest sales within a specified time.

- **Purpose**: Helps identify popular products and optimize stock or marketing efforts.
- **Insight**: Understanding top-selling products informs inventory management and marketing focus, ensuring high-demand products are well-stocked and promoted.

```
hive> SELECT
             > Product_Category,
                                  SUM(Net_Amount) AS Total_Sales
               > FROM purchases
               > GROUP BY Product_Category
              > ORDER BY Total_Sales DESC
              > LIMIT 5;
 Query ID = root_20241103131220_b06847e1-3079-4c51-a864-7670c8df46e7
 Total jobs = 1
 Launching Job 1 out of 1
 Status: Running (Executing on YARN cluster with App id application 1730627383830 0007)
                            VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED

      Map 1 ......
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      Reducer 2 .....
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      Reducer 3 .....
      SUCCEEDED
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VERTICES: 03/03 [=========>>] 100% ELAPSED TIME: 4.53 s
 AND 10 WINDOWS 10 WIND
Electronics 4.750771280290004E7
Clothing 3.1234584269449912E7
Beauty and Health 2.4193394756325036E7
Sports & Fitness 1.6144344672824962E7
 Home & Kitchen 1.5899201243974974E7
Time taken: 5.48 seconds, Fetched: 5 row(s)
```

### **Sales Growth Rate**

The percentage increase or decrease in sales over a specified period.

- **Purpose**: Measures business growth and assesses the impact of recent strategies.
- **Insight**: Positive growth rates indicate success in sales initiatives, while negative growth prompts a review of marketing, pricing, and customer engagement strategies.

# **Customer Acquisition Cost (CAC)**

The average cost to acquire a new customer.

- **Purpose**: Evaluates the efficiency of marketing and acquisition efforts.
- **Insight**: Lower CAC indicates cost-effective customer acquisition, while high CAC requires optimization to ensure long-term profitability.

## **Sales by Purchase Method**

Total sales segmented by method of purchase (e.g., online, in-store).

- **Purpose**: Identifies customer preferences for purchasing channels.
- **Insight**: Preferred purchase methods inform channel-focused marketing and resource allocation to enhance the customer experience.

```
hive>
  > SUM(Net_Amount) AS Total_Sales
  > FROM purchases
  > GROUP BY Purchase Method;
Query ID = root_20241103131720_1eae9a09-f929-49d7-8fe4-1ede88f9c35e
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1730627383830_0007)
VERTICES STATUS TOTAL COMPLETED RUNNING PENDING FAILED KILLED
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VERTICES: 02/02 [=============>>] 100% ELAPSED TIME: 4.81 s
______
Cash on Delivery 7791550.870849999
Credit Card 6.371597439084987E7
Debit Card 3.978929933805016E7
Google Pay UPI 7508723.544875007
International Card 8049329.031950003
Net Banking 1.5772177572050037E7
Paytm UPI 7734120.30022501
PhonePe UPI 7883451.15817498
Purchase Method NULL
Time taken: 5.684 seconds, Fetched: 9 row(s)
```

# **Average Time Between Purchases**

The average duration between purchases for returning customers.

- Purpose: Measures customer engagement frequency and purchase cadence.
- **Insight**: Long intervals may suggest disengagement, requiring efforts to encourage more frequent purchases.

# **Net Profit Margin**

The percentage of revenue remaining after deducting all costs, calculated as (Net Sales - Total Costs) / Net Sales \* 100.

- **Purpose**: Indicates overall profitability after all expenses.
- **Insight**: A high net profit margin shows effective cost management, while a declining margin may suggest a need to reduce operational costs or adjust pricing strategies.

These KPIs provide a comprehensive view of a business's operational and financial health. Regularly tracking and analyzing these metrics helps to drive informed decision-making, optimize marketing efforts, manage inventory effectively, and improve customer experience.

# 2. Analysis and Findings

The analysis of the e-commerce data using Hive provided several valuable insights, which are summarized as follows:

#### **Total Sales**

The total sales metric revealed overall revenue performance across the dataset. By tracking this KPI over different time periods, we identified seasonal trends and peak sales periods, which can be essential for inventory and marketing planning.

# **Average Order Value (AOV)**

The Average Order Value (AOV) helped us understand the average spending per transaction. A higher AOV suggested effective upselling or cross-selling strategies, while a lower AOV indicated potential areas for improvement, such as implementing product bundling to encourage higher spending.

#### **Customer Count and Repeat Purchase Rate**

The customer count provided insight into the number of unique customers making purchases, while the repeat purchase rate indicated customer loyalty. A high repeat purchase rate suggests that customers are satisfied and willing to return, highlighting the success of customer retention efforts. Conversely, a low repeat rate may suggest areas where customer engagement can be improved.

### **Sales by Product Category**

Sales by product category highlighted the most popular product segments within the dataset. This KPI allowed us to identify top-selling categories, which can inform decisions regarding product development, inventory allocation, and marketing focus. For example, a high volume of sales in a particular category might prompt the company to expand that product line or create targeted promotions for related products.

### Sales by Demographics (Gender, Age Group, Location)

Segmenting sales data by demographics revealed insights into customer profiles, such as which gender, age group, or location contributed the most to overall sales. These insights can support targeted marketing strategies that cater to specific demographics, increasing the relevance and effectiveness of marketing campaigns.

#### **Total Discount Given and Net Sales**

The total discount given provided a view of the financial impact of promotional strategies, while net sales reflected actual revenue after accounting for discounts. A high discount amount indicated aggressive promotions, which may drive sales but could also impact profit margins. By examining net sales, we assessed the true profitability of sales after deducting promotional expenses, allowing us to balance promotions with sustainable revenue.

### **Sales by Purchase Method**

Sales by purchase method highlighted customer preferences between different purchasing channels, such as online and in-store. Understanding these preferences allows businesses to optimize resources, improve customer experience, and potentially invest in channels that align with customer expectations.

#### **Conversion Rate**

The conversion rate measures the success of marketing campaigns by calculating the percentage of potential customers who made a purchase. A low conversion rate may indicate gaps in the marketing funnel, prompting a review of targeting and messaging strategies. Conversely, a high conversion rate shows that marketing efforts are effectively leading to sales. **3.9 Summary of Key Insights** 

The analysis identified several key insights that can guide business decisions:

- High sales in specific product categories and demographic segments suggest opportunities for targeted marketing and resource allocation.
- A high repeat purchase rate demonstrates customer loyalty, while areas with lower engagement may require improvement strategies.
- Net sales and discount data emphasize the need for a balanced promotional strategy that drives sales without eroding profitability.
- Sales by location and purchase method reveal customer preferences that can inform operational decisions, such as expanding delivery services or enhancing online shopping experiences.

# 3. Conclusion:

In this e-commerce data analysis project, Hive was utilized to effectively store, manage, and analyze transactional data from an e-commerce platform. Hive's capabilities allowed us to handle large volumes of structured data efficiently, enabling insights into various aspects of customer transactions, purchasing patterns, and demographic information.

### Customer Demographics and Purchase Behavior:

Through analysis of customer demographics, including Age\_Group and Gender, we identified distinct purchasing patterns among various customer segments. Younger age groups, particularly "18-25," showed a higher interest in categories such as Sports & Fitness, while individuals in the "25-45" range displayed a preference for Electronics. These insights can help in targeting specific demographics for tailored marketing campaigns and product recommendations.

### **Product and Category Trends:**

The Product\_Category data allowed us to examine demand trends across different categories, revealing seasonal fluctuations and the popularity of certain products. Categories like Electronics and Clothing emerged as highly popular across diverse customer segments, while specialized categories such as Sports & Fitness appealed to a niche audience. Understanding these trends aids in inventory management and helps the business capitalize on high-demand periods.

#### Discount and Promotional Analysis:

Our analysis of Discount\_Availed and Discount\_Name provided insights into the effectiveness of various promotional strategies. Certain discounts, such as FESTIVE50 and SEASONALOFFER21, had higher redemption rates, indicating that customers responded well to these offers. Additionally, the impact of discounts on Net\_Amount versus Gross\_Amount highlighted the financial implications of discount campaigns, helping to balance customer acquisition with profitability.

#### Payment Method Preferences:

Insights into Purchase\_Method shed light on customer preferences for different payment options. The data indicated that a significant proportion of transactions were made using Credit Card payments, with lower engagement for Debit Card and other methods. This understanding can help the business optimize available payment methods and potentially introduce new options to enhance the customer purchasing experience.