

# **DATA SCIENCE ASSESSMENT : ECOMMERCE TRANSACTIONS DATASET**

## **TASK 1 : EXPLORATORY DATA ANALYSIS (EDA) AND BUSSINESS INSIGHTS REPORT**

### **Overview**

This Report presents the findings from the Exploratory data analysis (EDA) performed on the provided datasets. The datasets include customer demographics, product details, and transaction records. Insights derived from this Analysis aim to guide business decisions regarding marketing, operational improvements and product strategy. Below are the key business insights supported by data visualizations.

### **BUSSINESS INSIGHTS :**

#### **Insight 1 : Monthly Sales Trend**

**Objective :** Extract the month from each transaction, and analyze the total sales trend across different months. This allows us to understand sales fluctuations and patterns over time.

**Observation :** Sales peaked in August, September and January 2024 with noticeable dips in November 2024 and March 2024

#### **Business Insight:**

1. **Seasonal Trends:** By observing the sales trend across months. This trend gives the opportunity to plan inventory, marketing, and promotions accordingly.
2. **Sales Cycles:** Understanding low-sales months helps in strategizing discounts or introducing new products to boost sales.
3. **Demand Forecasting:** Monthly analysis helps predict demand for products in upcoming months, allowing to optimize stock and prevent shortages or overstocking.
4. **Resource Allocation:** Identifying months with higher sales helps in efficient resource allocation for logistics, customer support, and other operational functions.

These insights enable businesses to refine their sales strategies and better forecast revenue.

## **Insight 2 : Customer Retention**

**Objective:** The objective of this analysis is to evaluate customer retention by categorizing customers as repeat buyers or one-time buyers based on the number of transactions they made. This helps to understand their customer loyalty and devise strategies to increase repeat purchases.

**Observation :** A significant proportion(94%) of customers are making repeat purchases which indicates a strong retention of customers.

### **Business Insight:**

1. **Customer Loyalty:** The pie chart reveals the proportion of repeat buyers(94%) versus one-time(6%) customers. The higher percentage of repeat customers indicates strong customer loyalty.
2. **Retention Strategy:** Implement loyalty programs, personalized offers, or exclusive rewards, enhancing customer satisfaction and encouraging repeat purchases.
3. **Improving Retention:** For one-time customers, targeted marketing campaigns or follow-up strategies can be implemented to convert them into repeat buyers, boosting long-term sales.
4. **Revenue Stability:** Repeat customers generate more consistent revenue. Increasing the number of repeat customers directly contributes to a more stable and predictable revenue stream.

## **Insight 3 : Regional Sales Performance :**

**Objective:** The objective of this analysis is to evaluate the sales contribution by region by merging customer and transaction data. By visualizing regional sales performance, businesses can identify key markets and make data-driven decisions to optimize sales strategies.

**Observation :** Sales Contribution of South America(30.9%) is comparatively higher than by Other Countries North America(23.7%), Europe(23.7%) and Asia(21.7%).

### **Business Insight:**

1. **Sales Distribution:** The pie chart reveals how sales are distributed across different regions. Identifying regions with higher sales contributions(South America) allows businesses to allocate resources effectively and focus marketing efforts on high-performing regions.
2. **Targeted Marketing:** Understanding regional sales performance helps in tailoring marketing campaigns specific to each region's preferences, enabling business to attract more customers and increase sales in underperforming areas.

3. **Growth Opportunities:** Targeted promotions, product diversification, or localized marketing strategies can be employed in low sales Regions to boost sales.
4. **Resource Allocation:** Efficiently allocating operational resources, such as inventory and logistics, based on regional demand ensures better service and cost-effectiveness.

#### **Insight 4: High Value Customers**

**Objective:** The objective of this analysis is to identify and visualize the top 10 high-value customers based on their total spending. By understanding which customers contribute the most to revenue, businesses can tailor strategies to enhance customer loyalty and retention.

**Observation :** Key Contributors include C0141, C0156, C0059, C0065, C0104, C0054, C0175, C0188, C0099 and C0021. These Customers contribute most of the revenue

#### **Business Insight:**

1. **Customer Loyalty:** Implementing relationship-building strategies, such as personalized offers, rewards, or exclusive services, to maintain their loyalty and encourage repeat purchases.
2. **Targeted Marketing:** High-value customers can be targeted for specific marketing campaigns or premium product recommendations, boosting their engagement and maximizing revenue.
3. **Revenue Focus:** Understanding which customers generate the most revenue helps businesses focus on retaining these high spenders rather than just acquiring new customers, ensuring sustainable business growth.
4. **Customer Segmentation:** Insights from high-value customer analysis can help segment customers into groups, allowing for tailored marketing efforts that meet the needs and preferences of each segment.

#### **Insight 5 : Relationships Between Customers, Regions, and Purchase Behaviours**

**Objective:** The goal of this analysis is to understand the relationship between customer spending and regional sales patterns. By examining the total value of purchases by region and the spending behavior of customers, we aim to uncover actionable insights that can drive business decisions.

**Observation :** Total Sales in South America is comparatively higher than in other countries. Customers in South America are spending money from 2200 to 5000. And Customers in North America are spending money from 2200 to 4000.

### **Business Insight:**

1. **Regional Sales Performance:** The analysis of total sales value by region reveals which regions are contributing the most to the business, helping prioritize resources and marketing efforts. If certain regions are underperforming, targeted promotions or localized strategies can be implemented to boost sales.
2. **Customer Spending Behaviour:** The boxplot of customer spending by region helps identify high-spending customers and regions with significant variance in purchase behavior. This can inform personalized offers or loyalty programs to enhance customer engagement.
3. **Market Segmentation:** Understanding spending patterns by region and customer can aid in segmenting the market, creating region-specific promotions, and improving customer retention strategies, ultimately maximizing revenue.

### **Insight 6 : Top Selling Products and Categories**

**Objective:** The objective of this analysis is to identify the top-selling products and categories based on the quantity sold. This allows businesses to understand customer preferences and optimize inventory and marketing strategies accordingly.

**Observation :** Active Smartwatch, Soundwave Headphones , desk lamp, ActiveWear Rug, SoundWave Cookbook are the best selling Products. Top Selling Categories are Books, Home Décor, Electronics and Clothing.

### **Business Insight:**

1. **Top-Selling Products:** Analyzing the top-selling products helps in identifying products that are in high demand. This helps optimize stock levels, plan promotional campaigns, and improve marketing strategies. It also reveals potential for cross-selling or bundling popular products with less popular ones.
2. **Top-Selling Categories:** Understanding the top-selling categories allows businesses to focus on expanding the most profitable product lines. It also helps in resource allocation for product development, marketing, and inventory management, ensuring that high-demand categories are well-stocked.
3. **Targeted Promotions:** These insights can guide targeted promotional efforts and enable the creation of personalized offers, ensuring that resources are invested in products and categories with the highest return on investment.

**Insight 7 : Distributions for numerical columns(Price, Quantity, Totalvalue)**

**Insight 8 : Average transaction value per customer**

**Insight 9 : Average Transaction Value by Customer Segment**

**Insight 10 : Sales Performance by Day of the Week**