

# E-commerce Sales Analysis - Final Report

## 1. Introduction

In today's fast-growing e-commerce industry, data-driven decision-making plays a crucial role in optimizing sales, enhancing customer satisfaction, and increasing profitability. This project analyzes Walmart's sales data to uncover key trends, provide actionable insights, and offer strategic recommendations to improve business performance.

## 2. Dataset Overview

- Total Records: 10,051 transactions
- Key Features: Invoice ID, Branch, City, Category, Unit Price, Quantity, Date, Time, Payment Method, Rating, Profit Margin
- Objective:
  - Identify top-performing product categories
  - Understand customer purchase behavior
  - Optimize inventory and marketing strategies

## 3. Data Cleaning & Preprocessing

- Converted unit\_price from string to numeric for calculations.
- Extracted hour from the time column to analyze peak sales hours.
- Removed missing values to maintain data integrity.
- Created a total\_sales column (unit\_price \* quantity).
- Converted date column into proper DateTime format for time-based analysis.

## 4. Exploratory Data Analysis (EDA)

- Top-Selling Product Categories: Health & Beauty, Electronics, and Home & Lifestyle contribute over 60% of total revenue.
- Preferred Payment Method: E-wallets are the most used, but Credit Card transactions generate higher-value purchases.
- Peak Sales Hours: Most sales occur between 12 PM - 3 PM and 6 PM - 9 PM, aligning with customer shopping behavior.
- Branch Performance Analysis: The San Antonio branch recorded the highest revenue.

## 5. Data Visualization & Interactive Dashboard

## Dashboard Components:

- Total Sales Trends (Line Chart) - Tracks revenue fluctuations over time.
- Category-Wise Sales (Bar Chart) - Identifies top-selling product categories.
- Payment Method Preferences (Pie Chart) - Highlights customer payment behavior.
- Peak Sales Hours (Histogram) - Determines busiest shopping periods.
- Branch-Wise Revenue (Bar Chart) - Analyzes location-based performance.

## 6. Business Insights & Strategic Recommendations

- Inventory Optimization: Increase stock for high-demand categories (Health & Beauty, Electronics) to prevent shortages.
- Customer-Centric Pricing Strategies: Offer targeted discounts during non-peak hours to encourage sales during slower periods.
- Payment Incentives: Introduce exclusive cashback offers for Credit Card transactions to promote high-value purchases.
- Branch-Specific Strategies: Implement location-based promotions for underperforming stores to improve footfall and engagement.

## 7. Conclusion & Impact

This analysis provides Walmart with data-driven insights that can improve inventory planning, pricing strategies, and customer engagement. The interactive dashboard further enables real-time tracking of sales trends and assists in making informed business decisions. Implementing these strategies can lead to enhanced revenue growth and better customer satisfaction.