DIC Group Project
Online Shopping Analytics Project

Presented by

Prateek Tiwari (21EC01005)

Artan Singh (21EE01035)

Girish Kumar (21EE01001)

Abstract

In today's digital economy, understanding customer behavior in online shopping is critical for businesses aiming to optimize user experience, enhance product offerings, and drive sales. This project introduces an Online Shopping Analytics Dashboard, a comprehensive tool that leverages transactional and demographic data to uncover valuable insights into customer behavior and spending trends. The dashboard integrates data on customer demographics, transaction details, product categories, and regional sales, consolidating these aspects into a centralized analytics hub.

The project is structured around two main dashboards: Sales Analysis and Location Analysis. These dashboards provide insights into key metrics, such as total sales by product category, spending patterns across the year, customer distribution by gender, and variations in product popularity across locations. Visualizations include bar graphs, area charts, and treemaps, allowing for a detailed examination of factors like average discount effects, seasonal spending, and location-based product demand.

Using SQL, SQL Server Management Studio, and Tableau, the project streamlines data exploration and visualization, empowering businesses to make data-driven decisions. The insights revealed by this project offer a deeper understanding of product demand cycles, regional preferences, and the impact of promotional activities. By consolidating customer behavior data, this analytics tool provides actionable insights to support strategic decision-making, enhance customer engagement, and optimize online shopping experiences.

Contents

1.Introduction

In the competitive world of online retail, gaining insight into customer behaviors, spending patterns, and regional demand is essential for enhancing customer experiences and driving growth. This project presents an Online Shopping Analytics Dashboard that consolidates data on customer demographics, transaction details, product popularity, and spending variations by location into a centralized, interactive platform.

Designed to enable data-driven decision-making, the dashboard provides insights into critical areas such as top-selling product categories, seasonal shopping patterns, and the impact of promotional campaigns. Key visualizations, including demographic breakdowns, location-based spending distributions, and year-round sales trends, support businesses in identifying high-demand regions and optimizing inventory. This report covers the dashboard's core components and technical setup, highlighting its potential to refine e-commerce strategies and improve customer engagement.

2.Project Overview

The Online Shopping Analytics Dashboard serves as an integrated platform providing a centralized view of essential online retail metrics. It consolidates data across various dimensions, including customer demographics, transaction specifics, product popularity, and regional spending trends. This unified view enables businesses to monitor customer behaviors, assess sales patterns, and optimize inventory and marketing strategies effectively.

The dashboard's main components include customer demographics, sales by product category, seasonal spending trends, location-based purchasing behavior, and engagement with promotional offers. These insights allow businesses to tailor their approach to different customer segments, improve product offerings, and identify high-demand regions, ultimately supporting data-driven growth in the online retail space.

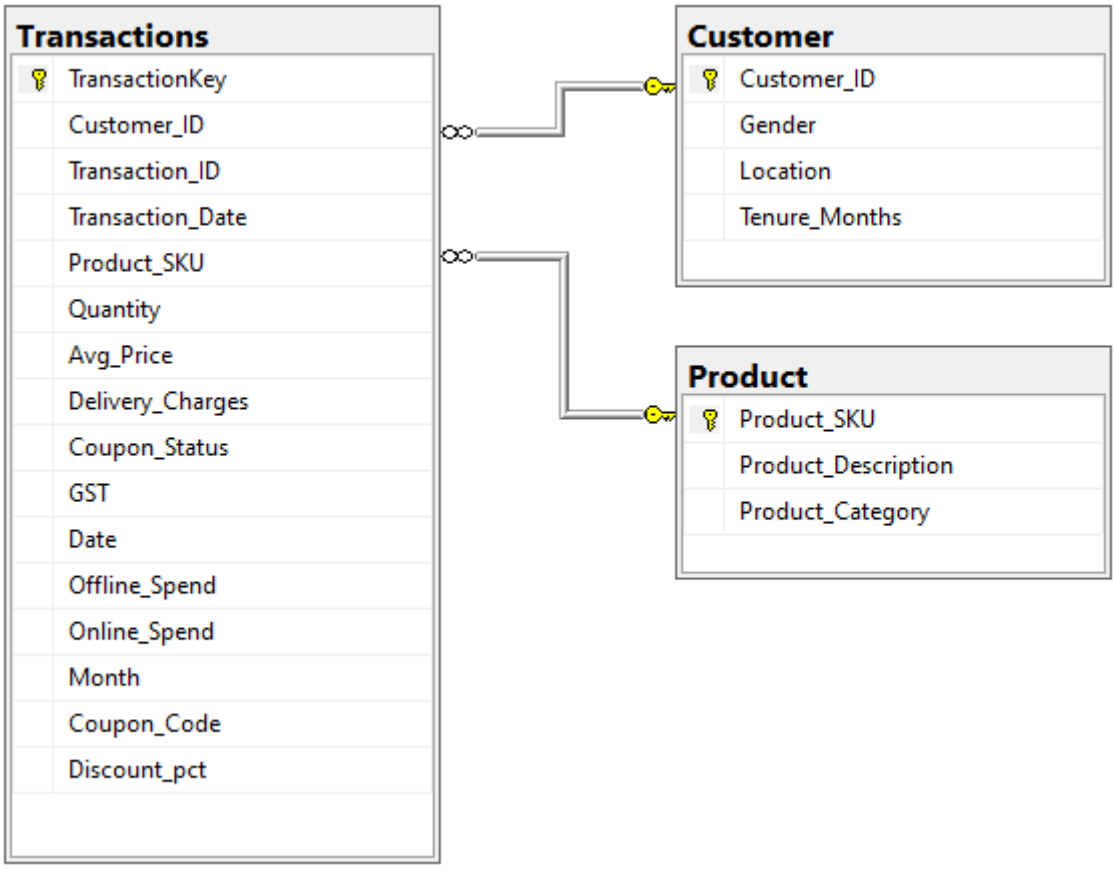

Figure 1 - ER Diagram: Online Shopping Database

3.Detailed Work on Project

The **Online Shopping Analytics** project focuses on exploring transaction trends, product preferences in the context of online shopping. Each aspect of the project is tailored to provide detailed insights into various operational and strategic functions related to online commerce. Below is a detailed breakdown of the project's key components:

- **Total Sales by Product Category:**

A bar graph that displays the total sales for each product category, helping businesses identify the most and least popular categories. For example, office supplies might dominate total sales, but other categories like apparel could show significant trends depending on the region.

- **Transactional Patterns by Gender and Tenure:**

The dashboard also provides insights into how different genders and customer tenure (membership duration) impact sales. This allows businesses to tailor product offerings and marketing strategies based on the demographic breakdown.

- **Customer Distribution:**

A key visualization in this section examines how customers are distributed by gender, offering insights into the purchasing behavior of different demographic groups. This helps identify product categories with higher engagement from specific customer groups.

- **Sales Distribution by Location:**

A packed bubble chart is used to visualize total spending across different locations. This chart highlights high-performing regions, helping businesses prioritize marketing efforts and adjust strategies for underperforming areas. For example, locations like Chicago and California may show higher sales than others, signaling a need for more focused marketing in these regions.

- **Regional Product Preferences:**

This section breaks down product preferences by location, showing which product categories perform well in specific regions. For instance, apparel might be the leading category in Chicago, while office supplies could be more popular in other regions. Understanding these regional preferences allows businesses to tailor product assortments and promotions to meet local demand.

- **Regional Sales Insights:**

The dashboard provides deeper insights into how different regions contribute to total sales. This can include metrics like sales volume, revenue generation, and spending behavior across locations. For example, Chicago and California could be identified as top performers, while regions like New York or Washington D.C. might have lower engagement**.**

4.Tools

The development of the **Sales and Location Dashboards** for the Online Shopping Analytics project involved a combination of tools to handle data exploration, analysis, and visualization:

- **Data Integration:**
  - **SQL (Structured Query Language):** SQL was used to query and manipulate the dataset, enabling data extraction, aggregation, and filtering for analysis.
  - **SQL Server Management Studio (SSMS):** SSMS was used for database creation, management, and efficient querying, facilitating the import and analysis of the Kaggle dataset.

- **Backend Frameworks:**
  - **SQL Server:** Served as the backend database for storing, managing, and querying the dataset, ensuring secure data handling and efficient querying for insights.

- **Frontend Technologies:**
  - **Tableau:** Tableau created interactive charts, graphs, and dashboards to visualize real-time data insights.

- **Analytics Libraries:**
  - **SQL Queries:** Used for data manipulation, including joins, aggregations, and filtering, to analyze transactional patterns, spending trends, and regional performance.

5.Learning Outcomes

Through this project, several valuable insights and skills were gained:

- **Data Integration and Management:** Gained experience in integrating and querying transactional data from various sources, ensuring accurate and comprehensive insights into sales and customer behavior.

- **Interactive Data Visualization:** Developed the ability to create interactive and user-friendly dashboards that allow stakeholders to easily understand key sales and regional metrics, improving data accessibility and decision-making.

- **Customization for Business Needs:** Learned to design dashboards that focus on specific business objectives, such as sales performance and regional trends, enabling companies to make data-driven decisions tailored to their unique needs.

- **Advanced Data Analytics:** Acquired skills in analyzing customer spending behavior, product popularity, and regional performance, leveraging this data to uncover trends and optimize sales strategies**.**

- **Strategic Resource Allocation:** Gained insights into optimizing marketing strategies and inventory management by identifying high-performing regions and adjusting product offerings based on local preferences.

6.Dashboard Results

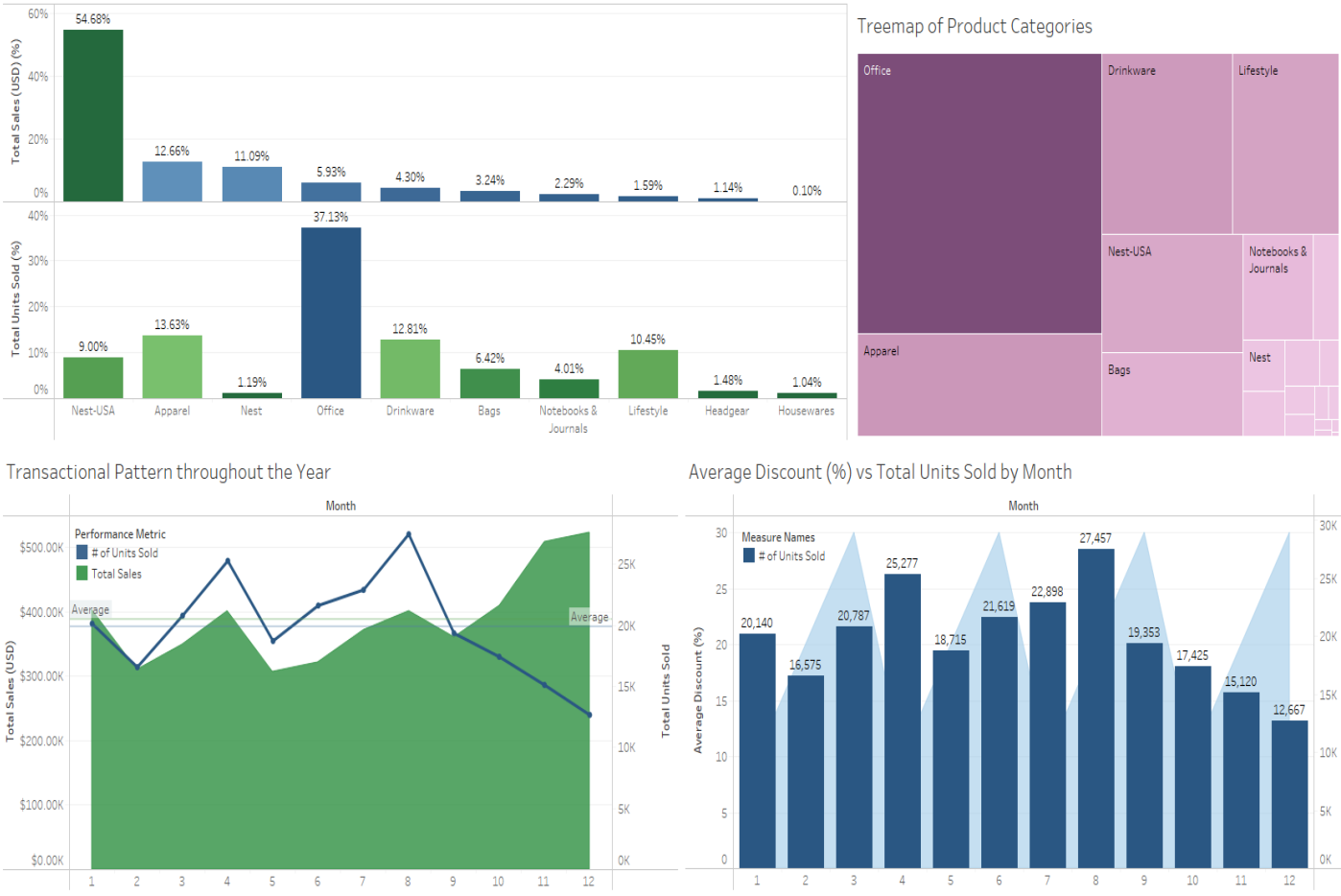

Figure 2 - Dashboard 1: Sales Analysis

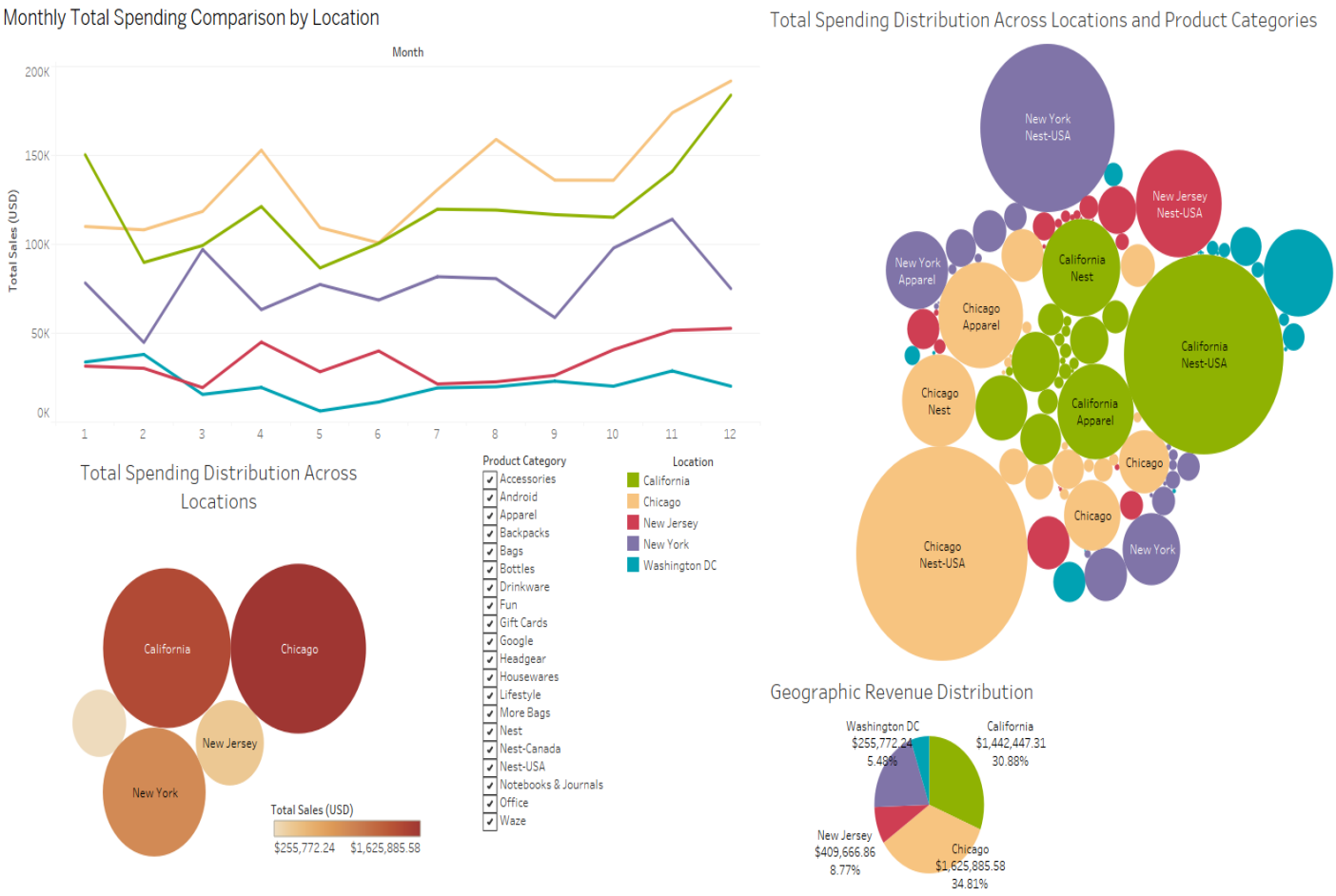

Figure 3 - Dashboard 2: Location Analysis

7.Conclusion

The ***Online Shopping Analytics Project*** provided valuable insights into customer behavior, product popularity, and regional sales performance. By leveraging SQL for data extraction and Tableau for visualization, we successfully analyzed key metrics that can guide businesses in optimizing their sales strategies. The Sales Analysis Dashboard highlighted trends in product categories and customer demographics, while the Location Analysis Dashboard revealed regional performance and preferences. These insights can drive targeted marketing efforts, tailored product offerings, and better inventory management. Overall, the project demonstrates the power of data-driven decision-making in enhancing sales performance and aligning strategies with customer and regional demands.