E-commerce Return Rate Analysis Project Report

Introduction

This project focuses on analyzing e-commerce product return rates to help businesses understand customer behavior, optimize supply chain operations, and reduce losses. By integrating data cleaning, SQL queries, and Power BI dashboards, the project provides a comprehensive view of return trends across categories, regions, suppliers, and marketing channels.

Abstract

The E-commerce Return Rate Analysis project leverages multiple tools to analyze large datasets and extract actionable insights. Using Python, the raw dataset was cleaned and prepared for analysis. SQL queries were employed to calculate key metrics such as overall return rates, returns by category, supplier, marketing channel, and monthly trends. Finally, Power BI was used to build an interactive dashboard, allowing stakeholders to visualize patterns and make data-driven decisions.

Tools Used

- Python: For data cleaning, preprocessing, and exploratory data analysis (EDA).
- SQL: For querying datasets and calculating KPIs such as return percentages by various dimensions.
- Power BI: For creating interactive dashboards and visualizations.
- Excel/CSV: For initial data storage and input files.

Steps Involved in Building the Project

1. Data Cleaning & Preparation: The raw dataset was processed in Python to handle missing values, format dates, and ensure consistency across fields.
2. Exploratory Data Analysis (EDA): Statistical summaries and distributions were explored to understand return patterns and anomalies.
3. SQL Analysis: Queries were written to calculate overall return rates, return rates by category, supplier, region, and marketing channel, along with monthly trends.
4. Dashboard Development: Power BI was used to integrate SQL outputs and cleaned data, presenting KPIs such as total orders, total returns, and return rate %. Visuals included return rates by category, region, supplier, and marketing channel.
5. Insights Generation: The dashboard enabled identification of high-return categories (e.g., Electronics, Clothing), and regional variations, allowing businesses to focus on improvement strategies.

Conclusion

The project successfully demonstrated how combining Python, SQL, and Power BI can provide deep insights into e-commerce return rates. The analysis highlights key return trends across suppliers, categories, and channels, empowering decision-makers to optimize inventory, improve supplier performance, and enhance customer satisfaction. This holistic approach ensures that businesses can minimize return-related costs while improving overall profitability.