**✅ Final Summary Report – *Ecommerce Return Prediction Project***

**Project Title:**

**E-commerce Product Return Rate Reduction Analysis**

**Objective:**

To analyze and predict product returns in an e-commerce business using historical order data and provide actionable business insights through a Power BI dashboard and logistic regression model.

**Tools Used:**

* Python (Jupyter Notebook)
* SQL
* Power BI
* Excel/CSV (Data Cleaning)

**Dataset Overview:**

Used order\_dataset.csv and cleaned it into order\_dataset\_cleaned.csv with the following columns:

* Item Name, Category, Version, Item Code, Item ID
* Buyer ID, Transaction ID, Date, Final Quantity
* Total Revenue, Price Reductions, Refunds, Final Revenue
* Sales Tax, Overall Revenue, Refund Item Count, Purchase Item Count
* Is Returned (Target), Order Date

**Data Cleaning & Preprocessing:**

* Removed nulls and irrelevant rows
* Handled duplicates
* Converted date fields
* Added computed fields like "Return Rate" and "Net Revenue"

**EDA & Feature Engineering (Python):**

* Correlation analysis showed Refund Item Count and Price Reductions as major return indicators
* Logistic Regression model used to predict Is Returned
* Accuracy: ~85%
* Key factors: Discounts, Refund history, Final quantity

**SQL Insights:**

* Top returned products and categories
* Customers with high return rate
* Seasonal trends in returns
* Contribution of returns to revenue loss

**Power BI Dashboard Highlights:**

* Return Rate by Category
* Monthly Trends of Purchases vs Returns
* Revenue Loss due to Returns
* High-risk Products & Customers
* Filters for Category, Date, Return Status

**Key Business Insights:**

* Categories like "Electronics" & "Clothing" showed highest return rates
* Discounted products had higher probability of returns
* Specific buyers and SKUs frequently involved in returns
* Monthly peaks in returns align with sales offers

**Recommendations:**

1. Reassess return policy for high-return categories
2. Add warning/flag to high-risk buyers
3. Monitor pricing strategies (especially discounts)
4. Improve product descriptions for frequently returned items