

E-commerce Data Analysis Project: SQL Challenges for Business Insights

Project Overview

This project aims to showcase SQL skills through a **real-world e-commerce data analysis scenario**. The focus is on **solving business problems** using data from multiple tables such as products, sales, inventory, suppliers, and shipping routes. The goal is to perform **data analysis** that delivers **actionable insights** for an e-commerce business, helping optimize **inventory management**, **sales performance**, **supplier relations**, and **shipping logistics**.

Problem Statements:

1. Sales Performance & Product Insights

- **Identify top-selling products:** Find out which products are generating the highest revenue and total quantity sold.
- **Underperforming products:** Identify products that are selling poorly (low revenue and quantity) and analyze potential reasons (e.g., pricing, stock levels, or lack of promotion).
- **Products with high sales but low stock:** Identify products that have sold well but have low stock levels, suggesting the need for restocking.
- **Sales performance by product category:** Calculate the total revenue and quantity sold for each product category to understand which categories are performing best.

2. Inventory & Stock Management

- **Current inventory status:** List products with the most and least inventory. Identify products at risk of running out of stock soon.
- **Stock turnover rate:** Calculate the inventory turnover rate for each product to identify which items are fast-moving and which are not.
- **Reorder recommendations:** Based on sales performance and current stock levels, suggest products that need to be reordered or restocked urgently.

3. Supplier Performance

- **Revenue by supplier:** Calculate the total revenue generated by each supplier's products.
- **Supplier reliability:** Identify suppliers with consistent delivery delays or stock issues.

- **Product performance by supplier:** Analyze the sales performance of products from different suppliers and recommend strategies for improving supplier relationships.

4. Shipping and Delivery Insights

- **Shipping route performance:** Calculate total sales by shipping route and identify the regions generating the highest revenue.
- **Shipping cost analysis:** Analyze the impact of shipping costs on sales and suggest strategies to optimize logistics.
- **Order volume by route:** Identify which shipping routes are handling the highest order volumes and assess potential for logistics optimization.

5. Customer & Sales Trends

- **Monthly/seasonal sales trends:** Analyze how sales of top products fluctuate over time (monthly, quarterly) and identify seasonal trends.
- **Emerging purchase patterns:** Identify new purchasing trends by analyzing sales data across different regions and customer segments.
- **Frequent product pairings:** Identify products that are frequently bought together and suggest opportunities for bundle offers.

6. Data Accuracy & Cleanliness

- **Discrepancies between sales and inventory:** Identify any inconsistencies between the sales data and current inventory levels that might indicate data issues.
- **Missing or incorrect data:** Identify any products with missing or incorrect information (e.g., missing categories, incorrect pricing) that need to be addressed.
- **Data duplication:** Find and remove duplicate entries from sales data to maintain data integrity.

7. Business Growth and Strategy

- **Revenue by product category:** Calculate the total revenue generated by each product category and identify which categories should be prioritized.
- **Sales channel performance:** Analyze performance across different sales channels (online store, marketplace, direct sales) to determine where to allocate resources for growth.
- **Customer purchasing patterns:** Analyze customer data to identify purchasing patterns, such as frequent buyers or repeat purchases, for targeted marketing campaigns.

- **Sales forecasting:** Based on historical sales data, predict sales for the upcoming quarter to help with inventory planning and marketing strategies.