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**Retail Sales and Customer Insights Analysis Report**

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## Project Overview:

## The goal of this project is to perform an in-depth analysis of the sales, customer and product data of a fictional retail company. Using advanced SQL techniques, we found useful insights about sales trends, customer habits, product profits, and how well the inventory is managed. The focus was on understanding important business numbers, grouping customers, checking stock levels, and seeing how sales strategies affect the company’s success.

## Dataset Description:

The analysis was conducted using four primary tables that contained detailed information about customers, products, sales, and inventory movements.

1. **Customers Table**:
   * Contains details about customers, including personal information and purchase history.
   * **Columns:** Customer\_id, First\_name, Last\_name, Email, Gender, Date\_of\_birth, Registration\_date, Last\_purchase\_date
2. **Products Table**:
   * Contains information about products available in the store.
   * **Columns:** product\_id, product\_name, category, price, stock\_quantity, date\_added.
3. **Sales Table**:
   * Contains records of each sale made, including quantity, price, discounts, and the total amount.
   * **Columns:** sale\_id, customer\_id, product\_id, quantity\_sold, sale\_date, discount\_applied, total\_amount.
4. **Inventory Movements Table**:
   * Tracks the movement of inventory, including restocks and sales.
   * **Columns:** movement\_id, product\_id, movement\_type, quantity\_moved, movement\_date.

**Key Objectives and Analysis:**

1. **Sales Performance Analysis:**

* **Total Sales per Month**: We calculated the total sales amount per month, including the number of units sold and the revenue generated. This provided insights into sales trends and helped identify peaks or declines.

**Key Insights**:

Monthly total sales have been steadily increasing over the past year, with a sharp rise during the December 2023 Christmas season. Additionally, May, July, and August 2024 recorded the highest sales compared to other months.

* **Average Discount per Month**: We calculated the average discount applied to sales each month and assessed the impact of discount strategies on overall sales.

**Key Insights**:

* + The average discount fluctuated, with some months offering higher discounts to boost sales.
  + A deeper analysis showed that for most products with higher discounts increased the number of units sold.

1. **Customer Behavior and Insights:**

* **High-Value Customers**: The high-value customers, defined by total spending, were identified using SQL queries. These customers showed a clear trend of loyalty and frequent purchases.

**Key Insights**:

* + High-value customers spent significantly more than 5000 with the top 10 customers contributing nearly 40% of the total revenue.
  + Personalized marketing strategies could be targeted towards these high-value customers to retain them.
* **Oldest Customer**: Customers born in the 1990s were identified, with their total spending and specific orders analyzed to understand their buying patterns.

**Key Insights**:

* + Customers born in the 1990s made regular purchases.
  + These customers were responsible for a large portion of sales in the specific products.
* **Customer Segmentation**: Using total spending as a metric, customers were segmented into different categories such as low, medium and high spenders.

**Key Insights**:

* + Low and medium spenders represented more than 50% portion of customers, but high spenders drove more revenue.
  + By offering personalized discounts or rewards programs, the business can encourage low and medium spenders to increase their purchases.

1. **Inventory and Product Management:**

* **Stock Management:**

#### **Objective:**

#### To identify products that are running low in stock (below 10 units) and recommend restocking amounts based on sales patterns from the last 3 months.

#### **Methodology:**

**Data Filtering:**

* + Analyzed sales data for the last 3 months to capture recent trends and seasonal variations.
  + Focused on products with a stock quantity below 10 units.

**Metrics Calculated:**

* + **Total Quantity Sold in 3 Months:** Aggregated sales for each product within the period.
  + **Average Daily Sales:** Computed based on sales data over distinct sale dates in the last 3 months.
  + **Recommended Restocking Amount:**
    - For products with sales data: Forecasted demand for the next 30 days using average daily sales and adjusted for current stock.
    - For products with no sales data: A default restock amount of 50 units was assigned.

#### **Key Insights:**

* Products with consistent sales trends over the last 3 months were identified as high-priority for restocking.
* Products with no recent sales might not be in demand but were still given a default restocking amount to ensure they stay available.
* **Inventory Movements Overview**: A report was created showing the daily inventory movements, including restocks and sales, for each product over a specified period.

**Key Insights**:

* + Products with high turnover had frequent inventory movements, both in terms of sales and restocks.
  + Understanding these movements helped predict future stock needs and optimize inventory management.
* **Rank Products**: Products were ranked within each category by their prices, providing an overview of high-end versus budget-friendly options.

**Advanced Analytics:**

1. **Average Order Size**: The average order size in terms of quantity sold was calculated for each product, revealing which products were commonly purchased in large quantities.

**Key Insights**:

* + Certain products from categories such as **sports, electronics, and home** exhibited **larger order sizes** compared to products in the **clothing** category.

1. **Recent Restock Product**: Products with the most recent restocks were identified, helping track popular items that are frequently restocked.

**Key Insights**:

* Products with high demand were frequently restocked.
* Tracking restocks allowed the company to maintain stock levels for top-selling products without overstocking.

**Advanced Features:**

1. **Dynamic Pricing Simulation:**

**Objective:**

To analyze the impact of price changes (10% increase) on sales volume, revenue, and customer behavior.

**Methodology:**

* A price simulation was conducted by increasing product prices by 10% and estimating the resulting adjusted quantity sold (assumed a 5% reduction in quantity due to price sensitivity).
* Customer behavior was segmented into **Low Spender, Medium Spender**, and **High Spender** categories based on their total purchase amounts, both before and after the price change.

**Key Insights:**

* **Revenue Impact:** Customers categorized as **High Spenders** before the price increase remained consistent in spending, though their quantity purchased slightly decreased.
* **Behavioral Shift:** Some **Medium Spenders** transitioned to **Low Spenders,** indicating that they are more price-sensitive.
* **Strategic Recommendation:** For expensive products, increasing the price may not have a large effect on revenue because customers are less sensitive to price changes. On the other hand, for affordable products, small price increases can lead to better revenue without a major drop in the quantity sold.

#### **2. Customer Purchase Patterns:**

**Objective:**   
To identify customer buying behavior patterns using time-series data and window functions.

**Methodology:**

* Calculated the time difference between successive purchases for each customer using window functions.
* Classified buying behavior into categories:
  + **High Frequency:** Purchases within 7 days.
  + **Medium Frequency:** Purchases between 8 to 30 days.
  + **Low Frequency:** Purchases more than 30 days apart.
* **Strategic Recommendation:** Introduce targeted marketing campaigns for high-frequency buyers, such as loyalty programs or subscription discounts, while offering personalized promotions to re-engage low-frequency buyers.

#### **3. Predictive Analytics for Customer Churn**

**Objective:**   
To predict customers at risk of churning and recommend retention strategies.

**Methodology:**

* Analyzed the timing of recent of purchases, purchase frequency, and total spending.
* Classified customers into churn risk levels:
  + **High Risk:** No purchases in the last 90+ days.
  + **Medium Risk:** No purchases in the last 60–90 days.
  + **Low Risk:** Recent purchases within the last 60 days.

**Key Insights:**

* **High Risk Customers:** Had much lower total spending compared to other groups, suggesting a decline in engagement over time.
* **Retention Strategies:**
  + For high-risk customers, offer personalized discounts or limited-time offers to encourage purchases.
  + For medium-risk customers, introduce targeted email campaigns showcasing new products or seasonal promotions.
  + Maintain engagement with low-risk customers through loyalty programs or exclusive access to new products.

**Conclusion:**

This analysis provided valuable insights into the retail company's sales, customer behavior, and inventory management practices. By using advanced SQL techniques, we were able to uncover patterns and trends that will aid in decision-making. The recommendations for stock management, customer segmentation, and pricing strategies are designed to boost profitability and enhance customer satisfaction. Furthermore, predictive analytics will allow the company to proactively address customer churn and optimize product offerings.