**PROJECT**

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**Task:** SQL Sales Data Analysis

**DBMS** – PostgreSQL 16

* **SQL queries for each step of the task.**

**Basic Queries:**

* Write SQL queries to retrieve the total number of orders, customers, and products in the dataset.

**SQL Code**

SELECT COUNT() as total\_number

FROM orders;

SELECT COUNT(DISTINCT "Customer ID") AS total\_customers

FROM orders;

SELECT COUNT(DISTINCT "Product Category") AS total\_products

FROM orders;

**Sales Metrics:**

* Calculate and display the total sales, average discount, and profit for each product category.
* Order the results by total sales in descending order.

**SQL Code**

SELECT DISTINCT("Product Category") AS Product\_category, SUM("Sales") AS Total\_Sales, AVG("Discount") AS Average\_Discount, AVG("Profit") AS Average\_Profit

FROM orders

GROUP BY "Product Category"

ORDER BY Total\_sales DESC;

**Customer Analysis:**

* Identify the top 10 customers with the highest total sales.

**SQL Code**

SELECT "Customer Name" AS Customer\_Name, SUM("Sales") AS Total\_Sales

FROM orders

GROUP BY "Customer Name", "Sales"

ORDER BY "Sales" DESC

LIMIT 10;

* Calculate the average order value for each customer segment.

**SQL Code**

SELECT "Customer Segment" AS Customer\_Segment, AVG("Sales") AS Average\_Sales

FROM orders

GROUP BY "Customer Segment";

**Temporal Analysis:**

* Analyze the sales trend over time by displaying the monthly sales for each year in the dataset.

**SQL Code**

SELECT EXTRACT(YEAR FROM "Order Date") AS Year,

EXTRACT(MONTH FROM "Order Date") AS Month,

SUM("Sales") AS Monthly\_Sales

FROM orders

GROUP BY EXTRACT(YEAR FROM "Order Date"), EXTRACT(MONTH FROM "Order Date")

ORDER BY Year, Month;

* Identify the month with the highest sales.

**SQL Code**

SELECT EXTRACT (MONTH from "Order Date") AS Month, SUM("Sales") AS Total\_Sales

FROM orders

GROUP BY EXTRACT (MONTH from "Order Date")

ORDER BY Total\_Sales DESC

LIMIT 1;

**Product Performance:**

* Determine the top 5 best-selling products based on the quantity sold.

**SQL code**

SELECT DISTINCT("Product Sub-Category") AS Products, SUM("Quantity ordered new") AS Quantity\_Sold

FROM orders

GROUP BY DISTINCT("Product Sub-Category")

ORDER BY Quantity\_Sold DESC

LIMIT 5;

* Calculate the profit margin for each product and display the results.

**SQL Code**

SELECT "Product Sub-Category" AS Products,

(SUM("Profit") / SUM("Sales")) 100 AS Profit\_Margin

FROM orders

GROUP BY "Product Sub-Category"

ORDER BY Profit\_Margin;

**Discount Analysis:**

* Analyze the impact of discounts on sales and profit.

**SQL Code**

SELECT "Product Category", AVG("Discount") AS Average\_Discount, AVG("Sales") AS Average\_Sales, AVG("Profit") AS Average\_Profit, AVG("Profit") - AVG("Profit") AVG("Discount") AS Impact\_on\_Profit

FROM orders

GROUP BY "Product Category"

ORDER BY Impact\_on\_Profit DESC;

* Calculate the average discount for each product category.

**SQL Code**

SELECT DISTINCT("Product Sub-Category") AS Products, AVG("Discount") AS Average\_Discount

FROM orders

GROUP BY DISTINCT("Product Sub-Category")

ORDER BY Average\_Discount DESC;

**Customer Segmentation (Bonus):**

* Create a segmentation analysis by dividing customers into different groups based on their total purchases.
* Provide insights into the characteristics of each customer group.

**SQL Code**

WITH customer\_purchases AS (

SELECT

"Customer ID",

SUM("Sales") AS total\_purchases

FROM

orders

GROUP BY

"Customer ID"

)

SELECT

CASE

WHEN total\_purchases >= 1000 THEN 'High Spenders'

WHEN total\_purchases >= 500 AND total\_purchases < 1000 THEN 'Medium Spenders'

ELSE 'Low Spenders'

END AS customer\_group,

COUNT() AS num\_customers,

AVG(total\_purchases) AS avg\_purchases

FROM

customer\_purchases

GROUP BY

customer\_group;

* **Query results in tabular form.**

1. Total Number of Orders, Customers, and Products:

|  |  |  |
| --- | --- | --- |
| **Total Orders** | **Total Customers** | **Total Products\_Category** |
| 1952 | 1130 | 3 |

2. Total Sales, Average Discount, and Profit by Product Category:

|  |  |  |  |
| --- | --- | --- | --- |
| **Product Category** | **Total Sales** | **Average Discount** | **Average Profit** |
| Technology | $ 712,264.95 | 0.04775467775467775468 | $156.56 |
| Furniture | $ 660,704.31 | 0.04980000000000000000 | $148.12 |
| Office Supplies | $ 551,368.62 | 0.04921568627450980392 | $83.59 |

3. Top 10 Customers with Highest Total Sales:

|  |  |
| --- | --- |
| **Customer Name** | **Total Sales** |
| Nina Horne Kelly | 45737.33 |
| Kristine Connolly | 43046.2 |
| Toni Swanson | 31670.6 |
| Rosemary O'Brien | 29718.53 |
| Yvonne Mann | 27587.55 |
| Lee Xu | 20552.55 |
| Erin Ballard | 13546.94 |
| Don Rogers | 13121.07 |
| Annie Odom | 12750.99 |
| Leroy Blanchard | 12599.55 |

4. Average Order Value by Customer Segment:

|  |  |
| --- | --- |
| **Customer Segment** | **Average Order Value** |
| Consumer | 979.9472439024390244 |
| Corporate | 961.6732894736842105 |
| Small Business | 1031.6854123711340206 |
| Home Office | 988.2575319148936170 |

5. Monthly Sales Trend Over Time:

|  |  |  |
| --- | --- | --- |
| **Year** | **Month** | **Monthly Sales** |
| 2015 | 1 | 274766.92 |
| 2015 | 2 | 326101.47 |
| 2015 | 3 | 271696.67 |
| 2015 | 4 | 389831.95 |
| 2015 | 5 | 306572.07 |
| 2015 | 6 | 355368.80 |

6. Month with Highest Sales:

|  |  |
| --- | --- |
| **Month** | **Total Sales** |
| 4 | 389831.95 |

7. Top 5 Best-Selling Products:

|  |  |
| --- | --- |
| **Product Name** | **Total Quantity Sold** |
| Paper | 3481 |
| Pens & Art Supplies | 2744 |
| Binders and Binder Accessories | 2554 |
| Computer Peripherals | 2481 |
| Telephones and Communication | 2358 |

8. Profit Margin by Product:

|  |  |
| --- | --- |
| **Product Name** | **Profit Margin** |
| Rubber Bands | -86.33062277 |
| Scissors, Rulers and Trimmers | -19.12117124 |
| Envelopes | -11.39731597 |
| Tables | -3.736529847 |
| Pens & Art Supplies | -0.988158384 |
| Bookcases | -0.863146706 |
| Computer Peripherals | 1.76399444 |
| Office Machines | 2.773485695 |
| Storage & Organization | 4.015547612 |
| Paper | 13.92003119 |

9. Impact of Discounts on Sales and Profit:

|  |  |  |  |
| --- | --- | --- | --- |
| **Product Category** | **average\_discount** | **average\_sales** | **average\_profit** |
| Technology | 0.047755 | 1480.8 | 156.5554 |
| Furniture | 0.0498 | 1651.761 | 148.1236 |
| Office Supplies | 0.049216 | 514.8166 | 83.59011 |

10. Average Discount by Product Category:

|  |  |
| --- | --- |
| **Product Category** | **Average Discount** |
| Tables | 0.056875 |
| Pens & Art Supplies | 0.05472 |
| Labels | 0.054507 |
| Rubber Bands | 0.053235 |
| Chairs & Chairmats | 0.052935 |
| Appliances | 0.0508 |
| Computer Peripherals | 0.049483 |
| Copiers and Fax | 0.049444 |
| Office Machines | 0.048947 |
| Scissors, Rulers and Trimmers | 0.048889 |
| Binders and Binder Accessories | 0.04825 |
| Envelopes | 0.047091 |
| Bookcases | 0.046977 |
| Storage & Organization | 0.046692 |
| Paper | 0.046021 |
| Office Furnishings | 0.045838 |
| Telephones and Communication | 0.045464 |

11. Customer Segmentation Analysis:

|  |  |  |
| --- | --- | --- |
| **Customer Group** | **Number of Customers** | **Avg\_purchases** |
| High Spenders | 384 | 4473.865417 |
| Medium Spenders | 144 | 723.9145 |
| Low Spenders | 602 | 169.6509 |

* **A brief summary explaining the insights gained from the analysis.**

Through the analysis of the provided dataset, several insights were gained:

* The dataset contains 1952 number of orders, 1130 number of unique customers, and 3 number of unique products.
* Product categories Technology contribute the highest total sales, with Furniture category having the highest average discount but Technology having the highest average profit.
* Customer segmentation analysis reveals that a significant portion of customers falls into the "High Spenders" category, indicating potential opportunities for targeted marketing strategies or loyalty programs.
* Sales trend analysis over time highlights seasonal patterns and helps identify peak sales months, aiding in inventory management and marketing planning.
* The top 5 best-selling products and their profit margins provide insights into product performance and pricing strategies.
* Discounts have a varying impact on sales and profit, with further analysis needed to determine the optimal discount strategy.
* Average discounts vary across different product categories, indicating potential areas for pricing optimization or promotions.
* Segmenting customers based on their total purchases helps in understanding their spending behavior and tailoring marketing efforts accordingly.

**Documentation:**

* Comprehensive documentation detailing data sources, methodologies, and actionable insights.

**Data Sources:**

The analysis is based on the "orders" dataset, which I obtained from our sales database. This dataset contains information about sales transactions, including fields such as order date, customer ID, product ID, product category, sales amount, discounts, and profits.

**Methodologies:**

1. Total Number of Orders, Customers, and Products:

- Rationale: Counting the total number of orders, customers, and products provides a foundational understanding of the dataset's size and scope. It helps establish a baseline for further analysis and provides context for interpreting other metrics.

2. Total Sales, Average Discount, and Profit by Product Category:

- Rationale: Analyzing sales, discounts, and profits by product category allows for insights into the performance of different product segments. Understanding which categories contribute the most to sales and profitability helps in strategic decision-making, such as resource allocation and product prioritization.

3. Top 10 Customers with Highest Total Sales:

- Rationale: Identifying the top customers based on total sales reveals the most significant revenue generators for the business. This information can guide customer relationship management strategies, such as targeted marketing campaigns or personalized customer experiences.

4. Average Order Value by Customer Segment:

- Rationale: Calculating the average order value by customer segment helps understand the purchasing behavior of different customer groups. It enables the identification of segments that contribute the most revenue per transaction, guiding segmentation-based marketing and pricing strategies.

5. Monthly Sales Trend Over Time:

- Rationale: Analyzing sales trends over time provides insights into seasonality, demand patterns, and overall business performance. Understanding when sales peak or decline helps in planning inventory levels, marketing campaigns, and resource allocation throughout the year.

6. Month with Highest Sales:

- Rationale: Identifying the month with the highest sales allows for pinpointing peak sales periods. This information helps in capitalizing on seasonal demand, optimizing marketing efforts, and ensuring adequate inventory availability during high-demand periods.

7. Top 5 Best-Selling Products:

- Rationale: Determining the best-selling products based on quantity sold highlights the most popular items among customers. This insight informs inventory management decisions, product promotions, and new product development efforts.

8. Profit Margin by Product:

- Rationale: Calculating the profit margin for each product reveals the profitability of individual items. Understanding which products yield the highest margins helps in pricing decisions, cost optimization, and product portfolio management.

9. Impact of Discounts on Sales and Profit:

- Rationale: Analyzing the impact of discounts on sales and profit provides insights into the effectiveness of discounting strategies. It helps in evaluating the trade-off between increased sales volume and reduced profit margins, informing pricing and promotion strategies.

10. Average Discount by Product Category:

- Rationale: Calculating the average discount by product category highlights pricing trends and discounting strategies across different product segments. This insight aids in optimizing pricing strategies, identifying competitive positioning, and maximizing revenue.

11. Customer Segmentation Analysis:

- Rationale: Segmenting customers based on their total purchases allows for personalized marketing and service strategies tailored to each segment's needs. Understanding customer spending behavior helps in customer retention efforts, loyalty program design, and targeted promotional campaigns.

By providing a rationale for each analysis step, stakeholders gain a deeper understanding of why certain metrics were chosen and how they contribute to actionable insights for the business.

**Actionable Insights:**

1. Product Category Analysis:

- Insight: Technology products contribute the highest total sales, but Furniture has the highest average discount.

- Actionable Insights:

- Optimize pricing strategies for Furniture to improve profit margins while maintaining competitiveness.

- Allocate resources and marketing efforts towards promoting high-selling Technology products to maximize revenue.

2. Customer Insights:

- Insight: A significant portion of customers falls into the "High Spenders" category.

- Actionable Insights:

- Implement targeted marketing campaigns or loyalty programs to retain high-spending customers and encourage repeat purchases.

- Tailor customer service experiences to meet the expectations of high-spending customers, potentially leading to increased satisfaction and loyalty.

3. Sales Trend Analysis:

- Insight: Peak sales occur in April, indicating a potential seasonal trend.

- Actionable Insights:

- Plan inventory levels and marketing campaigns to align with peak sales months, ensuring adequate stock availability and maximizing revenue during high-demand periods.

- Offer seasonal promotions or discounts to capitalize on increased customer activity during peak sales months.

4. Discount Strategy Optimization:

- Insight: Discounts have varying impacts on sales and profit across different product categories.

- Actionable Insights:

- Evaluate the effectiveness of discounting strategies for each product category and adjust discount levels accordingly to optimize sales and profitability.

- Experiment with targeted promotions or bundling strategies to stimulate sales in categories with lower profit margins without relying solely on discounts.

5. Product Performance and Pricing:

- Insight: Paper is the best-selling product, while certain products like Rubber Bands have negative profit margins.

- Actionable Insights:

- Review pricing strategies for low-margin products and consider adjustments to improve profitability.

- Explore opportunities to enhance the product offerings or adjust marketing tactics for best-selling products to maintain their popularity and drive further sales growth.

6. Customer Segmentation Strategy:

- Insight: Segmentation analysis reveals distinct groups of customers based on their total purchases.

- Actionable Insights:

- Tailor marketing messages and promotions to the spending behavior of different customer segments, ensuring relevance and effectiveness.

- Develop personalized engagement strategies to cultivate loyalty and increase customer lifetime value within each segment.

By acting on these insights, businesses can optimize their operations, improve customer satisfaction, and drive revenue growth effectively.

**Conclusion:**

The comprehensive analysis of the sales dataset has provided valuable insights into various aspects of our business operations. Through careful examination of sales metrics, customer behavior, and product performance, several key findings have emerged:

1. Sales Performance: Technology products lead in total sales, while Furniture products exhibit the highest average discount. This suggests the need for pricing optimization strategies to balance profitability and competitiveness across product categories.

2. Customer Behavior: The segmentation analysis identifies a significant proportion of "High Spenders" among our customer base. Targeted marketing efforts and personalized engagement strategies can capitalize on this segment's potential for increased revenue and loyalty.

3. Seasonal Trends: Analysis of sales trends over time reveals peak sales in April, indicating seasonal patterns that can inform inventory management and marketing planning strategies.

4. Discount Strategy: Discounts have varying impacts on sales and profit across product categories. Fine-tuning discounting strategies and exploring alternative promotional tactics can optimize sales and profitability.

5. Product Performance: While certain products, like Paper, demonstrate strong sales performance, others exhibit negative profit margins. Reviewing pricing strategies and product offerings can enhance profitability and maintain competitiveness.

In conclusion, the insights gained from this analysis provide a roadmap for strategic decision-making and operational improvements. Moving forward, it is imperative to:

- Implement targeted marketing campaigns and loyalty programs to leverage high-spending customer segments.

- Align inventory levels and marketing efforts with seasonal sales trends to maximize revenue during peak periods.

- Continuously evaluate and optimize discounting strategies to balance sales volume and profitability.

- Review product pricing and assortment to ensure competitiveness and profitability across all product categories.

- Invest in data-driven customer segmentation strategies to tailor marketing and service efforts for maximum impact.

By acting on these recommendations and leveraging the insights gained from this analysis, we can position our business for sustainable growth, enhanced customer satisfaction, and continued success in the competitive market landscape.

**Data Dictionary:**

* Order ID: Unique identifier for each order, enabling tracking and analysis of individual transactions.
* Customer ID: Unique identifier for each customer, allowing for customer-centric analysis and segmentation.
* Order Date: Date when the order was placed, providing insights into the temporal aspects of sales.
* Ship Date: Date when the order was shipped, helping in analyzing order fulfillment timelines.
* Ship Mode: Shipping mode for the order, indicating the delivery method chosen by the customer (e.g., standard, same-day).
* Segment: Customer segment categorization (e.g., Consumer, Corporate, Home Office), facilitating customer behavior analysis.
* Region: Geographic region where the customer is located (e.g., West, Central, East), aiding in regional sales analysis.
* Category: Product category classification (e.g., Furniture, Technology, Office Supplies), allowing for category-based analysis.
* Sub-Category: More detailed classification of the product within a category (e.g., Chairs, Desktops, Paper).
* Product Name: Name of the specific product purchased, providing details about the items sold.
* Sales: Sales revenue generated by each product, a crucial metric for financial analysis.
* Quantity: Number of units of each product purchased, offering insights into product demand.
* Discount: The discount applied to each product, influencing overall revenue and profit margins.
* Profit: The profit generated by each product, a key metric for evaluating business performance.