**National Sales Company**

**Diagnostic and Predictive Analysis of Retail Sales and Customer Behavior**

**Executive Summary:**

This analysis focuses on diagnosing profitability challenges within our region by leveraging customer, transactional, and sales data. By visualizing key metrics such as customer demographics, sales trends, seasonal patterns, and promotional effectiveness, we identified critical factors influencing customer churn, sales performance, and product returns. The goal is to empower regional marketing managers with quick insights within 30 seconds for identifying risks and opportunities, enabling prompt decision-making. Key findings highlight high-value products, underperforming regions, and customer behavior patterns, which can guide adjustments in marketing strategies to enhance profitability.

**Background:** This report was initiated to address declining profitability in certain regions and optimize sales strategies. By analyzing transactional data, customer demographics, product details, and promotional effectiveness, the goal was to gain insights into factors impacting sales and customer satisfaction. This analysis was driven by the need to optimize marketing spend, improve customer loyalty, and reduce product returns.

**Purposes and Questions:** The primary objective of this analysis is to provide a diagnostic and prescriptive study to:

* Identify which customer segments are most profitable, the impact of gender, income, and loyalty program participation on purchasing behavior, and which products are driving sales and contributing to high return rates.
* We also analyzed the relationship between regional sales performance and location, assessing which regions are underperforming.
* The impact of promotions on sales was a critical focus, as was the effectiveness of seasonal sales strategies.
* We also investigated how discount strategies and pricing structures affect profit margins and whether price adjustments could improve profitability.
* Finally, we explored the role of customer interactions, such as social media engagement, and how these correlate with sales performance. These questions were central to uncovering patterns that could explain profitability issues and guide strategic decisions.

**Methods and Data Source:** The analysis utilizes multiple datasets, including **Retaild\_sales\_data\_3** (main sales transactions), and lookup tables **US States** (1\_US\_States.xlsx) to map sales to regions, and **Customer Lookup** (customer\_Lookup.xlsx), **Product Lookup** (product\_Lookup.xlsx).

Additionally, we used the **US Census Bureau Regions and Divisions** dataset (us\_census\_bureau\_regions\_and\_divisions.csv) to link states to their census regions, allowing for geographical analysis.

* **Techniques**: The analysis was conducted using Tableau to visualize KPIs and identify trends. Data transformations were performed to calculate metrics such as total sales, Adjusted Sales, Profit, Holiday date based on transaction date and Federal holiday chart for the year 2020 and 2021, Adjusted profit margin due to discount reduction etc.
* **Note:** **Since the actual COGS data is not available, we assumed a 30% margin, meaning the cost is 70% of total sales**

**Results and Recommendations:**

**1. Customer Demographic Insights**:   
The first dashboard visualizes customer demographics, including education level, occupation, and churn status. Key insights:

* The loyalty program has a significant impact on reducing churn among employed customers.
* Divorced men with a bachelor's degree, who are employed, make the most purchases.

**2. Top Transactions Analysis**:  
This visualization highlights top-selling products and transaction trends over time.

* Focus on restocking and promoting these high-demand products can boost overall profitability.
* Xtool D1 Pro Laser: This product emerged as the highest-selling item, with a total of 491,274 units sold.
* Transaction Trends – Monthly Fluctuations: July Sales Dip: A noticeable decline in sales was observed after July compared to other months.

**3. Promotion Effectiveness**:

The Promotional Data Table analysis focused on evaluating promotion effectiveness and sales trends during promotional periods.

* The findings revealed that while promotions had low effectiveness in boosting profitability, they did lead to higher sales volumes during the medium promotion period.
* The "20% off" promotion drives the highest sales but by a moderate margin.
* Adjusting the discount rate for underperforming promotions can optimize profitability.
* However, a downward trend in sales was observed from January to December, indicating a potential seasonal decline.

**4. Product Information:**

The Product Information Table Dashboard analysis focused on identifying top-selling products, average product ratings, and return rates.

* The X1Tool Pro Laser emerged as the highest-selling product, driving significant revenue.
* On the other hand, the Unisex Baby Long Sleep had the highest return rate, indicating potential issues with customer satisfaction or product quality.
* This suggests that while the X1Tool Pro Laser is performing well in sales, further investigation is needed to understand the causes behind the high return rates of the baby sleep product.

**5. Geographical Insights**:  
The heat map displays sales and profit margins by region.

* The findings revealed that Montana (MT) had the highest total sales, while Rhode Island (RI) recorded the lowest. This indicates significant regional differences in sales performance, suggesting that Montana may have a higher demand or more effective marketing strategies compared to Rhode Island.
* Focused marketing campaigns and operational optimizations in these regions can improve margins.

**6. Seasonal and Temporal Analysis**:  
Analyzing sales across different seasons and holidays revealed:

* The findings revealed that fall had the highest total sales, indicating a strong seasonal demand during this period. Interestingly, more sales were recorded during non-holiday periods compared to holiday sales, suggesting that customers may be less influenced by traditional holiday promotions and are making purchases based on other factors, such as product need or promotions outside of peak holiday times.
* This insight suggests an opportunity to capitalize on non-holiday seasons with targeted marketing and promotions.

**7. Customer Interaction Insights**

The Customer Interaction Insights analysis focused on the relationship between social media engagement and sales performance.

* The findings revealed that medium social media engagement was associated with the highest sales, indicating that a balanced level of interaction—neither too low nor too high—drives better conversion rates.
* This suggests that overly aggressive or minimal social media engagement may not be as effective in boosting sales.
* A strategic approach with consistent, moderate engagement could enhance customer awareness and encourage purchases.

**8. Sales Data As per Location Analysis**

The Sales Data Table provides critical insights into the relationship between sales performance, location, and purchase frequency. By analyzing these variables, we can identify patterns that contribute to higher sales and also determine if there are locations with higher sales frequency that could be targeted for more strategic interventions.

* Location A stands out as the highest-performing location with total sales of 4,435,406 every 3 months. This makes ‘Location A’ the top contributor to overall sales in the region.
* Quarterly promotional campaigns in other regions to replicate the purchasing frequency observed in Location A. Measure the effectiveness of these campaigns and optimize them based on the response.

**9. What-If Scenario Analysis**:  
The scenario analysis dashboard examines the impact of changes in pricing, discounts, and regional focus on profitability.

**Price Increase Impact on Profit**

* Scenario: Increase the price of products by 20%.
* Simulation: Assess how a 20% price increase affects profitability by evaluating the impact on sales volume and profit margins.
* Goal: Determine if the price hike results in higher profit margins without a significant decrease in sales volume.

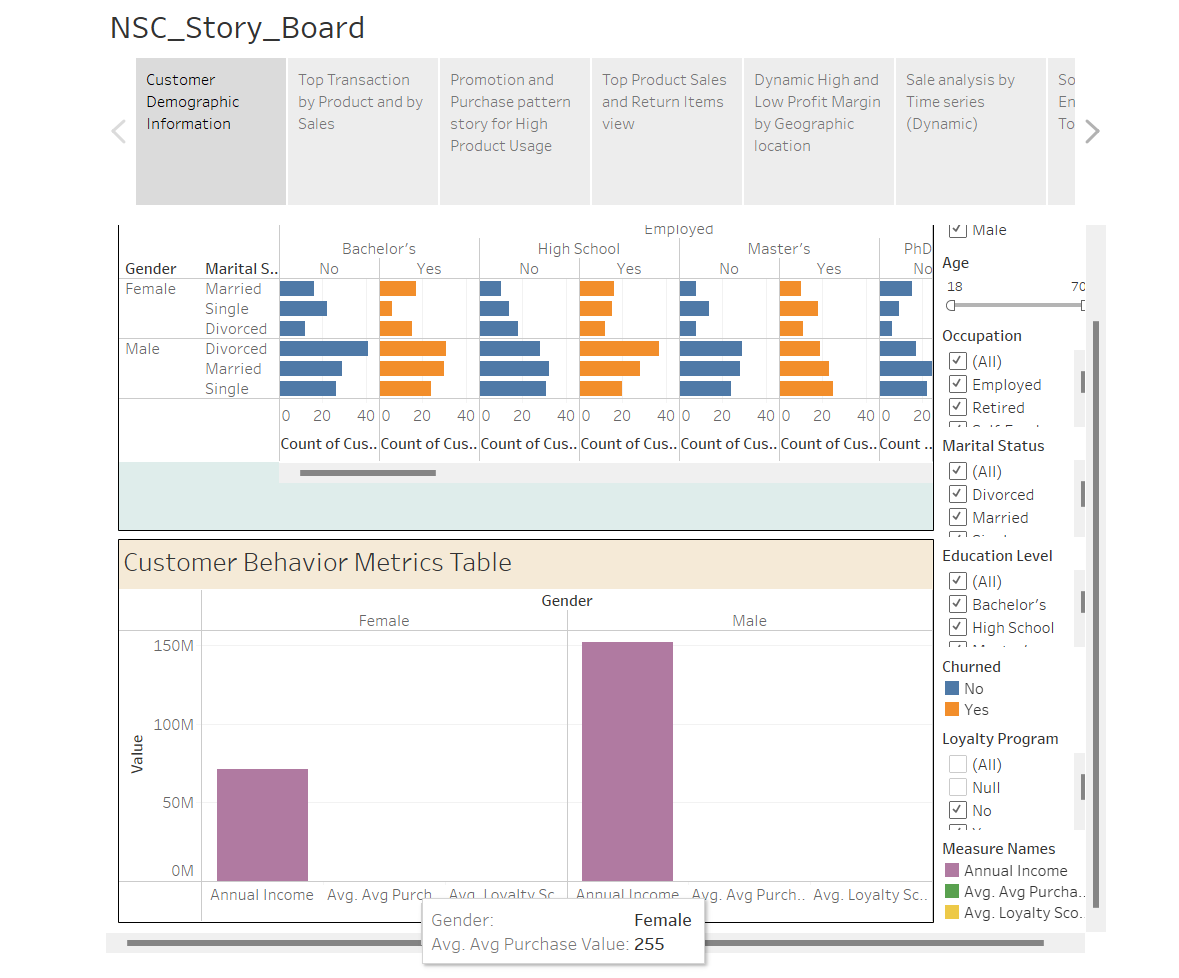
**Increasing Discounts on Product Categories**

* Scenario: Test the impact of increasing discounts on underperforming product categories.
* Simulation: Use Tableau parameters to simulate discount increases of 5%, 10%, and 15% for products with low sales performance.
* Goal: Evaluate if higher discounts lead to improved sales and if the increase in sales compensates for potential erosion in profit margins.

**Limitations:** Data Quality: The analysis relies on the accuracy of transactional data, which may be affected by inconsistencies in data entry.

* Assumed Cost of Goods Sold (COGS): **Since the actual COGS data is not available, we assumed a 30% margin, meaning the cost is 70% of total sales.** This assumption could affect the accuracy of profitability calculations, as actual costs may vary depending on the product or category.
* Short Time Period: The analysis uses data from only two years, which may be insufficient to capture long-term trends, seasonal variations, or cyclic behaviors that typically emerge over a longer time frame.
* Null Values: The dataset contains null or missing values, which can impact the accuracy and completeness of the analysis.

**Screenshots**:



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