Optimizing Sales and Profitability in the Beverage Industry

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Background:

A beverage company analyzes its sales data to optimize profitability across multiple product categories, customer types, and regions. The company operates in both B2B (business-to-business) and B2C (business-to-consumer) segments, selling soft drinks and alcoholic beverages. Discounts are offered exclusively to B2B customers, potentially impacting revenue. Understanding customer preferences, regional sales trends, and product profitability is critical for strategic decision-making

Problem Statement:

The company is facing challenges in identifying key drivers of profitability and customer behavior. Specifically:

1. **Profitability Challenges:** Juices are struggling to break even, while other products remain profitable. Management is considering discontinuing Juices or finding ways to optimize their performance.

2. **Customer Insights:** B2B and B2C customers exhibit different purchasing behaviors, but their impact on long-term growth is unclear.

3. **Regional Trends:** Sales performance varies significantly by region, but the reasons behind these differences need to be identified.

4. **Discount Impact**: Discounts for B2B customers are necessary for competitive advantage, but their overall effect on profitability remains uncertain.

Assumptions:

1. **Data Completeness:** The dataset includes all necessary details for analysis, such as order dates, product categories, unit prices, discounts, and customer information. There are no significant gaps or missing data points.

2. **Discounts Impact Profitability**: Discounts provided to B2B customers directly affect the overall profitability of the business. It's assumed that these discounts are applied consistently across the dataset.

3. **Market Stability:** The beverage market, including consumer preferences and regional demand, has remained relatively stable during the period covered by the dataset. Major external events (e.g., economic downturns or global crises) are not considered.

4. **Regional Behavior Consistency:** Consumer behavior within a given region is assumed to be consistent and reflective of broader trends, making regional data analysis valid for strategic recommendations.

5. **Juices Challenges:** The underperformance of juices is primarily due to internal factors (e.g., pricing, product formulation, or cost structure) rather than external market forces or competition.

6. **Customer Types Are Accurate:** The classification of customers into B2B and B2C categories is assumed to be accurate and consistent, with no overlap or mislabeling.

Research Questions:

1. **Profitability Analysis**:

   What are the most and least profitable product categories and regions, and how do pricing and discounts impact overall profitability?

2. **Customer Segmentation**:

   How do purchasing behaviors differ between B2B and B2C customers, and which customer segment contributes the most to revenue and profitability?

3. **Juice Viability**:

   What factors contribute to Juice's underperformance, and what strategies can be implemented to improve its profitability or assess its discontinuation?

4. **Regional Sales Trends**:

Which regions exhibit the highest and lowest sales performance, and what underlying trends or customer preferences drive these variations?

Hypotheses:

1. **Profitability Hypotheses**:

   o **H1**: Products with higher discounts for B2B customers have lower profit margins than those sold at full price to B2C customers.

   o **H2**: Soft drinks are more profitable than Juices due to lower production costs and higher demand.

2. **Customer Segmentation Hypotheses**:

   o **H3**: B2B customers generate more total revenue than B2C customers due to larger order quantities but contribute less to profitability because of discounts.

   o **H4**: B2C customers prefer higher-priced niche products, contributing more to per-unit profitability.

3. **Juice Performance Hypotheses**:

   o **H5**: The underperformance of chilled juices is caused by higher production costs and price sensitivity in the target consumer segment (e.g., mothers with school-age children).

   o **H6**: Increasing marketing and promotional efforts for Juices in underperforming regions could improve sales and profitability.

4. **Regional Sales Hypotheses**:

   o **H7**: Sales performance is highest in urban regions with diverse customer bases and strong retail networks.

   o **H8**: Regions with higher average discounts for B2B customers exhibit lower overall profitability despite higher sales volumes

Analysis & Findings:
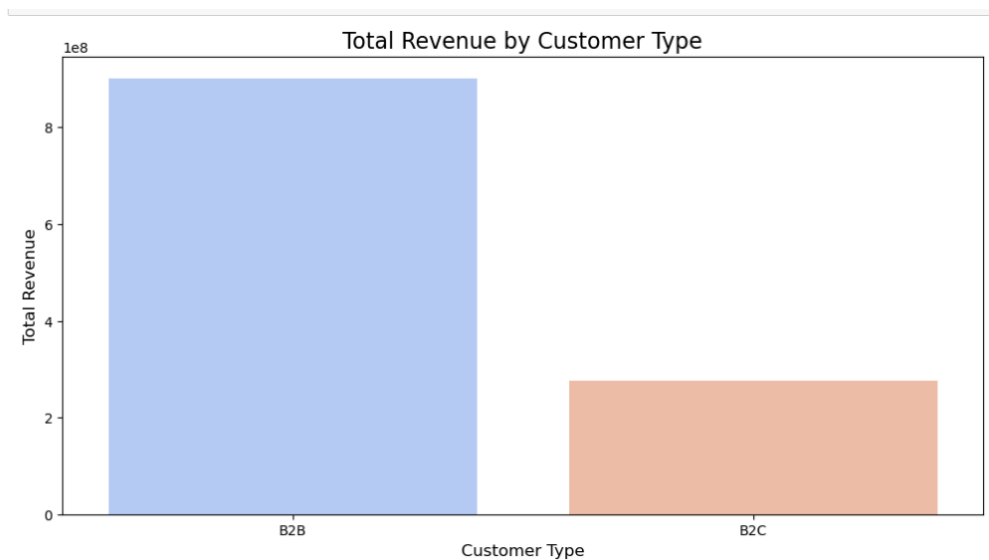
The bar chart illustrates total revenue distribution across two customer types: Business-to-Business (B2B) and Business-to-Consumer (B2C). The B2B segment contributes significantly more to total revenue than the B2C segment, showcasing its dominant role in overall sales. B2B customers are the primary drivers of business profitability.

Impact of Discount on B2B Revenue by Region

The scatterplot reveals how discounts, ranging from approximately 6% to 14%, impact B2B revenue. It is evident that certain regions, like Baden-Württemberg and Bayern, consistently contribute higher revenues, even at varied discount levels. However, there is no clear, direct correlation between increasing discounts and significantly higher revenues, as most revenue levels cluster around specific ranges, irrespective of discount level.


Revenue by Region
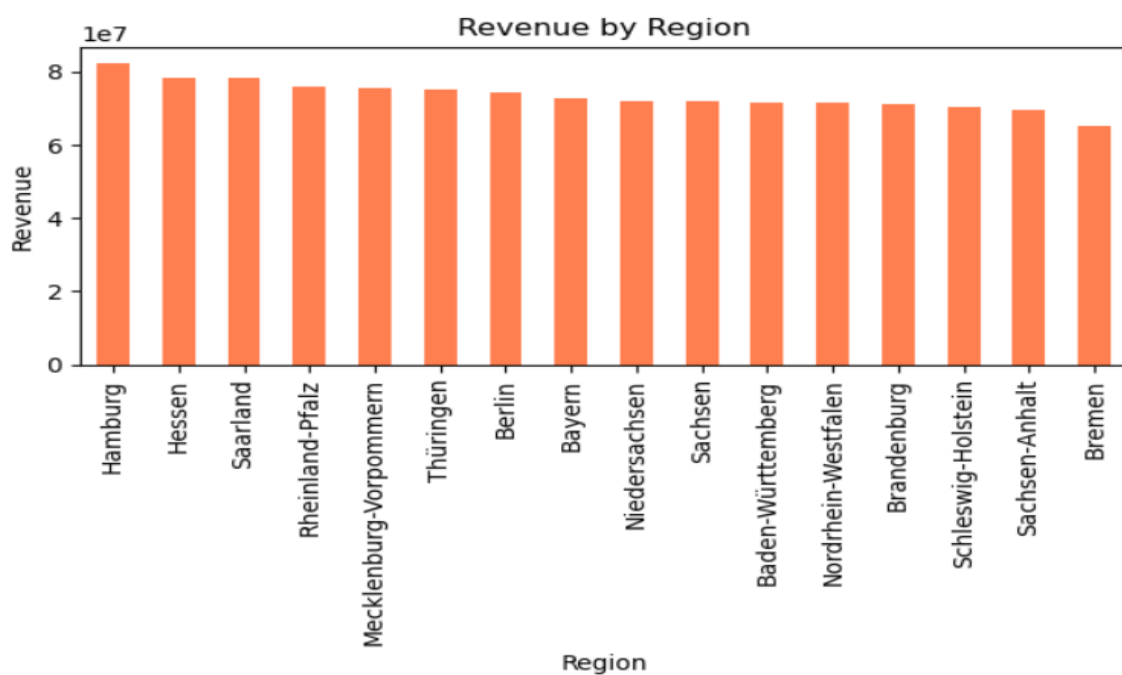
The chart highlights Hamburg as the top-performing region, with the highest revenue exceeding 8 million, reflecting strong market activity and customer engagement. Other regions such as Hessen, Saarland, and Rheinland-Pfalz follow closely, showing consistent revenue contributions near similar levels. At the lower end of the scale, Bremen exhibits the least revenue generation, indicating either lower market penetration or customer demand. The relatively uniform distribution across most regions suggests a balanced performance, with Hamburg standing out as a critical revenue driver.
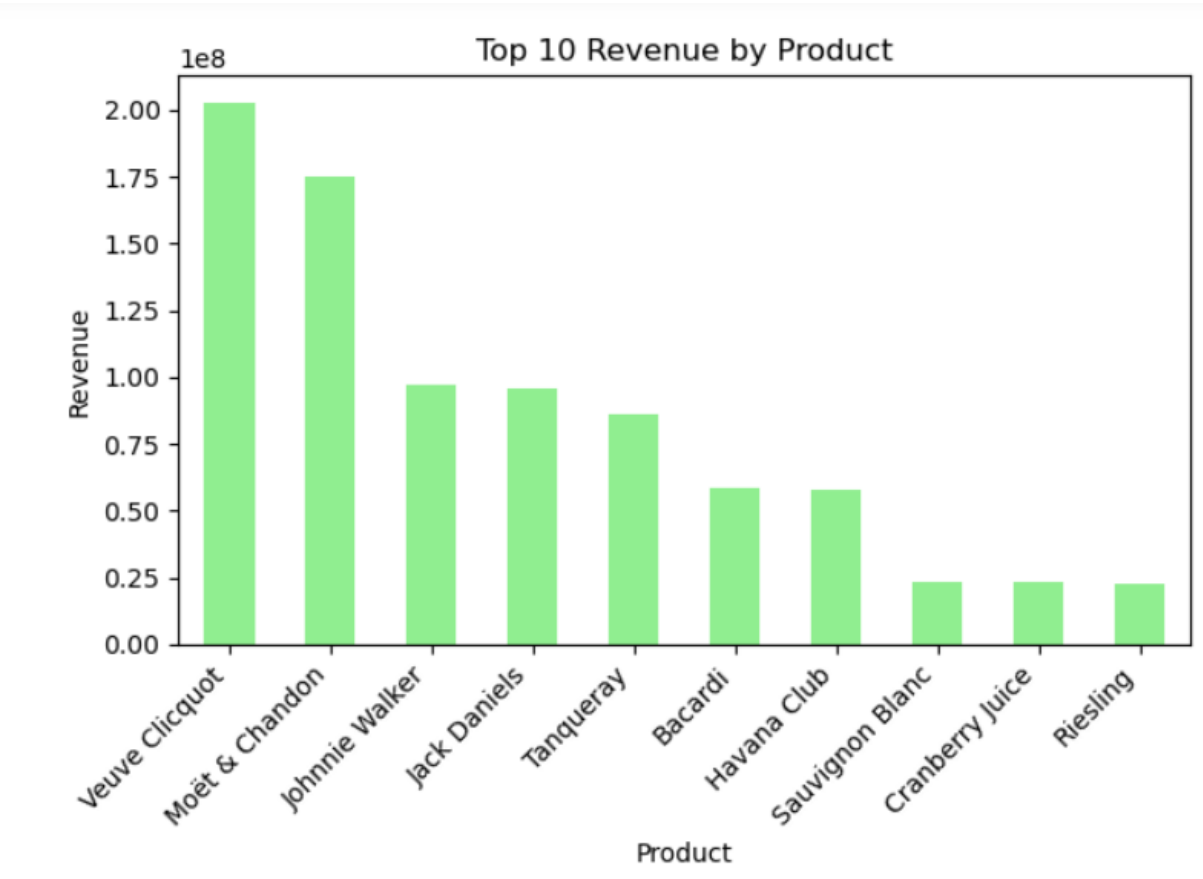
The chart highlights **Veuve Clicquot** as the leading product, generating the highest revenue, closely followed by **Moët & Chandon**. Both products outperform others significantly, establishing themselves as key sales drivers within their respective categories (likely premium beverages). This visualization emphasizes the dominance

of high-end products in driving revenue, with a steep decline in contributions beyond the top performers. It also indicates opportunities for further promoting lower-ranking products to balance the portfolio.
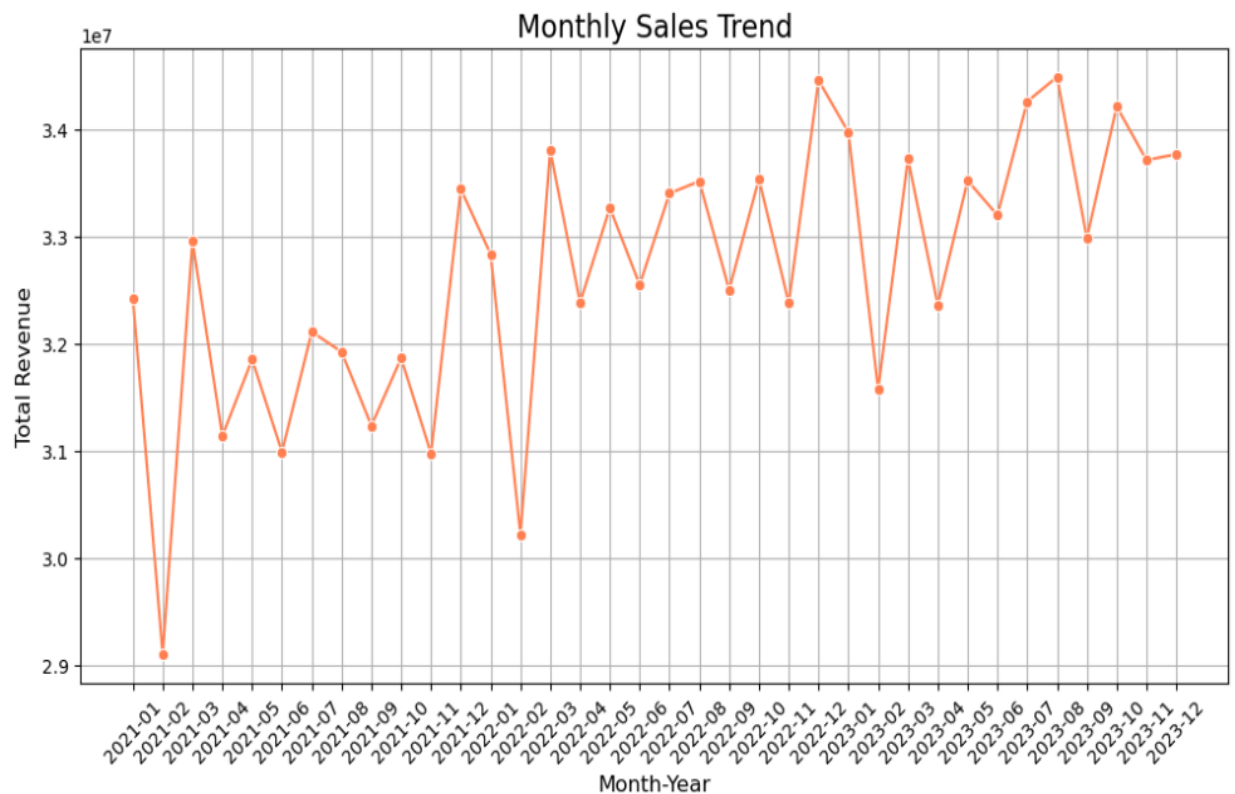

The chart reveals a fluctuating but generally upward trend in monthly total revenue over the three years. Key observations include:

1. **Initial Volatility (2021)**: Revenue fluctuates significantly in early 2021, including a pronounced dip in February. This could reflect seasonal effects or external market influences during that time.

2. **Stabilization (2022)**: Despite minor dips, revenue demonstrates more consistency throughout 2022, with peaks indicating strong sales periods, possibly linked to seasonal demand or promotions.

3. **Growth and Peaks (2023)**: The trend shows notable growth in 2023, with several revenue spikes, including the highest recorded values. However, there

are also sharp, temporary declines, highlighting variability that may be linked to supply chain or market dynamics.
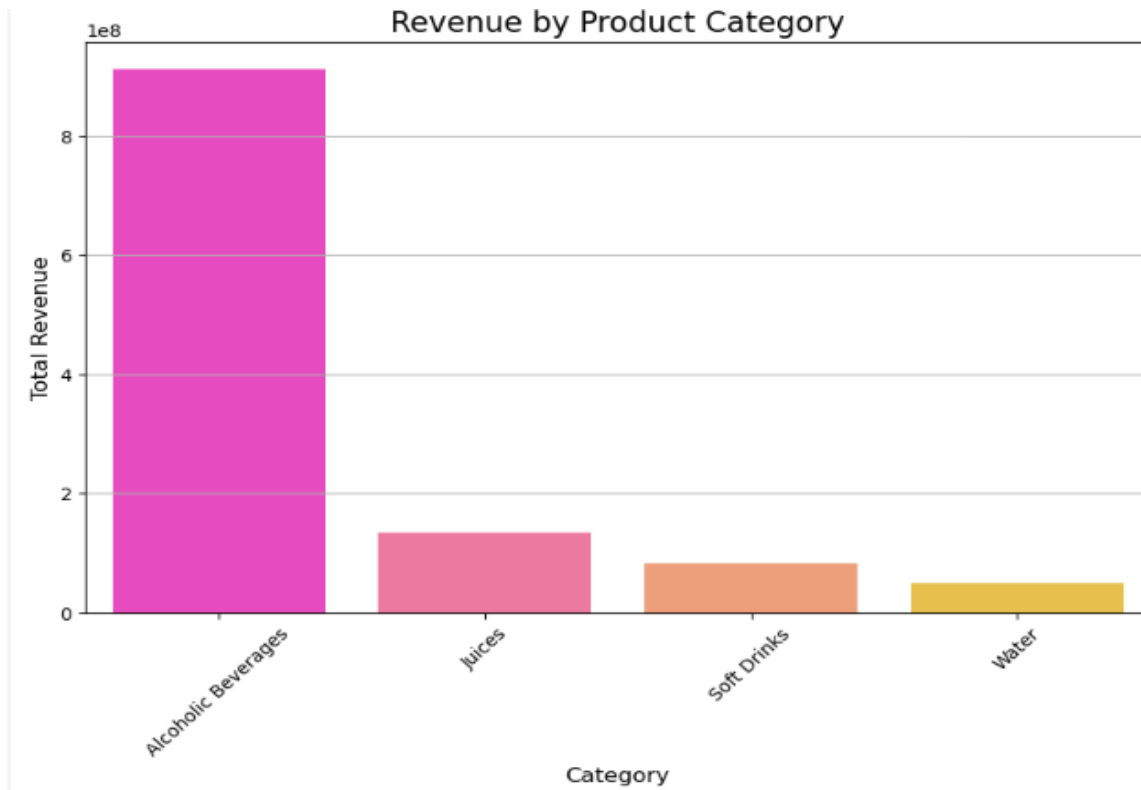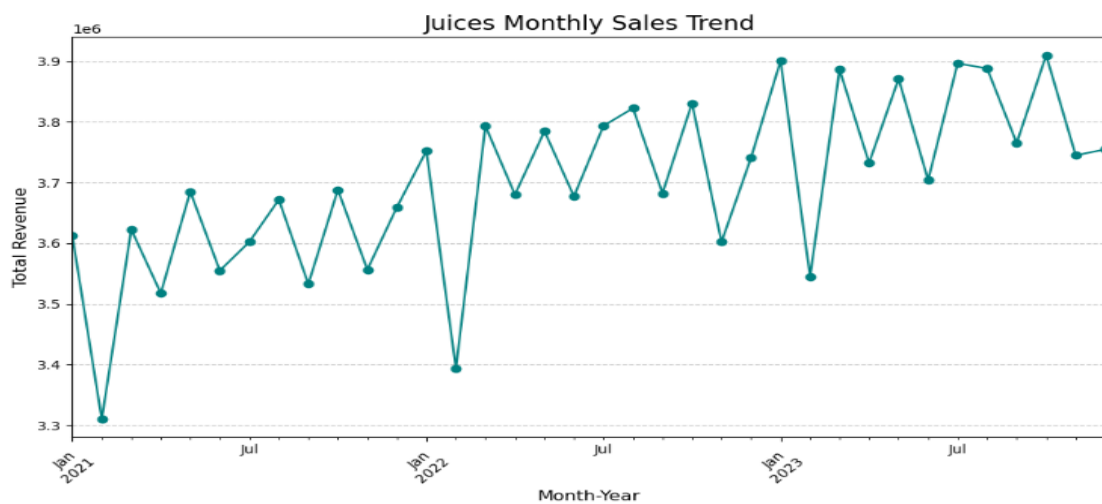

The visualization titled **"Revenue by Product Category"** presents a bar chart comparing the total revenue contributions of different product categories.

1. **Dominance of Alcoholic Beverages** significantly outpaces all others, generating nearly 9 times the revenue of the next closest category. The strong performance suggests high consumer demand, brand loyalty, or a larger variety of products in this category.

2. Juices contribute moderately, followed by Soft Drinks. This aligns with consumer demand in non-alcoholic beverage markets, though they trail far behind alcoholic beverages.

3. The Water category generates the least revenue. This may be due to lower price points or limited marketing efforts.

Juices Revenue by Region
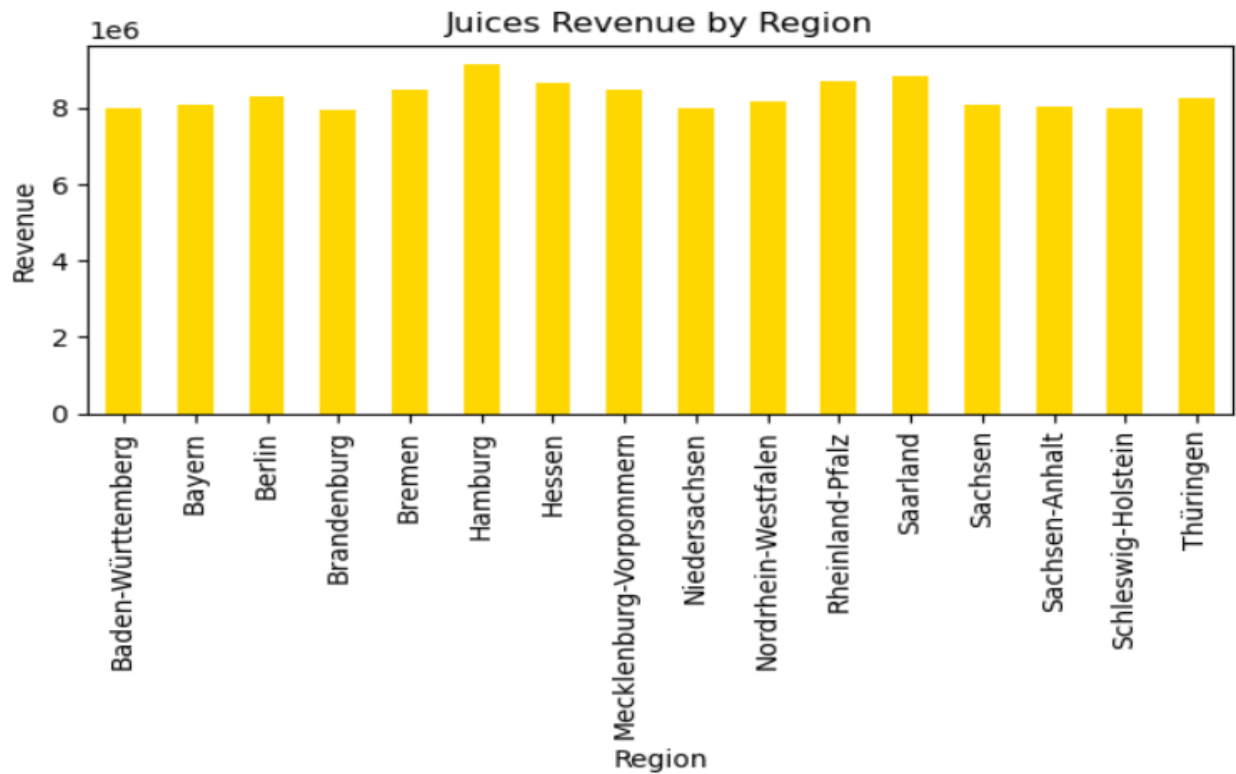
This visualization highlights the regional revenue distribution for juices, indicating consistent performance across regions, with slight variations. Since revenue is consistent across most regions, focus on identifying high-potential regions like **Hamburg and Rheinland-Pfalz** to maximize growth opportunities. Leverage partnerships with regional distributors in lower-performing areas to enhance penetration.

Juices Monthly Sales Trend

The visualization titled **"Juices Monthly Sales Trend"** depicts a line chart illustrating the monthly revenue generated by the Juices category over time. The sales trend shows consistent growth over the analyzed period from early 2021 to the end of 2023. Revenue rose from approximately 3.3 million to a peak near 3.9 million, indicating an annualized positive performance.

Periodic dips and spikes in revenue are observed, suggesting potential seasonality in juice consumption. Notable declines occurred around early 2022 and mid-2023, followed by strong recoveries.

Significant upward momentum is visible around the start of 2022 and sustained into 2023, indicating successful initiatives like promotions, product launches, or enhanced distribution channels.

```
B2B Discount Impact:
                      Total Revenue   Revenue Without Discount   Discount Amount
Category
Alcoholic Beverages 697,888,317.54              772,654,469.31    74,766,151.77
Juices              101,870,692.21              112,672,904.62    10,802,212.41
Soft Drinks          64,350,493.19               71,176,250.50     6,825,757.31
Water                37,510,109.33               41,526,416.90     4,016,307.57
```

The **B2B Discount Impact table** highlights the significant role of discounts across product categories. **Alcoholic Beverages** lead with the highest total revenue of $697.9M and a discount impact of $74.8M, showcasing the heavy reliance on discounts in this segment. **Juices** follow with a revenue of $101.9M and a $10.8M discount impact, reflecting its sensitivity to pricing. **Soft Drinks** and **Water** contribute $64.4M and $37.5M, with discounts reducing revenues by $6.8M and $4.0M, respectively.

Alcoholic Beverages lead in both total revenue and discount impact, highlighting their pivotal role in the B2B segment. Discounts are essential for maintaining competitive sales volumes across all categories but come with a notable

cost in terms of foregone revenue. Though contributing less revenue, categories like Juices and Water show that discounts are integral to sustaining demand.

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Average Transaction Value by Customer Type:
 Customer_Type
B2B    5.13
B2C    5.92
Name: Transaction_Value, dtype: float64
```

The analysis reveals a noticeable difference in the **Average Transaction Value** between customer segments. **B2C customers** show a higher transaction value of $5.92 compared to **B2B customers** at $5.13. This suggests that individual B2C transactions tend to be more lucrative, possibly due to smaller but higher-margin purchases. On the other hand, B2B customers might be focused on bulk transactions with lower margins. This distinction underscores the unique purchasing behaviors of the two segments and their impact on overall profitability.
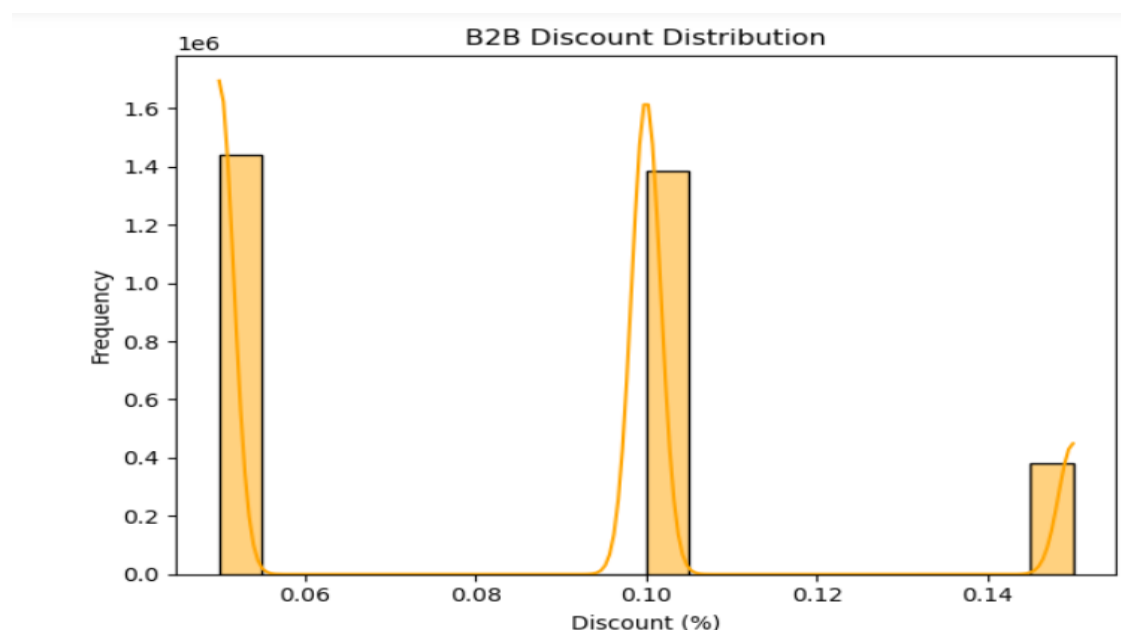
The visualization **"B2B Discount Distribution"** illustrates the percentage distribution of discounts applied to B2B customers. The distribution reveals three prominent discount percentages around **6%, 10%, and 14%**, each forming distinct peaks. This indicates a tiered discount strategy for B2B customers, likely based on purchase volumes, contracts, or specific sales campaigns.

The highest peak indicates the **10% discount** is the most frequently applied. This suggests it might be the standard or most popular discount rate for B2B customers. A smaller proportion of customers receive the **14% discount**, suggesting that this might be reserved for high-value contracts or special agreements. A significant portion of customers receive a smaller discount, around **6%,** possibly due to lower purchase volumes or infrequent buying.

Suggestions:

1. **Juices Promotional Strategies**: The data emphasizes the need to boost revenue from juices, especially in underperforming regions. Tailor promotions for both B2B and B2C customers using competitive discounts and loyalty programs, focusing on high-performing regions like Hamburg and Rheinland-Pfalz while addressing weaker markets.

2. **Balance Revenue Across Categories**: While alcoholic beverages dominate revenue, there's an opportunity to enhance the performance of soft drinks and water through increased marketing, seasonal offers, or partnerships to diversify contributions.

3. **Regional Best Practices**: Leverage insights from successful regions to replicate distribution strategies and partnerships elsewhere. Focus efforts on low-performing areas for better overall sales consistency.

4. **Optimize Discount Structures**: With B2B discounts significantly influencing revenues, explore dynamic discounts linked to purchase volumes and revisit static brackets (5%, 10%, 15%) for maximum profitability impact.

5. **Seasonal Juice Sales Trends**: Plan marketing campaigns and inventory replenishment strategies around peak months for juice sales. Investigate dips in revenue further to mitigate risks like supply chain inefficiencies.

6. **Customer Segmentation Insights**: With B2C transactions yielding higher average values, consider value-based offers for B2C customers while enhancing B2B profitability through bulk discounts, customized solutions, or tailored pricing structures.