Data Visualization Using Tableau

Final Project

The provided data encompasses sales and promotional activities for products across four categories: mouthwash, pretzels, frozen pizza, and boxed cereal. The data covers a period of 156 weeks, commencing in January 2009 and culminating in December 2011. The dataset encompasses various variables that offer detailed insights into the stores, products, sales, and promotions. Let us delve into the descriptions of these variables:

- ADDRESS_CITY_NAME: This variable is part of the "store lookup" table and identifies the city in which the store is located.
- ADDRESS_STATE_PROV_CODE: Also, part of the "store lookup" table, this variable signifies the state or province in which the store is situated.
- AVG_WEEKLY_BASKETS: Another variable from the "store lookup" table, it indicates the average number of baskets (i.e., purchases) sold in the store on a weekly basis.
- BASE_PRICE: This variable, present in the "data" table, represents the base price of the product. The base price is the initial price of the product before any discounts or promotions are applied.
- MANUFACTURER: Part of the "products lookup" table, this variable indicates the manufacturer or company that produces the product.
- CATEGORY: Also, a part of the "products lookup" table, this variable specifies the category to which the product belongs, such as mouthwash, pretzels, frozen pizza, or boxed cereal.
- DESCRIPTION: Found in the "products lookup" table, this variable provides a description or name of the product.
- DISPLAY: This variable, present in the "data" table, indicates whether the product was part of an in-store promotional display. An in-store display is a marketing tactic where products are showcased prominently within the store to attract customers.
- FEATURE: Another variable from the "data" table, it denotes whether the product was featured in an in-store circular. In-store circulars are promotional materials that advertise products and discounts.
- HHS: This variable, present in the "data" table, represents the number of purchasing households. It indicates the number of unique households that purchased the product.

- MSA_CODE: This variable is a part of the "store lookup" table and stands for Metropolitan Statistical Area code. It represents a geographic region with a high core population density and close economic ties throughout the surrounding areas.
- PARKING_SPACE_QTY: Another variable from the "store lookup" table, it provides the number of parking spaces in the store parking lot.
- PRICE: Present in the "data" table, this variable indicates the actual amount charged for the product at the shelf, which may differ from the base price if there are promotions or discounts.
- WEEK_END_DATE: This variable in the "data" table represents the date at the end of the week to which the sales and promotional information pertains.
- SALES_AREA_SIZE_NUM: Part of the "store lookup" table, this variable specifies the square footage of the store, indicating its size.
- STORE_APPEAL: Also, from the "store lookup" table, this variable represents the retailer's designated store appeal, which may refer to the overall attractiveness or ambiance of the store.
- SPEND: This variable in the "data" table denotes the total spend (i.e., total sales) generated by the product, measured in dollars.
- STORE_NUM: This variable is present in both the "data" table and the "store lookup" table, and it serves as a unique identifier for each store.
- SUB_CATEGORY: Part of the "products lookup" table, this variable provides a sub-category classification for the product.
- TPR_ONLY: Found in the "data" table, this variable indicates whether the product had a temporary price reduction only, meaning it was reduced in price but not part of any in-store display or advertisement.
- UNITS: This variable in the "data" table represents the number of units (i.e., individual products) sold.
- UPC: This variable is present in both the "data" table and the "products lookup" table, and it stands for Universal Product Code. It is a specific identifier for each product.
- VISITS: Another variable from the "data" table, it represents the number of unique purchases (baskets) that included the product.
- PRODUCT_SIZE: Part of the "products lookup" table, this variable provides information about the package size or quantity of the product.

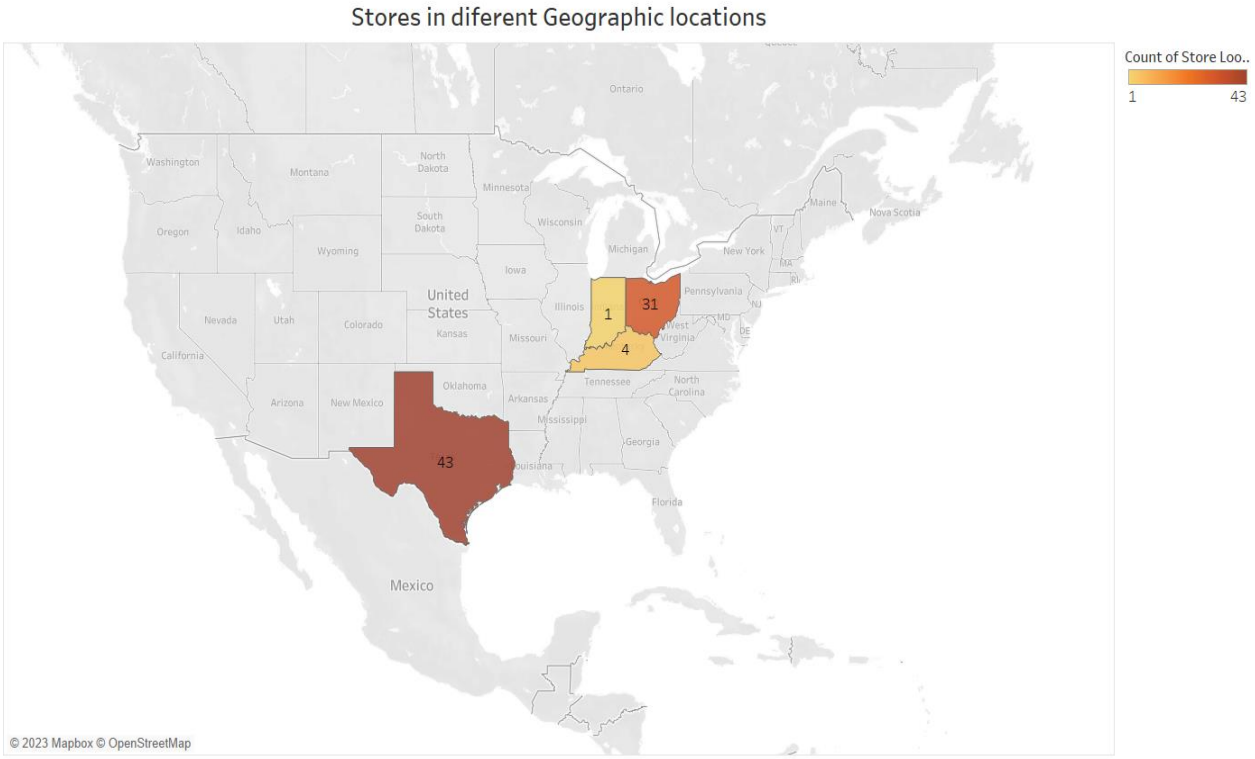
The data for this analysis is sourced from two files: "College Life Data Challenge" and "MSAData Text File." The Excel file contains three spreadsheets that need to be combined to facilitate seamless relationship extraction. The integration steps are as follows:

1. Merge the "MSA" and "Store Lookup" tables using the "MSA-Code" column as the common identifier.

2. Combine the "Store Lookup" and "Transaction Data" tables based on the matching "StoreID" column.

3. Integrate the "Product Lookup" and "Transaction Data" tables using the corresponding "UPC" columns.

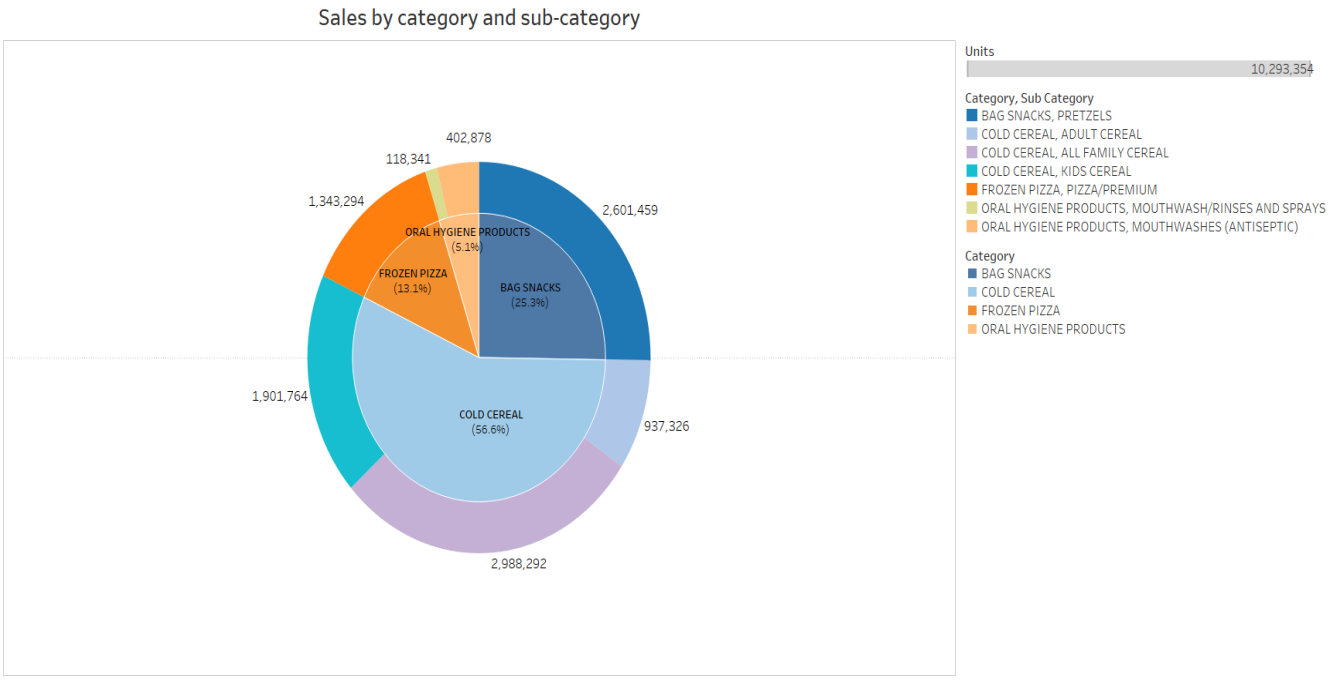
1. Stores in Different Geographical Locations



Map based on average of Longitude and average of Latitude. Color shows count of Store Lookup. The marks are labeled by count of Store Lookup. Details are shown for Address State Prov Code.

The data clearly indicates the geographic distribution of our outlets, demonstrating a strong concentration in four states: Texas, Ohio, Kentucky, and Indiana. Texas leads the way with the highest number of stores, boasting 41 locations. Ohio closely follows with 31 stores, while Kentucky has 4 stores and Indiana has 1 store. This distribution reflects the regional focus of our business operations, with a substantial presence in Texas and ongoing expansion into other states to meet customer needs and tap into new markets.

2. Revenue/Sales generated by category and Sub- category.



MIN(0) and MIN(0). Color shows details about Category. For pane MIN(0): Color shows details about Category and Sub Category. Size shows sum of Units. The marks are labeled by sum of Units. For pane MIN(0) (2): The marks are labeled by % of Total Units and Category.

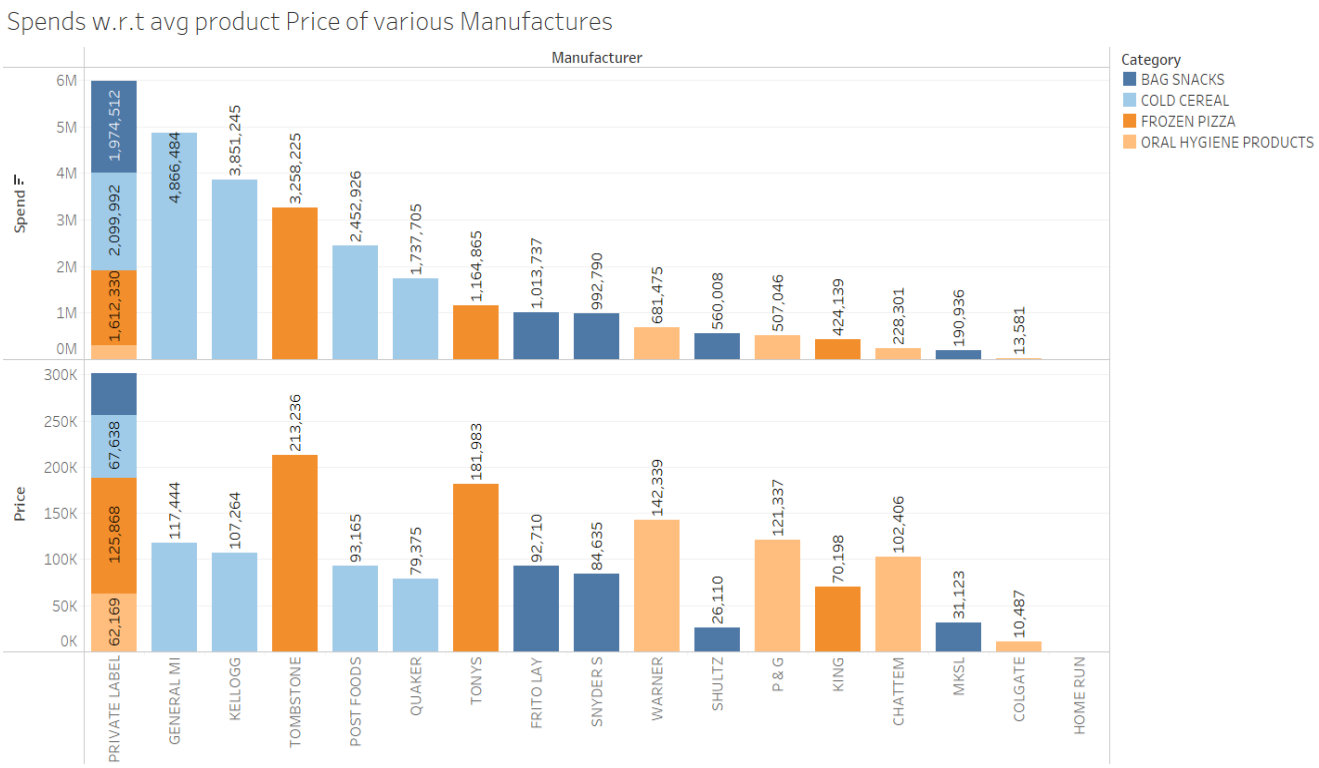
The Sunburst Chart Unveils Insights into Sales and Revenue Distribution

The Sunburst chart provides valuable insights into how sales and revenue are distributed across different categories and sub-categories. The chart clearly reveals the dominance of cold cereal, which captures a staggering 56.6% of total sales, making it the undisputed champion. Bag snacks follow closely behind, claiming 25.3% of the pie.

Zooming in on bag snacks, the chart highlights the undeniable reign of pretzels. They practically command the entire category, showcasing their immense popularity and solidifying their position as a major revenue driver within the segment.

This data underscores the crucial importance for stores to prioritize stocking high-performing sub-categories to maximize their sales potential. Sub-categories like "All Family Cereal," "Pretzels," "Kids Cereal," and "Frozen Pizza" collectively represent a staggering 85% of total units sold. By ensuring adequate inventory of these hot-selling items, stores can effectively fulfill customer demand, maintain high satisfaction levels, and ultimately, drive significant revenue growth.

3. Sales/spends in relation to the average product price across different manufacturers.



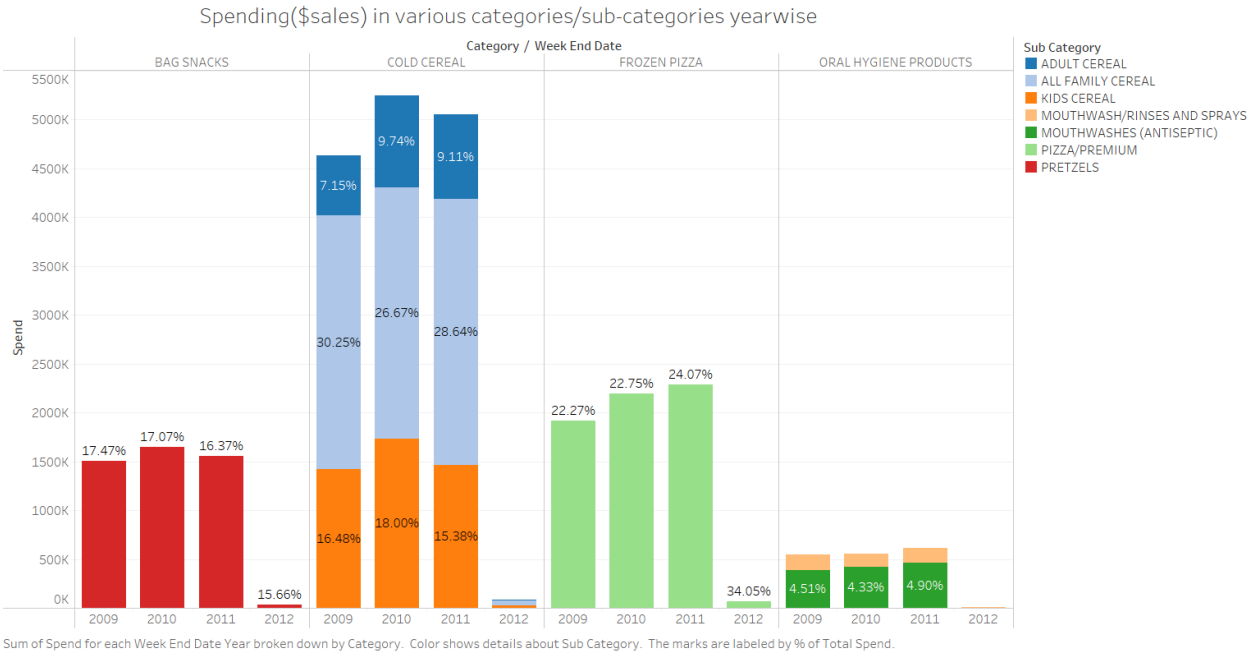
Sum of Spend and sum of Price for each Manufacturer. Color shows details about Category. For pane Sum of Spend: The marks are labeled by sum of Spend. For pane Sum of Price: The marks are labeled by sum of Price.

The above chart enables us to observe the patterns in the average product prices across different manufacturers and their corresponding sub-categories. Private Label stands out as the top performer, achieving sales of around 6 million across products in all four categories. Additionally, by combining the product price with the units sold, we can calculate the revenue for each manufacturer.

General MI secures the second position, specializing in products from a single category, specifically cold cereal, while Kellogg closely follows in third place. Kellogg also focuses on products in the cold cereal category, generating approximately 3.8 million in sales.

The data yields valuable insights into the performance of various manufacturers and their offerings in specific categories. By comprehending these trends, businesses can strategize their product offerings, pricing, and marketing approaches to optimize sales and profitability in the competitive market landscape.

4. Spending (sales generated) across various sub-categories annually.



Sum of Spend for each Week End Date Year broken down by Category. Color shows details about Sub Category. The marks are labeled by % of Total Spend.

The depicted chart provides a clear overview of the sales trends observed between 2009 and 2012 across various categories and sub-categories, offering valuable insights into market dynamics and consumer preferences during that period. The cold-cereal category consistently maintains sales dominance, recording nearly 5000k in sales each year. However, it is noteworthy that despite a sales increase in 2010, subsequent years witness a slight decline, suggesting fluctuations in consumer demand or market conditions impacting this category.

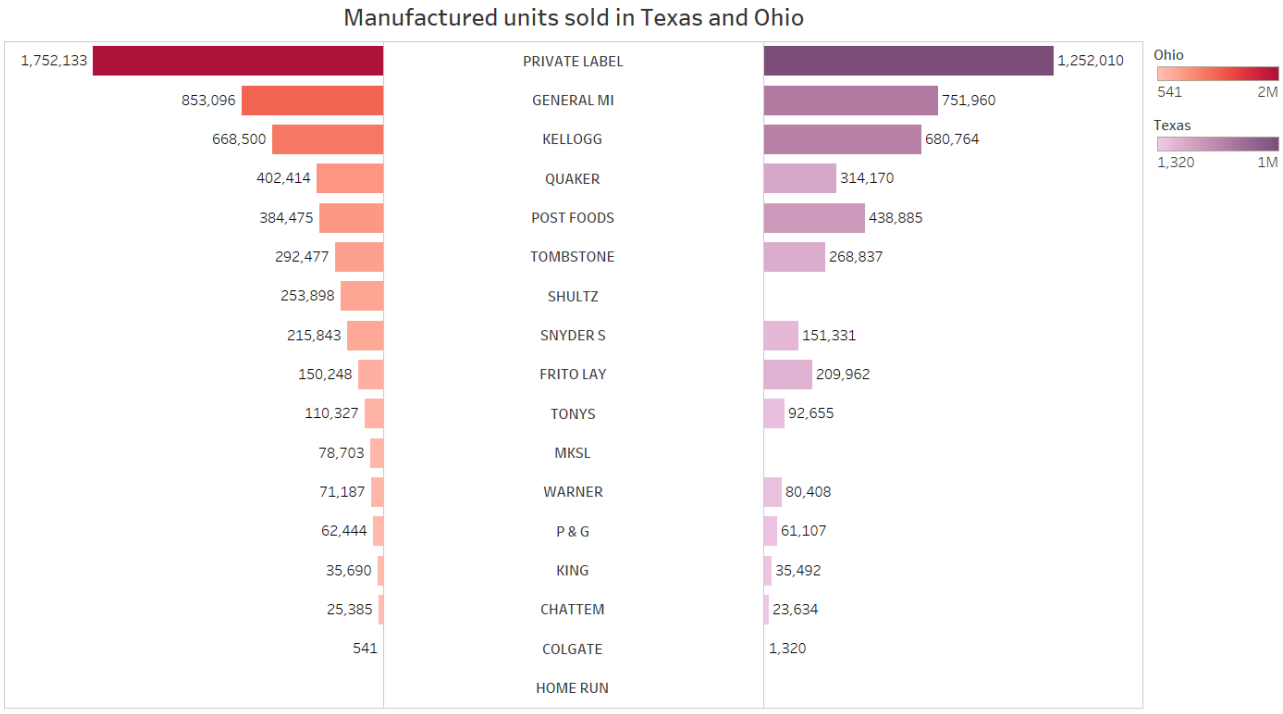
Conversely, the oral hygiene products category demonstrates relatively stable sales over the years, showing minimal to no significant growth. This consistency indicates a sustained demand for oral hygiene products throughout the specified period.

The most notable trend, however, is observed in the Frozen Pizza category, which exhibits consistent growth over the years, establishing itself as a standout performer among various categories. In 2012, the Frozen Pizza category's sales contributed an impressive 34% to the overall category sales, signifying substantial and sustained demand for frozen pizzas. This growth trend presents a promising opportunity for retailers and manufacturers to capitalize on the increasing popularity of frozen pizzas and explore strategies to further enhance their market presence.

The slight downward trend in most other categories underscores the importance for businesses to remain agile and adapt to changing market conditions. Understanding consumer preferences,

responding to market trends, and offering products that align with customer demands are critical factors for success in the competitive retail landscape.

5. Units sold in Texas and Ohio by various manufacturers



Sum of Ohio, sum of Zeroline and sum of Texas for each Manufacturer. For pane Sum of Ohio: Color shows sum of Ohio. The marks are labeled by sum of Ohio. For pane Sum of Texas: Color shows sum of Texas. The marks are labeled by sum of Texas.

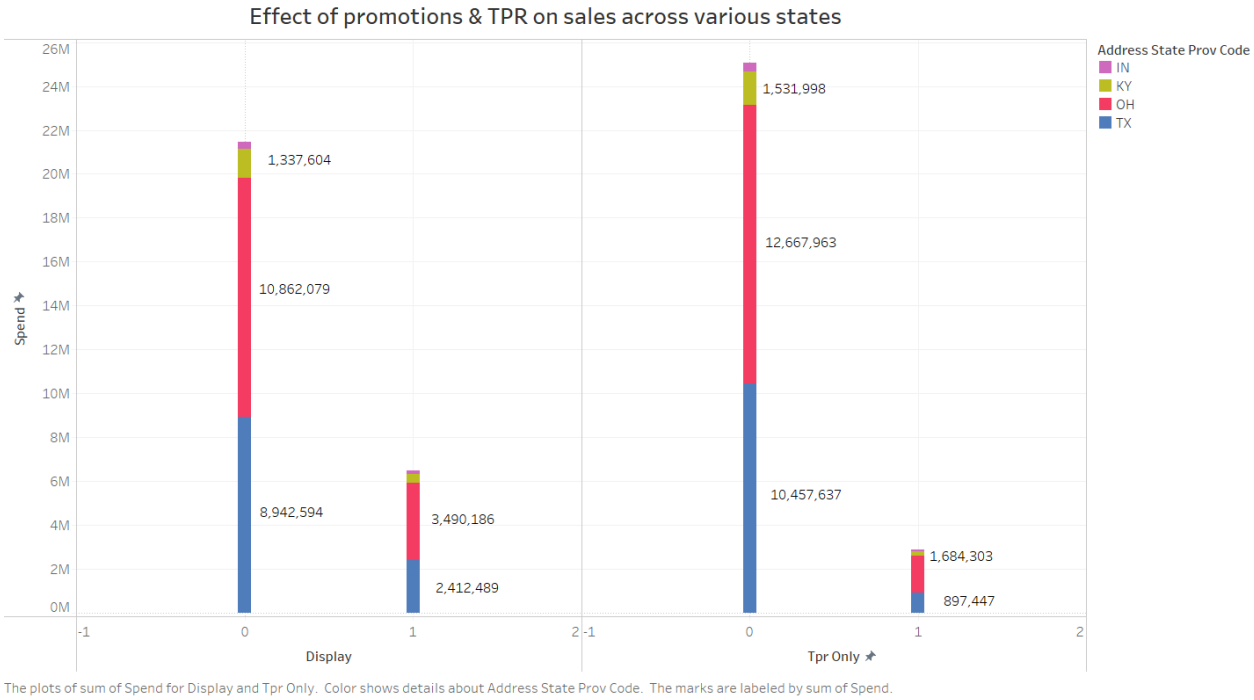
The above visualization emphasizes the disparity in store numbers between Texas (TX) and Ohio (OH) compared to Indiana (IN) and Kentucky (KY). In contrast, the butterfly plot hones in on units sold by different manufacturers in TX and OH, providing insights into their competition and potential areas for improvement. Notably, Private Label emerges as the leader in units sold, totaling approximately 3 million units in both states, followed by General MI and Kellogg. A notable observation is the limited presence of Shultz and MSTL in Ohio, despite having sales in Texas.

The butterfly plot proves to be a valuable tool for understanding market dynamics and identifying growth opportunities. It highlights Private Label's dominance in both TX and OH, indicating successful strategies and strong consumer appeal in these regions. For manufacturers like General MI and Kellogg, securing top ranks reflects their competitive performance.

However, the contrast in the presence of Shultz and MSTL in Texas versus their absence in Ohio is intriguing. This suggests potential challenges or untapped opportunities for these manufacturers in the Ohio market. Further analysis is necessary to comprehend the reasons behind this difference and devise strategies to expand their footprint in Ohio.

The data provides valuable insights for manufacturers to leverage strengths and address weaknesses in specific regions. It underscores the importance of tailoring marketing and distribution strategies based on regional preferences and competition to thrive in diverse markets like Texas and Ohio.

6. The Impact of Promotions and Temporary Price Reductions on Sales and Spending Across Regions



The chart offers insights into the efficacy of various promotions, including in-store displays and temporary price reductions (TPR), and how they influence product sales. Although some instances displayed promising outcomes, in many cases, these promotional approaches did not result in significant enhancements. Notably, products showcased in-store garnered more customer exposure compared to those featuring TPR.

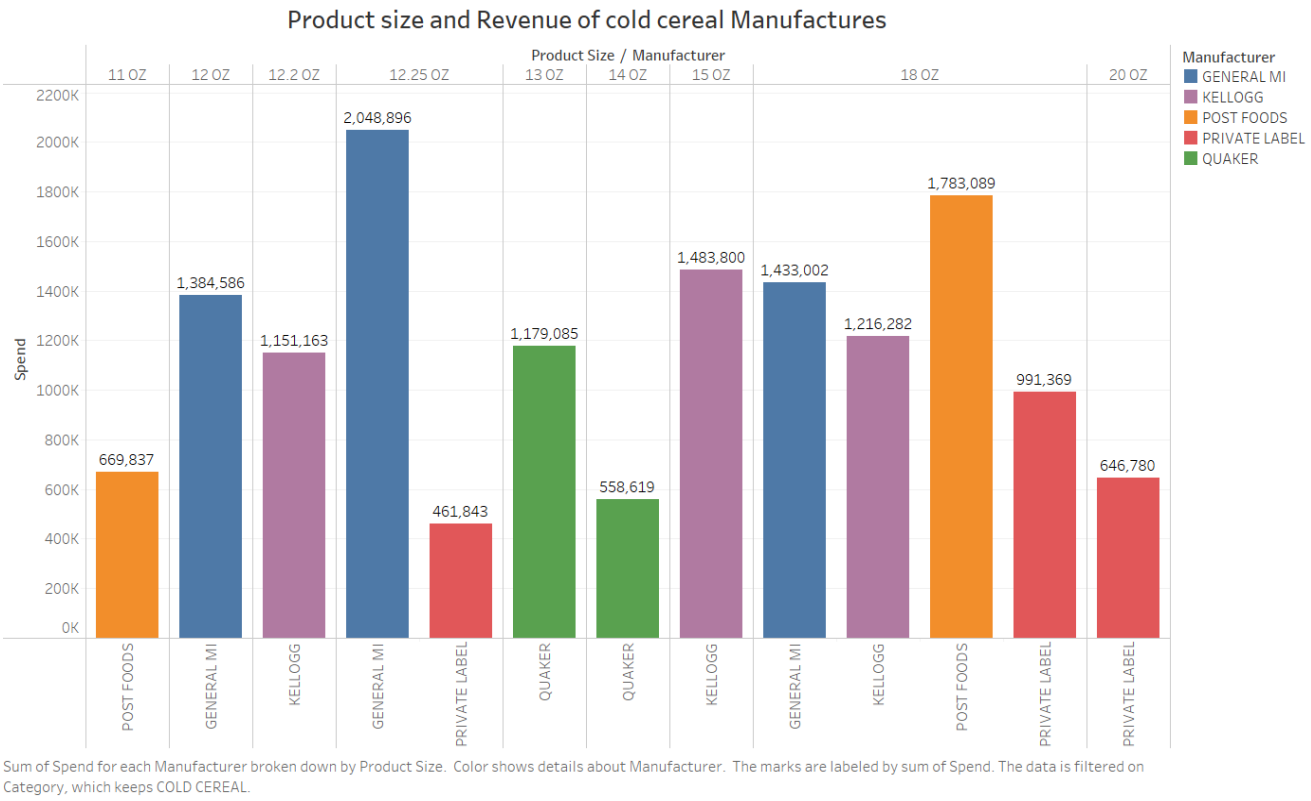
Upon closer scrutiny, it becomes apparent that Ohio has demonstrated superior sales results in comparison to Texas. Specifically, products exhibited in Ohio generated sales totaling 3.49 million, while Texas reported sales of 2.4 million. Even in the context of TPR, Ohio surpassed other states, producing higher revenue, and achieving a greater sales ratio with and without TPR.

These findings underscore the importance of strategically planning promotions based on regional preferences and market dynamics. In-store displays appear to exert a more profound influence on customer engagement, whereas TPR may not consistently lead to substantial sales

improvements. Businesses should contemplate tailoring their promotional strategies according to regional consumer behavior to optimize sales and revenue.

Furthermore, these observations offer valuable insights for retailers and manufacturers to allocate resources efficiently and implement targeted promotions that align better with customers in specific states or regions. By leveraging this data-driven approach, businesses can enhance their promotional effectiveness and maintain competitiveness in the market.

7. Sales of cold cereal manufactures with respect to Product sizes



Sum of Spend for each Manufacturer broken down by Product Size. Color shows details about Manufacturer. The marks are labeled by sum of Spend. The data is filtered on Category, which keeps COLD CEREAL.

As evident from the earlier visualizations, the cold cereal category emerges as a substantial revenue contributor. Now, let's explore this category in more detail by analyzing the distribution of product sizes among different manufacturers in the provided bar plot.

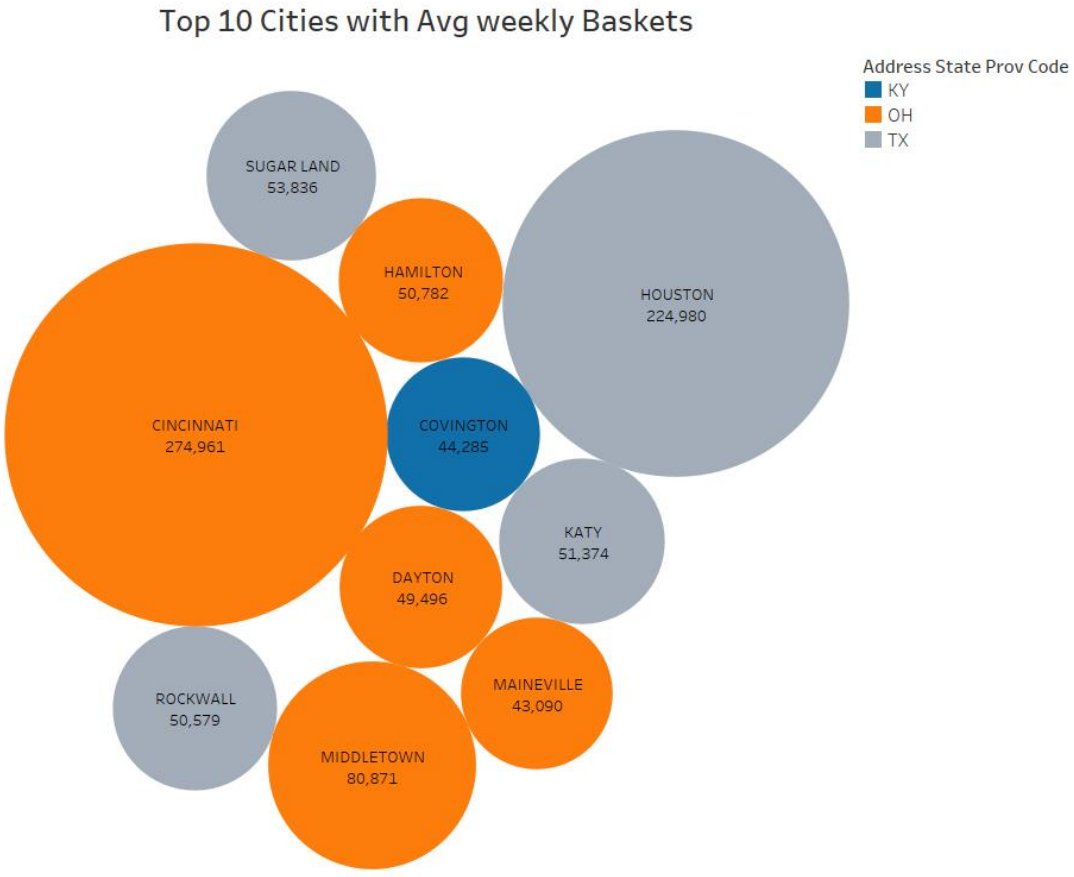
In the 18oz category, all manufacturers offer products, while in the 12.25oz category, competition is limited to General MI and Private Label. Intriguingly, all other size segments are monopolized by specific manufacturers.

Upon closer examination, it is clear that General MI leads in cold cereal sales, generating around 4.8 million, with Kellogg closely following in second place and Post foods in third. Despite

Private Label having the highest overall category sales, it lags behind in this specific segment. To enhance its sales in the cold cereal category, Private Label should consider strategizing based on the identified factors.

Understanding the distribution of product sizes and the competitive landscape in the cold cereal category can assist manufacturers like Private Label in tailoring their marketing and product offerings to compete more effectively and capitalize on this lucrative market segment. By leveraging this information, businesses can refine their strategies and position themselves for success in the highly competitive cold cereal market.

8. Top 10 Cities AVG weekly Baskets

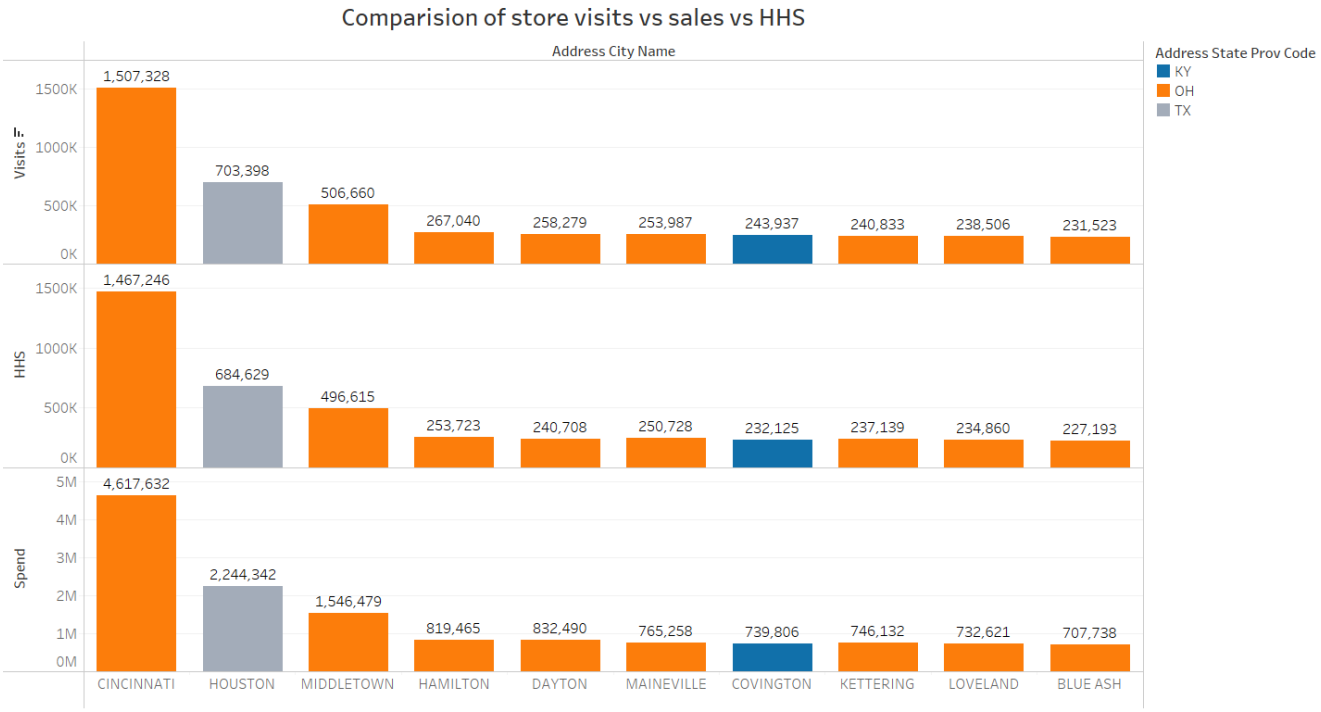


Address City Name and sum of Avg Weekly Baskets. Color shows details about Address State Prov Code. Size shows sum of Avg Weekly Baskets. The marks are labeled by Address City Name and sum of Avg Weekly Baskets. The view is filtered on Address City Name, which has multiple members selected.

The Bubble Graph depicts the relationship between the overall average weekly baskets and sales for stores across different cities. Cincinnati emerges as the top-performing city, boasting an

average of approximately 275k weekly baskets, closely followed by Houston with around 225k. Interestingly, most high-performing cities are situated in Texas and Ohio, with Covington being the lone standout from Kentucky. The graph offers a clear visual representation of city performance concerning average weekly baskets, a key factor influencing sales. The data underscores the significance of cities like Cincinnati and Houston in driving revenue, indicating potential opportunities for businesses to concentrate on these regions to optimize sales and foster growth.

9. Comparisons of store visits vs sales vs HHS



Sum of Visits, sum of HHS and sum of Spend for each Address City Name. Color shows details about Address State Prov Code. For pane Sum of Visits: The marks are labeled by sum of Visits. For pane Sum of Spend: The marks are labeled by sum of Spend. For pane Sum of HHS: The marks are labeled by sum of HHS. The view is filtered on Address City Name, which has multiple members selected.

The bar chart above presents a comprehensive overview of the interplay between sales, purchasing households (HHS), and customer visits across different cities and states. Through a careful analysis of the data, we can extract valuable insights into the factors influencing revenue generation in diverse locations.

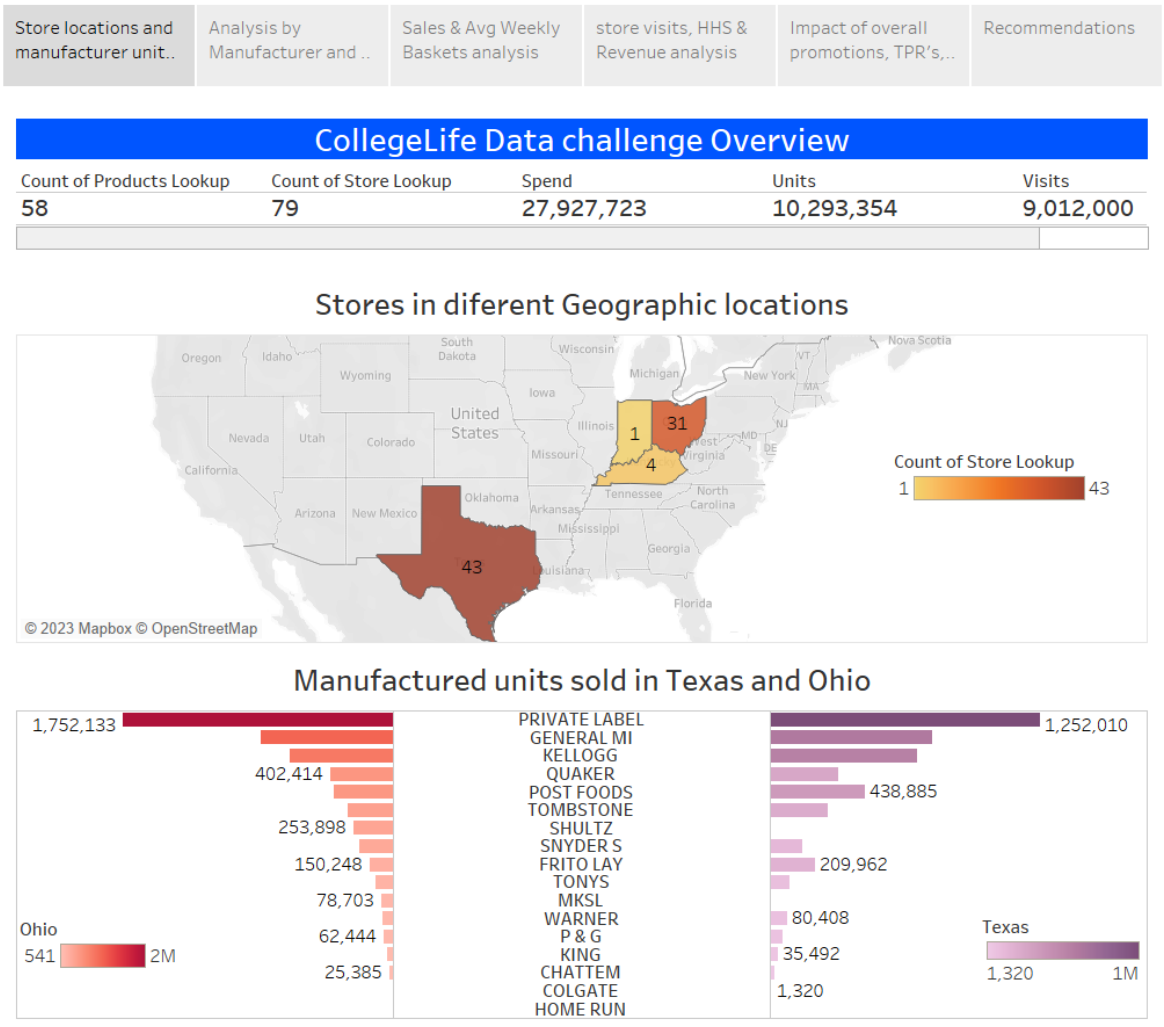
Cincinnati emerges as the standout city in terms of revenue, boasting an impressive 4.6 million in sales. This substantial revenue is closely tied to the city's high number of purchasing households and the frequency of customer visits to stores. The evident correlation between visits, HHS, and sales highlights that areas with a greater concentration of purchasing households tend to witness higher sales.

Following Cincinnati, Houston in Texas secures the second position with revenue totaling 2.2 million. The data underscores the critical importance of comprehending local market dynamics, as it significantly impacts sales and revenue outcomes.

The insights derived from the bar chart provide strategic direction for businesses seeking to expand their operations or optimize their store locations. Prioritizing areas with a substantial number of purchasing households can contribute to a more consistent upswing in sales. Furthermore, understanding customer preferences and behaviors in specific regions empowers businesses to tailor their marketing strategies and product offerings, thereby maximizing the potential for revenue growth.

All the worksheets are systematically organized into a coherent story in the twbx document, which serves as proof and visualization.

Story:



Recommendations:

1. Private Label could explore expanding its product range by introducing Kids Cereals and Adult Cereals, aiming to broaden its market presence significantly. A strategic focus on promoting Mouthwashes, which have a comparatively lower average price than competitors, could prove advantageous. Research indicates that the Kids Cereal Business is lucrative, making it a promising addition to Private Label's product lineup and a potential catalyst for further business expansion.

2. Recognizing that customers prioritize quality over price and quantity, manufacturers like Kellogg's and Private Label may adjust product pricing based on demand and competition to optimize profits. For instance, they might lower prices for less demanded products while increasing prices for popular ones, such as the 18oz size. This strategy has the potential to enhance sales and overall revenue.

3. Despite a slight downward trend in sales for most other categories, the Frozen Pizza category stands out with consistent growth, experiencing a notable increase from 22.7% to an impressive 34.05% in annual sales. This signals a substantial and sustained demand for frozen pizzas, positioning it as a standout performer in the market. Retailers and manufacturers should take note of this trend and explore opportunities to capitalize on the growing popularity of frozen pizzas. Understanding consumer preferences for convenience and taste may contribute to sustaining the category's continuous growth.

4. Manufacturers like Shultz and MKSL should concentrate on effectively advertising their Temporary Price Reductions (TPRs) to boost sales and awareness, particularly in the Ohio region where their sales presence is currently lacking. While they have a presence in Texas, capturing the Ohio market will require strategic advertising. Leveraging social media and other promotional methods can attract more customers and increase revenue, particularly in highly competitive times. Successful TPR advertising has the potential to significantly enhance their market position and help them tap into new growth opportunities.

5. Stores should prioritize stocking up on popular categories such as "All Family Cereal," "Pretzels," "Kids Cereal," and "Frozen Pizza," which collectively account for over 85% of total units sold. Additionally, recognizing the direct link between customer visits and sales, stores should invest in providing adequate facilities, including potential store size expansion and other improvements. By meeting the demand for these popular sub-categories and enhancing the overall shopping experience, stores can maximize sales and create a more appealing shopping environment for their customers.