

Predictive Analytics

Conagra Foods

Final Report

Index

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Background and Context

Conagra Brands: Unveiling Growth Opportunities for GARDEIN in the Thriving US Meat Substitute Market

This analysis delves into the sales distribution of Conagra Brands' product portfolio, specifically focusing on the meat substitute category across various geographical regions and timeframes. Within this growing market segment, top performers include established brands like Morningstar Farms, Beyond Meat, Impossible Foods, GARDEIN, and private label options.

Our primary objective is to identify strategic approaches to enhance revenue generation for the GARDEIN brand.

The Booming US Meat Substitute Landscape:

The United States meat substitute industry is flourishing, fuelled by a confluence of factors:

- **Rising Consumer Demand:** Consumers are increasingly opting for plant-based alternatives due to health concerns, environmental considerations, ethical reasons, and a desire for variety in their diets.
- **Innovation and Expansion:** Leading brands like GARDEIN are constantly innovating, offering new and improved meat substitute products that mimic the taste and texture of meat. This, coupled with expanding distribution channels, is making these options more accessible to a wider audience.

Consumer Trends

The meat substitute industry is experiencing a boom, driven by several key consumer trends:

1. Health and Wellness: Consumers are increasingly health-conscious and seeking out plant-based alternatives perceived as healthier than traditional meat products. This can be due to factors like lower saturated fat content, higher fibre content, and potential cholesterol benefits.

2. Environmental Concerns: There's growing awareness of the environmental impact of animal agriculture, including greenhouse gas emissions, water usage, and deforestation. Consumers concerned about sustainability are turning to meat substitutes as an eco-friendlier option.

3. Ethical Considerations: Animal welfare concerns are motivating many consumers to reduce or eliminate meat consumption. Meat substitutes offer an alternative that aligns with their values.

4. Dietary Preferences: The rise of vegetarian, vegan, and flexitarian diets is creating a larger market for meat substitutes. Flexitarians, who primarily eat meat but occasionally choose plant-based alternatives, represent a significant portion of this growing market.

5. Taste and Texture: Advancements in food technology have led to the development of meat substitutes that closely resemble the taste and texture of real meat. This is crucial for attracting consumers who might otherwise be hesitant to switch from traditional meat products.

6. Convenience and Variety: Meat substitutes are becoming increasingly accessible in grocery stores and restaurants, making them a convenient option for busy consumers. Additionally, the variety of meat substitute products available has expanded significantly, offering consumers a wider range of choices to suit their taste preferences.

7. Price Sensitivity: While price remains a factor for some consumers, the cost of meat substitutes is becoming more competitive with traditional meat products. This is making them a more accessible option for a broader range of people.

Understanding these consumer trends is crucial for companies in the meat substitute industry. By developing products that cater to these evolving preferences, companies can capture a larger share of the growing market.

SWOT Analysis

| Strengths: | Weaknesses: |
|---|--|
| <div><div>1. Strong Brands</div><div>2. Innovation</div><div>3. Accessibility</div><div>4. Diverse Products</div><div>5. Quality Focus</div></div> | <div><div>1. Limited Player Dependence</div><div>2. Price Sensitivity</div><div>3. Lower Availability</div></div> |
| Opportunities: | Threats: |
| <div><div>1. Natural/Organic Growth</div><div>2. Product Line Expansion</div><div>3. Health & Wellness Trend</div><div>4. International Markets</div></div> | <div><div>1. Intense Competition</div><div>2. Consumer Price Sensitivity</div><div>3. Potential Health Concerns</div><div>4. Regulatory Shifts</div></div> |

Data Understanding

Data sorting tools were applied to the cleaned data. Firstly, the data were merged, and the null values were replaced by the mean/median. The file consists of 991780 rows and 75 columns.

Question 1

The GARDEIN meat substitute range has various ounces available in their range. Does the weight of the product influence the dollar sales of the product? Does it play an important factor in the buying decision for the customers? If it does, then which ounces should GARDEIN focus on to increase their sales?

For analysis we have considered,

Independent Variable: Dollar Sales

Dependent Variables: Total Ounces and Manufacturer Name

Hypothesis

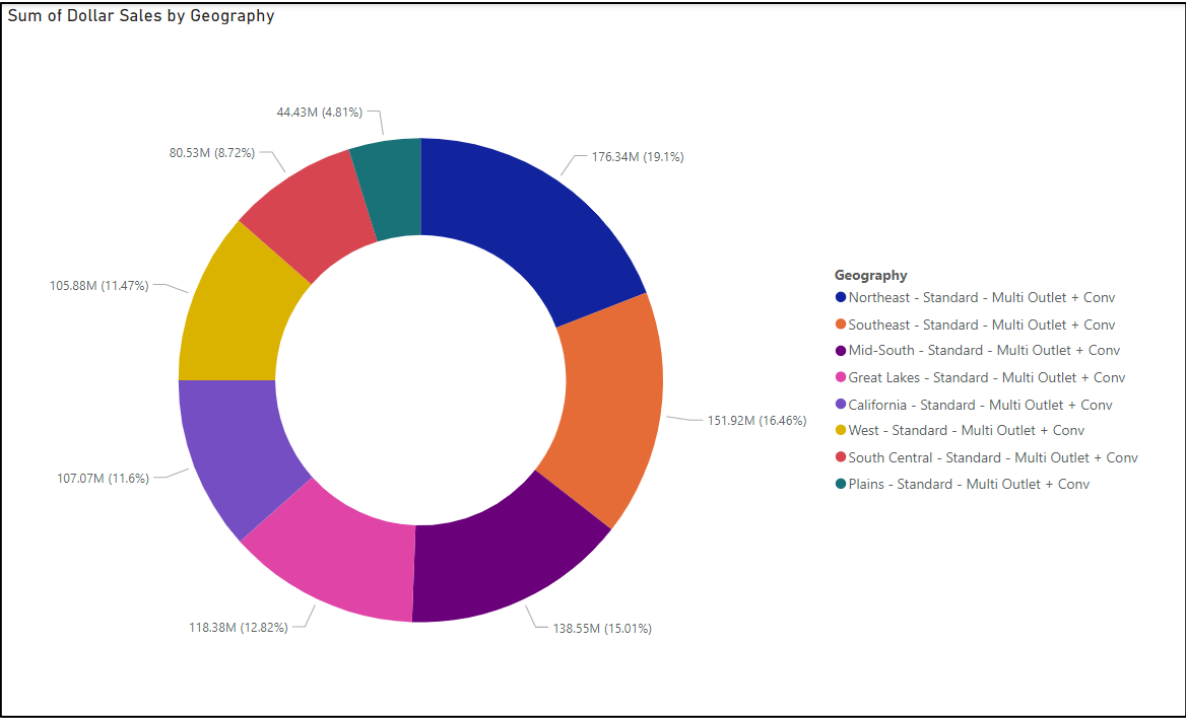
H0: Total Ounces and Manufacturer Name does not play an important Role in determining the Dollar Sales Amount

H1: Total Ounces and Manufacturer Name does play an important Role in determining the Dollar Sales Amount

Visualizations

The ounces weight for the products sold under the meat substitute category by various manufacturers are different. Our focus is to help CONAGRA do better by helping recognize if the weight (ounces) contributes to determining whether the product will sell.

Figure 1 - Total Sales Based on Geography



The above figure shows the geography-based total sales of meat substitute products in the United States.

Figure 2 and 3 - California and Great Lakes

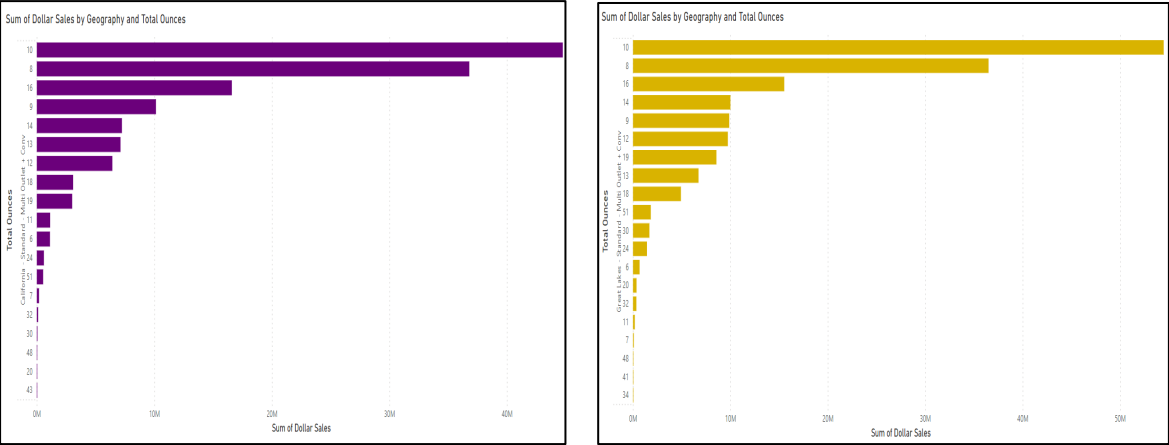


Figure 4 and 5 – Mid South and Northeast

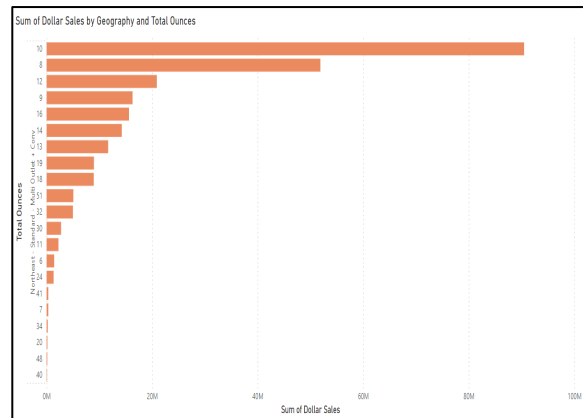
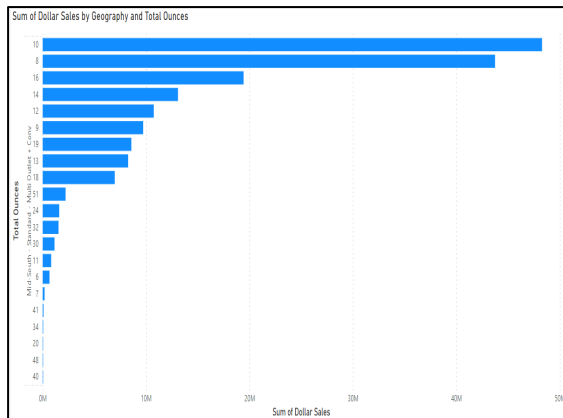


Figure 6 and 7 - Plains and South Central

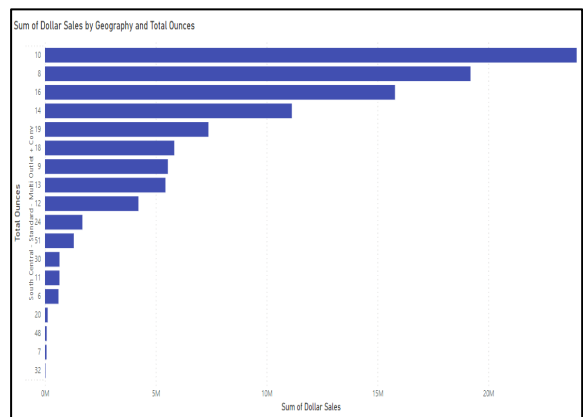
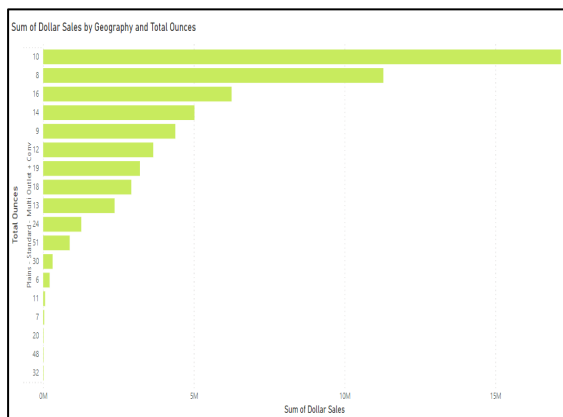
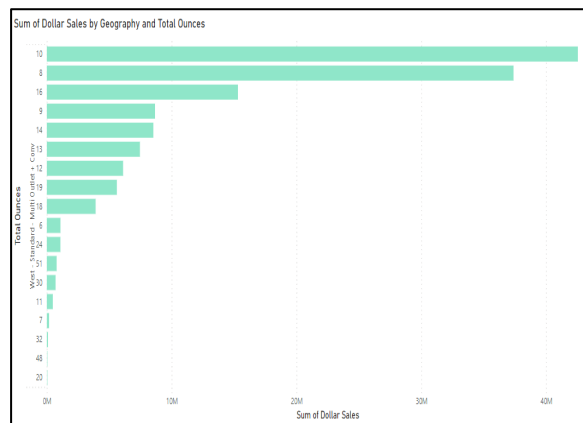
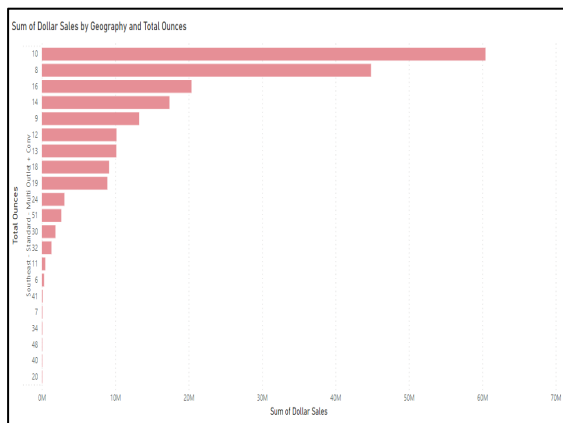


Figure 8 and 9 - Southeast and West



The 8 figures above showcase the geography wise sales of meat substitute products. The most popular weighed product bought is 10 ounces. Followed by 8 ounces, 16 ounces and so on.

Inferences & Outputs

Below are the inferences:

1. There is no evidence that geography wise the product weight preferences change. The most bought products have same weights throughout United States.
2. The most bought 8 products in 8 of these geographies along with their weight are as summarized below:

| | California - Standard - Multi Outlet + Conv | Great Lakes - Standard - Multi Outlet + Conv | Mid-South - Standard - Multi Outlet + Conv | Northeast - Standard - Multi Outlet + Conv | Plains - Standard - Multi Outlet + Conv | South Central - Standard - Multi Outlet + Conv | Southeast - Standard - Multi Outlet + Conv | West - Standard - Multi Outlet + Conv |
|--|---|--|--|---|---|--|--|---|
| Top 8 ounces in the 8 geographies | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | 16 | 16 | 16 | 12 | 16 | 16 | 16 | 16 |
| | 9 | 14 | 14 | 9 | 14 | 14 | 14 | 9 |
| | 14 | 9 | 12 | 16 | 9 | 19 | 9 | 14 |
| | 13 | 12 | 9 | 14 | 12 | 18 | 12 | 13 |
| | 12 | 19 | 19 | 13 | 19 | 9 | 13 | 12 |
| | 18 | 13 | 13 | 19 | 18 | 13 | 18 | 19 |

These are top selling products (ounces) in the meat substitute range throughout the United States. It is observed that GARDEIN range does not accommodate the substitutes having weights highlighted in yellow.

NOTE: The weights considered here are rounded off to whole numbers.

Recommendation 1

We suggest GARDEIN include meat substitute products with standard ounces between 8 to 30 ounces. According to our study and analysis, the meat substitute product's customers do not hesitate to buy products within the smaller ounces. Focusing on these weights is likely to increase the customer footfall for the GARDEIN range of products.

Also, we observed that the trend does not change based on Geography, the popular ounces i.e. between 8 to 30 are dominant all-over United States.

Question 2

Are flavors important for the sales of the GARDEIN meat substitute range? Do more flavors guarantee a higher sale? Does CONAGRA prefer variety in their meat substitute products? Then, though GARDEIN has a lot of variety in its product categories, how can GARDEIN improve its sales?

For analysis we have considered,

Independent Variable: Dollar Sales

Dependent Variables: Flavor and Manufacturer Name

Hypothesis

H0: Flavor and Manufacturer Name does not play an important Role in determining the Dollar Sales Amount.

H1: Flavor and Manufacturer Name does play an important Role in determining the Dollar Sales Amount.

Several flavors are available in the meat substitute industry. The flavors differ based on the manufacturer.

Visualizations

The figure below illustrates the dollar wise sales of meat substitutes based on Flavor/Scent.

Figure 10 – Sum of Dollar Sales based on Flavor/Scent

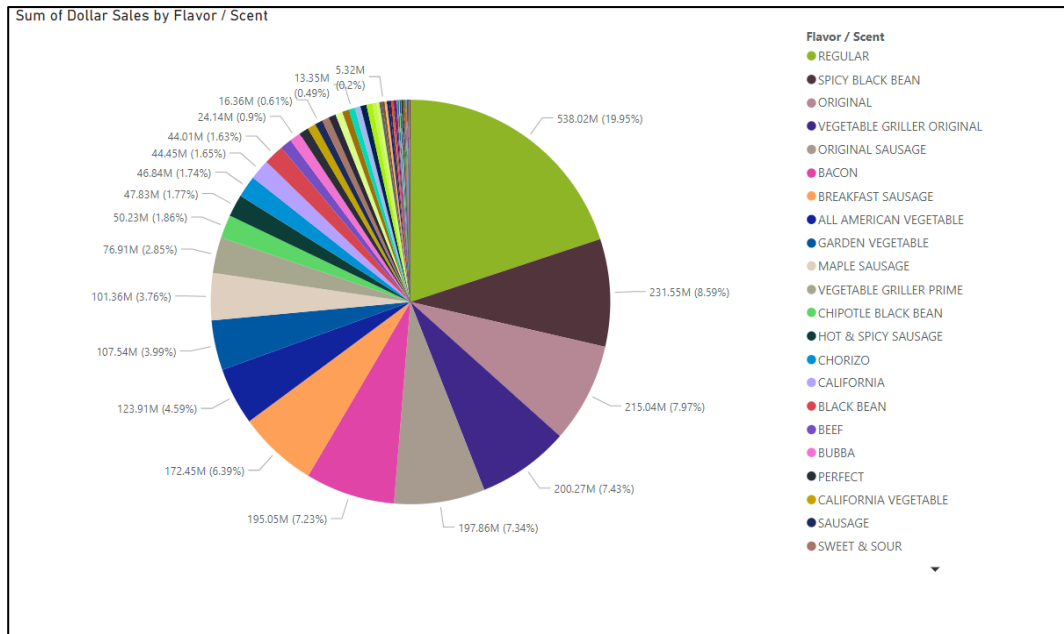
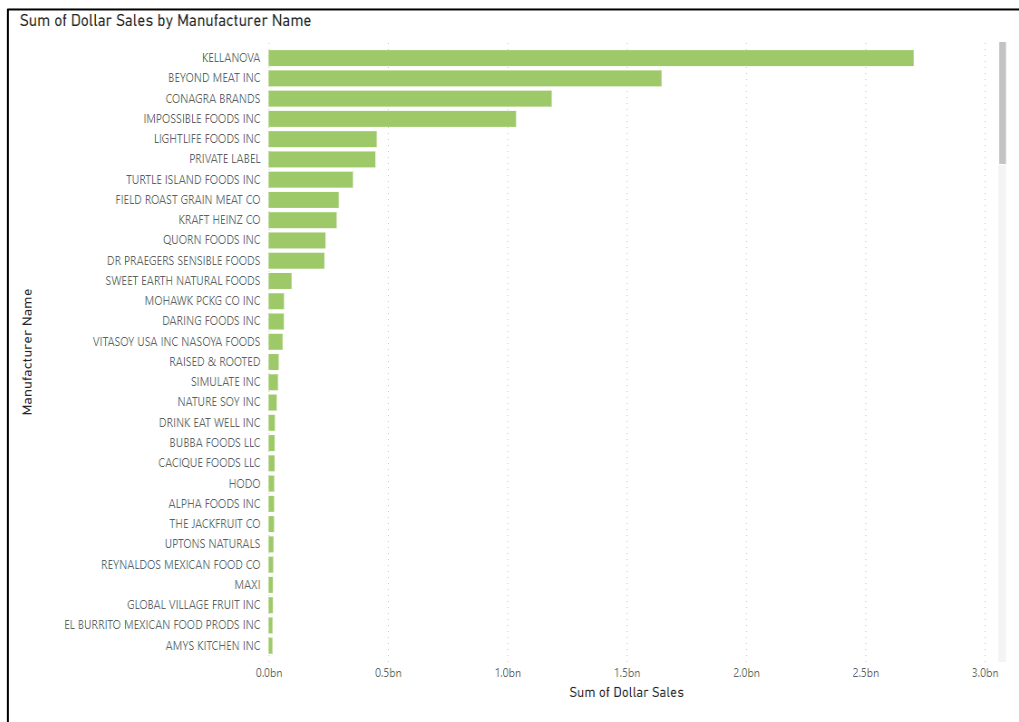
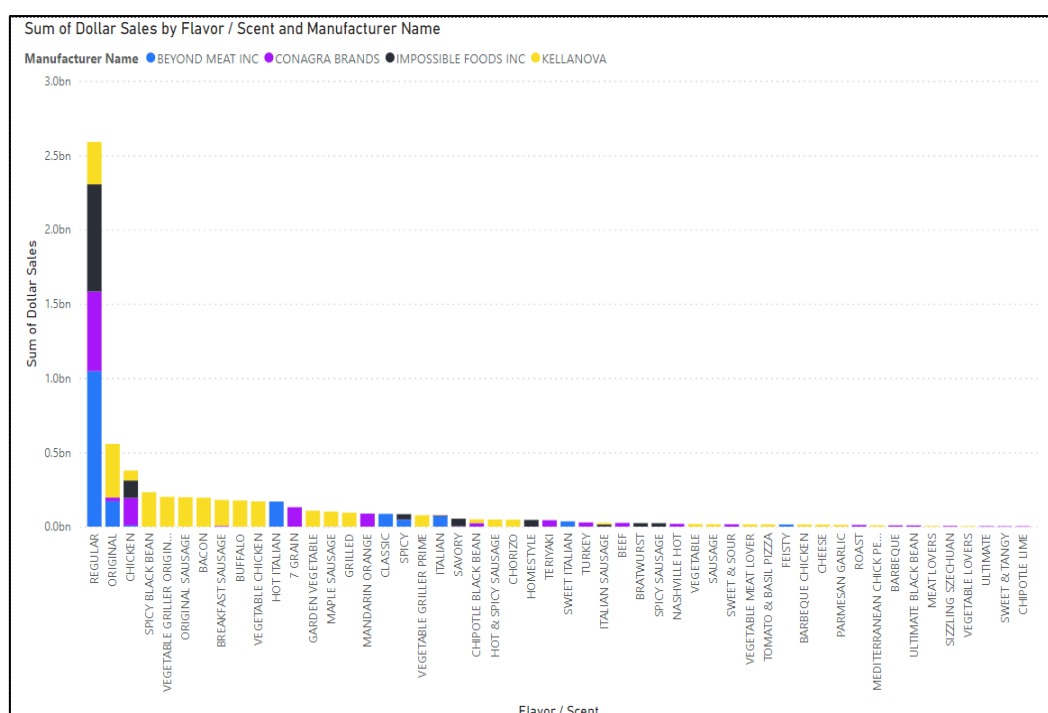


Figure 11 – Sum of Dollar Sales based on Manufacturer.



We see that most sales come from the top 4 Manufacturers namely: KELLANOVA, BEYOND MEAT INC, CONAGRA BRANDS and IMPOSSIBLE FOODS INC.

Figure 12 – Sum of Dollar Sales based on top 4 Manufacturers.



The top selling Flavors for these manufacturers are Regular, Original, Chicken, Spicy Black Bean, Vegetable Griller, Original Sausage and so on.

There are 106 Unique flavors available in the meat substitute industry. They are listed in excel below. The list has been derived by considering all records that have the Brand Name as GARDEIN:



Microsoft Excel Chart

Out of the 106 flavors available in the meat substitute industry, 11 flavors are available in the GARDEIN range. The available flavors are mentioned below, they do not accommodate important flavors like bacon, breakfast sausage, cheese, falafel etc. that do contribute to comparatively higher sales.

SR No Flavors available in GARDEIN range

| | |
|---|---------------------|
| 1 | BEEF |
| 2 | CHIPOTLE BLACK BEAN |
| 3 | CLASSIC |
| 4 | GARDEN |
| 5 | HOMESTYLE |
| 6 | MAPLE SAUSAGE |
| 7 | ORIGINAL |
| 8 | REGULAR |
| 9 | SIZZLING SZECHUAN |

| | |
|----|--------------|
| 10 | SPICY |
| 11 | SWEET & SOUR |

For better analysis of the problem, we have considered the top selling brand MORNING STAR FARMS and GARDEIN. We have analyzed the geography based favorite flavors.

Figure 13 – Top 9 flavours of California and Great Lakes.

| | | | |
|---------------------------------|-------------------------------------|---------------------------------------|--|
| GARDEIN Brand Name | REGULAR Flavor / Scent | 2,02,36,601.79 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 1,46,16,105.50 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 1,45,62,418.60 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 1,12,40,108.12 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 91,17,027.32 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 86,77,561.60 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 56,98,571.19 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 52,18,779.85 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | CHORIZO Flavor / Scent | 24,54,508.93 Sum of Dollar Sales | California - Standard - Multi Outlet + Conv Geography |

| | | | |
|---------------------------------|---------------------------------------|---------------------------------------|---|
| GARDEIN Brand Name | REGULAR Flavor / Scent | 2,30,72,732.72 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 1,88,07,421.73 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 1,26,17,243.34 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 1,24,85,963.69 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 1,10,26,877.00 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 75,51,114.60 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 71,53,226.12 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 62,66,697.56 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | HOT & SPICY SAUSAGE Flavor / Scent | 36,13,897.29 Sum of Dollar Sales | Great Lakes - Standard - Multi Outlet + Conv Geography |

Figure 12 above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in California and Great Lakes according to sum of dollar sales.

Figure 14 – Top 9 flavours of Mid-South and Northeast.

| | | | |
|---------------------------------|---------------------------------------|---------------------------------------|---|
| GARDEIN Brand Name | REGULAR Flavor / Scent | 2,83,37,235.85 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 1,79,96,591.99 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 1,58,49,108.54 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 1,48,17,384.78 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 1,23,11,419.19 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 1,02,03,579.89 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 93,09,472.66 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 75,33,107.60 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | HOT & SPICY SAUSAGE Flavor / Scent | 39,69,368.99 Sum of Dollar Sales | Mid-South - Standard - Multi Outlet + Conv Geography |

| | | | |
|---------------------------------|-------------------------------------|---------------------------------------|---|
| GARDEIN Brand Name | REGULAR Flavor / Scent | 3,61,59,496.70 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 2,16,30,267.76 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 1,77,90,891.11 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 1,59,97,538.07 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 1,59,30,920.74 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 1,26,07,846.09 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 1,09,82,967.60 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 77,35,899.47 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SAUSAGE Flavor / Scent | 49,05,185.58 Sum of Dollar Sales | Northeast - Standard - Multi Outlet + Conv Geography |

Figure above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in Mid-South and Northeast according to sum of dollar sales.

Figure 14 – Top 9 flavours of Plains-Standard and South Central.

| | | | |
|---------------------------------|--|---------------------------------------|--|
| GARDEIN Brand Name | REGULAR Flavor / Scent | 1,00,21,898.52 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 75,01,744.04 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 46,53,363.52 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 45,43,851.58 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 36,87,343.09 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 28,80,431.07 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 21,63,675.14 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 20,08,972.46 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | CHIPPOTLE BLACK BEAN Flavor / Scent | 8,94,701.06 Sum of Dollar Sales | Plains - Standard - Multi Outlet + Conv Geography |

| | | | |
|---------------------------------|---------------------------------------|---------------------------------------|---|
| GARDEIN Brand Name | REGULAR Flavor / Scent | 2,15,17,078.47 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 1,14,01,210.05 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 1,11,87,888.52 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 72,49,951.26 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 57,20,746.33 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 36,33,742.62 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 34,08,414.53 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | HOT & SPICY SAUSAGE Flavor / Scent | 32,09,488.73 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 25,66,638.60 Sum of Dollar Sales | South Central - Standard - Multi Outlet + Conv Geography |

Figure above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in Plains Standard and South Central according to sum of dollar sales.

Figure 15 – Top 9 flavours of Southeast and West-Standard.

| | | | | | | | |
|---------------------------------|---------------------------------------|---------------------------------------|---|---------------------------------|---------------------------------------|---------------------------------------|--|
| GARDEIN Brand Name | REGULAR Flavor / Scent | 3,98,22,960.52 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | GARDEIN Brand Name | REGULAR Flavor / Scent | 1,98,03,083.64 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 1,72,77,931.39 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | SPICY BLACK BEAN Flavor / Scent | 1,24,82,880.11 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 1,51,17,760.66 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | ORIGINAL SAUSAGE Flavor / Scent | 1,23,05,065.66 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 1,36,31,365.95 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | BACON Flavor / Scent | 1,22,02,520.92 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 1,17,72,109.69 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | BREAKFAST SAUSAGE Flavor / Scent | 1,19,68,147.27 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 80,61,222.81 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 99,53,963.44 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | ORIGINAL Flavor / Scent | 75,86,231.77 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | MAPLE SAUSAGE Flavor / Scent | 72,44,491.14 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 70,29,768.84 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | GARDEN VEGETABLE Flavor / Scent | 52,93,593.41 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |
| MORNINGSTAR FARMS Brand Name | HOT & SPICY SAUSAGE Flavor / Scent | 53,75,389.46 Sum of Dollar Sales | Southeast - Standard - Multi Outlet + Conv Geography | MORNINGSTAR FARMS Brand Name | HOT & SPICY SAUSAGE Flavor / Scent | 24,53,656.30 Sum of Dollar Sales | West - Standard - Multi Outlet + Conv Geography |

Figure above shows the top 9 flavors preferred among GARDEIN and MORNINGSTAR FARMS in Southeast and West-Standard according to sum of dollar sales.

Inference

From above all figures, it is **prominent** that the dollar sales of **GARDEIN's REGULAR** flavour is preferred all over the US though MORNING STAR is the number one selling brand (referred from Category 101). GARDEIN has multiple flavors that they offer including Beef, Chipotle Black Bean, Classic, Garden, Maple Sausage etc. But the flavors may not be enough to scale and acquire the meat substitute market of US.

Conclusion

Based on the above analysis, we reject the NULL Hypothesis and state that Flavor and Manufacturer Name does play an important Role in determining the Dollar Sales Amount.

It is observed that the US market explores different flavors. MORNING STAR has more flavors to make a mark compared to GARDEIN. GARDEIN can thus increase the number of flavors of their meat substitutes which would increase their revenue. Also, as Regular flavor offered by GARDEIN is the top selling flavor, GARDEIN can sample the products of various other flavors along with it to help customers try new and different flavors. If customers like it, they will buy the extended range of flavors in their next purchase.

Question 3

What is the significance of region and product form on influencing the dollar sales amount? Specifically, which combination of region and product form yields the highest dollar sales among the top 5 manufacturers displayed in Table 1??

- Independent variables: Region/Geography and Form
- Dependent variable: Dollar Sales(\$)

Hypothesis:

The hypothesis suggests that Conagra Brands can optimize their sales performance by strategically aligning their focus on 'Patties/Links Forms' in the Mid, Southeast, and Northeast regions, leveraging competitors' strategies. Additionally, emphasizing 'Speciality Forms' in the South Central and West regions can further boost revenue. This strategic approach, based on the hypothesis, capitalizes on regional preferences and competitive dynamics to effectively optimize sales performance.

1. Summary Statistics

Given the variety of 70 meat substitute forms, categorization into 4-5 groups is essential. Analyzing these categories about Manufacturer_Name and Region can reveal their influence on dollar sales. This approach facilitates a comprehensive understanding of the dynamics driving sales in the meat substitute market.

Examined the market share of each manufacturer across the entire meat substitute market.

Table 1

| | Manufacturer_Name | Total_Dollar_Sales |
|-----|----------------------|--------------------|
| 0 | KELLANOVA | 1.351337e+09 |
| 1 | BEYOND MEAT INC | 8.232169e+08 |
| 2 | CONAGRA BRANDS | 5.929881e+08 |
| 3 | IMPOSSIBLE FOODS INC | 5.185040e+08 |
| 4 | LIGHTLIFE FOODS INC | 2.264603e+08 |
| ... | ... | ... |
| 146 | TMRW FOODS | 3.004475e+02 |
| 147 | MIRACLE FOODS CORP | 5.127544e+01 |
| 148 | MAMA MANCINIS | 2.651963e+01 |
| 149 | LIVING HARVEST INC | 2.496949e+01 |
| 150 | PEAS OF MIND LLC | 2.480000e+00 |

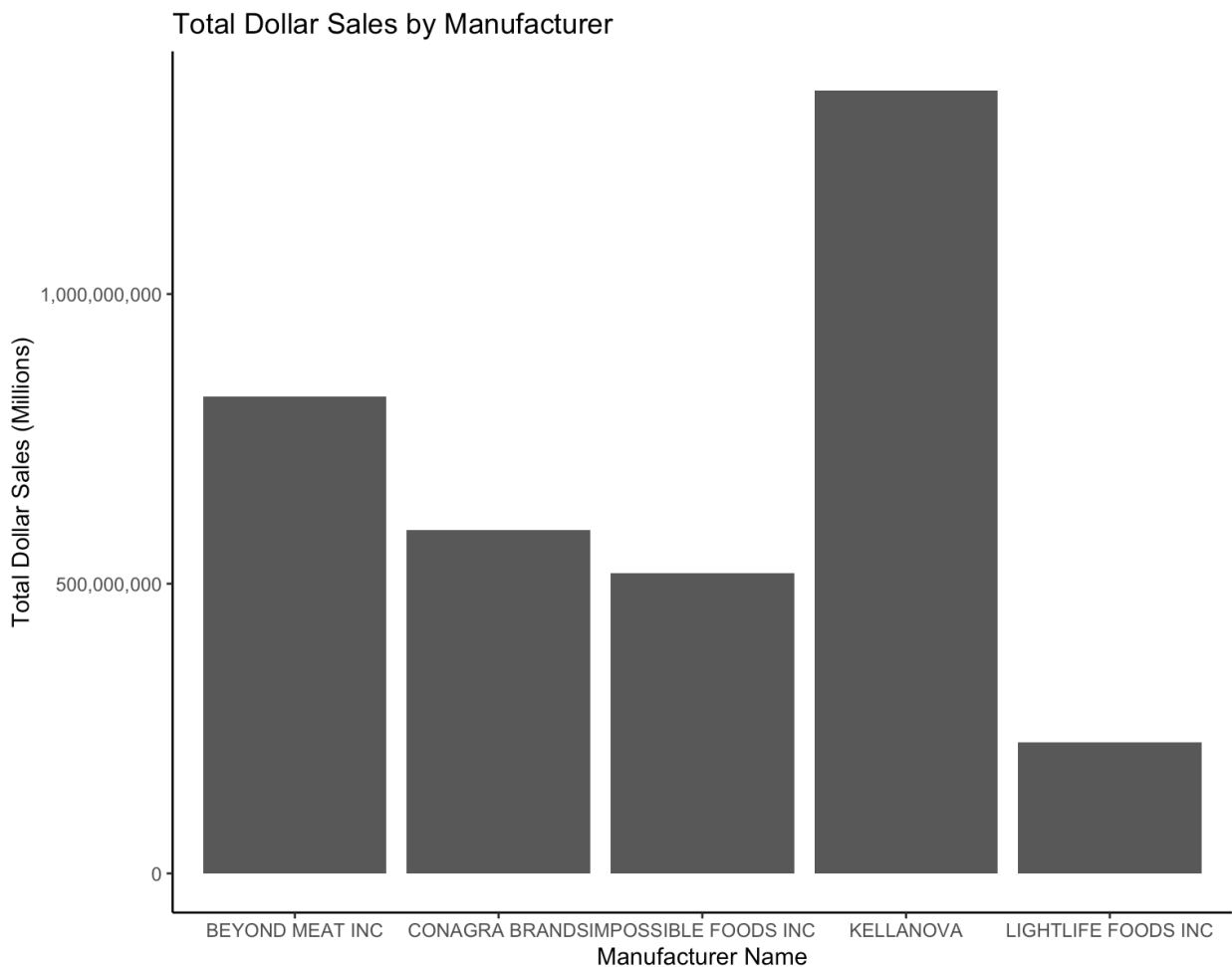
151 rows x 2 columns

The analysis reveals that Kellanova dominates the Meat Substitute Category, commanding a substantial market share of 27.8%. Following closely is Beyond Meat with 16.9%, while Conagra Brands holds the third position with 12.2%. Impossible Foods and Lightlife Foods Inc. follow with 10.7% and 4.7% respectively.

The combined market share of these top 5 brands amounts to approximately 72.53% of the total market share. These brands significantly influence the Meat Substitute Category,

reflecting their strong presence and impact on consumer preferences. Consequently, in further analysis, all manufacturers excluding Kellanova, Beyond Meat Inc., Conagra Brands, Impossible Foods Inc., and Lightlife Foods Inc. will be categorized as "OTHERS." Understanding the dominance of these top brands provides valuable insights into market dynamics and competition within the Meat Substitute Category. It underscores the importance of strategic positioning and brand recognition in capturing market share and shaping consumer choices.

Table 2



1) Questions and Analysis

What is the significance of region and product form on influencing the dollar sales amount? Specifically, which combination of region and product form yields the highest dollar sales among the top 5 manufacturers displayed in Table 1 (above)?

In the Meat Substitute Category, as shown in below Table 3 and 4, "Patties/links" Forms emerge as the dominant market force, commanding a substantial 52.8% share due to their widespread preference among consumers. "Other Forms" and "Speciality Forms" also hold competitive positions, contributing 12.0% and 10.2% respectively. While preferences may fluctuate over time, "Snackable Forms," "Sliced Cut forms," and "Structured Forms" collectively account for 24.9% of the market, suggesting untapped potential for further growth. Analyzing buyer

distribution data indicates opportunities for these forms to capture additional market share, signaling a dynamic landscape where consumer preferences and product innovation play pivotal roles in shaping market dynamics. As trends evolve, understanding and adapting to shifting consumer preferences will be key for manufacturers seeking to maintain and expand their market presence in the competitive meat substitute industry.

Sliced/Cut Forms consists of

```
sliced_cut_forms = [  
    "SLICE",  
    "ULTRA THIN SLICE",  
    "CHUNK",  
    "DICED",  
    "SLICED",  
    "CRUMBLE",  
    "SHREDDED",  
    "SHREDS",  
    "CUBE",  
    "PIECE",  
    "TIP",  
    "WHOLE"  
]
```

Structured Forms consists of

```
structured_forms = [  
    "STRIP",  
    "ROLL",  
    "CAKE",  
    "RIBS",  
    "ROPE",  
    "BINGS",  
    "CUT",  
    "CHUB",  
    "BLOCK",  
    "SPLIT ROPE"  
]
```

Patties and Links consists of

```
patties_links = [  
    "BREAKFAST SAUSAGE LINK",  
    "BREAKFAST LINK",  
    "SAUSAGE PATTY",  
    "BREAKFAST SAUSAGE PATTY",  
    "BREAKFAST PATTY",  
    "BREAKFAST SAUSAGE ROLL",  
    "BREAKFAST BITES",  
    "DINNER SAUSAGE LINK",  
    "DINNER LINK",  
]
```



```
"SAUSAGE PATTY",  
"LINK",  
"DINNER SAUSAGE LINK",  
"HOT DOG",  
"BURGER",  
"BURGER PATTY",  
"GROUND"  
]
```

Snackable/Portable Forms consists of

```
snackable_forms = [  
    "FINGER",  
    "BITE",  
    "POPPER",  
    "FUN NUGGETS",  
    "BAO BUN",  
    "NUGGET",  
    "STICK",  
    "FRIES",  
    "FRANK",  
    "TENDERS",  
    "WING",  
    "STICK"  
]
```

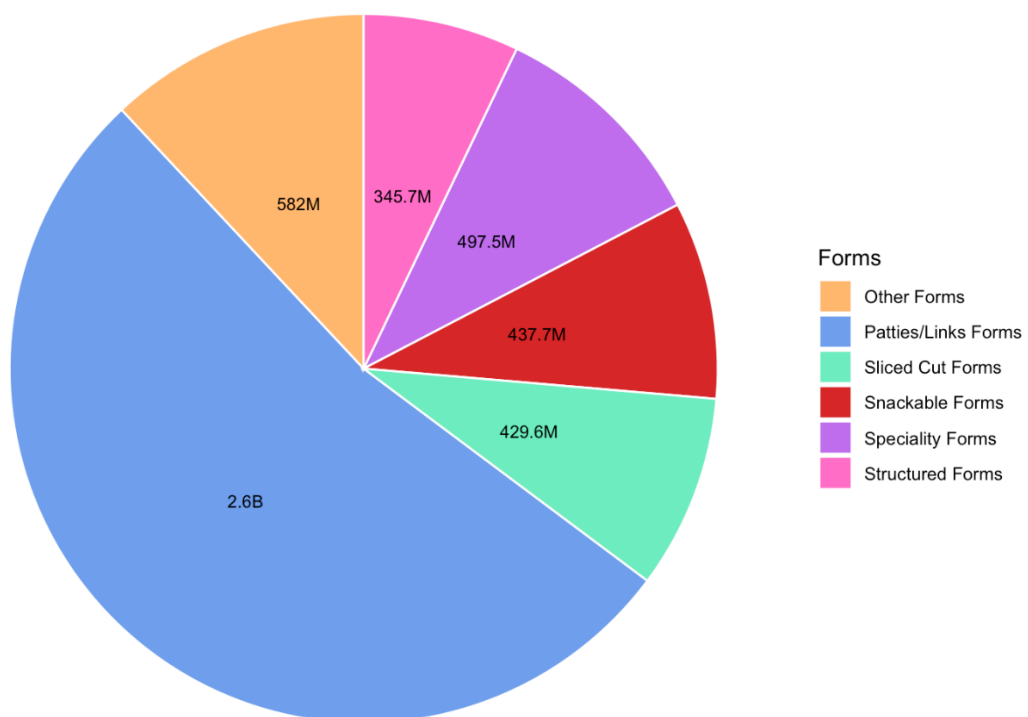
Specialty Forms consists of

```
specialty_forms = [  
    "MEATBALL",  
    "BREAKFAST SAUSAGE LINK",  
    "DIPPER",  
    "BAR",  
    "MEAT LOAF",  
    "GIZZARD",  
    "TENDER",  
    "RIBLET",  
    "FILET",  
    "ROAST",  
    "POPCORN",  
    "BREAST",  
    "PULLED",  
    "SAUSAGE",  
    "LOAF"  
]
```

Table 3

| | Form | Total_Dollar_Sales |
|---|---------------------|--------------------|
| 0 | Patties/Links Forms | 2.566116e+09 |
| 1 | Other Forms | 5.819574e+08 |
| 2 | Speciality Forms | 4.974908e+08 |
| 3 | Snackable Forms | 4.376678e+08 |
| 4 | Sliced Cut Forms | 4.295816e+08 |
| 5 | Structured Forms | 3.456503e+08 |

Total Dollar Sales by Form



Across various Manufacturer Names, as seen in below Table 5, 6 and 7 distinct Forms play crucial roles in contributing to Total Dollar Sales. Notably, "Patties/Links" Forms dominate sales for most manufacturers, except Conagra Brands, which prioritizes Speciality forms. Conagra's focus on Speciality forms positions "Patties/Links" as the second highest contributor, followed by Snackable and Structured Forms. Meanwhile, Sliced Cut Forms and Other Forms exhibit relatively equal and less substantial contributions. This highlights the nuanced strategies adopted by manufacturers in leveraging different product forms to drive sales within the competitive meat substitute market landscape.

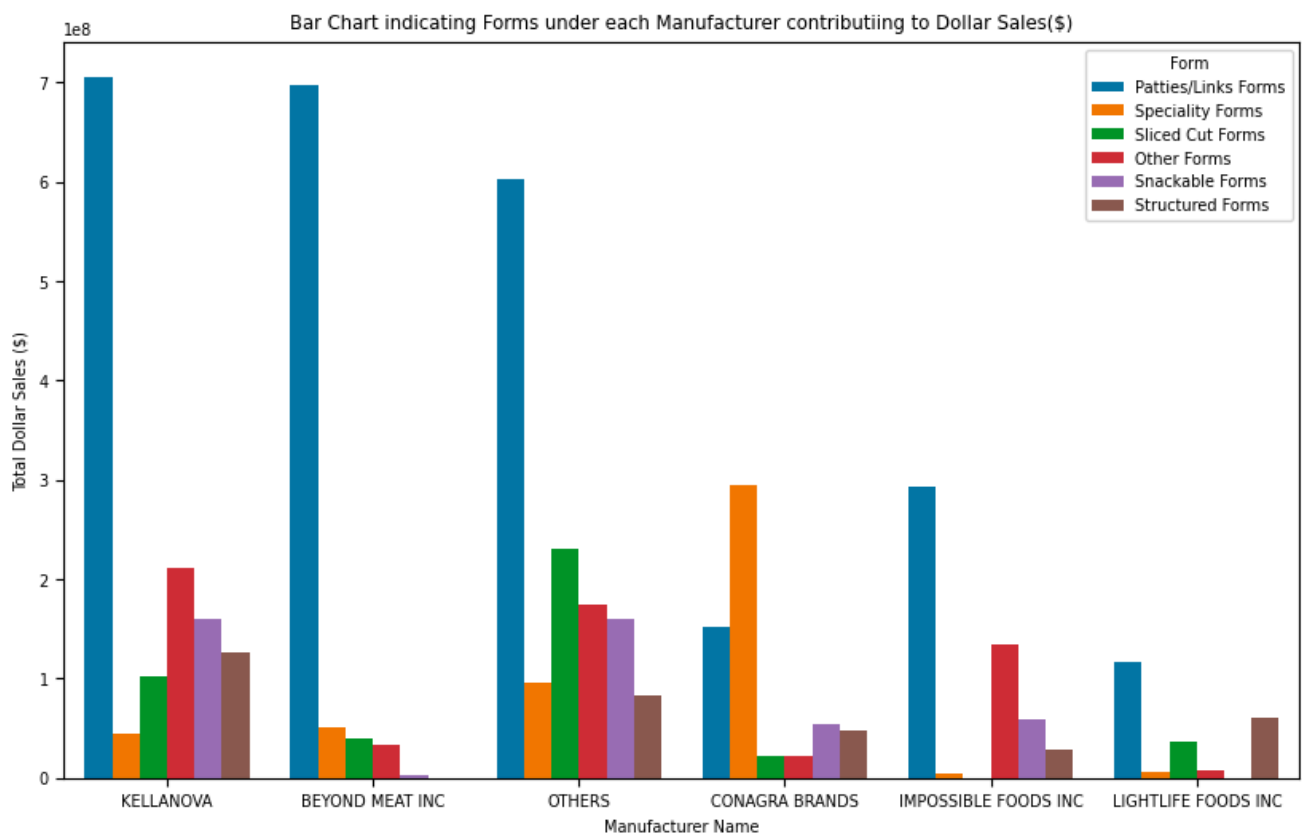
Table 5

| | Region | Manufacturer_Name | Form | Dollar_Sales |
|--------|---------------|---------------------|---------------------|--------------|
| 295126 | California | CONAGRA BRANDS | Snackable Forms | 1099.662195 |
| 559788 | Great Lakes | OTHERS | Speciality Forms | 4448.147986 |
| 478744 | Plains | LIGHTLIFE FOODS INC | Structured Forms | 236.119209 |
| 559736 | California | OTHERS | Speciality Forms | 2098.905174 |
| 78367 | South Central | OTHERS | Patties/Links Forms | 3579.556319 |
| ... | ... | ... | ... | ... |
| 476947 | West | OTHERS | Snackable Forms | 7724.959425 |
| 476944 | Southeast | OTHERS | Snackable Forms | 4693.542668 |
| 476941 | South Central | OTHERS | Snackable Forms | 1576.056940 |
| 27117 | Great Lakes | CONAGRA BRANDS | Sliced Cut Forms | 3638.218654 |
| 991779 | West | OTHERS | Other Forms | 102.819827 |

824367 rows x 4 columns

| | Manufacturer_Name | Form | Total_Dollar_Sales |
|----|----------------------|---------------------|--------------------|
| 0 | KELLANOVA | Patties/Links Forms | 7.057847e+08 |
| 1 | BEYOND MEAT INC | Patties/Links Forms | 6.965833e+08 |
| 2 | OTHERS | Patties/Links Forms | 6.026408e+08 |
| 3 | CONAGRA BRANDS | Speciality Forms | 2.954154e+08 |
| 4 | IMPOSSIBLE FOODS INC | Patties/Links Forms | 2.924214e+08 |
| 5 | OTHERS | Sliced Cut Forms | 2.298838e+08 |
| 6 | KELLANOVA | Other Forms | 2.106803e+08 |
| 7 | OTHERS | Other Forms | 1.751406e+08 |
| 8 | KELLANOVA | Snackable Forms | 1.607137e+08 |
| 9 | OTHERS | Snackable Forms | 1.593391e+08 |
| 10 | CONAGRA BRANDS | Patties/Links Forms | 1.527105e+08 |
| 11 | IMPOSSIBLE FOODS INC | Other Forms | 1.342130e+08 |
| 12 | KELLANOVA | Structured Forms | 1.269278e+08 |
| 13 | LIGHTLIFE FOODS INC | Patties/Links Forms | 1.159750e+08 |
| 14 | KELLANOVA | Sliced Cut Forms | 1.026506e+08 |
| 15 | OTHERS | Speciality Forms | 9.642480e+07 |
| 16 | OTHERS | Structured Forms | 8.252808e+07 |
| 17 | LIGHTLIFE FOODS INC | Structured Forms | 6.095697e+07 |
| 18 | IMPOSSIBLE FOODS INC | Snackable Forms | 5.948699e+07 |
| 19 | CONAGRA BRANDS | Snackable Forms | 5.438803e+07 |
| 20 | BEYOND MEAT INC | Speciality Forms | 5.111952e+07 |
| 21 | CONAGRA BRANDS | Structured Forms | 4.698008e+07 |

Table 7

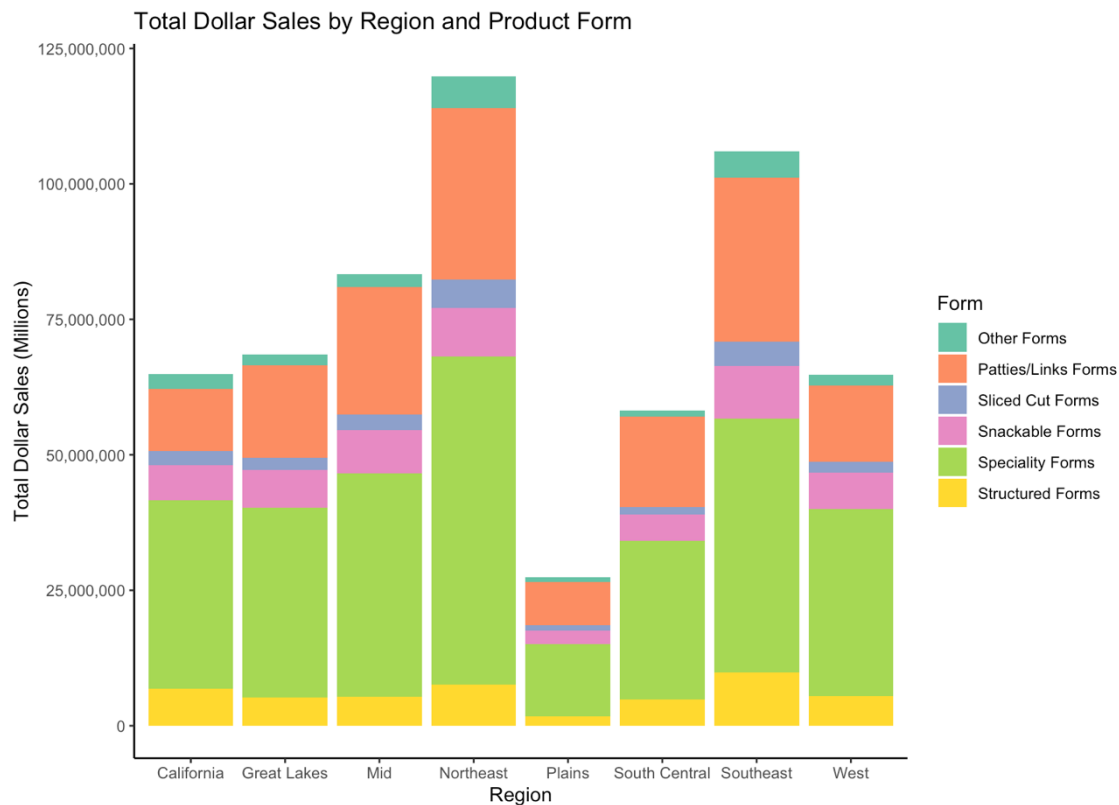


Based on the data from Table 8 and 9, it's evident that "Patties/Links Forms" consistently lead in sales across all regions of the US meat substitute market. Following closely are "Other Forms" and "Speciality Forms," indicating their competitive positions. "Snackable Forms," "Sliced Forms," and "Structured Forms" also contribute to sales but to a lesser extent. This underscores the importance of prioritizing "Patties/Links Forms" for brands seeking maximum Dollar Sales yield, particularly in major regions like "Northeast US," "Southeast US," and "Mid US" Regions. Aligning product strategies with regional preferences for these dominant forms can optimize sales performance and enhance market penetration. As consumer preferences evolve, continuous monitoring of regional sales trends will be crucial for brands to maintain their competitive edge in the dynamic meat substitute market landscape.

Table 8

| | Region | Form | Total_Dollar_Sales |
|----|---------------|---------------------|--------------------|
| 0 | Northeast | Patties/Links Forms | 5.507786e+08 |
| 1 | Southeast | Patties/Links Forms | 3.973788e+08 |
| 2 | Mid | Patties/Links Forms | 3.559514e+08 |
| 3 | California | Patties/Links Forms | 3.502897e+08 |
| 4 | Great Lakes | Patties/Links Forms | 3.288925e+08 |
| 5 | West | Patties/Links Forms | 3.146688e+08 |
| 6 | South Central | Patties/Links Forms | 1.632056e+08 |
| 7 | Northeast | Other Forms | 1.300896e+08 |
| 8 | Northeast | Speciality Forms | 1.085906e+08 |
| 9 | Plains | Patties/Links Forms | 1.049503e+08 |
| 10 | Southeast | Other Forms | 8.555427e+07 |
| 11 | Northeast | Snackable Forms | 8.521949e+07 |
| 12 | Great Lakes | Other Forms | 8.096683e+07 |
| 13 | Northeast | Sliced Cut Forms | 8.074234e+07 |
| 14 | Mid | Other Forms | 7.972445e+07 |
| 15 | Southeast | Speciality Forms | 7.558737e+07 |
| 16 | West | Other Forms | 7.333850e+07 |
| 17 | California | Other Forms | 7.017219e+07 |
| 18 | Northeast | Structured Forms | 6.997302e+07 |
| 19 | Mid | Speciality Forms | 6.896353e+07 |
| 20 | Great Lakes | Speciality Forms | 6.727424e+07 |
| 21 | Southeast | Snackable Forms | 6.421740e+07 |
| 22 | Southeast | Sliced Cut Forms | 6.099408e+07 |
| 23 | West | Sliced Cut Forms | 6.092678e+07 |
| 24 | California | Structured Forms | 5.998149e+07 |
| 25 | Great Lakes | Snackable Forms | 5.969716e+07 |
| 26 | Mid | Snackable Forms | 5.852467e+07 |
| 27 | Mid | Sliced Cut Forms | 5.803170e+07 |
| 28 | Great Lakes | Sliced Cut Forms | 5.794388e+07 |
| 29 | California | Snackable Forms | 5.719324e+07 |
| 30 | West | Speciality Forms | 5.672331e+07 |
| 31 | California | Sliced Cut Forms | 5.622578e+07 |
| 32 | California | Speciality Forms | 5.610697e+07 |
| 33 | West | Snackable Forms | 5.597971e+07 |

Table 9



a. Regression Analysis: Determining the T-Statistic Values for Region-Dollar Sales Influence

```

=====
Dep. Variable:      Total_Dollar_Sales      No. Observations:      8
Model:              GLM                     Df Residuals:          0
Model Family:       Gaussian                 Df Model:              7
Link Function:      Identity                 Scale:                 inf
Method:             IRLS                    Log-Likelihood:        108.75
Date:               Wed, 17 Apr 2024         Deviance:              7.2919e-13
Time:               14:17:00                 Pearson chi2:          7.29e-13
No. Iterations:     1                       Pseudo R-squ. (CS):    1.000
Covariance Type:    nonrobust

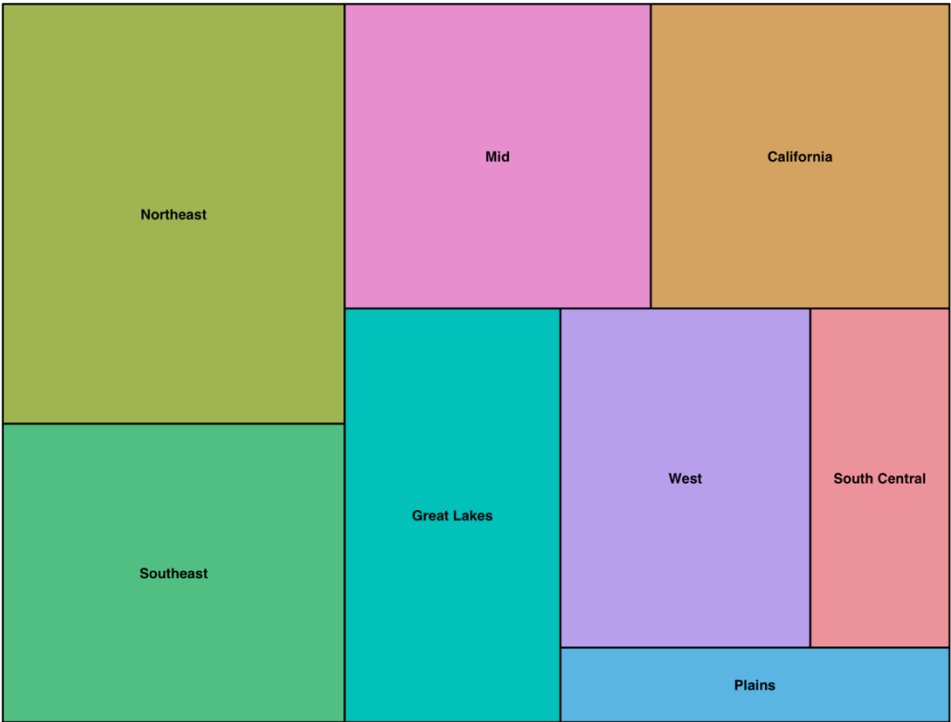
=====

```

| | coef | std err | z | P> z | [0.025 | 0.975] |
|-------------------------|------------|---------|----|-------|--------|--------|
| Intercept | 6.5e+08 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Great Lakes] | -1.198e+07 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Mid] | 1.608e+07 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Northeast] | 3.754e+08 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Plains] | -4.425e+08 | inf | -0 | 1.000 | -inf | inf |
| Region[T.South Central] | -3.126e+08 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Southeast] | 7.886e+07 | inf | 0 | 1.000 | -inf | inf |
| Region[T.West] | -4.459e+07 | inf | -0 | 1.000 | -inf | inf |

Table 10

Total Dollar Sales by Region



Conclusion: Despite the insignificant p-value, indicating region's limited impact on Dollar Sales, Northeast, Southeast, and Mid US regions exhibit higher and positive coefficients in Table 10. This suggests potential for stronger sales performance in these regions for Conagra Meat Substitute products.

Recommendation: Prioritizing sales efforts in Northeast, Southeast, and Mid US regions can be advantageous for Conagra. Leveraging the positive coefficients observed in Table 10, focusing marketing and distribution strategies in these regions can enhance sales performance and market presence.

b. Regression Analysis: Determining the T-Statistic Values for Region-Dollar Sales Influence

Table 11

| Generalized Linear Model Regression Results | | | | | | |
|---|--------------------|---------------------|------------|-------|--------|--------|
| Dep. Variable: | Total_Dollar_Sales | No. Observations: | 6 | | | |
| Model: | GLM | Df Residuals: | 0 | | | |
| Model Family: | Gaussian | Df Model: | 5 | | | |
| Link Function: | Identity | Scale: | inf | | | |
| Method: | IRLS | Log-Likelihood: | 80.521 | | | |
| Date: | Wed, 17 Apr 2024 | Deviance: | 7.7449e-13 | | | |
| Time: | 14:17:00 | Pearson chi2: | 7.74e-13 | | | |
| No. Iterations: | 1 | Pseudo R-squ. (CS): | 1.000 | | | |
| Covariance Type: | nonrobust | | | | | |
| | coef | std err | z | P> z | [0.025 | 0.975] |
| Intercept | 5.82e+08 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms] | 1.984e+09 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms] | -1.524e+08 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms] | -1.443e+08 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms] | -8.447e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms] | -2.363e+08 | inf | -0 | 1.000 | -inf | inf |

Conclusion: Despite potential insignificant p-values, the regression model reveals that forms such as "Patties/Links Forms" exhibit significant positive coefficient values, indicating their substantial contribution to Dollar Sales. Therefore, it is pivotal for brands in the Meat Substitute Category to prioritize these forms to maximize their Dollar Sales yield. Leveraging the insights from Table 11, focusing marketing and product development efforts on "Patties/Links Forms" can enhance sales performance and market competitiveness within the dynamic meat substitute industry landscape.

c. GLM Analysis : Form * Region ~ Total_Dollar_Sales for 'Kellanova' Manufacturer

Table 12

| Generalized Linear Model Regression Results | | | | | | |
|---|--------------------|---------------------|------------|-------|--------|--------|
| Dep. Variable: | Total_Dollar_Sales | No. Observations: | 48 | | | |
| Model: | GLM | Df Residuals: | 0 | | | |
| Model Family: | Gaussian | Df Model: | 47 | | | |
| Link Function: | Identity | Scale: | inf | | | |
| Method: | IRLS | Log-Likelihood: | 720.89 | | | |
| Date: | Wed, 17 Apr 2024 | Deviance: | 2.5338e-13 | | | |
| Time: | 14:17:00 | Pearson chi2: | 2.53e-13 | | | |
| No. Iterations: | 1 | Pseudo R-squ. (CS): | 1.000 | | | |
| Covariance Type: | nonrobust | | | | | |
| | coef | std err | z | P> z | [0.025 | 0.975] |
| Intercept | 2.054e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms] | 5.989e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms] | -9.194e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms] | -1.016e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms] | -1.637e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms] | -2.476e+06 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Great Lakes] | 8.018e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Mid] | 9.881e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Northeast] | 3.107e+07 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Plains] | -8.202e+06 | inf | -0 | 1.000 | -inf | inf |
| Region[T.South Central] | -5.474e+06 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Southeast] | 1.014e+07 | inf | 0 | 1.000 | -inf | inf |
| Region[T.West] | 9.555e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Great Lakes] | 7.016e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Great Lakes] | -4.798e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Great Lakes] | -5.783e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Great Lakes] | -4.823e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Great Lakes] | -8.817e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Mid] | 1.715e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Mid] | -6.22e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Mid] | -7.056e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Mid] | -8.288e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Mid] | -8.954e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Northeast] | 2.083e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Northeast] | -2.718e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Northeast] | -1.72e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Northeast] | -2.791e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Northeast] | -2.652e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Plains] | -3.611e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Plains] | 2.771e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Plains] | -2.646e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Plains] | 6.583e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Plains] | -3.386e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.South Central] | -1.531e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.South Central] | 4.839e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.South Central] | -1.256e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.South Central] | 5.219e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.South Central] | -2.29e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Southeast] | 1.92e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Southeast] | -4.623e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Southeast] | -5.366e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Southeast] | -6.149e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Southeast] | -1.138e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.West] | 3.211e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.West] | 7.324e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.West] | -3.657e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.West] | 2.744e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.West] | -2.598e+06 | inf | -0 | 1.000 | -inf | inf |

Conclusion: The GLM analysis for 'Kellanova' as the Manufacturer indicates a notable correlation between Form and Dollar Sales. Particularly, the form "Patties/Links Forms" demonstrates positive and higher coefficient values, suggesting its significance in driving Dollar Sales. Moreover, when considering region, this form maintains substantial coefficient values across all regions, with notable contributions observed in the Mid, Northeast, and Southeast regions. Therefore, prioritizing marketing efforts and product development strategies around "Patties/Links Forms" can potentially enhance Dollar Sales performance for 'Kellanova' within the meat substitute market landscape.

d. GLM Analysis : Form * Region ~ Total_Dollar_Sales for 'Beyond Meat.Inc' as the Manufacturer

Table 13

| Generalised Linear Model Regression Results | | | | | | | |
|---|--------------------|---------------------|------------|----|-------|--------|--------|
| Dep. Variable: | Total_Dollar_Sales | No. Observations: | 48 | | | | |
| Model: | GLM | DF Residuals: | 0 | | | | |
| Model Family: | Gaussian | DF Model: | 47 | | | | |
| Link Function: | Identity | Scale: | inf | | | | |
| Method: | IRLS | Log-Likelihood: | 697.59 | | | | |
| Date: | Wed, 17 Apr 2024 | Deviance: | 6.6912e-13 | | | | |
| Time: | 14:17:01 | Pearson chi2: | 6.69e-13 | | | | |
| No. Iterations: | 1 | Pseudo R-squ. (CS): | 1.000 | | | | |
| Covariance Type: | nonrobust | | | | | | |
| | | coef | std err | z | P> z | [0.025 | 0.975] |
| Intercept | | 1.843e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms] | | 1.178e+08 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms] | | 3.737e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms] | | -1.576e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms] | | 5.511e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms] | | -1.843e+06 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Great Lakes] | | 2.446e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Mid] | | 2.022e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Northeast] | | 5.076e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Plains] | | -2.719e+05 | inf | -0 | 1.000 | -inf | inf |
| Region[T.South Central] | | 1.75e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Southeast] | | 6.016e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.West] | | -2.609e+04 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Great Lakes] | | -4.23e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Great Lakes] | | -2.394e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Great Lakes] | | -2.152e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Great Lakes] | | -2.502e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Great Lakes] | | -2.447e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Mid] | | -2.534e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Mid] | | -2.526e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Mid] | | -2.77e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Mid] | | -2.178e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Mid] | | -2.023e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Northeast] | | 2.058e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Northeast] | | -5.84e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Northeast] | | -4.958e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Northeast] | | 1.266e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Northeast] | | -5.077e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Plains] | | -9.868e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Plains] | | -2.438e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Plains] | | 2.88e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Plains] | | -5.398e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Plains] | | 3.711e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.South Central] | | -9.59e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.South Central] | | -4.442e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.South Central] | | -1.625e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.South Central] | | -6.728e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.South Central] | | -1.75e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Southeast] | | -1.108e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Southeast] | | -2.304e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Southeast] | | -5.731e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Southeast] | | -7.452e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Southeast] | | -6.017e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.West] | | -2.566e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.West] | | -2.16e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.West] | | 3.769e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.West] | | -6.284e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.West] | | 3.592e+04 | inf | 0 | 1.000 | -inf | inf |

Conclusion: The GLM analysis for 'Beyond Meat' as the Manufacturer shows a non-significant p-value for the correlation between Form and Dollar Sales. However, notable positive coefficient values are observed for forms such as Patty/Links, Speciality Forms, and Sliced Cut Forms. Moreover, region-specific analysis reveals significant contributions from the Northeast region for Patty/Links Forms and the Plains region for Structured Forms. This highlights the importance of regional focus in driving sales for specific form categories within the 'Beyond Meat' product line, suggesting opportunities for targeted marketing and distribution strategies to optimize sales performance.

e. GLM Analysis : Form ~ Total_Dollar_Sales for the top 5 Manufacturers

Table 14

| Generalized Linear Model Regression Results | | | | | | | |
|---|--------------------|---------------------|------------|-------|--------|--------|--|
| Dep. Variable: | Total_Dollar_Sales | No. Observations: | 48 | | | | |
| Model: | GLM | Df Residuals: | 0 | | | | |
| Model Family: | Gaussian | Df Model: | 47 | | | | |
| Link Function: | Identity | Scale: | inf | | | | |
| Method: | IRLS | Log-Likelihood: | 682.59 | | | | |
| Date: | Wed, 17 Apr 2024 | Deviance: | 1.2498e-12 | | | | |
| Time: | 14:17:01 | Pearson chi2: | 1.25e-12 | | | | |
| No. Iterations: | 1 | Pseudo R-squ. (CS): | 1.000 | | | | |
| Covariance Type: | nonrobust | | | | | | |
| | coef | std err | z | P> z | [0.025 | 0.975] | |
| Intercept | 4.639e+07 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms] | 2.302e+08 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms] | -2.059e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms] | -1.147e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms] | 1.427e+06 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms] | -1.048e+07 | inf | -0 | 1.000 | -inf | inf | |
| Region[T.Great Lakes] | 7.783e+06 | inf | 0 | 1.000 | -inf | inf | |
| Region[T.Mid] | 1.265e+07 | inf | 0 | 1.000 | -inf | inf | |
| Region[T.Northeast] | 4.699e+07 | inf | 0 | 1.000 | -inf | inf | |
| Region[T.Plains] | -2.663e+07 | inf | -0 | 1.000 | -inf | inf | |
| Region[T.South Central] | -2.032e+07 | inf | -0 | 1.000 | -inf | inf | |
| Region[T.Southeast] | 1.591e+07 | inf | 0 | 1.000 | -inf | inf | |
| Region[T.West] | -6.903e+05 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms]:Region[T.Great Lakes] | -3.88e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms]:Region[T.Great Lakes] | -6.968e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms]:Region[T.Great Lakes] | -5.045e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms]:Region[T.Great Lakes] | -5.442e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms]:Region[T.Great Lakes] | -8.483e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms]:Region[T.Mid] | -8.09e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms]:Region[T.Mid] | -1.201e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms]:Region[T.Mid] | -8.583e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms]:Region[T.Mid] | -5.175e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms]:Region[T.Mid] | -1.17e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms]:Region[T.Northeast] | 7.204e+07 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms]:Region[T.Northeast] | -3.515e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms]:Region[T.Northeast] | -2.912e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms]:Region[T.Northeast] | -1.056e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms]:Region[T.Northeast] | -3.325e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms]:Region[T.Plains] | -1.684e+08 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms]:Region[T.Plains] | 1.06e+07 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms]:Region[T.Plains] | 6.469e+06 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms]:Region[T.Plains] | -3.486e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms]:Region[T.Plains] | 2.123e+06 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms]:Region[T.South Central] | -1.298e+08 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms]:Region[T.South Central] | 1.237e+07 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms]:Region[T.South Central] | 9.601e+06 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms]:Region[T.South Central] | 8.632e+06 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms]:Region[T.South Central] | 4.126e+06 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms]:Region[T.Southeast] | 1.91e+07 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms]:Region[T.Southeast] | -1.09e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms]:Region[T.Southeast] | -8.974e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms]:Region[T.Southeast] | -1.884e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms]:Region[T.Southeast] | -1.41e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Patties/Links Forms]:Region[T.West] | -3.126e+07 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Sliced Cut Forms]:Region[T.West] | -3.441e+05 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Snackable Forms]:Region[T.West] | -1.092e+06 | inf | -0 | 1.000 | -inf | inf | |
| Form[T.Speciality Forms]:Region[T.West] | 7.512e+05 | inf | 0 | 1.000 | -inf | inf | |
| Form[T.Structured Forms]:Region[T.West] | 1.419e+06 | inf | 0 | 1.000 | -inf | inf | |

Conclusion: Despite the non-significant p-value, analysis across the top 5 manufacturers, including Conagra, reveals significant correlations between Form and Dollar Sales. The primary focus for these manufacturers lies on "Patties/Links Forms" and "Speciality Forms," with notable positive coefficient values. Regionally, the Mid, Northeast, and Southeast regions exhibit positive coefficient values, indicating their influence on Dollar Sales. Moreover, specific form-region combinations display significant contributions, such as "Patties/Links Forms" in the Northeast and Southeast regions, and "Speciality Forms" in the South Central and West regions. This underscores the importance of regional considerations in formulating marketing

and distribution strategies to optimize sales performance for the top 5 manufacturers within the competitive meat substitute market landscape.

f. GLM Analysis : Form * Region ~ Total_Dollar_Sales for the top 5 Manufacturers

Table 15

| Generalized Linear Model Regression Results | | | | | | | |
|---|--------------------|---------------------|------------|----|-------|--------|--------|
| Dep. Variable: | Total_Dollar_Sales | No. Observations: | 48 | | | | |
| Model: | GLM | Df Residuals: | 0 | | | | |
| Model Family: | Gaussian | Df Model: | 47 | | | | |
| Link Function: | Identity | Scale: | inf | | | | |
| Method: | IRLS | Log-Likelihood: | 701.40 | | | | |
| Date: | Wed, 17 Apr 2024 | Deviance: | 5.7083e-13 | | | | |
| Time: | 14:17:01 | Pearson chi2: | 5.71e-13 | | | | |
| No. Iterations: | 1 | Pseudo R-squ. (CS): | 1.000 | | | | |
| Covariance Type: | nonrobust | | | | | | |
| | | coef | std err | z | P> z | [0.025 | 0.975] |
| Intercept | | 2.771e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms] | | 8.674e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms] | | -1.978e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms] | | 3.79e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms] | | 3.196e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms] | | 4.061e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Great Lakes] | | -7.154e+05 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Mid] | | -3.059e+05 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Northeast] | | 3.089e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.Plains] | | -1.94e+06 | inf | -0 | 1.000 | -inf | inf |
| Region[T.South Central] | | -1.659e+06 | inf | -0 | 1.000 | -inf | inf |
| Region[T.Southeast] | | 2.029e+06 | inf | 0 | 1.000 | -inf | inf |
| Region[T.West] | | -7.692e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Great Lakes] | | 6.324e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Great Lakes] | | 3.214e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Great Lakes] | | 1.155e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Great Lakes] | | 1e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Great Lakes] | | -8.945e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Mid] | | 1.233e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Mid] | | 5.849e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Mid] | | 1.775e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Mid] | | 6.765e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Mid] | | -1.126e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Northeast] | | 1.716e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Northeast] | | -5.074e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Northeast] | | -6.606e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Northeast] | | 2.275e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Northeast] | | -2.321e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Plains] | | -1.477e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Plains] | | 2.946e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Plains] | | -2.083e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Plains] | | -1.95e+07 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Plains] | | -3.139e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.South Central] | | 6.879e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.South Central] | | 5.022e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.South Central] | | -8.063e+04 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.South Central] | | -3.837e+06 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.South Central] | | -2.619e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.Southeast] | | 1.687e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.Southeast] | | -1.345e+05 | inf | -0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.Southeast] | | 1.168e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.Southeast] | | 1.011e+07 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.Southeast] | | 9.185e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Patties/Links Forms]:Region[T.West] | | 3.345e+06 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Sliced Cut Forms]:Region[T.West] | | 2.299e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Snackable Forms]:Region[T.West] | | 8.975e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Speciality Forms]:Region[T.West] | | 5.812e+05 | inf | 0 | 1.000 | -inf | inf |
| Form[T.Structured Forms]:Region[T.West] | | -5.77e+05 | inf | -0 | 1.000 | -inf | inf |

Inference: For Conagra Brands, the analysis highlights a strategic focus on multiple forms within the meat substitute category. Specifically, Conagra emphasizes 'Patties/Links Forms,' 'Speciality Forms,' 'Snackable Forms,' and 'Structured Forms,' with a prime emphasis on 'Speciality Forms.'

Regional analysis reveals dynamic competition among various forms within each region:

- In the Northeast US, 'Patties/Links Forms' and 'Speciality Forms' compete closely.
- In the Southeast US, 'Patties/Links Forms,' 'Snackable Forms,' and 'Speciality Forms' exhibit significant competition within the same brand and region.
- The Mid US region sees competition among 'Patties/Links Forms,' 'Sliced Cut Forms,' 'Snackable Forms,' and 'Speciality Forms.'
- In the West US, 'Patties/Links Forms,' 'Sliced Cut Forms,' 'Snackable Forms,' and 'Speciality Forms' compete vigorously within the same brand and region.

Recommendation:

Considering the form, region, and Dollar Sales dynamics across various brands, Conagra should prioritize 'Patties/Links Forms' in the Mid, Southeast, and Northeast US regions, aligning with competitors' regional optimization strategies. Additionally, highlighting 'Patties/Links Forms' as a primary offering in these regions could enhance sales revenue.

To further maximize sales revenue, Conagra can target 'Speciality Forms' in the South Central US and West US regions, leveraging insights from the sales region trajectories of top competitors in the meat substitute category. This detailed approach to form and region-specific marketing strategies can effectively drive sales performance and market presence for Conagra within the competitive landscape.

Question 4

What is the significance of product type and region on influencing the dollar sales amount?

- Independent variables: Product Type/Region
- Dependent variable: Dollar Sales(\$)

Product Type Sales Data

```
Product Type
MEAT SUBSTITUTE      560678
POULTRY SUBSTITUTE   108180
PLANT BASED SUBSTITUTE 74328
PLANT BASED CHICKEN SUBSTITUTE 32854
TOFU                 10567
TEMPEH               8533
FISH SUBSTITUTE      5966
SEAFOOD SUBSTITUTE   5237
SEITAN               4246
TOFU SUBSTITUTE      4168
SOY SUBSTITUTE        2455
PLANT BASED TURKEY SUBSTITUTE 2058
FALAFEL              1653
BURGER               1415
CHICKEN SUBSTITUTE   1363
TEMPEH SUBSTITUTE     334
SOY                  281
VEGETABLE MEAT SUBSTITUTE 51
Name: count, dtype: int64
```


a. Regression Analysis: Dollar Sales Prediction Based on Product Type and Region

OLS Regression Results

Dep. Variable:

Dollar Sales

R-squared:

0.006

Model:

OLS

Adj. R-squared:

0.006

Method:

Least Squares

F-statistic:

273.2

Date:

Tue, 30 Apr 2024

Prob (F-statistic):

0.00

Time:

15:51:33

Log-Likelihood:

-9.0965e+06

No. Observations:

824367

AIC:

1.819e+07

Df Residuals:

824348

BIC:

1.819e+07

Df Model:

18

Covariance Type:

nonrobust

coef

std err

t

P>|t|

[0.025

0.975]

const

3.402e+13

7.08e+13

0.480

0.631

-1.05e+14

1.73e+14

BURGER

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

CHICKEN SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

FALAFEL

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

FISH SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

MEAT SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

PLANT BASED CHICKEN SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

PLANT BASED SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

PLANT BASED TURKEY SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

POULTRY SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

SEAFOOD SUBSTITUTE

-3.402e+13

7.08e+13

-0.480

0.631

-1.73e+14

1.05e+14

...

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

[2] The smallest eigenvalue is 2.36e-21. This might indicate that there are strong multicollinearity problems or that the design matrix is singular.

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Inference:

- The R-squared and adjusted R-squared values are both extremely low, measuring at 0.006. This suggests that the model explains only 0.6% of the variance in dollar sales, indicating a poor fit where the predictors do not effectively explain the changes in sales. Despite this, the model's F-statistic is significant, suggesting that the model is statistically significant.
- However, all predictors, including the intercept, exhibit exceptionally large coefficients and standard errors, both in the range of $\pm 3.402e+13$. Such large values typically indicate severe multicollinearity or specification errors in the model. Moreover, the t-values and corresponding p-values are uniformly non-significant ($p > 0.05$) for all predictors.
- This uniformity, especially given the massive size of coefficients and standard errors, is highly unusual and suggests underlying issues with the data or model formulation. Consequently, due to the negative and very high coefficients, it is advisable to focus only on the Top 10 Product Types for further analysis and decision-making.

b. Regression Analysis Results for Product Type and Dollar Sales

| OLS Regression Results | | | | | | |
|--------------------------------|------------------|---------------------|-------------|-------|-----------|----------|
| Dep. Variable: | Dollar Sales | R-squared: | 0.006 | | | |
| Model: | OLS | Adj. R-squared: | 0.006 | | | |
| Method: | Least Squares | F-statistic: | 480.4 | | | |
| Date: | Tue, 30 Apr 2024 | Prob (F-statistic): | 0.00 | | | |
| Time: | 15:51:42 | Log-Likelihood: | -9.0966e+06 | | | |
| No. Observations: | 824367 | AIC: | 1.819e+07 | | | |
| Df Residuals: | 824356 | BIC: | 1.819e+07 | | | |
| Df Model: | 10 | | | | | |
| Covariance Type: | nonrobust | | | | | |
| | coef | std err | t | P> t | [0.025 | 0.975] |
| const | 1795.7761 | 152.997 | 11.737 | 0.000 | 1495.907 | 2095.645 |
| MEAT SUBSTITUTE | 4454.1269 | 154.303 | 28.866 | 0.000 | 4151.699 | 4756.555 |
| POULTRY SUBSTITUTE | 2911.0064 | 159.648 | 18.234 | 0.000 | 2598.102 | 3223.911 |
| PLANT BASED SUBSTITUTE | 5790.2893 | 162.587 | 35.613 | 0.000 | 5471.624 | 6108.954 |
| PLANT BASED CHICKEN SUBSTITUTE | 2555.1294 | 173.940 | 14.690 | 0.000 | 2214.213 | 2896.046 |
| TOFU | 1201.6419 | 211.415 | 5.684 | 0.000 | 787.276 | 1616.008 |
| TEMPEH | 3225.0108 | 223.093 | 14.456 | 0.000 | 2787.755 | 3662.266 |
| FISH SUBSTITUTE | 3317.8908 | 247.212 | 13.421 | 0.000 | 2833.364 | 3802.418 |
| SEAFOOD SUBSTITUTE | -253.6341 | 257.609 | -0.985 | 0.325 | -758.539 | 251.271 |
| SEITAN | -602.9888 | 276.383 | -2.182 | 0.029 | -1144.691 | -61.287 |
| TOFU SUBSTITUTE | -1105.6186 | 278.171 | -3.975 | 0.000 | -1650.825 | -560.412 |
| ... | | | | | | |

Inference:

- The model exhibits a very weak fit with an R-squared value of 0.006, indicating that only 0.6% of the variance in dollar sales is explained by the predictors.
- Product types like MEAT SUBSTITUTE, POULTRY SUBSTITUTE, and PLANT BASED SUBSTITUTE show positive coefficients, suggesting an increase in dollar sales. However, SEAFOOD SUBSTITUTE and TOFU SUBSTITUTE exhibit negative coefficients, with TOFU SUBSTITUTE being statistically significant ($p = 0.000$).
- Apart from SEAFOOD SUBSTITUTE, all predictors are statistically significant ($p < 0.05$), providing strong evidence against the null hypothesis for these coefficients.

Reccomendation:

Considering the positive sales impact and coefficients of various product types, Gardein should prioritize expanding and promoting their 'Meat Substitute' and 'Plant Based Substitute' lines. These products show substantial positive influence on dollar sales, particularly effective for boosting the brand's market presence and revenue.

[illegible]

Inference:

- The model demonstrates a modest explanatory power with an R-squared value of 0.019, indicating that it explains only 1.9% of the variance in dollar sales.
- Positive coefficients are observed for product types like MEAT SUBSTITUTE and PLANT BASED SUBSTITUTE, suggesting sales boosts, while negative coefficients, notably in combinations like California + SEAFOOD SUBSTITUTE and TOFU SUBSTITUTE, imply sales reductions.
- Most predictors are statistically significant ($p < 0.05$), indicating reliable drivers of sales differences according to the model.

Recommendation:

1. California Region:

Expand 'Meat Substitute' and 'Plant Based Substitute': These categories have shown strong positive coefficients in California, suggesting they are well-received and contribute significantly to sales. A targeted expansion and enhanced marketing in California could capitalize on this demand.

2. Great Lakes Region:

Leverage 'Fish Substitute' Strength: While not as strong as other regions, the positive coefficient for 'Fish Substitute' suggests a potential market niche that could be developed further in the Great Lakes area.

3. Northeast and Southeast Region:

Capitalize on 'Tofu' in the Southeast: With a strong positive coefficient, 'Tofu' sales in the Southeast are robust, indicating a successful market penetration that could be enhanced through targeted marketing and product availability.

4. Plains Region:

Address Broadly Negative Impacts: Almost all product categories show negative coefficients in the Plains region. This requires a strategic review to understand the market dynamics and possibly reposition Gardein products or intensify promotional activities to improve brand perception and product uptake.

