



Regional Sales and Profitability Analysis

Data Science Project – ETL Techniques

Dec 2025

Introduction

This report analyses a global sales dataset to examine purchasing patterns, profitability and seasonal trends for meat and vegetables. The analysis is conducted to support a convenience food business considering overseas expansion in a post-Covid environment, where changes in public behaviour has influenced business investment decisions. Different regions and selected countries are examined to assess profit maximisation potential and consumer purchasing behaviour. While the business traditionally relies on accounting and economic indicators, this report uses sales data to provide additional insights that can support strategic decision-making.

Data Overview

The dataset used in this analysis contains 203,318 records and 14 columns, representing sales transactions across multiple regions and countries. It includes information on regions, countries, item types, sales channels, order priority and order ID, as well as order and shipping dates, units sold, pricing, costs, revenue, and profit.

The dataset provides a broad view of purchasing behaviour and financial performance for different product types, particularly meat and vegetables, across global markets. Detailed data exploration, validation, and cleaning steps were carried out in the accompanying Jupyter notebook, where all decisions and supporting outputs are documented.

Data Preparation

The dataset was reviewed and prepared to ensure accuracy and consistency. This included checking data types, identifying missing values, and verifying value ranges across all columns. Date columns were converted to the appropriate datetime format to support time-based analysis.

Noise and potential outliers in numeric columns were assessed using summary statistics and visual checks. Missing values were handled based on the role of each column: base variables were preserved, while derived values such as revenue, cost, and units sold were recalculated using valid mathematical relationships where possible. Categorical columns were reviewed for inconsistencies, and incorrect or unexpected values were corrected where justified. All data preparation steps and decisions are fully documented in the accompanying Jupyter notebook.

Analysis

Average Spend on Meat vs Vegetables by Region

The average spend on meat and vegetables was calculated for each region using total revenue as a measure of spending. This allows for a comparison of how consumer spending differs between the two product types across regions.

The results show that, across all regions, average spending on meat is higher than spending on vegetables. While spending levels vary slightly by region, the overall pattern remains consistent, indicating stronger consumer spending on vegetables compared to meat, as shown in Figure 1.

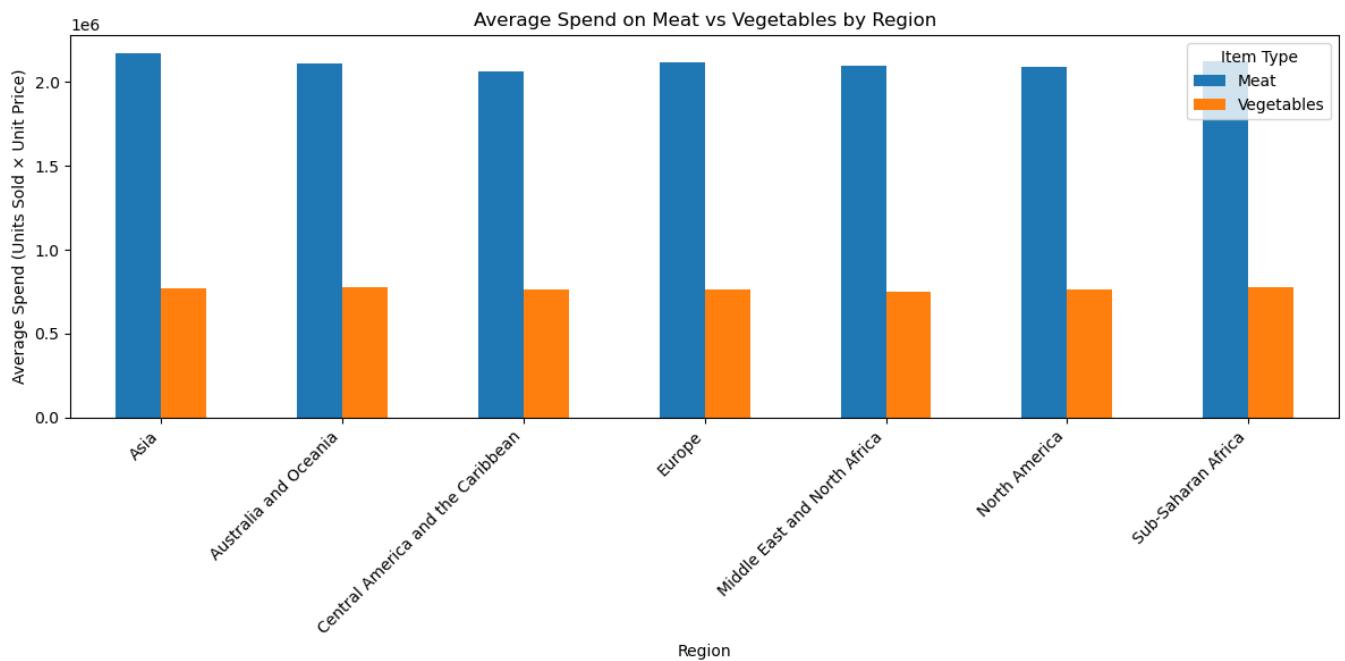


Figure 1: Average spending on meat and vegetables by region

Country with Highest Vegetable Spending

Total spending on vegetables was calculated for each country using total revenue. This was

done to identify the country with the highest overall expenditure on vegetables.

The results show that Uzbekistan records the highest spending on vegetables among all

countries in the dataset. Although spending levels across countries are relatively close,

Uzbekistan ranks highest with a total revenue of \$94,513,653.16, indicating a strong market

for vegetables and potential value for country-specific targeting.

Country with Highest Meat Consumption

Meat consumption was measured using units sold, as this reflects the quantity of meat

purchased rather than revenue or profit.

The results show that Togo records the highest meat consumption among all countries in the

dataset, with a total of 576,320 units sold. This indicates that, relative to other countries, meat

products are purchased in higher quantities in Togo, suggesting stronger demand for meat in

this market.

Average Profit by Region

Average profit was calculated for meat and vegetables across each region using total profit.

This allows for a comparison of profitability between the two product types across different markets.

The results show that vegetables generate higher average profit than meat in every region.

While average profit levels vary slightly across regions, the pattern is consistent, indicating that vegetables are more profitable than meat regardless of location.

As shown in Figure 2, vegetables outperform meat in terms of average profit across all regions, highlighting their stronger contribution to profitability.

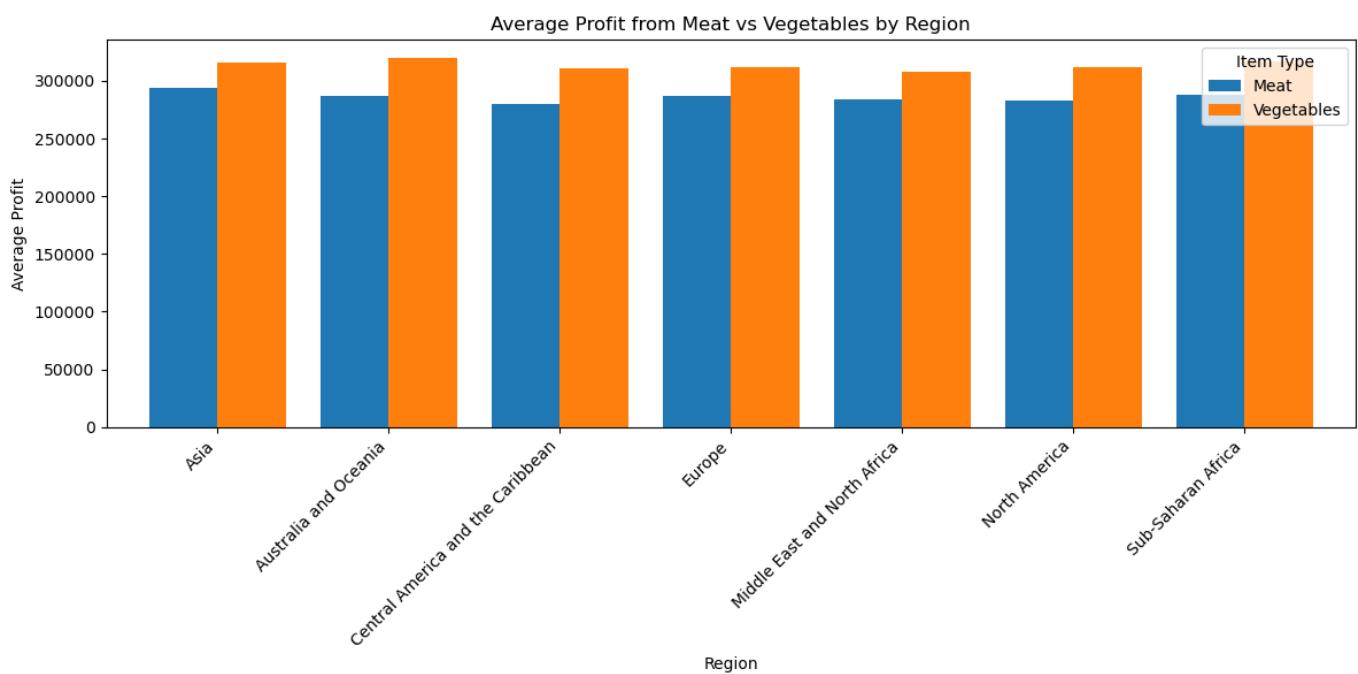


Figure 2: Average Profit by Region: Meat vs Vegetables

Total Revenue: Meat vs Vegetables by Year (Since 2012)

Total revenues for meat and vegetables were aggregated by year using the order date,

focusing on data from 2012 up to 2017 when data is latest available. This was done to

examine how revenue for the two product types has changed over time.

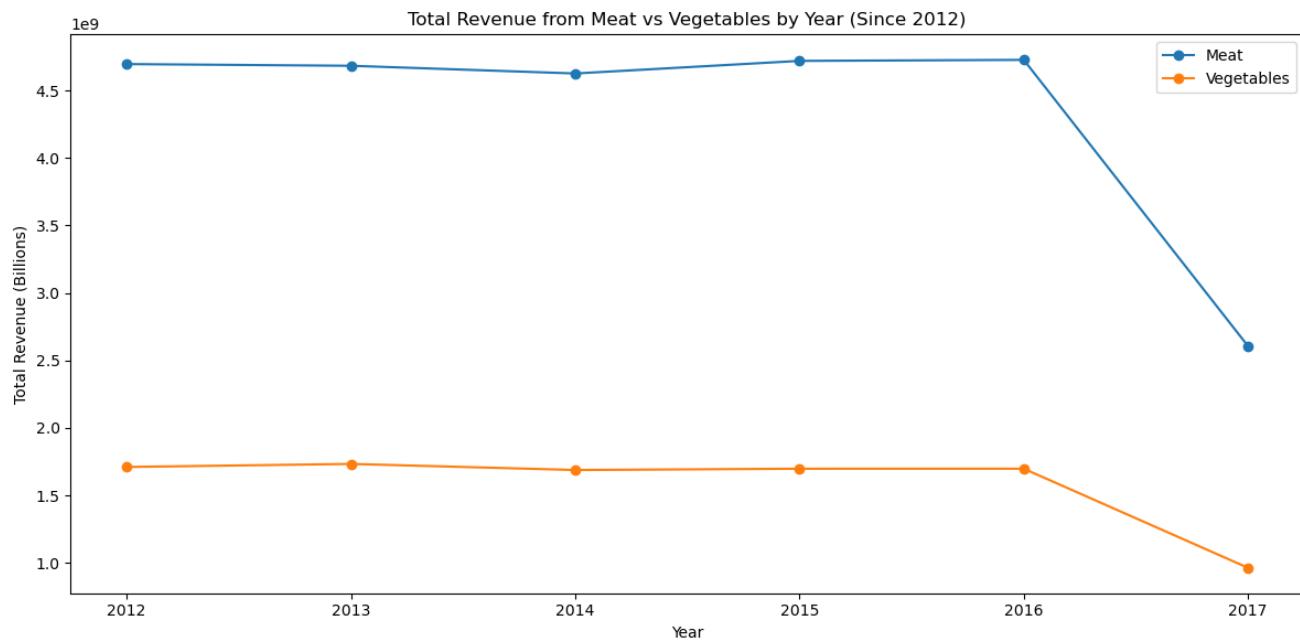
The results show that meat generates higher total revenue than vegetables in every year.

Although both product types follow similar trends over time, meat consistently records higher

revenue levels. A noticeable decline in revenue is observed in the later years, reflecting a

general reduction in overall sales activity rather than a shift between product types.

Figure 3: Total Revenue: Meat vs Vegetables



As shown in Figure 3, revenue trends for meat and vegetables move closely together across

the years, with meat maintaining higher revenue throughout the period.

Average Revenue Over a 12-Month Period

Average monthly revenues for meat and vegetables were analysed over a selected 12-month

period (2016) to examine short-term revenue patterns within a single year.

The results show that meat generates higher average monthly revenue than vegetables across

the 12-month period. Both products display similar month-to-month patterns, indicating

consistent purchasing behaviour throughout the year. While monthly revenue fluctuates, the

gap between meat and vegetables remains relatively stable.

As shown in Figure 4, meat maintains higher average revenue in each month of the selected

period.

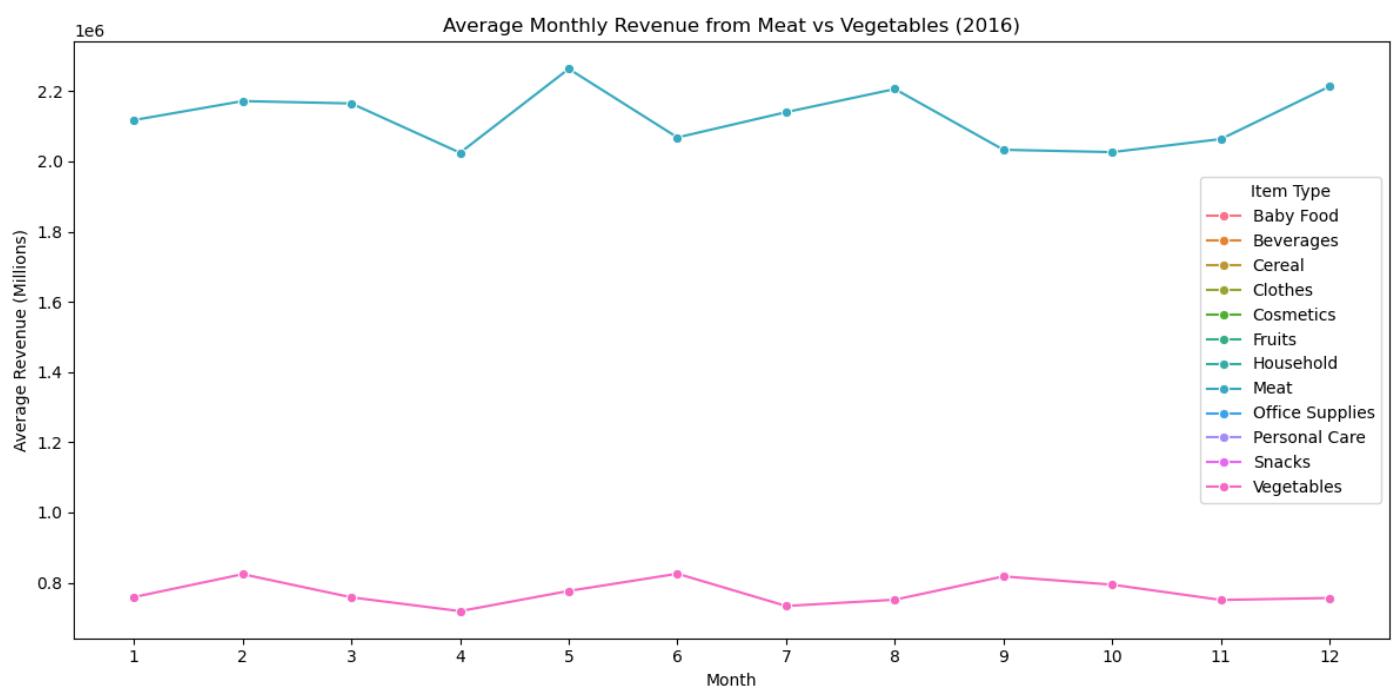


Figure 4: Average Monthly Revenue (Jan – Dec 2016)

Units Sold Analysis

The average number of units sold was calculated for each item in the dataset by region to examine purchasing volume across different markets. An overall mean for units sold was also calculated to provide a benchmark for comparison.

The results show that meat has an average units sold value above the overall mean, while vegetables fall below the overall mean. This indicates that meat products are purchased in slightly higher quantities than vegetables across the dataset, even though vegetables perform strongly in terms of spending and profitability.

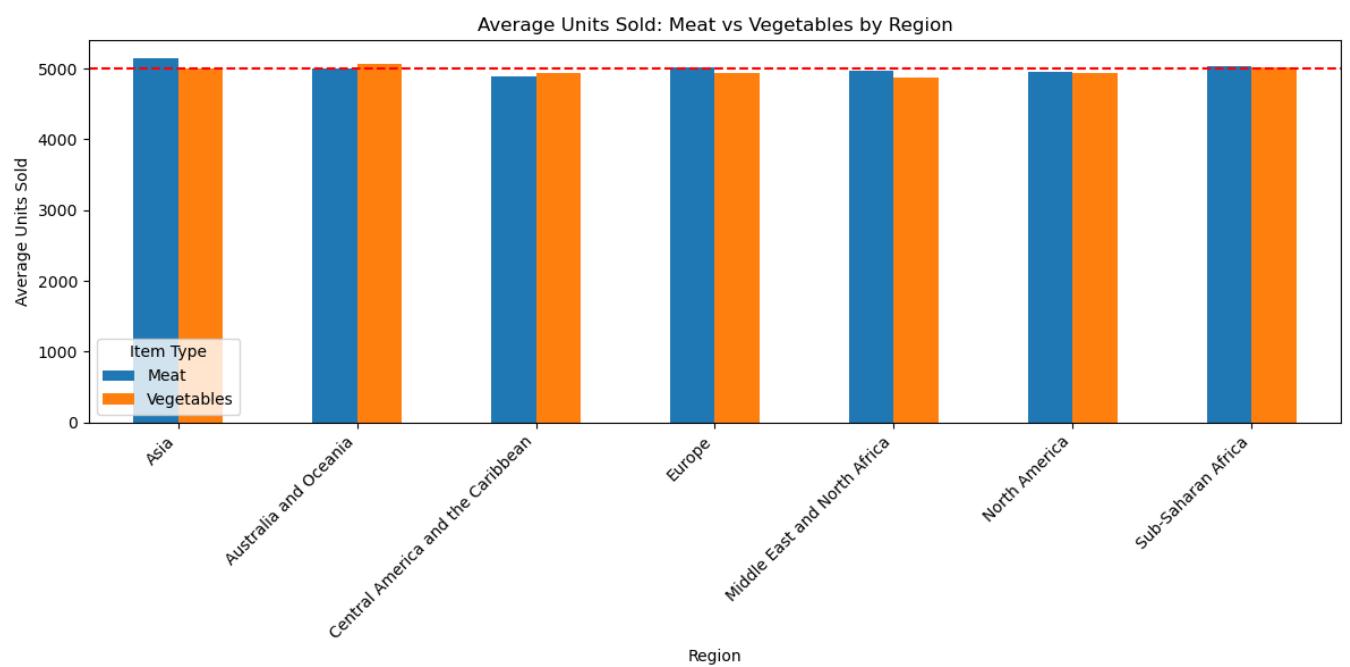
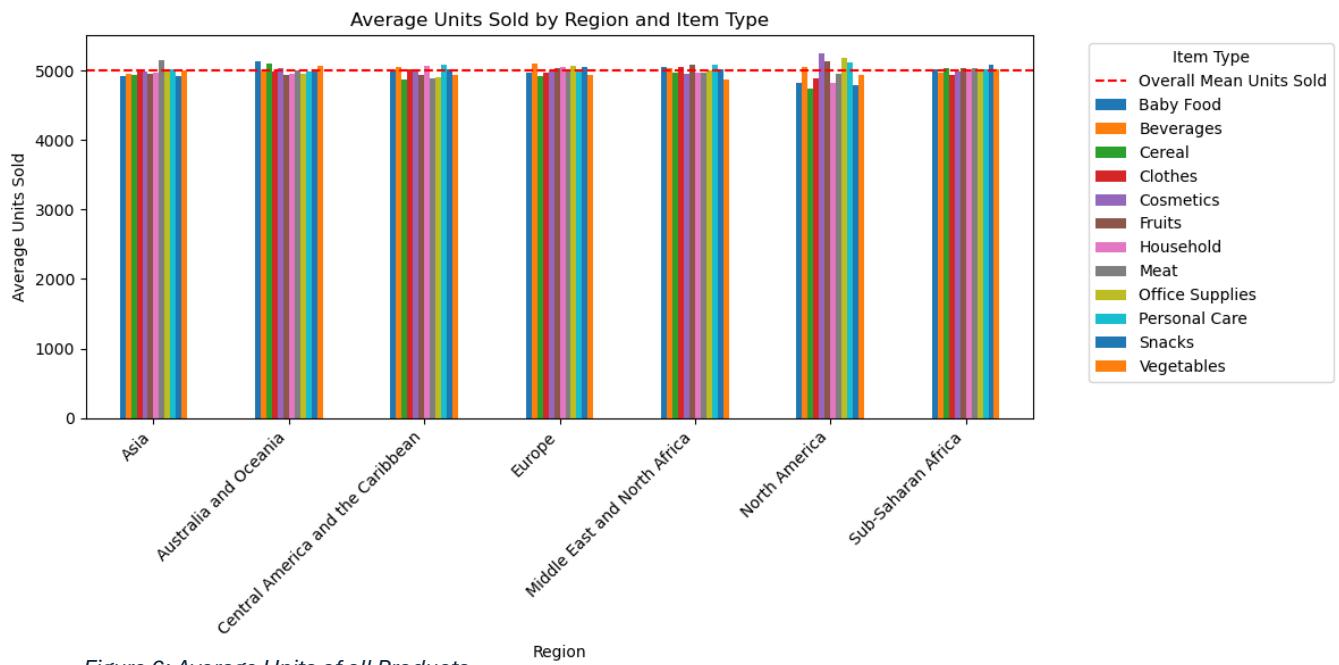


Figure 5: Average Units: Meat and Vegetables vs Average

This comparison helps distinguish between products that generate higher sales volumes and those that generate higher profit per transaction.

N.B: Figure 6 shows the average units sold for all products across regions. The dashed line represents the overall mean units sold across the dataset, which helps to assess whether individual products are sold above or below the average level.



Seasonal Spending Patterns: Meat vs Vegetables

Seasonal spending on meat and vegetables was analysed by aggregating total revenue across Winter (December to February), Spring (March to May), Summer (June to August), and Autumn (September to November).

The results show that Spring records the highest total spending for both meat and vegetables.

While spending levels vary across the remaining seasons, Spring ranks highest for both products. Spending is slightly lower in Summer and Winter, and lowest in Autumn.

As shown in Figure 7, total spending on both meat and vegetables peaks during Spring, indicating stronger consumer demand during this season.

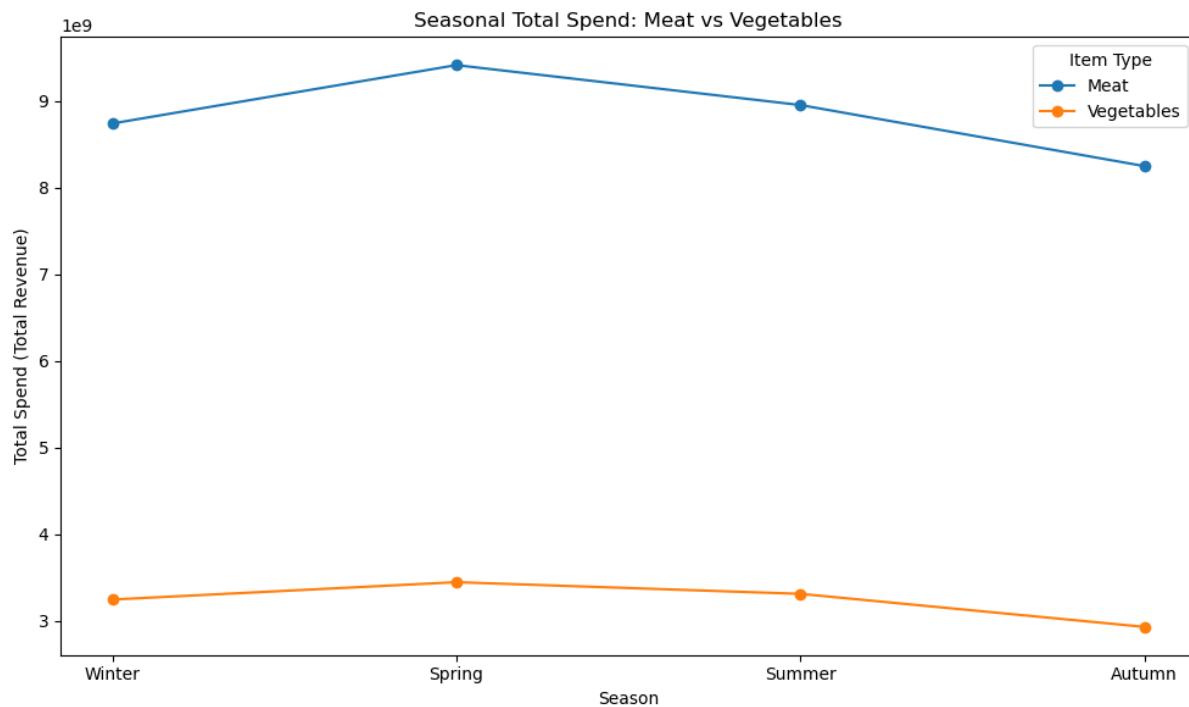


Figure 7: Season Spend for Meat vs Vegetables

Recommendations

The analysis indicates that Spring, during the period of March to May, is the most suitable time to expand the franchise.

The assessment shows that spending on both meat and vegetables is highest during Spring, making it the most economically favourable period to begin operations. Seasonal spending was calculated using total revenue, and Spring consistently ranked highest for both product categories. This result was also supported by the multi-series line chart, which shows clear spending peaks for meat and vegetables during the Spring season.

Opening during Spring aligns the franchise with historically strong purchasing behaviour, which can help support early sales and revenue growth. Although the dataset does not include direct measures of Covid-19 sentiment or consumer confidence, the observed spending patterns provide a useful baseline for identifying periods of higher demand. In a post-Covid environment, launching during a season with more stable and consistent consumer spending reduces risk and improves the likelihood of a successful market entry.

The analysis further indicates that the best opportunity for profit maximisation lies within high-revenue regions, particularly Europe and Asia, with a primary focus on vegetables. Vegetables generate higher average profit than meat across all regions, as shown in the average profit by region table and corresponding grouped bar chart. In every region, vegetables record higher average profit values than meat, indicating stronger profitability

across the dataset. In addition, regional revenue analysis shows that Europe and Asia consistently record high overall revenue levels for both meat and vegetables, suggesting strong and sustained purchasing demand in these regions.

By prioritising the sale of vegetables in regions with large and active markets, while cross-referencing with high-spending countries within those regions, the franchise is more likely to maximise returns based on the purchasing patterns and profit trends observed in the data. At the country level, vegetable spending is highest in Uzbekistan, highlighting the potential value of country-specific targeting within high-performing regions.

Limitations and Ethical Considerations

Limitations

This analysis is based on past sales data and does not include direct information on Covid-19 sentiment or changes in consumer behaviour. As a result, the findings reflect historical purchasing patterns and may not fully represent customer behaviour in a post-Covid environment. In addition, profit comparisons are based on total profit values and do not include a detailed breakdown of costs, which limits how much can be concluded about why vegetables are more profitable than meat.

Ethical Considerations

The results should not be used to make broad assumptions about consumer behaviour across entire regions or countries, as purchasing habits can vary widely within the same area. The findings should also not be interpreted as encouraging increased meat consumption, particularly given environmental and health concerns related to meat production. Any expansion decisions should therefore consider sustainability, local regulations, and responsible business practices alongside profit objectives.