CONSUMER SPENDING BEHAVIOR ANALYSIS: DETERMINANTS AND IMPLICATIONS.

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Abstract

The present study explores the combined impacts of demographic aspects, consumer behavior, and marketing campaigns on consumer expenditure in selected product categories. Descriptive analysis, correlation analysis, comparative analysis, ANOVA, factor analysis, and time series analysis were used as parts of the quantitative analytical technique that, based on the availability of secondary data, investigated how age group, income group, marital status, education, and acceptance of campaigns affect spending across different categories.

Key findings show that income is a major determinant of discretionary spending, while marital status and education level are closely related to spending on luxurious and quality-oriented products. Although campaign acceptance generally increases the spending of all categories of consumers, recency, or time of last engagement, shows very negligible spending of the long-time consumers upon acceptance. The study also highlights that family structure and time-of-consumer-brand association are two major determinants of consumer spending while long-time consumers tend to spend more. Descriptive and comparative analyses reinforce the

understanding of a dataset through clear insights on spending behaviors impelled by preferences and necessities related to lifestyle. The methods of analysis will support the underline of the diverse relationships that exist between consumer attributes and their expenditure decisions.

This research goes a long way in a scientifically relevant direction toward the targeting strategies marketers seek and the promotional efforts of businesses. It further stipulates the need to adopt various analytical techniques that will give a detailed understanding of the spending behavior of consumers and, therefore, add worthy evidence to inform future marketing practices and strategies.

CHAPTER ONE

1.0 Introduction

The term "consumer" focuses the attention of the definition on the individual or entity as the final user of the product or service, rather than on entities involved in the process of production, distribution, or reselling. In a broad sense, consumption refers to the process of acquiring, using, and often disposing of products or services. Consumer behavior involves the study of how people, groups, or organizations select, acquire, use, and dispose of products, experiences, or ideas. It comprises all the factors that affect consumers' choices: psychological, social, cultural, and economic aspects. Consumer behavior is the multidisciplinary field of study of how individuals, groups, or organizations decide to choose, buy, use, and dispose of goods, services, experiences, or ideas. (Piligrimienė et al., 2021). Any business trying to tune its offering to the needs and wants of its target markets needs to delve deeper into this behavior. Several critical factors underpin this behavior, each important in shaping consumer interactions with products or services.

The decision-making process is one of the most basic yet imperative aspects of consumer behavior. This process essentially involves several stages that a consumer characteristically goes through while making a purchase. It all starts with the realization of a need and the subsequent search for information to fulfill that need. Consumers evaluate various options by weighing the pros and cons of each option. Once the decision is reached, the purchase is made. However the process does not just end there, as post-purchase evaluation kicks in as consumers reflect on their satisfaction with the product or service, which may influence future purchasing decisions. A structured approach to a decision-making process such as this evidence that consumer behavior is quite thoughtful and often sequential.

Psychological Factors: Another major set of factors that influence consumer buying behavior is psychological. These include motivation, perception, learning, beliefs, and attitudes. (Indeed, Editorial Team, 2024). In the example of a car-buying consumer, motivational drive could be because of several needs: the desire for safety, the pursuit of status, or simply because of convenience. Another important psychological factor is perception, which determines how consumers interpret products based on sensory experiences and prior knowledge. Learning, resulting from past experiences, may affect later behavior, while beliefs and attitudes are the structure of a consumer's general approach to a purchase decision. (Hollifield & Coffey, 2023; Iwanow et al., 2005).

Aside from psychological factors, social influences are one of the strong forces shaping consumer behavior. The choices that consumers make may also be manipulated by their social environment, including family, friends, social networks, and cultural norms. (Shah, 2023; Understanding the Social Outcomes of Learning,2007). One might choose a specific brand of smartphone due to its features and also due to its popularity among peers. This social validation solidifies the choice and brings with it a sense of belonging and approval. Social influences reinforce the interdependence of individual decisions and the community in general.

Another important element in consumer behavior is cultural factors. Culture, subculture, and social class affect the preferences and buying behaviors of consumers. The cultural values and norms deeply held in society define what is desirable or acceptable. ((Akdoğan, Durucu, & Durmaz, 2021; Judge, 2014). Take, for example, food habits: this varies greatly in different cultures, which in turn influences consumers to buy a specific kind of food item. Likewise, sub-cultures within a culture, that is, ethnic groups or religious communities, might also have unique consumer behaviors. Social class, which often concomitantly affects income level, education level, and occupation level, further distinguishes consumer preference and access to goods and services.

Personal factors like age, occupation, lifestyle, economic situation, and personality greatly determine consumer behavior as well. (Alade, 2023). The young professional, for instance, may have y different buying habit than the person who is retired. The former may become increasingly oriented towards convenience and trendiness in their purchases, while the latter may focus on comfort and value. Their lifestyle choices guided by personal interests and activities further determine the kind of products that people are looking for. Economic situation, including income level and financial stability, has a direct influence on the purchasing power of consumers and on their capability of making some buying decisions. Among the major factors of economic influence are those of income levels, inflation, and general stability in the economy. (Investopedia, n.d.) In stronger economic times, consumers may be confident in spending on luxury or discretionary goods. During economic downturns, they are likely to spend only on basic goods and services and reduce non-essential purchases. This change in behavior shows that consumers' decisions are very sensitive to general economic conditions.

The behavior of consumer spending is an extensive field of research in marketing and economics, one that brings a deep understanding of the variables that motivate purchasing choices and the general dynamics of the economy. Knowledge of the factors determining consumer expenditure is important to businesses, policymakers, and scholars, as this information affects marketplace strategies, economic regulations, and many other areas.

1.1 Problem statement

The project Consumer Spending Behavior Analysis: Determinants and Implications is designed to study various psychological, social, and economic factors that shape consumer behavior. Grounded in firmly established theories such as the Theory of Planned Behavior (TPB), the Consumer Decision-Making Model, and core principles of Behavioral Economics, this paper seeks to examine the complex processes that consumers undergo once they become involved in making a purchase. This becomes an especially important study for not just academic excursions but also for enterprises willing to apply marketing strategies according to consumer behavior and for legislators trying to bring economic growth through informed decisions. The research conducted will therefore depict crucial findings relating to the dynamics of consumer spending in studying the leading causes and the way such trends could be influenced by external factors.

CHAPTER TWO

2.0 Literature Review

This will require a deep and tough analysis of the many factors that enter purchasing choices. The major determinants in the existing literature have been scrutinized: demographics, customer loyalty, and marketing tactics. However, it seems imperative to study the interactions among these factors and their reciprocal influences to get a complete understanding of consumer behavior. This literature review covers important areas of research, including the impact of demographic variables, the importance of customer duration and recency, the impact of marketing programs, identifying key spending categories, and examining general spending patterns. Drawing on the findings of a wide collection of research studies, this review establishes a strong foundation for the analysis of consumer spending habits and the implications for the same for businesses, policymakers, and consumers.

2.1 Analyze the Impact of Demographic Factors on Consumer Spending

Demographic variables such as age, gender, income, educational attainment level, and family composition are the basic constituents of consumer expenditure patterns (FasterCapital, 2024). These affect not only the type of goods and services consumers are interested in but also the general spending pattern about life stages. Younger generations, commonly known as Millennials and Generation Z, are traditionally found to spend a larger portion of their financial resources on technology, entertainment, and dining. This group is also more open to e-commerce and online services, showing their comfort with digital platforms and technology. In contrast, older consumers, particularly Baby Boomers and the Silent Generation, tend to spend more on healthcare, home maintenance, and retirement-related services. (Paut, 2022; Fan et al., 2022). The change in spending direction is based on needs related to life stages and a desire for stability and health security. Gender plays a crucial role in consumer behavior; research shows that women tend to spend more of their expenses on household goods, health care services, and children's products while men are likely to spend more on technology products, automobile-related goods, and leisure activities. (Fiagborlo et al., 2023)

One of the major forces that determine the quantity and quality of products purchased is income level. Those consumers who have a higher level of income usually have more discretionary income, which they can expend on luxury products, high-tech gadgets, and high-end services. On the other hand, lower-income groups are concerned with their basic needs like food, shelter, and transport, with very limited discretionary spending (Wang, 2023; Yao, 2023).

Furthermore, the level of educational attainment defines expenditure behavior; people with higher levels of education tend to invest in quality goods and services such as education, financial products, and cultural experiences. (Munir et al., 2023)

Despite this, most of the existing literature analyzes these demographic measures singly. There is a big lack of understanding regarding the interaction among these variables and their combined contribution toward more complex expenditure patterns. For example, how do the interactions of age and income influence spending on luxury goods, or how do gender and education together impact investment in health and well-being? Future research should therefore aim to fill these gaps by looking at the interactions between these demographic factors, hence giving a more nuanced understanding of consumer expenditure.

2.2 Understand the Role of Consumer Tenure and Recency

The concepts of consumer tenure and recency help to understand consumer loyalty and spending habits. Consumer tenure is the length of time in which the relationship between the consumer and a particular brand is established, while recency indicates the time elapsed since the customer last purchased a product. In most cases, long-term consumers have a deeper relation with a brand, are more loyal, and tend to spend more. The latter is often the result of past positive experiences, gaining trust, and perceived value, hence holding a higher lifetime value to the company. It was also found that customers who stay with the brand for a longer period are less price-sensitive, mainly because they perceive the value in the relationship with the brand to be much more. (Trebicka et al., 2023; Lemon & Verhoef, 2016). These customers have a higher tendency to participate in loyalty programs, respond positively to personalized marketing plans, and provide recommendations through word-of-mouth, thus increasing continued spending.

On the other hand, recency has a strong impact on the prediction of future purchasing habits. The customers who have recently had a transaction are in possession of a purchasing attitude and therefore become perfect targets for additional marketing efforts. Marketing strategies based on recency usually involve follow-up contacts, targeted promotions, and reminders to keep the brand name alive among the customers. This is especially effective in today's digital environment, where organizations can track consumer behavior in real-time and respond with appropriate, timely offers. However, the relationship between tenure and recency is complex and depends on contextual variables.

Especially in those sectors with a long purchase cycle, like real estate or the automotive industry, there may be different relevance of recency compared to the fast-moving consumer goods area. In addition, the dawn of digital platforms has changed the dynamics around tenure and recency, where now digital provides new ways for companies to stay in contact and deepen their relationships. Future research would do well to focus more on these dynamics, especially in digital marketing and changing customer behavior trends.

2.3 Evaluate the Influence of Marketing Campaigns

Marketing campaigns are, in fact, one of the main intervention tools for influencing consumer behavior. There is a big body of literature on how to understand their effectiveness. Traditional marketing strategies, such as television and print advertising, have been long studied, and their ability to shape consumer preferences and drive sales is well-documented. Many of these traditional methods usually rely on broad reach and frequency in hopes of building brand awareness and influencing consumer attitudes over time.

However, the rise of digital marketing has revolutionized how businesses engage with consumers. Digital platforms offer more targeted and personalized marketing opportunities, allowing businesses to tailor their messages to specific consumer segments based on demographics, past behavior, and real-time data. (Nwaimo, 2024) Social media campaigns, influencer marketing, and personalized advertising have emerged as powerful tools for driving consumer spending, particularly among younger, digitally savvy audiences. Personalized marketing, using analytics to deliver unique content and offers, is most effective in triggering spending among consumers. This is because it aligns with the individual consumer's preferences and behavior, which will make it more relevant to them. This is supported by several studies, such as Nwaimo, 2024, and Chandra et al., 2022. For instance, personalized email campaigns, where recommendations have been made based on previous purchases, have shown better conversion rates and increased the average order value.

However, so much remains unexploited about how different marketing campaigns intersect with consumer demographics, tenures, and regencies in determining spending behaviors across industries. Marketing campaign efficiency can be remarkably different depending on the stage of the consumer in the buying cycle, product or service type, and message delivery channel. For that reason, future research should be based on these interactions, especially in the context of multi-channel marketing strategies and online touchpoint integrations.

2.4 Identify Key Spending Categories

Identifying the key spending categories can help in understanding where consumers allocate their resources and how these patterns evolve. Traditionally, consumer spending has been categorized into broad areas such as necessities, which would involve items such as food, housing, and healthcare, discretionary spending on items like entertainment, dining out, and vacations, and savings or investments. Such categories are crucial in simplifying consumer behavior analysis and offering a framework that can be used to understand how various economic, social, and cultural factors ensure variance in spending.

Research has shown that economic conditions, cultural influences, and personal preferences significantly impact the distribution of spending across these categories. During economic downturns, consumers tend to prioritize necessities and reduce discretionary spending, leading to a shift in spending patterns. (Riles, 2018). Another crucial role is cultural factors such as societal values and norms. While spending on education and the welfare of the family is valued highly in some cultures, consumerism and status-driven purchases are dominant in other cultures. (Arıkan Saltık et al., 2013). Current studies have started exploring the new emerging categories of spending, particularly those related to digital goods and services. The proliferation of digital content-such things as subscription streaming services, online gaming, and e-books-has given rise to new ways in which consumer spending doesn't fit neatly into traditional categories. Deloitte estimates this will continue. Further, growing interest in pure-play subscription service kits, digital news subscriptions, and software as a service represent changes in how people divide up their budgets. The second key area of interest in this regard is how new ways of paying- for example, digital wallets, cryptocurrencies, and buy-now-pay-later-affect spending categories. Each of these could potentially drive changes in behavior either by making spending easier or by changing perceptions of cost and value. For example, the convenience of digital wallets can lead to higher spending in certain categories, while buy-now-pay-later options have the potential to impact customers' finance management and further resource allocation.

Further research is, thus, needed in the future to further establish these emerging trends, especially in their relation to traditional spending categories and effects on overall consumer behavior. This will be an important understanding for businesses in adapting to shifting consumer preferences, as well as for policymakers in trying to guide economic growth and stability.

2.5 Explore Overall Spending Trends

Overall spending trends reflect the macro level pattern of spending behavior over time. In general, these mirror broader influences such as economic indicators of inflation, unemployment rates, and consumer confidence, and even broader social and cultural changes. The spending of consumers normally increases with the growth in the economy because it reflects a higher level of confidence, disposable income, and even willingness to invest both in necessities and discretionary purchases. (Loxton et al., 2020) Conversely, during recessions, consumer spending contracts as individuals become more cautious and prioritize saving overspending. This shift is often accompanied by changes in spending categories, with consumers reducing expenditure on luxury goods and non-essential services while maintaining or even increasing spending on necessities. The COVID-19 pandemic accelerated a remarkable shift in consumer spending, much of which has gone toward online shopping, home-related expenses, and health and wellness products.

A recent study has also highlighted the impact of world events, advances in technology, and changing consumer tastes in purchasing habits. The growth in the importance of sustainability and ethical purchasing has led to greater demand for 'eco-friendly' goods and services, consequently affecting spending habits in several sectors". (Foroudi et al., 2017). Moreover, the rise in the gig economy and remote work has also reshaped the spending habits of consumers, moving towards more home office equipment, digital tools, and flexible services. However, most of these studies are limited to integrating presented macro-level trends into micro-level factors like demography and individual spending behaviors. This can provide a better level of understanding of consumer spending, helping businesses and policymakers alike to better anticipate and where necessary respond to changes in consumer preference and economic conditions.

Future research should also cover the long-term effects of digital transformation on the trends in consumer expenditure, particularly about harmonization between online and offline spending, the role of artificial intelligence in shaping consumer behavior, and how global supply chain dynamics affect the availability and pricing of products.

This expanded literature review will cover greater detail on the main areas of consumer spending behavior and hence provide a comprehensive basis for the study.

CHAPTER THREE

3.0 Methodology

This study, therefore, uses data from Kaggle to analyze the important determinants of consumer spending behavior. The research questions sought to understand how demographic factors, customer tenure and recency, marketing campaigns, and category spending determine consumer spending. The approach used in this study is a quantitative one through secondary data analysis. The methods used in this research have their roots in tested ways of conducting research; each chosen with care about relevance and efficiency toward consumer behavior data analysis.

3.1 Research Design

The quantitative nature of the design will be informed by the power of secondary data from an already available dataset. Different relationships will be analyzed, such as demographics, customer loyalty-alternatively stated as tenure and recency-responses from marketing campaigns, and spending behaviors across different categories of products.

3.2 Data Source and Sample Selection

Data Source: This dataset was sourced from Kaggle and covers 2,240 consumers in detail, including demographic data, purchase history, and interactions with marketing campaigns. The data covers a wide range of demographics and behaviors for consumers, making it a very sound basis for analysis.

Sample Selection: Already, the dataset is a broad sample of consumers from different demographic backgrounds, hence spending patterns can be studied across different segments. Also, because the sample already happens to be representative, no further sampling beyond including all entries will be conducted in the analysis.

3.3 Data Collection.

Given that the study relies on secondary data, the primary activity becomes choosing and processing the relevant variables from the dataset:

Demographics: Year of Birth, Education, Marital Status, Income, Kid home, Teen home. These are the variables that will help analyze the effect of demographics on consumer spending.

Customer Tenure and Recency: Date Customer will account for customer tenure, while Recency refers to the time in days since the last purchase; these variables will help explain how customer tenure and recency impact spending behavior.

Spending Categories: variables such as Wines, Fruits, Meat Products, Fish Products, Sweet Products, and Gold Prods will be examined to identify spending categories that are most important.

Marketing Campaigns: In order to study the impact of marketing campaigns variables such as AcceptedCmp1 to AcceptedCmp5 and Response will be used to show how consumers participated and responded in various campaigns.

3.4 Data Analysis Techniques

The following statistical methods are used, each representing a particular mathematical conception to provide a rigorous analysis:

- **Descriptive Analysis:** Descriptive statistics will be used to summarize the basic features of the data, including mean, median, standard deviation, and frequency distributions for demographic variables and spending categories. Descriptive statistics are foundational in marketing research and were effectively used by Kotler & Keller (2016) and Ali et al. (2020)

Mean(μ): $\mu = \frac{1}{n}\sum_{i=1}^{n} x_{\mathrm{i}}$

Standard Deviation (σ): $\sigma = \sqrt{\frac{1}{n-1}}\sum_{1-i}^{n}(x_i - \mu)^2$

These statistics provide an initial understanding of the distribution of key demographics and behavior variables.

- **Analysis of Variance** (ANOVA)

ANOVA tests are used to compare spending patterns across different demographic groups (e.g., age, education, marital status, income), customer tenure categories, and recency groups. This will help identify significant differences in spending behavior among these groups, providing valuable insights into targeted marketing strategies and customer relationship management initiatives. This method was employed by Torrone et al. (2018) to examine the influence of demographic variation on spending behaviors.

ANOVA Equation $\boldsymbol{y_{ij} = \mu + \alpha_i + \epsilon_{ij}}$

Where:

- y_{ij} is the dependent variable (spending),
- μ is the overall mean,
- α_i is the group effect (e.g., income group),
- ϵ_{ij} is the error term.

The F-statistics are used to test for differences between groups:

$$F = \frac{Between\ group\ variance}{Within\ group\ variance}$$

ANOVA allows for the identification of significant differences in spending patterns, helping to pinpoint which demographic groups have distinct behaviors.

- Correlation Analysis:

Correlation analysis is used to measure the strength and direction of relationships between variables such as income affecting spending categories. Yang et al. (2020)

applied this method to investigate how demographic factors affect consumer spending patterns. X

Correlation Coefficient(r):

$$\gamma = \frac{\sum(X_1 - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2 (Y_i - \overline{Y})^2}}$$

Understanding the correlation helps businesses identify which variables are driving spending in different categories, information more target marketing strategies

- **Factor Analysis:** Factor analysis is employed to reduce the complexity of consumer spending behaviours across different product categories. By identifying latent variables, the analysis simplifies relationships across many variables. Zhang et al. (2019) utilized factor analysis to determine key drivers of consumer spending.

Factor Analysis model:

$$X = \Lambda F + \in$$

Where:

X is the vector of observed variables (Spending on different products),

Λ is the matrix of factor loading

F represents the common factors

ϵ is the error term.

Factor analysis helps highlight underlying factors that influence spending behavior, reduce dimensionality, and enable better decision-making.

- **Time Series Analysis:**

Time series analysis, particularly the ARIMA model, is used to analyze trends in consumer spending over time, considering factors such as customer tenure and recency. Muallem & Peleg (2020) applied ARIMA to forecast consumer demand.

ARIMA Model:

$$yt = \alpha + \beta\beta_{1yt-1} + \beta_{2yt-2} + \cdots + \beta_{pyt-p} + \varepsilon_i$$

Where y_{ty} is the value of the series at time t, and ϵtis the error term.

Time series analysis is critical for forecasting future consumer spending trends based on past behaviour companies to anticipate demands shifts.

3.5 List of Key Contributions in the Field

The following tables summarize the major contributions to consumer behavior analysis

Table 1: Summary of Major Contributions in Consumer Spending Behavior Analysis

Study	Methodology	Key Contributions	Results
Kotler & Keller (2016)	Descriptive Statistics	Analyze consumer demographics and purchasing behavior trends	Insights into demographic segmentation and targeting
Torrone et al. (2018)	ANOVA Correlation Analysis	Identified demographic	Significant differences in

		factors influencing spending patterns	spending by age and income
Ali et al. (2020)	Time series Analysis, ARIMA	Explored consumer demand trends over time	Forecast demand trends and seasonal spending patterns
Zhan et al. (2019)	Factor analysis, Correlation	Reduction complexity in multiple spending categories	Identify key drives of consumer purchases
Muallem & Peleg (2020)	ARIMA, Time Series Forecasting	Time-based analysis of spending in response to marketing campaigns	Predicted the impact of marketing on future consumer spending

3.6 Ethical Considerations

This is a study based on secondary data; hence, ethical considerations revolve around responsible usage of the data. The dataset used has been anonymized, and analyses will be done with respect to standards of data privacy. No personal identifiers will be used to analyze or report the results.

CHAPTER FOUR

4.0 Results Chapter

This chapter represents the findings of the analysis conducted to explore the research questions proposed in Chapter 1 and analyzed based on the methods discussed in Chapter 3. These results will be reported to reflect the sequence and structure of the research question.

Data for the analysis in this study was acquired from the Consumer Behavior data found in Kaggle. The sections described herein depict the result of each analytical process, including descriptive statistics, time series analysis, factor analysis, and correlation that formed an easy link between results with their theoretical implications derived from Chapter 2.

This is further evidenced by the inclusion of tables and figures, which are numbered consecutively and referred to explicitly in the text to ensure clarity and ease in understanding the data presented.

4.0 Results Chapter

This chapter presents the findings from the analysis conducted to investigate the research questions posed in Chapter 1 and examined through the methods detailed in Chapter 3. The results are organized and reported to reflect the sequence and structure of the research question. The data analyzed in this study was obtained from Kaggle's Consumer Behavior data. The subsequent sections will detail the outcomes of each analytical procedure performed including descriptive statistics, time series analysis, factor analysis, and correlation providing a straightforward linkage between results and the theoretical implications discussed in Chapter 2. Tables and figures are provided to illustrate the finding comprehensively, with each visual aid numbered consecutively and referred to explicitly within the text. This ensures clarity and facilitates an easier understanding of the data presented.

4.1 Demographic and Economic Information

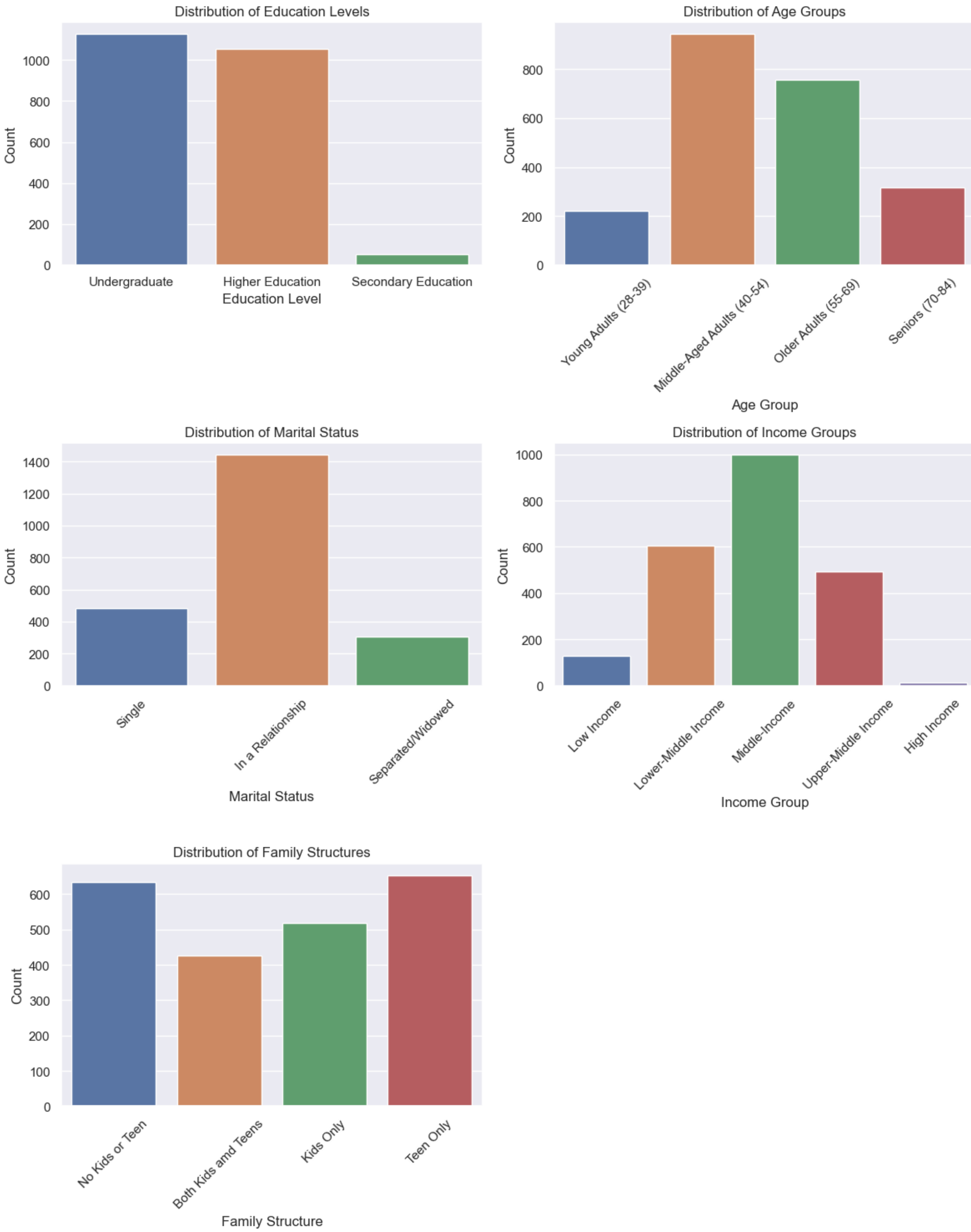

Figure 1: Distribution of Demographic and Socioeconomic Variables.

Figure 1 Series of bar charts against different demographic factors in the population. Different attributes such as education level, age group, marital status, income group, and family structure have been pointed out in the series of bar charts.

Distribution of Education levels

Two major leading educational levels are Undergraduate and Higher Education, which show the same count leading to a relatively educated population base.

Whereas for secondary education, it shows a considerably lower count, which seems to mean that there are just a few people with only high school education in this data. At least each of them is educated.

2. Distribution of Age Group

This population seems to skew to a younger and middle-aged group.

The biggest part is Middle-aged Adults (40-54), and the second is Older Adults (55-69).

Younger Adults (28-39) and Seniors (70-84) are smaller. And Seniors are the smallest among these four groups.

3. Distribution of Marital Status

Single, followed by people in a relationship, is the highest marital status.

Separated/Widowed represents a small percentage of the population.

4. Distribution of Income Group

The distribution is dominated by Middle-income and Upper-income groups, thus indicating economic demography ranging from middle to upper-income levels. High-income and low-income groups are smaller, with the high-income group slightly larger than the lower-income group.

5. Distribution of Family Structures.

The counts are somewhat similar for the Three family structures: No kids or Teen, Both Kids and Teen, Kids only, which may suggest a somewhat balanced distribution across different family unit types.

Teen only is the smallest in count, hence, fewer families with only teenagers.

Table 2: Summary Statistics of Total Spending, Income, Recency (Days), Tenure (Days), and Age

	Total Spending ($)	**Age(years)**	**Tenure Days**	**Income ($)**	**Recency (Days)**

mean	605.22	55.10	4108.78	51,943.76	49.10
std	601.85	11.69	202.14	21,406.50	28.96
min	50.00	28.00	3755.00	1,730.00	0.00
25%	69.00	47.00	3936.00	35,482.00	24.00
50%	396.00	54.00	4111.00	51,651.00	49.00
75%	1,043.50	65.00	4284.00	68,211.00	74.00
max	2,525.00	84.00	4454.00	16,2397.00	99.00

Table 2 summarizes descriptive statistics of total spending, income recency, and consumer age.

Total Spending: Range and dispersion: The range of spending is huge, from $50 to $2,525, and this indicates immense dispersion in the amount spent by consumers. The large standard deviation ($601.85) compared to the mean ($605.22) reflects that consumer spending is highly scattered. This might be indicative of various consumer segments with different behaviors at the spending level, possibly touching bases on income level, product preferences, or brand engagement level.

The age ranges from 28 to 84 and centers on the median age of 54. It would, therefore, suggest that the consumer base is towards middle-aged and older adults. This preponderance of an older demographic may have consequences for product preference, marketing channels, and service expectations; age-specified marketing strategies will thus be required.

Tenure in Days: Loyalty and Involvement: The tenure ranges from 3,755 days, or roughly 10.3 years, to 4,454 days, or approximately 12.2 years, with a median duration of about 11.3 years. The above explanation also justifies the long-term involvement with the product for most consumers. The tenure duration reflects strong consumer loyalty.

Income: Economic Diversity, the huge variation within the income ranges from $1,730 to $162,397, and the high-income dispersion at a standard deviation of $21,406.50 implies a very economically diverse consumer portfolio. Having full knowledge of the income groups allows product offering and price strategy alignment with the diverse abilities and preferences of consumers.

Recency: Customer Engagement-Recency of purchase implies that half of the consumers have engaged with the product in the last 49 days. This helps capture recent engagement levels and the effectiveness of the recent marketing efforts. Recency is normally one of the key predictors of consumer churn and opportunities for re-engagement campaigns.

4.2 Consumer Spending Behavior

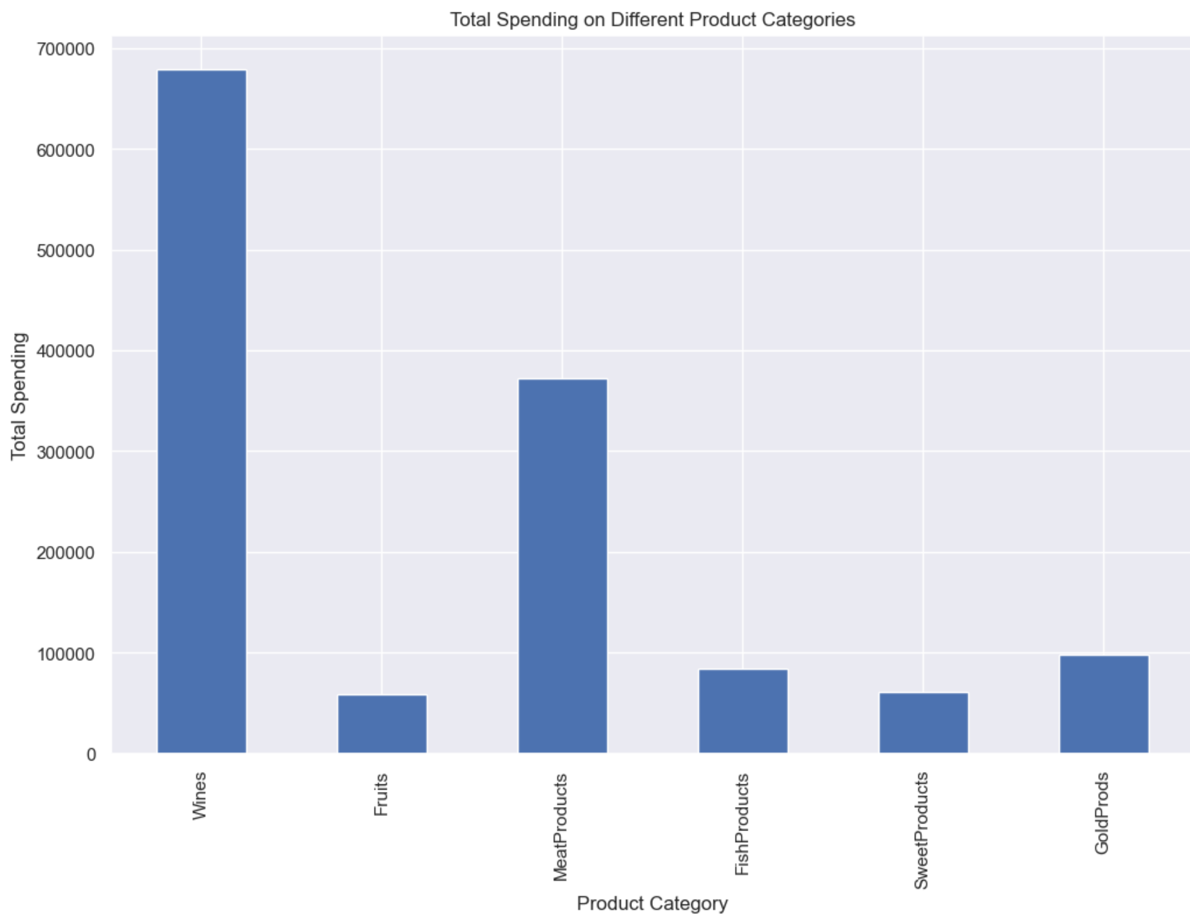

Figure 2: Total spending on Different Product categories

The bar graph titled Total Spending on Different Product Categories visualizes the distribution of total spending across various product categories.

Overview of Total Spending by Product Category

Wine: A High-Spending, Culturally Embedded Segment.

The highest total spending in all categories, the spending comes to 700,000 units. This also reflects that wine is one of the highly demanded products among consumers. This trend signified an established market segment wherein buyers would be willing to spend a bit more, possibly because they felt the extra cost for wine was worth it or preferred it for cultural reasons.

Wine expenditure could also indicate a cultural or lifestyle variable-one that consigns wine not only to consumption but also to one status. Following Maslow's hierarchy of needs, people could consider wine to belong to self-actualization and esteem needs as these are usually part of a celebration, social gatherings, or an indulgence for oneself.

It might also be that wine is perceived as an investment in quality or health, where studies indicate several health benefits for moderate consumption of wine, particularly red wine, such as antioxidant properties. The perception would then make consumers allocate the lion's share of their expenditure on wine.

Meat Product: Highly Demanded and Intertwined with Tradition.

The second highest category by spending, significantly lower than wine, but still substantial with about 300,000 units. That said, it is still quite indicative of substantial consumer engagement and demand.

High spending on meat can indicate the nutritional and dietary significance of meat as a primary source of protein. To many consumers, especially in cultures encouraging protein intake through animal sources, meat is a diet staple that contributes to higher spending. This perpetuates theories in nutritional anthropology, wherein dietary preference often prioritizes protein perceived as giving strength for daily energy needs.

Cultural traditions may also factor in, whereby meat often occupies the center of special occasions. This association with significant occasions could make meat products a priority for the consumer when allocating their spending. Akdoğan, Durucu, & Durmaz, 2021; Judge, 2014.

Food consumption psychology research indicates that consumers tend to emphasize their foodstuff on the cultural or family traditions that are reflected, an issue that may explain why, despite their staple nature, many dietaries see consistent spending. (Burton, 2016).

Fish products: Selective but moderate spending choice

It is the interest of the consumers in a moderate way, placed third in total spending at about 100,000 units. Fish products realize considerably less expenditure compared to meats, probably due to lower consumer preference or higher prices that cut frequency.

This relatively moderate spending may indicate that while consumers are interested in fish, perhaps owing to perceived health benefits purchase it less frequently than meat. Most of the time, fish is more expensive compared to other types of protein; this may make regular purchases accessible only to certain consumer segments.

Fish consumption is also associated with health-conscious behavior, where although consumers consider it a more up-end type of protein, they purchase it more discriminatorily because of its higher price.

Sweet and Gold Products:

Both categories show relatively the same spending amount from the consumers, a little below the expenditure on the fish products, but with gold products a little above the sweet products. This is a narrow market where particular segments of consumers are interested, maybe because such goods are considered luxury or non-essential.

Discussion: This, with the other product, might be looked at more as treat items. While pleasurable, they are generally thought of as discretionary purchases, which could make their spending periodic indulgence rather than regular buys. This goes along with the hedonic consumption concept, such that sweets fulfill pleasure but are not considered necessary items. (Pinto, 2022)

Gold products, on the other hand, are quite niche, and may indeed be appealing to a particular segment of those looking for symbolic representations. Spending here may relate to conspicuous consumption theory, Veblen, where buyers of luxury goods consume such products as a means of reflecting status, even when practical utility is low.

Fruits: Routine, Essential Spending on Low Financial Allocation

Fruit is the lowest spending within categories by far, implying routine but low-value purchases.

Expenditure on fruits probably reflects their needs as part of the daily grocery basket but with a small budget apportionment, unlike other grocery commodities. Generally, fruits are low-priced; therefore, consumers are more likely to purchase frequently but in small quantities hence lower spending.

The habitual buying behavior witnessed in fruits is precisely explained by behavioral economic theories, in which the commodities of daily use are bought based on need and where extreme spending is less likely unless health-conscious consumers drive demand.

Fundamentally, this analysis gives companies a solid insight into the trends of consumers' preferences and spending behavior related to categories of products. Companies strategically position their market and business operations in congruence with these perspectives, optimizing their pricing to increase the engagement of their consumers and foster consumer loyalty. These insights therefore support revenue growth since business efforts would align with the distinct needs and interests of their consumer base.

4.3 Demographic Factors on Consumer Spending Behaviors.

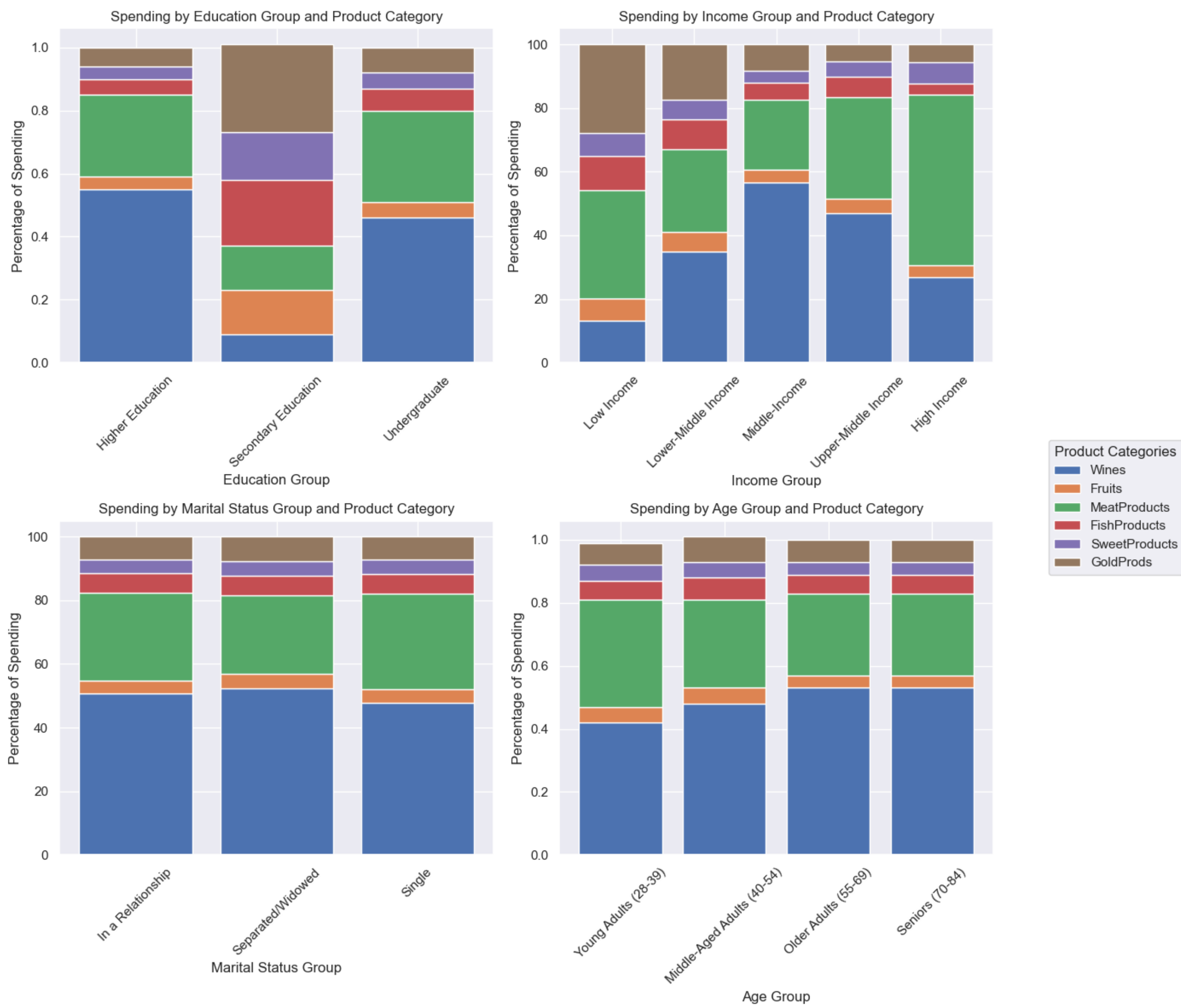

Figure 3: Consumer Spending Patterns Across Demographic Segments: A Multi-categorical Analysis.

The set of graphs is a comparative visualization of consumer spending across different product categories, segmented by various demographic groups: Education, Income, Marital Status, and

Age. Each graph provides a breakdown of how much each demographic group spends on specific categories, represented as a percentage of their total spending.

Graph Interpretation

In the graph, each bar stack represents 100% of spending by the demographic group, with colors indicating how much of the spending goes to which product group.

Spendings by Education Group and product:

Spending patterns across education levels are relatively evenly distributed across product categories, with minor variations in preference. For instance, the higher education groups had a slightly greater propensity to spend on luxury items such as wine and gold products compared to those in the secondary education category. Education level correlated with spending behavior can be indicative of differences in disposal income or value perception across education achievements.

Income and education level go hand in hand; a high education level often means a high income that can provide more disposable income for luxury purchases. Research in consumer psychology shows that education may affect spending because highly educated people are more likely to make conscious purchasing decisions and may appreciate quality more. Consumers with higher education would be perceived to value symbolic items in agreement with Maslow's hierarchy of needs, where consumers whose basic needs are met by self-actualization in the form of luxury.

By Veblen's theory on conspicuous consumption, education, and high-income groups should use luxury items as display status in agreement with observed spending patterns.

Spending by Income Group and Product Category:

The same is largely true of commodities like wine and gold products, luxury goods that show a steep increase in expenditure with rises in disposable income. Poorer households tend to devote a greater share of their budget to staples like fruit and meat products. Spending behavior does strongly vary with income level, in particular discretionary versus essential items.

Discussion: The pattern here reflects the theory of income elasticity of demand, stating that spending on luxury or non-essential items, for instance, wine and gold products, increases with rising income. In poorer income groups, a higher percentage is spent on essentials.

The lower-income groups avoid the high risk of expenditure on luxury items because they want to ensure stability, hence their priority on essential commodities. On the contrary, the high-income group simply looks forward to more experience-oriented or self-expressive purchases because finances are flexible and the ability to indulge in items that attribute symbolic or hedonic value.

For high-income groups, expenses on wine and gold are a form of social signaling hypothesis in consumer behavior that comes under Signaling theory, which identifies that people buy certain items to send a signal of wealth or status. According to Engel's law, as income rises, the proportion spent on necessities falls, and spending on luxury goods rises. Indeed, the higher-income groups have allocated less of their budget on essential items: fruits and meats.

By marital status group and product category:

Marital status influences expenditure behaviors. The related or single marital statuses spend more on wines and sweet products probably because of a different lifestyle compared to separated or windowed status groups. In real life, marital status may affect lifestyle and choices of consumption perhaps for the reason of differences in household needs or personal indulgence.

Interpreted: lifestyle choices and social influence, singles and couples may favor activities that are social in nature, such as dining out or going out, where wine and desserts are consumed. This supports social identity theory, wherein choices made by a person in a specific social setting represent group norms or a specific lifestyle to which social experience is most important. Expenditure for separated or widowed consumers would be more conservative since life changes affect income and financial responsibilities. It also agrees with the life cycle hypothesis where changes in consumption patterns occur with major life events. For instance, the number of social occasions for which wine is needed may be fewer for widowed people.

Single and those in a relationship may view sweets and wine as affordable indulgence and per Hedonic Consumption Theory, the focus is on pleasure or emotional experience with a product. Sweetness and wines are generally perceived as associated with good mood and socializing.

The family life cycle model predicts that individuals at different stages have varied spending behaviors as needs and responsibilities change.

The theory of planned behavior may explain how marital status influences attitudes and subjective norms toward spending. For example, social expectations may encourage couples or singles to indulge in categories like wines and sweets.

Spending by Age Group and Product Category:

Young adults aged 28-39 years have variations in spending across all categories and perhaps try many types of products. Seniors between 70-84 years have conservative or category-specific spending due to fixed incomes or settled preferences. This reflects age influencing consumer preference and capacity for spending, which varies because of different life stages of needs and wants.

Exploratory behavior among younger consumers, a younger adult group (28-39) may have more disposable income and be at a stage in life where they explore a range of product categories from indulgences to essentials. This is in line with the Optimal Distinctiveness Theory, where younger adults look to increase their distinctiveness through varied purchases and create a unique identity by the choices that they make about what to buy.

Seniors may focus on essential products due to fixed incomes or a shift in priorities toward simplicity and necessity. Prospect theory suggests that with increasing age, people become more risk-averse in their purchasing choices-especially when finances become limited. Life stage and stability: Younger adults are more likely to try new brands and products as they are setting up their financial and social independence, while for older consumers, brand loyalty and category preferences may have been made already. This again supports the Life Cycle Theory, where spending corresponds with the stage of life, and changing financial situations. The diversity in spending behavior may be explained by studies in consumer psychology showing that younger consumers have a more novelty- and experience-driven purchase desire, whereas seniors perhaps lean more toward habitual purchases of items people can trust.

Summary of insight and application for business and marketing:

- Businesses can develop luxury offerings for higher education or higher income earners, focusing on the cultural and symbolic nature of merchandise like wine and gold products.
- The focus for Consumers with lower education or income should be on essential budget-friendly options that have a strong value proposition, such as meat and fruit bundles. Marketing could be targeted at singles, or couples by highlighting the social and indulgent qualities of the wine and sweet products through holiday or event-themed campaigns. Separated or windowed individuals may respond better to personalized or needs-based marketing related to essentials.
- For younger consumers, promotions on familiar, essential items with loyalty discounts may stimulate spending in categories they care about, consistent with value-oriented shopping.
- Higher-income groups may accept premium pricing for perceived luxury goods, such as wine or gold products, while lower-income groups may prefer value-based pricing of everyday essentials. Indeed, businesses can effectively tap the spending potential of each group by adopting segmented pricing accordingly.
- These spending habits assist business enterprises in designing more targeted advertisements, based actually on facts and figures. For instance, wine and luxury

advertisements for high-end education consumers and essentials with value propositions for low-income segments can help refine advertising.

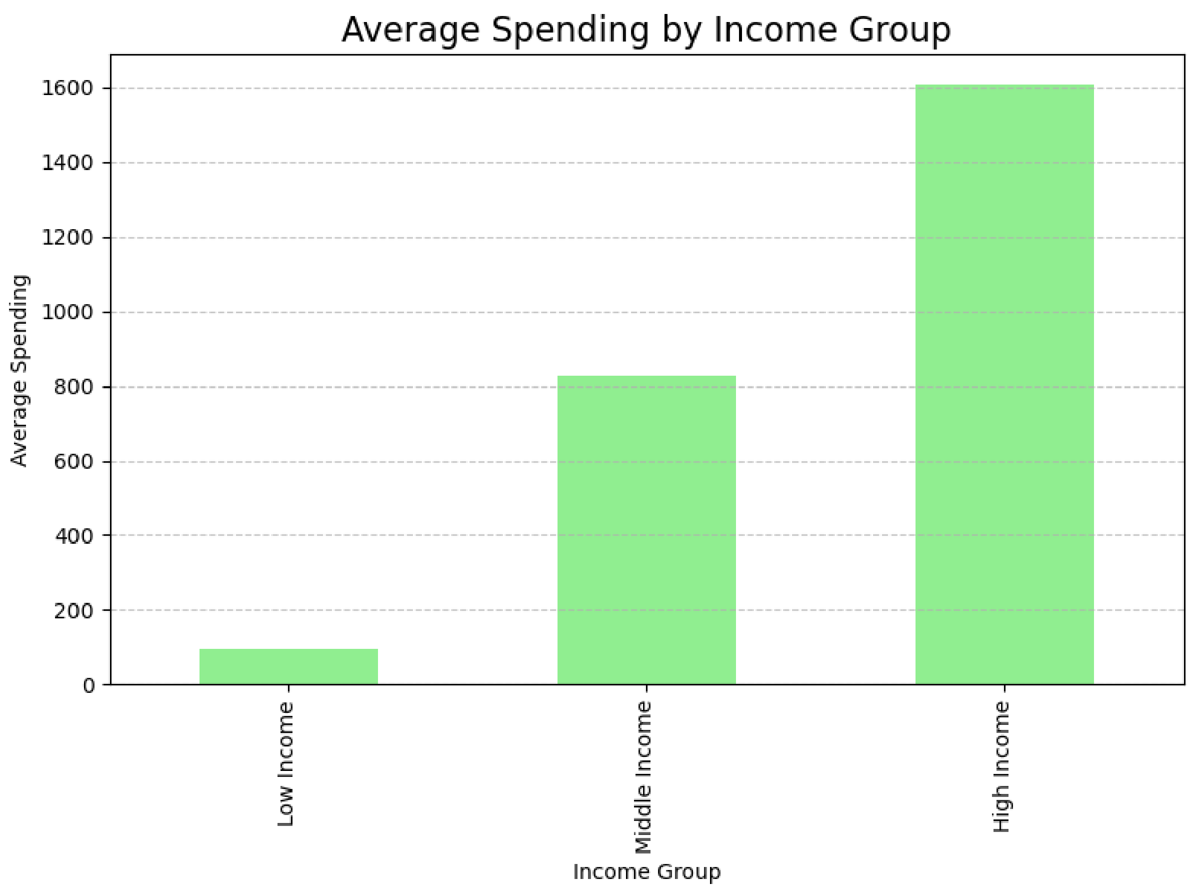

Figure 4 Average Spending by Income Group

The bar chart, titled “Average Spending by Income Groups,” visually represents how income level influences consumer spending across three distinct income brackets: low, middle, and high income. This data highlights substantial disparities in spending capacity tied to income, providing valuable insights into economic policy and business strategy.

Low-Income Group: Smallest Average Spending

The smallest bar, thus the smallest average spending, comes from the low-income group.

Interpretation: The lower average spending that this group demonstrates reflects limited disposable income, with financial resources more than likely being dedicated to essential items rather than discretionary spending. Income Constraint Theory suggests that lower-income consumers prioritize their basic needs, limiting their capacity for non-essential purchases. The lower-income consumer is therefore more subject to economic changes, such as inflation, further restricting their purchasing power. This would mean that businesses may see only limited demand for higher-end goods or services from this segment.

Implications: This group would be interested in value-for-money products and services that are needed, supported by value-oriented advertising emphasizing affordability.

Middle-Income Group: The middle-income group reflects moderate average spending, more than the low-income group but less than half of the high-income group.

Interpretation: People in this group usually have sufficient income to be able to meet needs and still have some discretionary income. This agrees with Lifestyle Segmentation Theory, which suggests that middle-income consumers may balance necessities with occasional spending on lifestyle or leisure items. Middle-income earners may devote a portion of their budget to higher-quality products or the odd indulgence, but they remain very sensitive to prices. They usually look for value and might give priority to products that would enhance the quality of their lifestyles without making their financial positions weaker.

Implications: To this group, businesses can highlight those products that add value by providing quality at an affordable price. This would include mid-range products and discounted premium products.

High-Income Group: Highest Average Spending: This group generally displays the highest average spending, almost twice that of the middle-income group, and well above that of the low-income group.

Analysis: The high-income group's high expenditure suggests that they have a handsome amount of disposable income, comfortably apportioned both to necessities and indulgences.

Discretionary Income Theory supports the fact that high-income earners can spend on frivolous items without jeopardizing their financial security. The high-income consumer is predisposed toward luxury goods and services that provide exclusivity, quality, and top-branded products.

Conspicuous Consumption Theory postulates that high-income groups may use spending to signal status or identity, thus driving demand toward luxury and high-quality goods. The high-income earning group is responsive to premium products, luxury brands, and exclusivity-driven marketing. Businesses catering to this segment might benefit from emphasizing quality, prestige, and exclusivity in their offerings.

The chart illustrates that spending capacity increases with increased income levels. As income rises, average spending also rises. This points to one factor of how directly income disparity can influence consumer trends: the capacity of high-income consumers in discretionary and luxury spending is higher compared to low-income brackets.

This would imply wide differences in spending capacity, which could have implications for economic policies and business strategies. Specifically, this may indicate that low-income segments may benefit more from policies of support of income or subsidies for main goods, while businesses can design products and marketing strategies targeted at the unique needs of each income group.

Business Strategy Implications

- Low-Income Group: Affordable, basic goods. May be attracted by value packages, discounts, or basic options that provide basic service without thrills.
- Middle-Income Group: Products positioned between quality and affordable price. Mid-range product lines or sometimes discounts on premium products will attract the leading budget-to-aspirational buying behaviors.

- High-Income Group**:** Premium and luxury products can be marketed prominently, focusing on exclusive merchandise, high-quality products, and reputable brands to capture the expensive tastes of rich buyers.
- Target the low-income group with practical messaging that talks about affordability and essential value.
- Allow the middle-income group to be inspired by quality and value-for-money products that uplift their lifestyles.
- Aimed at status, exclusivity, and quality, the high-income class is involved in marketing.
- Income-support initiatives or subsidies on essential goods are some of the ways policymakers could take off some of the financial pressures from low-income groups and probably have them more actively contribute to the economy.
- Policies aimed at stabilizing living costs-for instance, in areas of housing and health raise discretionary spending towards economic growth for the middle-income group.

4.4 Correlation

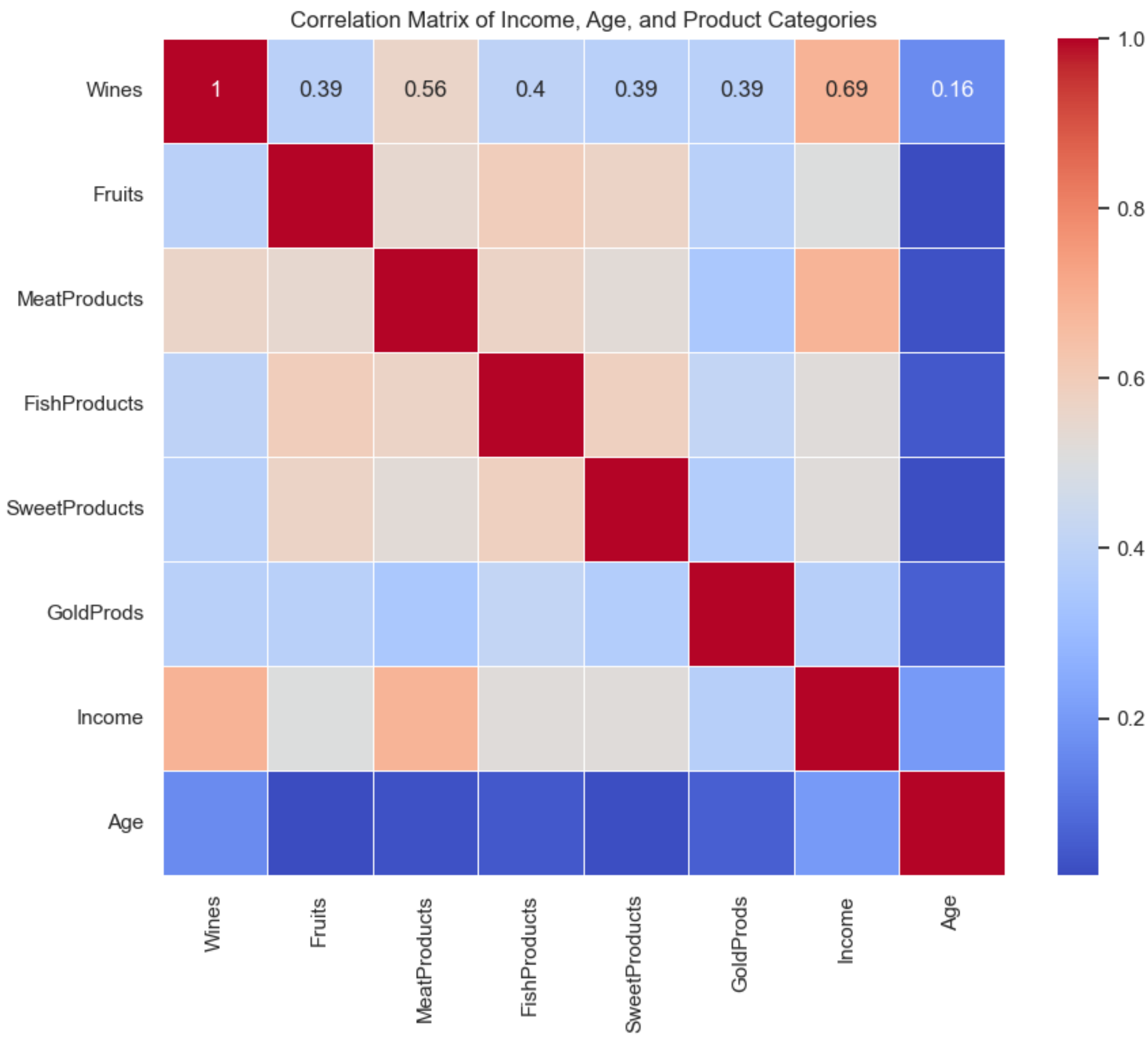

Figure 5: Correlation Matrix of Demographic Variables and Spending Across Product Categories.

The correlation matrix given below is a heat map of the various variables-product categories and their inter-variable relations relating to Income and Age. Color intensity and direction show the strength and direction of the correlations, respectively. Coefficient correlation ranges from -1.0

to 1.0 where 1.0 indicates perfect positive correlation, 0 indicates no correlation and -1.0 indicates perfect negative correlation.

Strong Positive Correlation between Wines and Income:

By far, the strongest positive correlation is observed between spending on wine and income, at a value of 0.69. This would suggest that the higher the income, the more it is spent on wines, reflecting perhaps a luxury or discretionary spending behavior that rises with wealth.

Interpretation: This positive correlation follows theories of conspicuous consumption; whereby high-income earners tend to purchase commodities that in turn signal their social status and lifestyles. Wine is often associated with sophistication, culture, and taste; hence, the more financially endowed consumers could see it as a worthy status symbol.

Generally, higher-income consumers have more disposable income to devote to products perceived as high quality. Consumer behavior studies indicate that perceptions of exclusivity and quality influence wine consumption and hence make it more attractive to higher-income consumers who seek unique experiences. (Mick, 1986)

CCT again supports it because income is one of the significant determinants of accessing luxury products that consumers use to build or reinforce social identities. High-income consumers will most likely be loyal to brands or products they feel identify with status, which in this case could be wine.

Age-Gold Products Correlation: The correlation between age and expenditure on gold products is appreciably positive at 0.16. While this is a moderate correlation, it may indicate that older people could spend a little more on gold products, either due to higher disposable income or different investment preferences.

Interpretation: older consumers can generally provide more financial stability and disposable income to invest in assets such as gold that tend to retain their value. Gold purchases may signify a preference for 'hard' assets, particularly from older respondents seeking avenues for low-risk financial investment.

Cultural associations for purchasing gold have traditional value and could be considered a family legacy product. Older consumers may prioritize purchases of this type for personal consumption or as a family heirloom.

Prospect Theory suggests that, with increasing age, people get more risk-averse and prefer conservative expenditure and investment decisions. Gold as an asset class fits this bill quite nicely, and that possibly explains the preference among older consumers.

Comparison with existing research:

Financial psychology research indicates that people approaching their retirement age tend to redirect their expenditures toward low-risk investments that have long-term value. This conservative investment behavior for older age groups reflects the modest correlation between age and gold spending.

Positive-Weak Correlation of Fruit Spending with Income and Age: In this case, the correlation is positive but weak, 0.39 with wine and 0.39 with age. Both higher income and older age contribute mildly to an increase in fruit consumption, possibly because of health consciousness or a stable purchasing pattern.

Interpretation:

Both are indicative of better health awareness amongst older and higher-income classes, while studies in health psychology indicate that expenditure on fresh products, such as fruits, rises among the classes.

Fruits would form part of a stable and routinized buying habit for older adults and the higher income groups, where quality would be more important than quantity. Organic produce would most probably be purchased by higher-income earners who consider them an integral part of their health regimen.

Comparison with Existing Research:

This finding is supported by Engel's law, which states that spenders with high incomes tend to splurge more on commodities not essential but perceived to be useful. Other studies on aging and consumer behavior support the idea that older consumers tend to spend on health as a prevention measure.

Income and Meat Products: This shows a positive relationship with the correlation at 0.4. A higher income may be spent on meat products, hence dietary preference or high quality because of affordability.

Interpretation: Higher-income consumers may prefer premium cuts of meat or organic that tend to cost more. With Maslow's hierarchy of needs, wealthier consumers prioritize quality and healthfulness, especially in dietary choices.

There is a big volume of meat consumption in most types of cuisine; therefore, spending on meat would likely increase with the rise in households' income due to cultural preference, entertainment, or hosting. According to social identity theory, wealthier people try to use only premium products, including meat, to correspond with social status.

Theories Comparison: This finding is concurrent with value expressive theory, which would suggest that higher-income consumers are more likely to select foods that represent values of quality, health, or sustainability. Research has also documented that greater dietary variety and inclusion of higher-priced items, such as premium meats, are characteristic of the diets of higher-income consumers.

Spending across categories is somewhat negatively correlated. Many product categories, like fruit and sweet products, are very slightly negatively correlated with some other categories. This would point to increased spending in one category corresponding to decreased spending in another category.

Interpretation: Consumers often spend their money according to priorities. Spending more on one category may mean cutting down on others to balance the budget, such as healthy fruits against sweet products. This would reflect the Budget Constraint Theory, which states that, given a budget limit, consumers must make choices, and there is a trade-off between discretionary and essential spending. It could also be the case that the negative correlation across categories-for instance, fruits, and sweets- may reflect that in a health or lifestyle-oriented consumer, fruits are meant to replace sweets, thereby falling into one category or the other. The lower-income consumer, being more budget-constrained, might show a higher category-switching probability.

This also aligns with the finding from behavioral economics that budget-conscious consumers tend to be more discriminating and deliberate in their spending across categories.

Comparison with Theories:

According to consumer budget theory, the pattern of negatives between the categories suggests that consumers prefer to spend where they perceive value or a need for the categories and cut down on less prioritized categories.

Summary of insight and Business implications.

- A strong positive wine spending-income correlation supports the fact that marketing luxury products to high-income earners can be profitable. Premium positioning, exclusivity, and luxury branding in the case of items such as wine and gold products create engagement and build up status appeal.
- The fruit spending is moderately correlated with age or income, so there could be a market for health-conscious, older, or wealthier consumers. Firms can build health-benefit, quality-, and freshness-oriented campaigns focused on these segments. Relatedly, meat spending is positively related to income; wealthy people may demand a higher quality of meat. Tiered pricing based on the quality of organic or grass-fed meats can be provided to capture different income levels.

- Knowing negative correlations helps businesses put together a balanced bundle that may appeal to different priorities for different consumers. For instance, marketing fruits and wellness products together can appeal to health-conscious consumers. Sweet products can be segregated to cater to those who make indulging purchases. That low-income consumers tend to substitute categories implies that value-based promotions or the ability to purchase in bulk can attract budget-conscious consumers without necessarily sacrificing category sales.

Table 3: Impact of Demographic Factors on Product Category Spending: ANOVA Results.

Category Demographic	**F-statistic**	**p-value**	**Significant**
Meat Products-Income	526.06	0.00000	Yes
Wines Income	468.77	0.00000	Yes
Fruits Income	208.54	0.00000	Yes
Sweet Products- Income	242.27	0.00000	Yes
Fish Products Income	244.75	0.00000	Yes
Gold Prods Income	105.47	0.00000	Yes
Wines Education	29.83	0.00000	Yes

Wines Age	20.16	0.00000	Yes
Gold Prods Education	22.31	0.00000	Yes
Fruits Education	16.78	0.00000	Yes
Meat Products Education	15.11	0.00000	Yes
Fish Products Education	14.34	0.00000	Yes
Sweet Products Education	14.2	0.00000	Yes
Meat Products Age	6.36	0.00027	Yes
Gold Prods Age	5.37	0.00110	Yes
Fish Products Age	2.91	0.03310	Yes

The table presents the results of an ANOVA analysis that tests the effects of demographic variables such as income, education, and age on spending across various product categories. Each row in the table represents a different ANOVA test with its associated F-statistic, p-value, and significance indicators. The f-statistics measures the ratio of the variance explained by the variable to the variance within groups, while the p-value indicates the probability of observing the data if there was no actual effect.

Income Influences across Categories:

In all product categories, the relationship to income is highly significant since very high F statistics are recorded with equally low p-values of 0.00000, thus showing a good dependence of spending behavior in these categories on the income standing of the consumer.

Analysis: Increased income generally widens discretionary spending on luxury items like wine. This follows Engel's law, which states that as an individual's income rises, they spend more on non-essential items, showing their ability to spend beyond necessary items.

Elasticity in income can explain the various income influences on each product category. For example, luxury products have higher income elasticity as compared to essentials, meaning with an increase in income, the growth of spending recorded for the most luxurious items shows corresponding high rates of growth.

Consumer economics evidences this trend where high-income households tend to allocate more of their budgets to categories that denote status.

Education and Product Spending:

Spending on wines, gold products, fruits, meat products, fish products, and sweet products are all significantly influenced by education, though F statistics are relatively lower compared to income, implying moderation of influence. This would therefore mean that spending can change with educational attainment because of some reasons such as lifestyle choices or economic understanding.

Interpretation: Generally, education level is positively correlated with higher income level and greater financial literacy. Hence, higher educated consumers may spend more on consuming products associated with quality and health such as wine and premium meat. Based on Maslow's hierarchy of needs, an individual with a higher education level would be more self-actualized through sophistical choices of consumption.

Higher education coincides with health-conscious behavior, hence an increased expenditure on fruit and fish due to perceived healthier options. Lifestyle segment theory can also be applied in arguing that educated consumers use their purchasing power to express values related to health, quality, and even social status.

Comparison with theories: As social identity theory proclaims, "people express their identity through consumption." Educated consumers may use purchasing power as a reflection of values related to health, quality, and social status.

Effect of Age on Spending:

Age is an important variable that influences spending on wines, gold products, meat products, and fish products. They have relatively low F-statistics compared to income and education. That would imply that spending habits alter with aging consumers, perhaps reflecting changes in dietary needs, health consciousness, or financial priorities.

Interpretation: as the individual ages, the spending pattern moves to cater to their stage of life, such as health awareness. The life cycle hypothesis proves that the consumption patterns of people move through stages.

Studies indicate consumer spending behavior is becoming more discriminatory to older consumers, and products that can answer their health needs are in demand.

4.5 Examine the Effect of family structure on spending

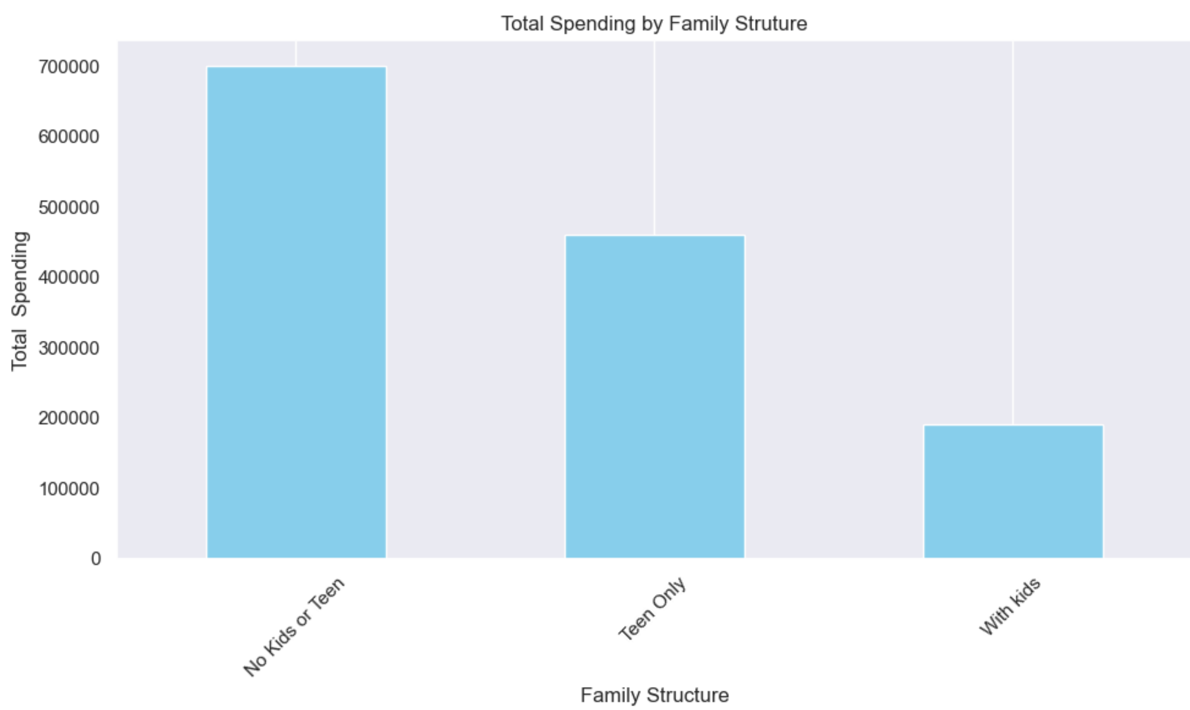

Figure 6: Bar Charts for Total Spending by Family Structure.

The bar chart compares the overall spending amongst three different family structures: "NO kids or Teen," "Teen Only," and "With kids."

Families with No Kids or Teens: Highest Spending

This category reflects the highest spending among the three groups, with spending close to 700,000 units. This may suggest that families without children or no teenagers have more disposable income available for spending, likely because of few dependents with its attendant costs.

Interpretation: free from the financial burdens of childcare or teenager support, these families have a greater disposable income. As the income allocation theory posits, the less dependent within a household, the freer the family will be in allocating more funds towards discretionary lifestyle-based spending or as they incur fewer obligatory expenditures.

This would include spending money on amusement, vacations, and value-acceptive products like gold. Childless households may indulge in discretionary spending congruent with lifestyle, status, or self-fulfillment.

Clearly, the childless family represents a more financially free demographic with greater capacity to invest in premium products. This would also fall in line with the theory of conspicuous consumption, which shows that people spend money on luxury items as a form of display of their wealth, which may be more feasible when there are no child-related expenses.

Teen Only Families:

The second biggest-spending group is families with only teenagers, a total of about 400 000 units. This spending level may suggest that, though there are certain expenses associated with keeping teenagers - education, activities, and probably higher food and clothing bills - these are less expensive than those of younger children.

Explanation: Teens tend to be the drivers of family spending in specific areas: food, clothes, extracurricular activities, technology, etc. Unlike younger children, teens have fewer childcare costs but have more costs in other areas - such as education and personal expenses - that add up without reaching the extent of full dependence.

The major factors governing the time spent in families with teenagers are teenagers' desire for social inclusion, brand preferences, and lifestyle-oriented products. According to social identity theory, teenagers develop distinct preferences based on peer influence and social trends, which may be the drivers of spending by their parents on branded clothes, technology items, or extracurricular activities to support their children's social lifestyles.

Families With Kids:

The lowest spending group is the families with kids, and overall spending falls drastically to about 200,000 units. This could again mean that families with younger children may emphasize more on essential spending and can get very budget-cautious, probably because of the expensive childcare cost coupled with saving for future needs relating to education.

Interpretation: families with young children often have higher expenses related to childcare, early education, health, and basic needs. The high cost of these basic items is very often the cause of stringent budgeting and lower spending on less vital things. Young families are usually of low disposable income for both reasons of direct costs associated with raising young children and saving for future expenses.

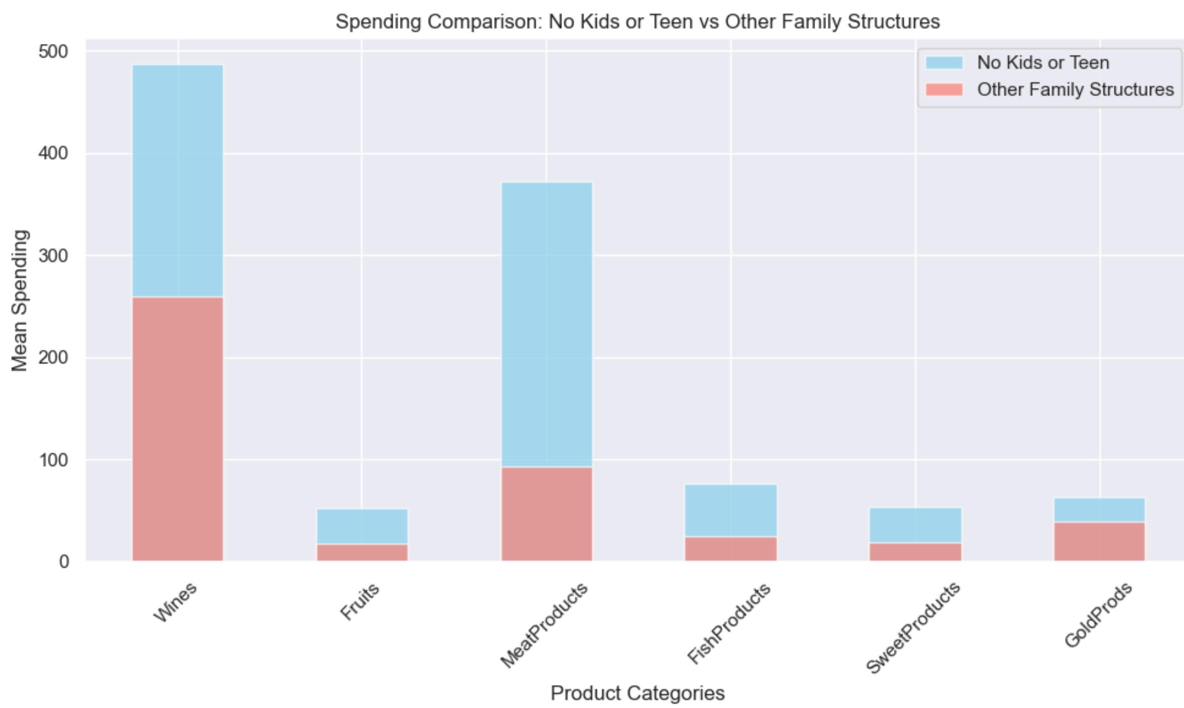

Figure 7: Stacked Bar Chart Comparison of Mean Spending by Product Category: No Kids or Teen vs. Other Family Structures

In the bar plot below, we compare average spending across various product categories among households with "No Kids or Teen" versus other family structures. The stacked bars reflect how spending is divided between the two groups for each product category.

Wine (Higher Spending by Families with NO kids or Teen): Households with "No Kids or Teens" spend considerably higher amounts on wines than any other category of family structure. This category presents the highest percentage difference in expenditure, insinuating that households without kids or teens give higher priority to the purchase of wines.

Interpretation: Childless families and those families without teenagers are likely to have more disposable income and can spend more on discretionary items like wine. For such families, wine is not just a commodity but is somehow related to lifestyle aspects of leisure, socializing, and personal indulgence. Conspicuous consumption theory suggests that people who have fewer financial burdens or other family dependents often spend on items that signal or mirror their lifestyle and status.

Wine is related to socialization, relaxation, and even culture and style. Childless families may simply enjoy wine for personal consumption and the occasional social gatherings. To them, it may be part of a lifestyle that focuses on quality over quantity.

Consumer lifestyle segmentation studies confirm this by stating that households without children more often spend on luxury and lifestyle-driven categories. Research shows that in consumer behavior studies, families without children often give more resources to products associated with enjoying oneself and social life, which means wine would be a priority.

Meat Products: Spending is also moderately varied in the case of meat products. The "No Kids or Teen" family structure tends to spend more in this category compared to other categories, though the difference is less dramatic than for wines.

Interpretation: meat is a kind of luxury good in the category of food, especially when a high-cut or specialty product is considered. For childless families, their higher spending on meat reflects a preference for quality and a choice quantity, not constrained by the need to please younger children's tastes or nutritional needs.

Fruits, Fish Products, Sweet Products, and Gold Products: There is quite a similar spending within these categories when comparing "No Kids or Teen" households with other family structures. These categories are quite similar and do not show much differentiation, perhaps suggesting that the presence or absence of children or teens does not affect these types of purchases quite as much.

Interpretation: such commodities as fruits and fish fall under the category of essential food, which most households of any composition tend to consume regularly; these categories tend not to fluctuate too much because they are staples that can fit into nearly every household's budget and eating habits. As supported by one of Engel's Laws, basic food consumption is similar across households where income and familial structures differ once a standard of living has been met.

Sweets represent an inexpensive indulgence, with appeal across family types, while gold products represent more niche appeals because of lack of variable budget constraints or cultural preferences. In these categories, spending tends to be driven by personal preference rather than family composition.

Fruit and fish are also regularly associated with health benefits, so a staple household purchase for families concerned with maintaining a balanced diet, regardless of the composition of the family. These categories align with routine consumption theory, where the essentials are purchased habitually, remaining stable across demographic variation.

Implication For Business and marketing

- Products like wine and meat can be marketed to households without children or teens. These households indeed have the financial elasticity and a lifestyle penchant to spend more in these categories. Advertisements that point to quality, social enjoyment, and lifestyle benefits can specifically appeal to this target market.

- Products like fruits and fish interest across family structures can be marketed as universal needs. Messaging that points out health, freshness, and quality can attract a broad of households that focus on these items for their consistent and universal needs.
- Content marketing and social media campaigns focused on lifestyle topics like wine and food pairing, grilling, or entertaining can be very effective in reaching childless households. Households with children may more likely respond to content that indicates recipes or tips for family-friendly healthy meals on a budget.

Table 4: ANOVA Results for Differences in Spending by Product Category

Product Category	F-statistic	p-value	Significant
Wines	408.37	0	Yes
Fruits	289.66	0	Yes
Meat Products	621.91	0	Yes
Fish Products	343.52	0	Yes
Sweet Products	273.53	0	Yes
Gold Products	168.56	0	Yes

The ANOVA results in Table 4 reveal significant differences in spending across product categories. Each product category has a p-value of 0, indicating a statistically significant difference in spending levels. F statistics vary across categories, reflecting the extent of these differences, with large F values indicating more pronounced variation in spending among different groups.

Wine: F-statistic 408.37, p-value 0 (significant)

The high F statistics for wine suggest a strong difference in spending across groups, indicating that certain demographic or family structure groups allocate significantly more or less to wine than others. This aligns with previous findings that households with higher income or with children are more inclined to spend on discretionary items like wine, treating it as a luxury or social indulgence. This significant result suggests that wine spending is highly influenced by factors like disposable income, lifestyle preferences, and perhaps social status.

Fruits: F statistic 289.66, p-value 0.00

The significant f-statistics for fruits indicate that spending on fruits also varies considerably across groups, though the f value is lower than wine. This could suggest that factors like health consciousness, age, or household size may influence spending on fruit, with older or more health-conscious groups possibly allocating more to this category. Despite being an essential item, spending on fruit may still differ significantly depending in demographic factors, highlighting the role of lifestyle choices in determining how much households spend on this staple.

Meat products: F statistic 621.91, p-value 0.00

Meat products show the highest f-statistics, suggesting that spending on this product varies more dramatically than on any other category. This significant difference may reflect dietary preferences, cultural influences, and income levels.

Fish products: F-statistic 343.52, p-value 0.00:

Fish also shows a spending difference, with f-statistics that suggest a strong variation across groups. Fish is often perceived as a health-oriented or premium item, which might mean that older or more health-conscious consumers allocate more spending to this category. The significant result could indicate that while some households prioritize fish for its health benefits, others might view it as a discretionary or occasional purchase due to its price, leading to marked differences in spending.

Sweet Products F-statistic: 273.53, p-value: 0 (Significant)

The significant ANOVA result for sweet products indicates that spending on sweets varies meaningfully among groups. This may be due to age or family structure, with households containing children or teenagers potentially spending more on sweets. In contrast, health-conscious or older consumers might limit spending in this category. The results suggest that factors such as family composition and health preferences may influence spending in this category, leading to notable differences across demographic groups.

Gold Products F-statistic: 168.56, p-value: 0 (Significant)

Gold products have the lowest F-statistics among the categories, indicating significant but less pronounced differences in spending. Gold is often considered a luxury or investment item, so spending in this category is likely influenced by disposable income and cultural values. The lower F-value compared to other categories suggests that while spending on gold varies among groups, it is less influenced by factors like age or family structure compared to categories like meat or wine. Households with higher income or an inclination for luxury spending may allocate more to gold, but the variation isn't as extreme as with other categories.

Implications for Marketing and Product Strategy

- For products like wine, meat, and gold, where spending varies the most, businesses can benefit from targeted marketing to demographics that show the highest spending tendencies. For instance, luxury marketing for wines and gold products may appeal to child-free households or higher-income groups.
- For fruits, fish, and other health-oriented products, campaigns that highlight health benefits may resonate with older consumers or families without budget constraints.

Family-oriented households may respond well to promotions on fruits or meats, particularly value-driven or bulk offers that align with essential needs.

- For categories like sweets, seasonal or holiday promotions may be effective in attracting households with children or those looking for indulgent products. Recognizing that sweet products appeal differently to family structures can help businesses craft promotions that appeal to families and align with celebrations.
- The high variability in spending on meats and wines, for example, suggests an opportunity to offer tiered product options (e.g., premium, standard, and budget) that can cater to a broader range of consumer spending capabilities.

Table 5: Tukey's HSD test results across the product categories

Product Category	**Comparison**	**Mean Difference**	**p-value**	**95% CI (Lower)**	**95% CI (Upper)**	**Significant (Reject H0)**
Wines	No Kids or Teen vs Teen Only	-70.7	0	-108.36	-33.04	Yes
	No Kids or Teen vs With Kids	-384.3	0	-418.98	-349.63	Yes
	Teen Only vs With Kids	-313.61	0	-347.98	-279.23	Yes

Fruits	No Kids or Teen vs Teen Only	-25.31	0	-29.93	-20.68	Yes
	No Kids or Teen vs With Kids	-43.68	0	-47.94	-39.42	Yes
	Teen Only vs With Kids	-18.37	0	-22.59	-14.15	Yes
Meat Products	No Kids or Teen vs Teen Only	-233.84	0	-257.47	-210.2	Yes
	No Kids or Teen vs With Kids	-324.36	0	-346.12	-302.59	Yes
	Teen Only vs With Kids	-90.52	0	-112.1	-68.95	Yes
Fish Products	No Kids or Teen vs Teen Only	-39.75	0	-45.97	-33.52	Yes
	No Kids or Teen vs With Kids	-64.01	0	-69.74	-58.28	Yes
	Teen Only vs With Kids	-24.27	0	-29.95	-18.59	Yes
Sweet Products	No Kids or Teen vs Teen Only	-24.81	0	-29.65	-19.97	Yes

	No Kids or Teen vs With Kids	-44.39	0	-48.85	-39.94	Yes
	Teen Only vs With Kids	-19.58	0	-23.99	-15.17	Yes
Gold Products	No Kids or Teen vs Teen Only	-7.34	0.0177	-13.66	-1.03	Yes
	No Kids or Teen vs With Kids	-41.3	0	-47.12	-35.49	Yes
	Teen Only vs With Kids	-33.96	0	-39.73	-28.2	Yes

The results from Tukey's HSD (Honestly Significant Difference) test provide a detailed comparison of spending differences across various product categories based on family structure groups: households with "No Kids or Teen," "Teen Only," and "With Kids." The mean differences for each comparison, along with their p-values and confidence intervals (CI), reveal statistically significant differences in spending behavior across family structures. Here's an interpretation of the results for each product category.

Wine:

- No Kids or Teen vs. Teen Only: The No Kids or Teen group spends significantly more on wine than the "Teen Only" group, with a mean difference of -70.7 units (CI: -108.36, -33.04).

- No Kids or Teen vs. With Kids: The spending difference widens, with "No Kids or Teen" households spending 384.3 units more on wine compared to "With Kids" households (CI: -418.98, -349.63).
- Teen Only vs. With Kids: Teen-only households spend more on wine than households with younger children, with a mean difference of -313.61 units (CI: -347.98, -279.23).

Interpretation: The significant difference in wine spending suggests that households without children or teenagers have more disposable income for discretionary items like wine. These households may prioritize wine as a social or lifestyle product, aligning with theories of Conspicuous Consumption, where consumers without financial obligations for dependents allocate more towards luxury items. Households with young children spend the least on wine, likely due to financial constraints and different lifestyle priorities focused on family-oriented essentials rather than luxury goods.

Implication: Marketing wine as a lifestyle or premium product may resonate particularly well with child-free households, while family-focused campaigns might highlight value-oriented or alternative beverage choices.

Fruits

- No Kids or Teen vs. Teen Only: Households without children or teens spend significantly more on fruits than teens in teen-only households, with a mean difference of -25.31 units (CI: -29.93, -20.68).
- No Kids or Teen vs. With Kids: The "No Kids or Teen" group spends 43.68 units more on fruits than households with younger children (CI: -47.94, -39.42).
- Teen Only vs. With Kids: Teen-only households also spend more on fruits than "With Kids" households, with a mean difference of -18.37 units (CI: -22.59, -14.15).

Interpretation: Spending on fruits shows consistent differences across family structures, with child-free households spending the most. This could reflect a health-conscious or flexible dietary choice, where households without dependents allocate more toward fresh or quality produce without significant budget constraints. For families with children, spending on fruits is lower, likely due to the need to allocate funds to more budget-friendly, filling foods that meet the demands of larger family sizes.

Implication: Campaigns that position fruits as part of a health-conscious lifestyle could be particularly effective for child-free households, while family-oriented marketing might focus on bulk or value options for families with children.

3. Meat Products

- No Kids or Teen vs. Teen Only: Child-free households spend significantly more on meat products than teen-only households, with a mean difference of -233.84 units (CI: -257.47, -210.2).
- No Kids or Teen vs. With Kids: The difference is even larger between child-free households and those with young children, with a mean difference of -324.36 units (CI: -346.12, -302.59).
- Teen Only vs. With Kids: Teen-only households also spend more on meat products than households with young children, with a mean difference of -90.52 units (CI: -112.1, -68.95).

Interpretation: Meat spending is highest among child-free households, possibly reflecting a preference for quality or premium cuts without the constraints of feeding a larger family. Meat is often a high-cost item, and child-free households may have the flexibility to purchase premium options. Families with young children may prioritize more affordable protein sources or budget-friendly meats, aligning with Behavioral Economics theories where families with higher fixed costs must carefully manage spending on discretionary items.

Implication: Marketing premium or high-quality meat options to child-free households could be effective, while promotions for budget-friendly meats or family packs may appeal to families with children.

Fish Products

- No Kids or Teen vs. Teen Only: The "No Kids or Teen" group spends significantly more on fish than the "Teen Only" group, with a mean difference of -39.75 units (CI: -45.97, -33.52).
- No Kids or Teen vs. With Kids: The difference widens between "No Kids or Teen" and "With Kids" households, with a mean difference of -64.01 units (CI: -69.74, -58.28).
- Teen Only vs. With Kids: Teen-only households spend more on fish products than households with young children, with a mean difference of -24.27 units (CI: -29.95, -18.59).

Interpretation: Spending on fish is higher among child-free households, likely due to health-conscious choices and financial flexibility. Fish is often a pricier protein source, and child-free households may be able to afford this more regularly than those with children, who might limit fish spending due to cost.

Families with young children may view fish as an occasional purchase due to its price, instead prioritizing more affordable proteins.

Implication: Marketing fish as part of a healthy, premium lifestyle could appeal to child-free consumers, while family-targeted campaigns might emphasize value or sustainable sourcing to attract budget-conscious households.

Sweet Products

- No Kids or Teen vs. Teen Only: The No Kids or Teen group spends significantly more on sweets than the "Teen Only" group, with a mean difference of -24.81 units (CI: -29.65, -19.97).
- No Kids or Teen vs. With Kids: The difference between "No Kids or Teen" and "With Kids" households is larger, with a mean difference of -44.39 units (CI: -48.85, -39.94).
- Teen Only vs. With Kids: Teen-only households spend more on sweets than "With Kids" households, with a mean difference of -19.58 units (CI: -23.99, -15.17).

Interpretation: Sweets appear to be a discretionary item that child-free households indulge in more frequently. This may reflect an indulgent lifestyle choice, where households without dependents prioritize treats without concern for budget constraints or dietary restrictions that are often prioritized in families. Families with young children may limit spending on sweets due to health concerns or dietary priorities, particularly for younger children.

Implication: Marketing sweets as an occasional indulgence for personal enjoyment may resonate with child-free consumers, while family-friendly messaging could emphasize moderation and portion control.

Gold Products

- No Kids or Teen vs. Teen Only: The spending difference for gold products between "No Kids or Teen and Teen Only households" is relatively small but significant, with a mean difference of -7.34 units (CI: -13.66, -1.03).
- No Kids or Teen vs. With Kids: The difference between child-free and With Kids households is larger, with a mean difference of -41.3 units (CI: -47.12, -35.49).
- Teen Only vs. With Kids: Teen-only households spend more on gold products than those with young children, with a mean difference of -33.96 units (CI: -39.73, -28.2).

Interpretation: Gold products represent a luxury or investment item, and child-free households may have more flexibility to spend on such items. The smaller differences compared to other categories may indicate that while gold is a luxury item, it has less universal appeal across family structures, with purchases likely influenced by income rather than family structure alone. Families with younger children might avoid spending money on gold products due to the higher costs and preference to allocate funds towards family essentials.

Implication: Gold products could be positioned as luxury investments for consumers without dependents, focusing on quality and value as aspirational purchases.

Overall Insight

The turkey’s HSD test highlights consistent spending patterns across family structures:

Child-free household: Tend to allocate more towards discretionary, luxury, and lifestyle-oriented items (e.g., wine, sweets, gold), reflecting financial flexibility and preference for indulgent or premium choices.

Teen-Only Households: Spend moderately across most categories but generally less than child-free households. Spending choices may be shaped by teenagers’ preferences and social needs yet constrained by family considerations.

Households with Young Children: Exhibit the lowest spending on non-essential items, likely due to budget constraints and a focus on family-oriented essentials over luxury items.

Implications for Business and Marketing

- Marketers can target child-free households with promotions for premium, lifestyle-driven products like wines, high-quality meats, and luxury items (e.g., gold products), as these households are more likely to allocate spending toward these categories.
- For families with children, particularly young children, businesses might focus on value-based offerings or family-friendly bundles in categories like meats, fruits, and sweets. Marketing messages emphasizing affordability, quality, and family-sized portions may resonate more with this group.

- For health-oriented products like fruits and fish, child-free households may respond well to messaging that emphasizes health benefits and quality. For families with teenagers, highlighting sweet and indulgent products could align with teenagers' preferences, possibly by focusing on snack packs or portioned treats.
- Creating loyalty programs tailored to family structure can encourage repeat purchases. For example, offering discounts on premium items for child-free households and bulk discounts on essentials for families with children can cater to the unique spending patterns of each group.

4.6 Understand the roles of consumer Tenure and Recency

Table 6: ANOVA Results for Spending Across Product Categories by Tenure and Recency Segments.

Product Category	Tenure Segment: F-statistic	Tenure Segment: p-value	Recency Segment: F-statistic	Recency Segment: p-value
Wines	35.73	0.0000	0.35	0.7046

Fruits	1.22	0.2704	0.2	0.8166
Meat Products	4.51	0.0338	1.01	0.3640
Fish Products	6.41	0.0114	0.08	0.9204
Sweet Products	4.97	0.0259	0.44	0.6460
Gold Products	44.33	0.0000	0.16	0.8492
Total Spending	26.68	0.0000	0.53	0.5889

The table presents a statistical analysis examining the impact of two different segments' tenure and recency on spending across various product categories. The study employs ANOVA to investigate whether there are significant differences in spending patterns based on these segments.

Wine

Tenure Segment: F-statistics = 35.73, p-value = 0.0000

Recency Segment: F-statistics = 0.35, p-value = 0.7046

Tenure Impact: The high F-statistics and a p-value of 0.0000 suggest that tenure significantly affects spending on wines. Longer-tenured customers may exhibit a higher preference for wines, possibly due to established purchasing habits or brand loyalty developed over time. This could indicate that loyal customers are more inclined to purchase discretionary items like wine.

Recency Impact: With a non-significant p-value (0.7046), recency does not appear to influence wine spending. This suggests that recent purchase activity does not drive wine spending behavior; rather, it may be a stable preference linked to long-term customers.

Fruits

Tenure Segment: F-statistics = 1.22, p-value = 0.2704

Recency Segment: F-statistic = 0.2, p-value = 0.8166

Tenure Impact: Both the F-statistics and p-value (0.2704) indicate that tenure does not significantly influence spending on fruits. This may suggest that fruit spending is consistent across both newer and longer-tenured customers, likely because fruits are seen as a staple or essential item.

Recency Impact: With a p-value of 0.8166, recency also shows no significant effect on fruit spending. This suggests that fruit purchases are driven by routine or necessity rather than influenced by recent shopping behavior.

Meat Products

Tenure Segment: F-statistics = 4.51, p-value = 0.0338

Recency Segment: F-statistics = 1.01, p-value = 0.3640

Tenure Impact: The p-value (0.0338) suggests a modest but statistically significant impact of tenure on meat spending. This may indicate that longer-tenured customers allocate more to meat purchases, possibly reflecting brand loyalty or a preference for quality meat products among established customers.

Recency Impact: With a non-significant p-value of 0.3640, recency does not significantly affect spending on meat products. This indicates that meat purchases are relatively stable and not driven by recent shopping activity.

Fish Products

Tenure Segment: F-statistics = 6.41, p-value = 0.0114

Recency Segment: F-statistic = 0.08, p-value = 0.9204

Tenure Impact: The significant p-value (0.0114) indicates that tenure has a meaningful impact on fish spending. Longer-tenured customers may spend more on fish, which could reflect a preference for health-conscious or premium food choices among loyal customers.

Recency Impact: With a very high p-value (0.9204), recency does not significantly influence spending on fish products. This suggests that fish purchases are consistent and are not driven by the recency of prior purchases.

Sweet Products

Tenure Segment: F-statistics = 4.97, p-value = 0.0259

Recency Segment: F-statistics = 0.44, p-value = 0.6460

Tenure Impact: The significant p-value (0.0259) for tenure suggests that tenure has a modest impact on sweet product spending. Longer-tenured customers may spend more on sweets, potentially due to established purchasing patterns or comfort-driven purchases over time.

Recency Impact: With a p-value of 0.6460, recency does not significantly influence sweet product spending. Sweets may be a consistent purchase for both recent and infrequent shoppers, indicating no specific pattern tied to recent shopping behavior. **Gold Products**

Tenure Segment: F-statistics = 44.33, p-value = 0.0000

Recency Segment: F-statistic = 0.16, p-value = 0.8492

Tenure Impact: The very high F-statistics (44.33) and significant p-value (0.0000) indicate a strong impact of tenure on spending on gold products. This may suggest that long-term customers have a greater tendency to invest in luxury or high-value items like gold, reflecting accumulated loyalty and trust in the brand.

Recency Impact: With a p-value of 0.8492, recency does not significantly impact spending on gold products, which are likely viewed as infrequent, planned purchases rather than routine buys.

Total Spending

Tenure Segment: F-statistic = 26.68, p-value = 0.0000

Recency Segment: F-statistic = 0.53, p-value = 0.5889

Tenure Impact: The significant p-value (0.0000) and high F-statistic (26.68) suggest that tenure strongly impacts total spending, indicating that long-term customers tend to spend more overall.

This may reflect accumulated loyalty and a broader purchasing range among long-standing customers.

Recency Impact: The p-value (0.5889) indicates that recency does not significantly influence total spending. This suggests that total spending levels are steady and not strongly affected by how recently customers made their last purchase.

Implications for Business and Marketing

- Since tenure significantly impacts spending, particularly in high-value categories, businesses may benefit from loyalty programs that reward long-term customers. Offering exclusive discounts or perks on premium products like wines and gold could enhance loyalty and encourage continued spending.
- For luxury or discretionary items like wines and gold products, targeting long-term customers with personalized promotions or exclusive offers could capitalize on their established brand loyalty and spending habits.
- Since essential products like fruits and meats show stable spending patterns, consistent, routine-based marketing (such as regular newsletters or staple product bundles) can help maintain engagement among all customer segments, regardless of tenure or recent activity.

- For new customers, emphasizing the quality and unique benefits of discretionary items could help build long-term loyalty. Highlighting product quality in categories like fish and wine might encourage newer customers to make these products part of their regular purchases.
- Given that recency has no significant impact on spending, businesses may not need to prioritize recency-based incentives, such as recent purchase rewards, as these do not strongly influence overall spending. Instead, focusing on tenure-based loyalty strategies could be more effective.

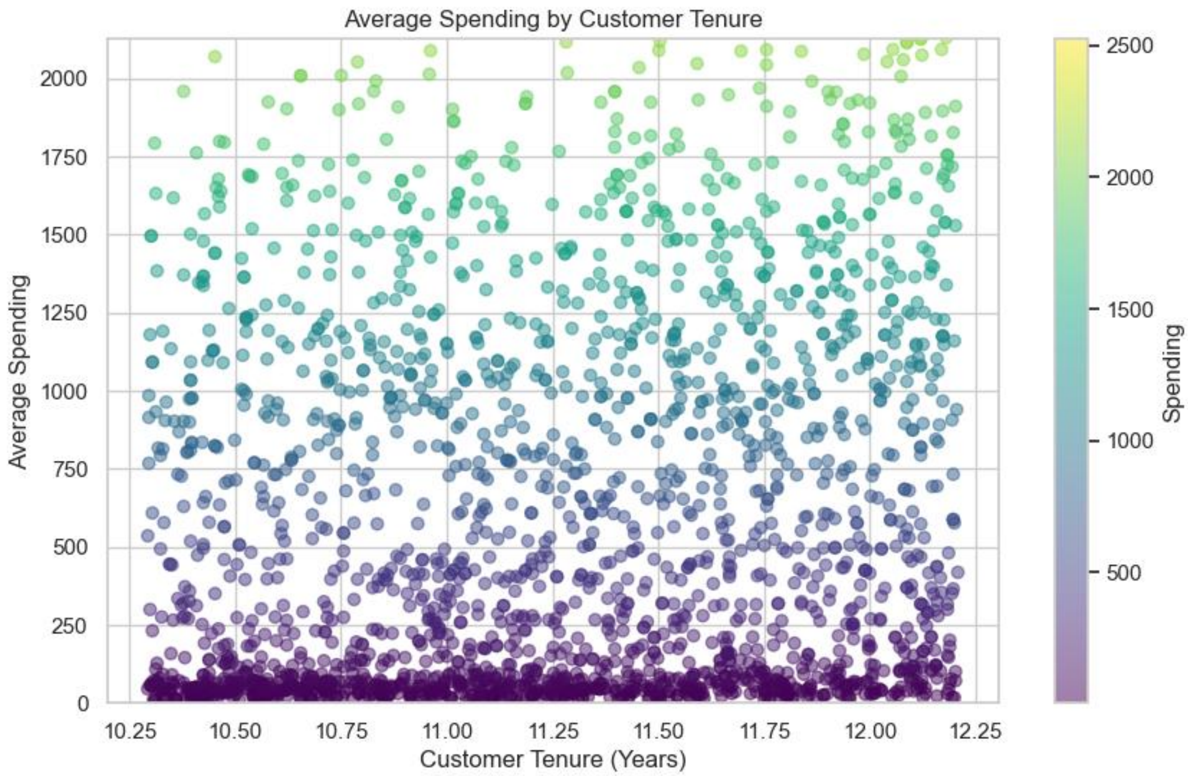

Figure 8: Average Spending by Consumer Tenure

The figure shows how consumer spending varies across different lengths of consumer tenure. The scatter plot uses varying colors to represent spending amounts, ranging from purple to green (lowest to highest), plotted against tenure in years.

Tenure Distribution.

Tenure is represented on the horizontal axis, ranging from 10.25 years to over 12.25 years. The spread of data points indicates varieties of spending habits among consumers with similar tenures.

The vertical axis, which shows average spending varies significantly with each tenure group, suggests that tenure alone does not determine spending levels.

Higher spending appears more frequently as tenure increases, indicating that consumers might spend more as their relationship with the company grows longer. However, high spending is also observed sporadically across all tenure lengths.

Consumer loyalty and spending: the visual trends suggest that long-term consumers might be more inclined to spend higher amounts, potentially due to developed loyalty, satisfaction, or accumulation of consumer value over time.

Variability in spending: there is significant variability in spending within each tenure group, implying that other factors besides tenure also influence spending behavior.

4.7 Evaluating the influence of marketing campaigns

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Table 7: T-Test Results for Campaign Acceptance Impact on Spending

Campaign	t-statistic	p-value	Significant
Acceptcmp1	19.52	0.0000	Yes
Acceptcmp2	6.5	0.0000	Yes
Acceptcmp3	2.54	0.0000	Yes
Acceptcmp4	12.41	0.0000	Yes
Acceptcmp5	25.06	0.0000	Yes

The table presents **t-test results assessing the effectiveness of consumer responses** to five marketing campaigns, as measured by the statistical significance of spending differences between consumers who engaged with each campaign and those who did not. Each campaign shows a statistically significant impact, though the degree of influence varies, with some campaigns demonstrating a far stronger effect on consumer spending than others.

Interpretation of Campaign Effectiveness

All campaigns (Acceptcmp1 to Acceptcmp5) show statistically significant p-values (0.0000), meaning each campaign successfully influenced consumer spending. This suggests that the campaigns generally resonated with the target audience, leading to measurable increases in spending among those who engaged.

Differences in t-statistics reveal that while all campaigns had a positive impact, the strength of this impact varied substantially. Campaigns with higher t-statistics (such as Campaigns 1, 4, and 5) demonstrate a stronger influence on spending compared to those with lower t-statistics (like Campaign 3). This variability could stem from several factors:

Campaigns with stronger effects may have had messaging that was more compelling or better aligned with consumer interests and needs. Campaigns that are better identified and reach high-intent consumers could see higher engagement, leading to greater spending.

Stronger campaigns may have provided more attractive or exclusive product offers, creating higher perceived value for consumers. External factors, such as seasonal demand, economic conditions, or competitors' actions, could influence consumer receptiveness to each campaign differently.

Table 8: Comparison of Mean Spending Between Consumers Who Accepted and Not Accepted Campaigns

Campaign	Mean Spending (Accepted)	Mean Spending (Not Accepted)	Effect
AcceptedCmp1	1484.08	545.14	Positive (higher spending)
AcceptedCmp2	1307.67	595.66	Positive (higher spending)
AcceptedCmp3	720.54	596.15	Positive (higher spending)
AcceptedCmp4	1143.13	561.78	Positive (higher spending)
AcceptedCmp5	1617.12	526.67	Positive (higher spending)

Table 8 indicates a pattern that all five campaigns, AcceptedCmp1 to AcceptedCmp5, have shown that the average spending of those who have accepted the campaigns is always higher than those who have not accepted. This reflects a promising situation where acceptance of any campaign indicates increased spending, hence showing the effectiveness of such campaigns.

I**ncreased Spending Among Campaign Responders:** Across all campaigns, the average total spending amongst customers who have accepted a campaign is always higher than the average amongst customers who have not, indicating a positive effect of campaign engagement on spending.

Interpretation:

Consumers who accept a campaign often perceive they get an extra value discount, exclusive offer, or added benefit that attracts spending. Value-Perception Theory in consumer behavior suggests that the perceived "deal" or added benefit creates a sense of gain, encouraging customers to spend more. Campaigns designed with attractive value propositions can thus be especially effective for driving spending.

Accepting a campaign often involves an initial commitment (e.g., redeeming a discount or signing up for an offer), which may drive customers to act consistently by increasing their spending. This is supported by Cialdini’s Principle of Consistency, where consumers, after committing to a small initial action, feel compelled to follow through with further actions aligned with that initial choice, in this case, increased spending.

The Social Exchange Theory says that accepting a campaign may represent a reciprocal relationship with a brand for consumers, in which the perceived exclusivity of an offer or promotion creates a sense of obligation to reciprocate, thereby increasing spending. This sort of effect can be achieved in any kind of campaign that offers users something they perceive as exclusive in value or nature and that they would want to "repay" through enhanced engagement or purchases.

Compared with the Existing Studies: The studies of promotion effectiveness indicate that sharp and exclusive value propositions are leading consumers to increase their spending due to enhanced perceived value and compelled them to act in reciprocity. Also, on many occasions, studies have found that customers who accept promotional offers tend to spend more, partially because of the psychological commitment enacted by accepting the offer.

Consistent Positive Effect Across All Campaigns: The fact that spending consistently rose for those who accepted each campaign would seem to suggest that these marketing efforts drive revenue quite well.

Interpretation: Effectiveness across campaigns would suggest that targeting and messaging most likely fit with customer preference. The theory of Targeted Marketing purports that the more personally relevant or targeted a consumer group, the greater the degree of engagement and spending because messaging resonates more directly with the consumer's unique interest. If the campaigns had been segmented by preference or some past purchase behavior, it would explain a consistent positive effect.

Campaigns creating a sense of urgency or scarcity may have an even more significant effect on spending. Theoretically, Scarcity and Loss Aversion Theories suggest that consumers are most interested in engaging with and spending on offers they feel are rare or exclusive. Framing the campaign as a limited time offer or an "exclusive deal" could lead to people hastily accepting the offer; this may bring about immediate spending as consumers seek to avoid the discomfort of potentially missing out.

Moreover, such efforts may create tight consumer loyalty toward a brand since consumers are more likely to accept a campaign. Campaigns involving consumers raise short-term consumption and create consumer loyalty in the longer term as well because, through campaigns, consumers feel affiliated with the brand, according to Relationship Marketing Theory. This then converts such consumer loyalty into longer-term maintained spending behavior due to their increased sensitivity toward future campaigns.

Customer Loyalty Studies: Compared to Marketing Effectiveness Studies, consistent customer loyalty through targeted marketing can reinforce brand loyalty and lead to higher spending. Studies have confirmed that consistent consumer engagement with meaningful offers or incentives creates valued customer relationships and results in increased spending across successive campaigns.

Greater spending means for customers accepting each campaign underscores the value of well-designed marketing efforts as an effective driver for revenue. This behavior is in concert with various theories, including Value-Perception Theory, Targeted Marketing Theory, and Social Exchange Theory, which describe how perceived value, targeting, and commitment can heighten spending. Further, the variability in campaign impact indicates that campaign design elements personalization, timing, and product relevance the maximum effectiveness of campaigns. By integrating these insights, future campaigns can be tailored to optimize consumer engagement and spending, reinforcing customer loyalty and long-term revenue growth.

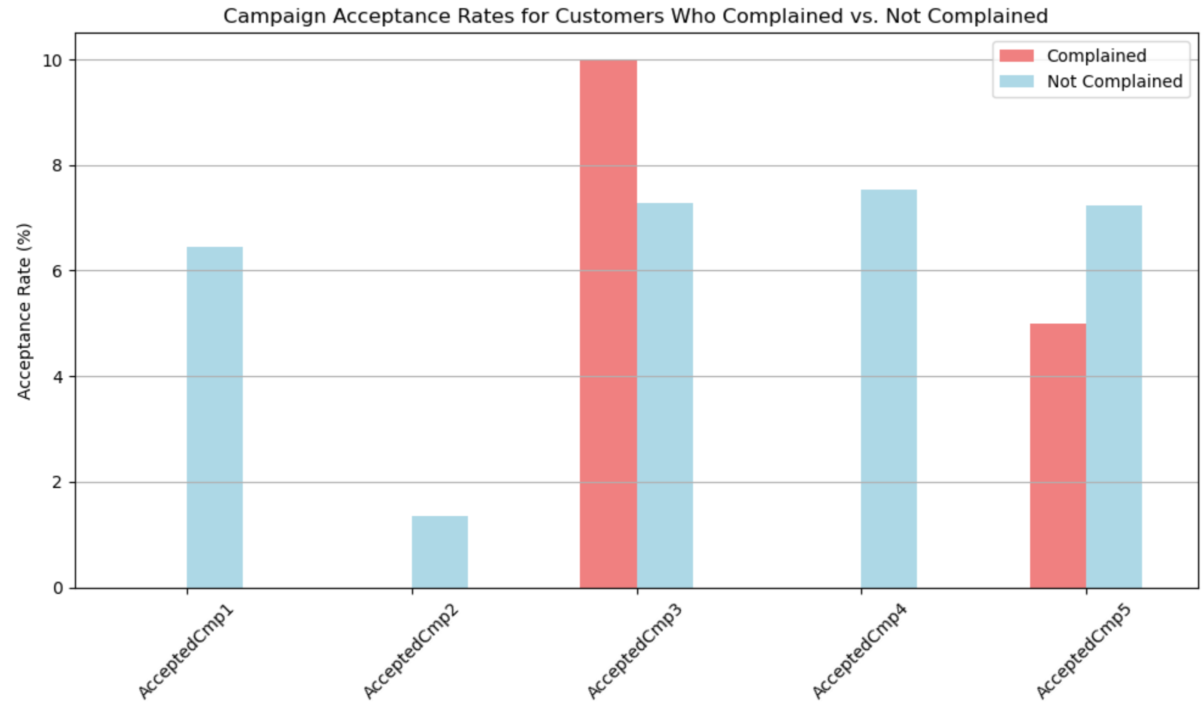

Figure 9: Campaign Acceptance Rates(Complained and not Complained)

The bar chart visualizes the Campaign Acceptance Rates for customers who complained versus those who did not complain across five campaigns.

The graph shows a higher acceptance rate for consumers who complained only for campaign 3, where the acceptance rate for those who complained was notably higher compared to those who did not complain. This suggests that something specific about Campaign 3 appealed to or addressed the concerns of the consumers who had previously complained.

For the other campaigns (AcceptedCmp1, AcceptedCmp2, AcceptedCmp4, and AcceptedCmp5), the acceptance rate for those who complained is either lower than for those who did not complain or relatively similar but not high enough to denote a trend. This indicates that complaining customers do not generally have higher acceptance rates across all campaigns.

Higher Acceptance Rate for Complaining Customers in Campaign 3:

For Campaign 3, the acceptance rate among customers who previously complained is significantly higher than that of customers who did not complain.

Interpretation: The elevated acceptance rate for complaining customers in Campaign 3 suggests that this campaign may have directly addressed the grievances or needs of these customers. Campaign 3 may have included messaging, offers, or services specifically tailored to re-engage dissatisfied customers, effectively converting a higher proportion of them.

Campaign 3's structure might reflect a service recovery strategy, where businesses aim to retain and satisfy previously dissatisfied customers through special offers or incentives. Customer Recovery Theory supports this approach, suggesting that targeted efforts to regain dissatisfied customers can lead to positive engagement, as these customers feel acknowledged and valued when their concerns are addressed.

customers who had previously complained, the specific focus or acknowledgment in Campaign 3 could have created a sense of reciprocity or loyalty. Social Exchange Theory indicates that customers who feel “recovered” are more likely to engage with offers, possibly explaining the higher acceptance rate.

Lower or Similar Acceptance Rates Among Complaining Customers in Other Campaigns:

In Campaigns 1, 2, 4, and 5, the acceptance rate among customers who complained is either lower than or like those who did not complain.

Interpretation: The lower acceptance rates for complaining customers in these campaigns suggest that the offers or messaging may not have been tailored to address specific complaints. Without a targeted approach, previously dissatisfied customers may be less responsive, potentially due to lingering dissatisfaction or a lack of personalized attention.

Expectation-Disconfirmation Theory suggests that consumers who have previously had a negative experience might require campaigns that exceed expectations or address past grievances directly to regain interest. Campaigns 1, 2, 4, and 5 may not have offered anything distinct enough to re-engage these customers, resulting in lower acceptance rates.

Complaining customers might be more skeptical of future campaigns if they feel their concerns haven’t been addressed, leading to lower acceptance. Attribution Theory posits that customers who attribute their dissatisfaction to controllable factors within the company are less likely to respond to subsequent campaigns unless these issues are visibly acknowledged.

Implications of Complaining Customers' Acceptance Patterns Across Campaigns:

- The success of Campaign 3 in re-engaging complaining customers suggests that targeted recovery campaigns can positively impact acceptance rates among dissatisfied customers. This finding aligns with studies in Service Recovery and Relationship Marketing, which show that personalized recovery efforts are often effective in rebuilding customer trust and engagement.
- The lower or similar acceptance rates in the other campaigns indicate that generic campaigns may not effectively appeal to complaining customers. Marketing efforts aimed at these customers may need to go beyond standard offers to address their specific concerns or needs.

Table 9: Campaign Acceptance Rates by Recency Segment (%)

Recency Segment	AcceptedCmp1	AcceptedCmp2	AcceptedCmp3	AcceptedCmp4	AcceptedCmp5	Total Accepted Campaigns
Recent	6.8	1.59	8.1	7.24	7.67	31.4
Mid-Recency	6.2	0.61	7.72	6.51	5.9	26.93
Inactive	6.23	1.73	6.46	8.42	7.84	30.68

The table shows the acceptance rate as a percentage for five different marketing campaigns across three different recency segments. Additionally include the total acceptance rate for all campaigns combined with each segment.

Recent **Consumers: Highest Combined Acceptance Rate (31.4%)**

Recent consumers have the highest combined acceptance rate, showing that 34.4% of consumers in this segment accepted campaign offers.

Interpretation: Recent consumers are likely still highly engaged and connected to the brand, making them more responsive to marketing messages. Recency Theory suggests that consumers who have recently interacted with a brand are more likely to respond positively to new offers because the brand remains fresh and relevant to them.

Recent buyers might have a higher level of trust in the brand, built through recent positive experiences. This trust makes them more open to campaign offers, especially if they believe these offers align with their recent purchases or preferences.

The high acceptance rate among recent consumers indicates that campaigns targeting this segment are effective. Continuing to engage recent consumers with personalized or value-driven offers could sustain this responsiveness, potentially boosting customer loyalty and repeat purchases.

Mid-Recency Consumers: Moderate Combined Acceptance Rate (26.93%)

Mid-recent consumers have a combined acceptance rate of 26.93%, which is lower than recent consumers but still reflects a reasonable level of responsiveness.

Interpretation: Consumers are somewhat engaged but may have started to drift, explaining their lower acceptance rate. Customer Lifecycle Theory suggests that engagement tends to wane over time if there are no further touchpoints. This mid-level response rate implies that while these consumers are still responsive, they may require more targeted offers to reignite their interest.

The moderate responsiveness across all campaigns, with a particularly higher response to Campaign 3, suggests that certain campaign elements (e.g., discounts, and product bundles) may resonate more effectively with this group. Campaigns that emphasize value or exclusivity might capture their attention better, as these consumers may be on the fence about re-engaging.

For mid-recency consumers, campaigns with added incentives or exclusive offers could improve acceptance rates. Segment-specific messaging that reminds these consumers of the benefits of re-engaging with the brand may also help increase response rates.

Inactive Consumers: Surprisingly High Combined Acceptance Rate (30.68%)

Inactive consumers, despite being labeled “inactive,” show a surprisingly high acceptance rate of 30.68%, nearly matching that of recent consumers.

Interpretation: The high acceptance rate among inactive consumers suggests that certain campaigns were successful in reactivating this segment. Dormant Customer Reactivation Theory posits that well-targeted campaigns with compelling offers (e.g., exclusive discounts, limited-time incentives) can effectively drawback previously disengaged customers.

This response implies that many inactive consumers may still have a latent interest in the brand, which the right campaign can reignite. Studies in Customer Reactivation highlight that inactive customers often remain receptive to re-engagement if presented with tailored offers that meet their current needs or address past disengagement reasons.

Implications for Campaign Strategy: The strong response from inactive consumers suggests that reactivation campaigns have the potential to be highly effective, especially when paired with personalized or exclusive offers. Campaigns for inactive consumers might emphasize welcome-back offers, loyalty discounts, or other incentives that give a reason to re-engage

Table 10: ANOVA Results for Campaign Acceptance by Recency Segment

Campaign	F-statistic	p-value	Significance
AcceptedCmp1	0.14	0.8731	Not Significant
AcceptedCmp2	2	0.136	Not Significant
AcceptedCmp3	0.86	0.4238	Not Significant
AcceptedCmp4	1.04	0.355	Not Significant
AcceptedCmp5	1.22	0.2965	Not Significant

The table titled “ANOVA Result for Campaign Acceptance by Recency Segment” presents the results of an ANOVA analysis conducted to test the differences in campaign acceptance rates across different recency segments for each campaign.

The consistent lack of significance across all campaigns suggests that the recency of consumer interaction does not play a decisive role in accepting a specific marketing campaign. This indicates that other factors, such as the content of the campaigns, consumer preferences, or external factors, might be more influential in determining campaign acceptance than the recency of consumer engagement. This ANOVA analysis indicates that adjusting campaign strategies based purely on the recency of consumer interaction may not be effective for a particular campaign.

Table 11: ANOVA Results for Spending After Campaign Acceptance by Recency Segment.

Campaign	F-statistic	p-value	Significance
AcceptedCmp1	1.14	0.3240	Not Significant
AcceptedCmp2	0.80	0.4605	Not Significant
AcceptedCmp3	3.13	0.0462	Borderline Significant
AcceptedCmp4	0.03	0.9662	Not Significant
AcceptedCmp5	0.24	0.7862	Not Significant

The ANOVA test results indicate that, for most campaigns, recency of the timing of a consumer's last interaction with the brand does not significantly affect spending behavior after campaign acceptance. This suggests that once consumers accept a campaign, they tend to exhibit similar spending patterns regardless of how recently they last engaged with the brand. However, Campaign 3 shows a significant borderline impact, suggesting a slight influence of recency on spending, though this effect is marginal.

Interpretation of Results

Uniform Influence Across Recency Segments for Most Campaigns:

For most campaigns, consumer spending remains consistent across different recency segments after campaign acceptance.

Interpretation: This uniform spending suggests that after a campaign is accepted, the timing of a consumer's prior interaction with the brand (i.e., recency) has little influence on how much they spend. This finding aligns with theories of engagement stability, where, post-engagement, consumers display steady behaviors regardless of their previous engagement history. The consistency in spending patterns across recency segments indicates that the specific campaign offer itself (such as discounts, bundles, or rewards) is likely the main driver of spending, not the timing of prior brand interaction. This suggests that once a campaign is compelling enough to gain acceptance, it encourages similar spending regardless of recency.

Implications for Marketing Strategy: Since spending appears unaffected by recency for most campaigns, marketers can focus on creating universally appealing offers that engage consumers across different recency levels. This approach suggests that campaign design should emphasize value or exclusivity rather than tailoring based on recency to drive post-acceptance spending.

Campaign 3's Borderline Significant Impact by Recency:

Campaign 3 shows a marginally significant influence on spending across recency segments, hinting that it may resonate differently based on how recently consumers engaged with the brand.

Interpretation: **Targeted Elements in Campaign 3**: The slight significance of Campaign 3 suggests that certain aspects of this campaign perhaps specific offers or messages might appeal more strongly to consumers based on their recency. For instance, Campaign 3 might have featured a reactivation-focused approach that appealed more to consumers with longer gaps in brand interaction, leading to slightly higher spending in this group.

Campaign 3's results may suggest that campaigns acknowledging a consumer's less recent engagement or providing incentives for re-engagement can have a small but meaningful impact on spending. Reactivation Theory supports this, as campaigns targeting previously disengaged customers can boost spending by addressing their unique needs or re-establishing brand relevance.

Implications for Campaign Strategy: While Campaign 3's effect is only marginally significant. It indicates potential value in testing reactivation-specific campaigns tailored to different recency segments. This approach may be particularly useful for re-engaging inactive or mid-recency consumers who could be motivated to spend more with targeted incentives.

Limited Influence of Recency on Spending for Most Campaigns:

The general lack of significant impact from recency across campaigns suggests that spending behavior post-acceptance is relatively stable.

Interpretation: Once consumers engage by accepting a campaign, their spending is more likely driven by the appeal of the campaign offer itself than by the timing of their last brand interaction. The Behavioral Consistency Theory, where consumers display steady purchasing behaviors once motivated by an appealing offer, regardless of past engagement timing. While recency can be a useful indicator for campaign acceptance, it appears less impactful on actual spending levels post-acceptance. Marketers might, therefore, find more success focusing on high value offers and discounts that appeal universally rather than segmenting campaigns by recency to drive spending.

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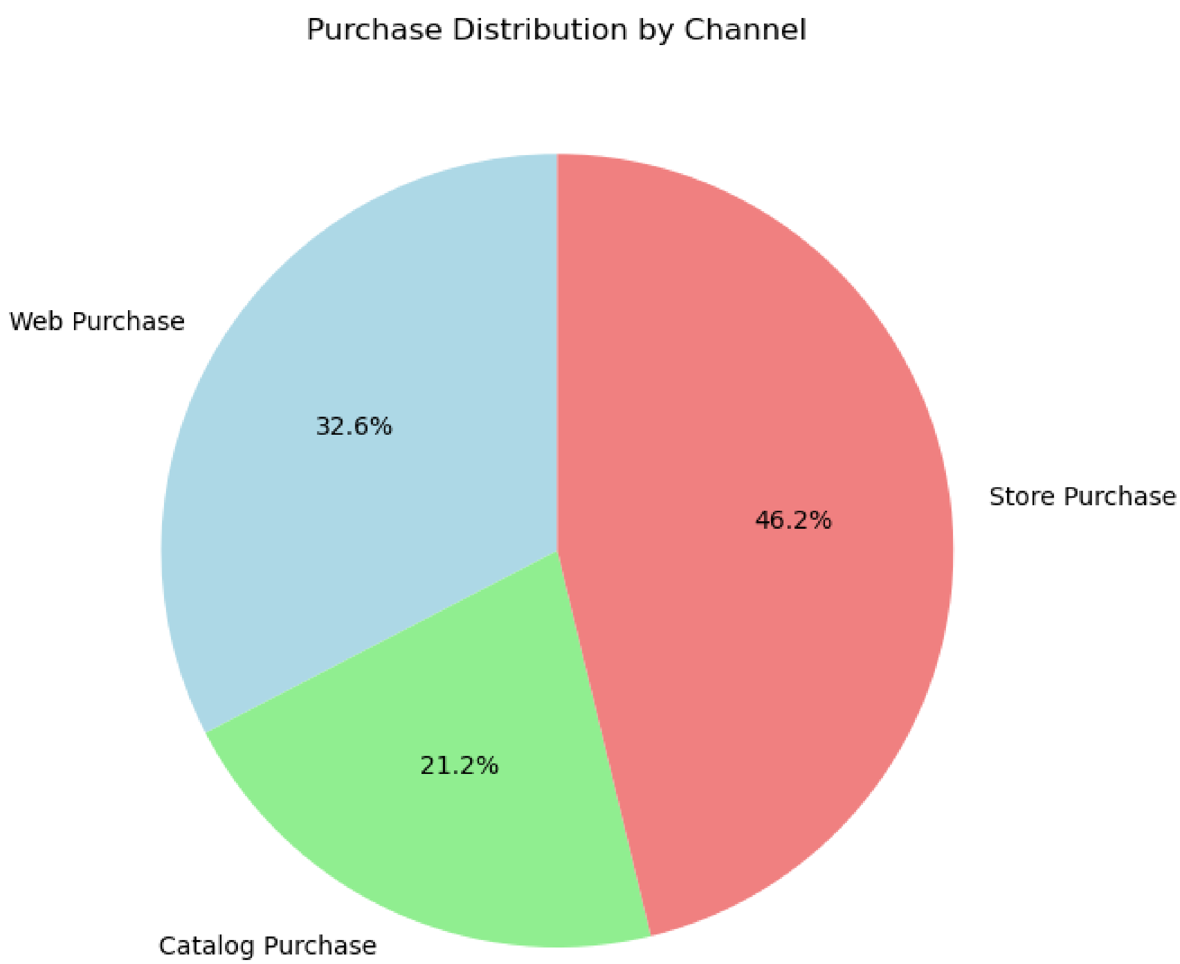

Figure 10: Purchase Distribution By Channel

The pie chart titled “Purchase Distribution by Channel” illustrates the propositions of purchases made through different sales channels.

Store purchases (46.2%)

This represents the largest segment of the chart, indicating that nearly half of all purchases are made in physical store locations. This is a strong consumer preference for person's shopping experience where they can physically assess the product before buying.

Web Purchases (32.6%)

It accounts for approximately one-third of purchases, highlighting the important role of online shopping in modern consumer behavior. This channel's substantial share reflects the convenience and accessibility of e-commerce platforms.

Catalog Purchase (21.2%)

While smaller than the other two channels, catalog purchases still constitute an important portion of total purchases. This channel may appeal to specific customer segments who prefer browsing traditional catalogs or who value the curated selection often found in such formats.

The preference for store purchases suggests that many consumers still value immediate tactile experience and the ability to take items home immediately, which online or catalog shopping cannot fully replicate.

Table 12: Mean Purchases Channel by Income Group

Income Group	Web purchases	Catalog	Store

		Purchases	Purchases
High Income	5.134	6.942	7.307
Middle Income	5.027	3.579	7.108
Low Income	2.146	0.523	3.073

Table 13: Mean Purchases Channel by Age Group

Age Group	**Web Purchases**	**Catalog Purchases**	**Store Purchases**
Seniors (70-84)	4.66	3.4	6.51
Older Adults (55-69)	4.44	2.87	6.14
Middle-Aged Adults (40-54)	3.78	2.28	5.34
Young Adults (28-39)	3.35	2.49	5.51

Table 14: Mean Purchases Channel by Family Structure

Family Structure	**Web Purchases**	**Catalog Purchases**	**Store Purchases**
No Kids or Teen	4.4	4.75	7.27

Teen Only	5.55	3.18	7.18
With Kids	2.87	0.89	3.84

Mean purchases channel by income group

Store purchases consistently have the highest across all income groups, indicating a strong preference for in-store shopping irrespective of income level. This shows that the tactile experience of shopping, the ability to obtain items immediately, and perhaps the enjoyment of the shopping experience itself is valued across the board.

Web purchases are the second most popular mode of purchasing across all groups, with numbers decreasing as income decreases. This could reflect the increasing accessibility of and convenience of online shopping, although it still lags behind store shopping. The lower figures in the low-income group may indicate barriers such as access to reliable internet or payment methods

Catalog purchases are the least favored method across all groups, with a dramatic decrease in frequency as income decreases. This suggests that catalog shopping requires a specific consumer habit or preference that is less prevalent and less necessary to other channels.

Mean purchase channels by Age Group.

All age groups show that store purchases are the most popular purchasing channel, indicating universal preference for shopping in physical store environments regardless of age, web purchases hold the second position underscoring the importance and convenience of online shopping in the digital age. Catalog purchases are the least favored.

Mean purchase channels by family structures

For families, regardless of their structure, store purchases again lead as the preferred channel, reflecting the appeal of traditional retail shopping. Web purchases are notably higher in households with teens, catalog purchases drop more in families with family with kids.

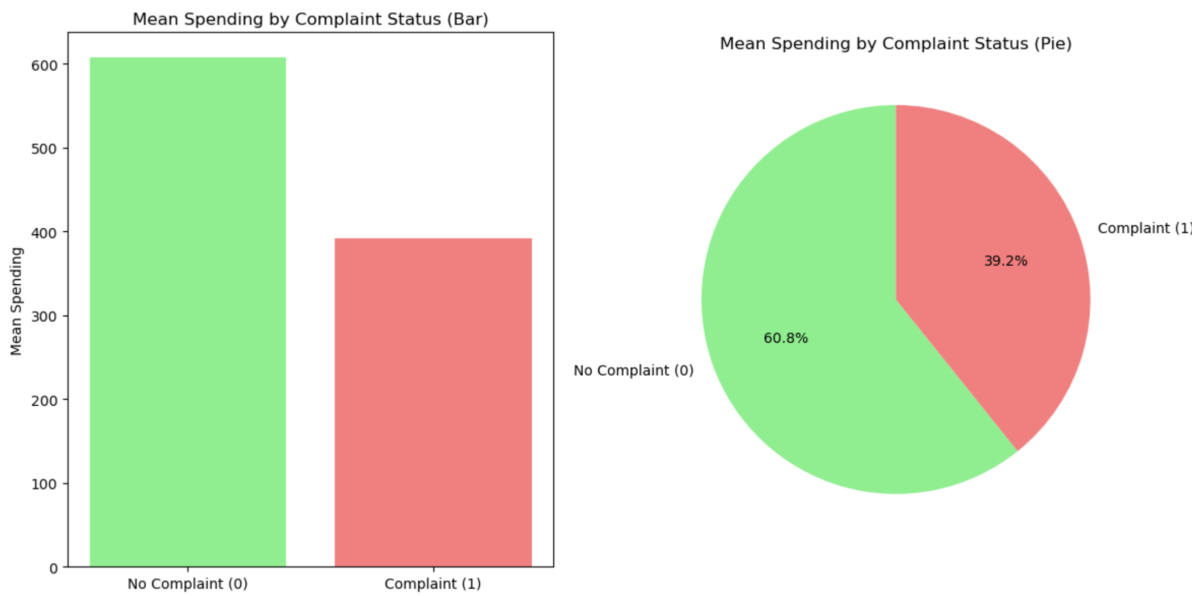

Figure 11: mean spending by complaint status

The visual provided depicts "Mean spending complaint status " in both bar and pie chart formats, illustrating how the presence of customer complaints correlates with spending behavior.

No Complaints

This group. representing consumers who have not registered complaints, show higher mean spending as depicted by the taller green bar. This shows that consumers without grievances tend to spend more, possibly indicating greater satisfaction with the product.

Complaints

The shorter red bar indicates that consumers who have lodged complaints spend less on average than those who do not complain. This may reflect dissatisfaction or unsolved issues impacting their willingness or ability to spend more.

Analysis of the pie chart: mean spending by complaint status

The pie chart quantifies the proportion of mean spending associated with each group. Consumers without complaints account for 60.8% of the total mean spending, while those without complaints contribute 39.2%.

This distribution further illustrates that while consumers with complaints still represent a substantial portion of spending, their contribution is significantly less than those without complaints. This implies that potential revenue loss or consumer loyalty risk if complaints are not adequately addressed.

4.8 Factor Analysis

Factor Analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. Essentially, it helps to identify underlying relationships between measured variables and reduces the dimensionality of data without losing significant information. Factor analysis is common in market research, behavioral science, and discipline to uncover latent structures (factors) that explain patterns in data, such as consumer preferences or psychological traits.

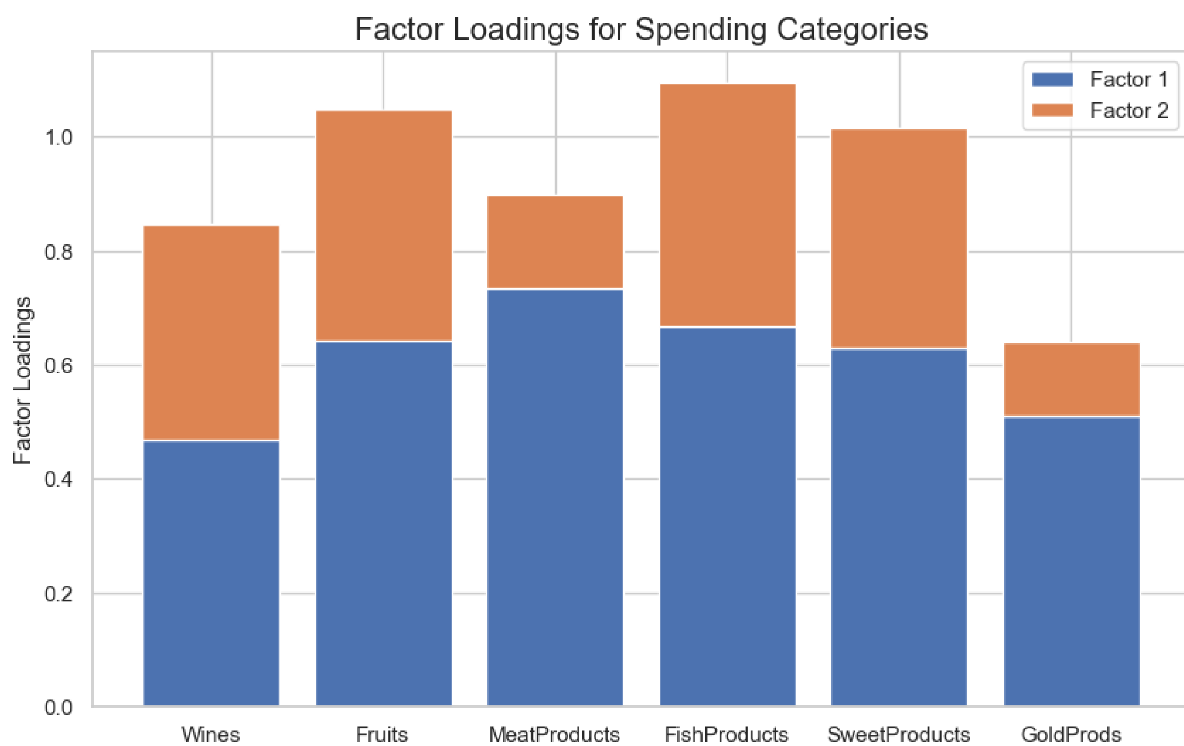

Figure 12: Factor Loading for Spending Categories

The bar chart displays factor loadings for various spending categories across two factors. factor loadings represent the correlation coefficient between the variables (spending categories) and the factors. They indicate how much of the variance in a variable is explained by the factors.

Interpretation of Factor Loadings

Factor 1 Dominance in Most Categories: For most spending categories (Wines, Meat Products, Fish Products, Sweet Products, and Gold products), Factor 1 has a substantial loading, suggesting that these categories align closely with the underlying dimension represented by Factor 1.

Interpretation: Factor 1 might represent a general pattern of discretionary or lifestyle spending where consumers prioritize non-essential items. Higher loadings in Factor 1 for categories like wines, meat products, and sweets suggest that consumers who score highly on this factor might be inclined toward spending on items associated with enjoyment or quality of life. The consistent presence of Factor 1 across various product types indicates a relatively stable consumer segment that spends broadly across lifestyle-oriented categories.

Factor 2 Strong Influence on Fruits and Moderate Presence in Other Categories: Factor 2 has a particularly high loading in the Fruits category and also shows moderate loadings for Fish Products and Sweet Products.

Interpretation: Factor 2 might represent health-conscious or routine spending. The high loading in the Fruits category suggests that consumers associated with Factor 2 may prioritize health-oriented or everyday essentials over lifestyle indulgences. Additionally, the moderate loadings in Fish Products and Sweet Products hint that Factor 2 could be related to spending on items that have a mixed essential-discretionary role, perhaps associated with balanced dietary choices.

The loadings suggest that some consumers, particularly those focused on Factor 2, may prioritize spending on items that align with health and routine needs, rather than on discretionary items alone.

Mixed Factor Loadings in Categories Like Meat Products and Fish Products:

Both Meat Products and Fish Products show substantial loadings for Factor 1 but also have noticeable contributions from Factor 2.

Interpretation: The dual factor loadings in these categories indicate that spending on meat and fish may appeal to consumers with both discretionary and health-oriented motivations. For example, these items could appeal to lifestyle spenders focused on quality (Factor 1) and to health-conscious individuals seeking nutritious foods (Factor 2).

This mixed loading suggests that meat and fish appeal to a broader spectrum of consumer types, perhaps reflecting the versatility of these items as both high-quality and nutritious choices.

Relatively Low Factor Loadings for Gold Products in Factor 2:

Gold Products shows a significant loading in Factor 1 but only a minor contribution from Factor 2.

Interpretation: The low Factor 2 loading and high Factor 1 loading for Gold Products indicates that this category is primarily associated with discretionary, luxury spending. Consumers likely consider gold products as non-essential, aligning more with high-income or lifestyle-driven spending rather than health or routine-oriented purchases.

Gold products likely influence a niche consumer segment motivated by status or investment value, as indicated by their alignment with Factor 1, which may represent an affluent or luxury-focused group.

General Insights

The factor loadings suggest two primary dimensions in consumer spending behavior:

- **Factor 1**: Primarily associated with lifestyle and discretionary spending, capturing spending on items that enhance enjoyment or align with non-essential preferences.
- **Factor 2**: Likely represents health-conscious or routine-oriented spending, emphasizing essential or nutritionally valuable products.

Implications for Targeted Marketing:

Factor 1 Consumers: Marketing strategies targeting Factor 1 could focus on promoting the quality, exclusivity, or luxury aspects of items like wine, gold products, and premium meats, as these consumers may prioritize discretionary purchases.

Factor 2 Consumers: For Factor 2, brands might emphasize health benefits, routine consumption, and the essential nature of items like fruits, fish, and moderate indulgences such as sweets.

Consumer behavior

The Factor Loadings for Spending Categories chart highlights two distinct consumer spending dimensions discretionary lifestyle spending (Factor 1) and health-oriented or routine spending (Factor 2). Most spending categories support strongly Factor 1, indicating a broad consumer base interested in lifestyle enhancements, while specific categories like fruits align with Factor 2, appealing to health-conscious or routine-oriented consumers. This segmentation provides valuable insights for businesses aiming to target consumer preferences effectively across different product types and spending motivations. Categories with high loading on both factors may require nuanced product positioning that addresses multiple consumer needs and desires simultaneously, enhancing the appeal across different consumer segments.

4.9 Time series Analysis.

Table 15: Augmented Dickey-Fuller Test Results (ADF).

Metric	Value
ADF Statistics	-7.063
P-value	0.000
Critical Values	
1%	-3.440
5%	-2.865
10%	-2.569

The table is a result of an Augmented Dickey-Fuller (ADF) test, a statistical test used to determine whether a time series is stationary. Stationarity is an important property in time series, especially when forecasting, as many models assume that the series is stationary.

- ADF Statistics is a test statistic used to reject or fall to reject the null hypothesis that time series has a unit root
- P-value indicates the probability that it would observe the given or more extreme outcome of the test statistic if the null hypothesis were true. A small p-value suggests that the observed data is inconsistent with the null hypothesis.
- Critical values are values that correspond to the test statistics values at different significant levels (1%, 5%, and 10%). If the ADF statistics are more negative than the critical value. The null hypothesis can be rejected at that significant level.

ADF Statistic vs. Critical Values: The ADF Statistic of -7.063 is more negative than all of the critical values (-3.440, -2.865, and -2.569). This implies a strong rejection of the null hypothesis at all conventional significant levels (1%, 5%, and 10%).

P-vale: The p-value of 0.000 is extremely small. This reinforces the rejection of the null hypothesis, suggesting that the time series does not have a unit root and is stationary.

Table 16: SARIMAX Model Results for Total Spending.

Parameter	Coefficient	Std. Error	z-Statistic	P-value	95% CI
Constant	2040.9955	380.139	5.369	0.000	[1295.936, 2786.055]
AR (1)	0.9969	0.005	202.614	0.000	[0.987, 1.007]
MA (1)	-0.9801	0.012	-79.488	0.000	[-1.004, -0.956]
Sigma^2	2.897e+06	0.480	6.04e+06	0.000	[2.9e+06, 2.9e+06]

Table 17: Fit Statistics:

Statistic	Value	Description
Log Likelihood	-5873.535	Measure of fit under the log-likelihood
AIC	11755.071	Akaike Information Criterion
BIC	11773.058	Bayesian Information Criterion
HQIC	11762.041	Hannan-Quinn Information Criterion

Table 18: Diagnostics

Test	Statistic	Value	Significance
Ljung-Box	Q	0.78	0.38
Jarque-Bera	JB	261.33	0.00
Heteroskedasticity	H	0.65	0.00
Skew		1.23	
Kurtosis		4.84	

Interpretation of table

The SARIMAX (Seasonal Autoregressive Integrated Moving Average with eXogenous variables) model summary presented offers a detailed statistical insight into the fitted model for the dependent variable.

Model Summary

- The model type ARIMA (1,0,1) indicates an ARIMA model with 1 autoregressive term and 1 moving average term. The integrated term 0 suggests that the series is assumed to be stationary.
- Log likelihood measures the likelihood that the model, as specified, produced the observed data, higher values (less negative) are better.
- AIC is used to compare models; lower AIC values indicate a better model.
- HQIC: Another criterion for model comparison, balancing model complexity and fit.

Coefficients:

- **Const:** 2040.9955 ± 380.139, This represents the intercept or the baseline levels of the dependent variable when all other predictors are zero.
- **Ar. L1 (A**utoregressive Lag1): 0.9969 ± 0.005 indicates a very high positive correlation with the first lag of the series, suggesting a strong persistence over time.
- **Ma. L1 (moving Average Lag1)** -0.9801 ± 0.012 The negative coefficient almost complements the AR term, stabilizing the short-term fluctuations.
- **Sigma2: A**pproximately 2.897e+06. The variance of the model residuals indicates the average squared deviations from the fitted values.

Diagnostic Test

- **Ljung-Box Test: prob(Q)=0.38** indicates the residuals are independently distributed, there is no autocorrelation at lag 1 ($p > 0.05$).
- **Jarque-Bera Test: prob** (JB) = 0.00. Test for normality of residuals, low p-value suggests the residuals do not follow a normal distribution.
- Heteroskedasticity Test pro(H) = 0.00 indicates the presence of heteroskedasticity, the error variance is not constant.
- Skewness 1.23 Residuals are skewed is not constant
- Kurtosis 4.84 indicates a heavily tailed distribution compared to a normal distribution.

The chosen model ARIMA (1,0,1) effectively captures the pattern in the dependent variable, as evidenced by significant coefficients and a substantial number of observations. Given the model's capability to capture the persistence in spending behavior, it can be used for a short period. The non-normal and heteroskedastic nature of residuals suggests that improvement could be made, possibly by incorporating additional variables, applying transformations, or using a more complex seasonal mode if justified by the data.

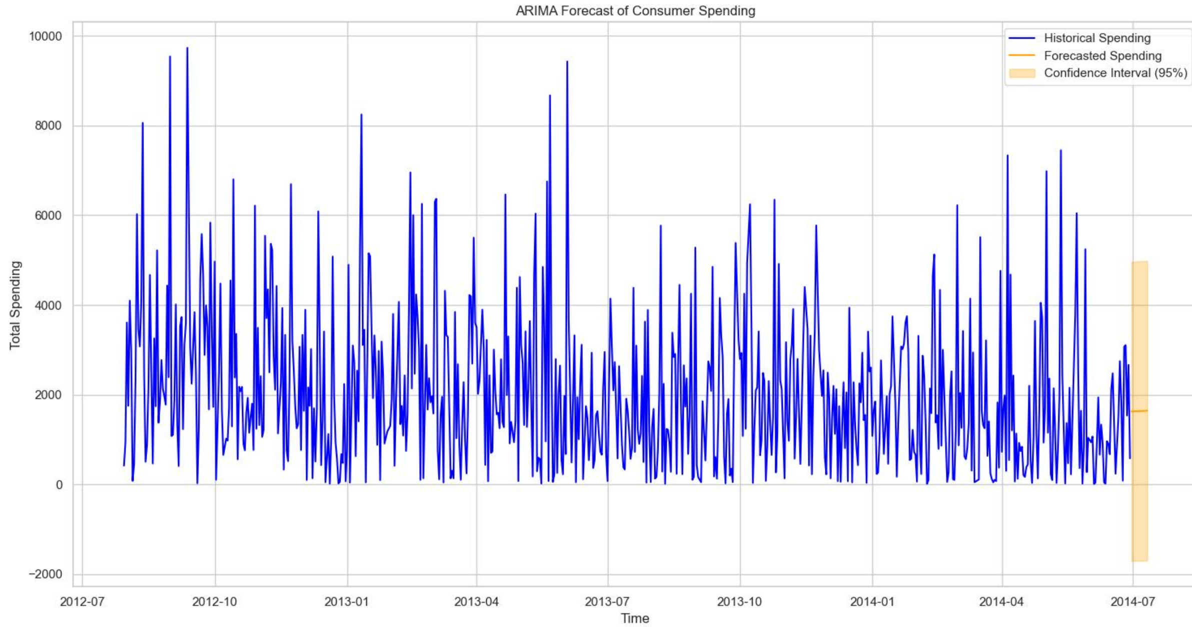

Figure 13: Forecast for Consumer Spending

The graph showcasing the ARIMA forecast of consumer spending is impressively detailed and provides a clear visual representation of both historical and forecasted spending patterns,

The graph effectively distinguishes between historical data and forecasted values using different colors. Effective use of confidence intervals including 95% confidence intervals visually communicates the uncertainty in the forecast, giving a realistic picture of future projection.

CHAPTER 5: Discussion, conclusion, and Recommendations.

5.0 Introduction

This chapter interprets the findings that have been made from the research study in trying to answer the most important objectives and questions guiding the study. The study tries to establish how different drivers such as demographic variables, consumer spending habits or trends, and responses to focused marketing campaigns have their impact on consumer behavior and spending. Of interest was how income, recency of brand interaction, family structure, and campaign acceptance shape spending behavior across different product categories.

To be able to achieve these objectives, the quantitative methodological approach was adopted, using statistical techniques in the computation of patterns and variations in consumer spending. In this way, there is more critical testing of consumer responses across segments and some insight into how demographic and behavioral factors combine to influence purchasing behavior.

These findings bear important implications for marketing strategies and policy recommendations regarding the need to focus campaigns that enhance fit among specific consumer segments. The results, thus, enrich knowledge in the areas of consumer behavior and targeted marketing in terms of the key questions addressed in the study; hence, actionable insights are provided to help improve overall engagement and optimize spending across diverse consumer groups.

5.1 Discussion

Findings and Discussion

This section of the work contextualizes findings from the study in relation to the research questions presented in the introduction. The discussion based on the analysis therefore reveals a greater understanding of demographic variables, consumer spending, and campaign acceptance as motivators of purchasing behavior within various categories of products.

Demographic Factors Influencing Consumer Behavior

Age and Lifestyle Needs:

It appears that seniors or older adults emphasize necessities, possibly due to fixed incomes and a movement towards basic need consumption. In contrast, income and spending power related to different life cycles demonstrate different consumer needs and demands.

Income and Education:

It finds that higher income and higher attainment of education are directly related to higher discretionary spending. This might reflect a correspondence of higher economic status and educational background to the consumer's perceived value of quality and luxury.

Marital Status and Social Engagement:

The singles or those in relationships were found to spend more on luxury items, arguably out of increased social engagements and indulgence of oneself.

Family and Spending Patterns:

Households with fewer dependents like a household without kids or teens also tend to spend more towards lifestyle-oriented and discretionary spending. This shows that family structure makes a marked difference in spending.

Health and Cultural Influences:

The health benefits of a product, which consumers stress, and the cultural importance of various products are also important reasons for spending on products, especially those that are Staples in everyday use.

Marketing Campaigns Recency:

Whereas campaign acceptance had a significant influence on spending behavior, especially for consumers who are recent interactors or re-engaged, the ANOVA result shows that, for some campaigns, interaction recency is generally negligible in driving consumer spending behavior after accepting campaigns.

Longevity and Consumer Spending

Long-time Consumers and Spending: From the analysis, it might be further observed that long-time consumers tend to spend more, showing a significant relationship between the duration of engagement with a brand and the spending habits of consumers. This may probably be due to increasing loyalty and the element of trust growing over time. The longer a customer spends with a company, the higher their confidence in the quality of its products may be, and the easier it will be to upsell or cross-sell. It hints at the importance of customer retention strategies and loyalty programs in augmenting lifetime customer value.

Compared to Existing Literature: The results confirm some of the previous studies related to consumer behavior, especially those concerning the impact of income on discretionary spending and how personalized campaigns enhance engagement. On the other hand, our results contradict some of the literature that has been more inclined toward recency as a strong predictor of post-campaign spending. However, this research showed that the novelty of post-acceptance of campaigns had a very minimal effect on spending, which might indicate that it is the offer and not the novelty that is more critical in driving spending among engaged consumers.

Theoretical Implications

The findings enrich the theoretical framework upon which this study is founded, especially regarding the Value-Perception Theory and the Engagement Stability Theory.

Refining existing theories, the findings also suggest that whereas recency may predict campaign acceptance, it is not a strong driver of spending post-acceptance for most campaigns. This finding thus refines the Engagement Stability Theory by suggesting that spending behaviors are more stable due to the nature of the campaign offer than because of the prior timing of engagement. Another evidence for the Value-Perception Theory is that, regardless of income level, consumers responded positively to high perceived value offers, especially in discretionary categories.

Extending and Challenging Theories: The limited role of recency in post-campaign spending suggests that the role of recency in long-term engagement may be relatively limited. Results thus provide partial support to theories that place recency as a key factor in consumer spending and could offer avenues for other dimensions, such as consumer preferences or campaign characteristics, which are stronger predictors of post-acceptance expenditure on future research.

5.2 Methodological Considerations.

Methodologically, the statistical analyses used provided a sound framework within which complex patterns in consumer behavior could be examined. This quantitative approach allowed for a detailed look at spending variations across demographic and behavioral segments.

Strengths: Descriptive Statistics and Correlation Analysis: In addition to factor analysis, descriptive statistics allowed the basic characteristics of the data set to be understood in means, medians, and standard deviations, creating a very important baseline for further analysis. The correlation analysis added much value by determining the strength and direction of many associations between key variables. This helped analyze how demographic factors of age and income level are related to consumer spending and thus provided a statistical basis for supporting or rejecting a hypothesized relationship.

Comparative Analysis: The employment of comparative analytical methodologies strengthened our findings even further. We can segregate the groups based on demographic characteristics and consumer behavior and compare them to find significant differences and similarities in spending habits. The various comparisons put the effect of marketing campaigns into perspective, giving a much better view of the effectiveness of strategies with consumer profiles.

Limitations: The estimated spending data relies on self-reporting, which may be subject to biases due to recall or social desirability. In addition, although ANOVA and factor analysis yield very valuable information, they do not point out any kind of causation, which restricts the possibility of making conclusive statements about the direction of the relationships observed.

The reliability and validity of the results: These would correspond to similar studies in consumer behavior, therefore justifying their reliability. Of course, one can further develop the latter with validity through a longitudinal approach to track the spending over time and hence present a more dynamic view of the changes in consumer engagement and spending behavior.

In sum, a discussion of the findings considering the research questions, theoretical framework, and existing literature follows. The contributions of these insights are at once practical and theoretic, underlining the need for focused marketing strategy and allowing for further theorizing on modifications in consumer behavior theories that take recency and value perception into consideration.

5.3 Conclusions

This study provides valuable insights into how demographic factors, campaign acceptance, and recency of brand interaction influence consumer spending behavior. Key findings indicate that income level has a significant impact on discretionary spending, with high-income consumers demonstrating the highest spending across lifestyle and non-essential categories. Campaign acceptance was also found to positively influence spending, though the effect of recency on post-acceptance spending was minimal for most campaigns, suggesting that once a campaign is accepted, the value of the offer itself becomes the primary driver of spending behavior.

The main conclusions drawn from the research are as follows:

Income is a critical determinant of consumer spending behavior, particularly in discretionary categories.

Campaign acceptance can enhance consumer spending across all income levels, but the **timing of the last engagement (recency)** does not significantly alter post-acceptance spending in most cases.

Factor analysis revealed two distinct dimensions of spending behavior: lifestyle-oriented (Factor 1) and health-conscious or essential spending (Factor 2). This suggests that consumer spending is driven by both lifestyle preferences and routine necessities.

Tenure Influence: Longer tenure with a brand correlates with higher spending, indicating the importance of customer loyalty.

Health and Cultural Influences: Factor analysis identified two spending dimensions: lifestyle-oriented and health-conscious or essential spending, suggesting that purchases are motivated by both personal preferences and necessities.

Family Structure: Family structure influences spending, with fewer dependents correlating with increased discretionary spending.

This study contributes to the field of consumer behavior by challenging the traditional emphasis on recency in post-campaign spending and emphasizing the importance of the campaign offer's intrinsic value. The findings provide a nuanced understanding of the relationships between demographic factors, engagement, and spending behavior, offering both theoretical and practical implications for targeted marketing.

5.4 Recommendations

Practical Recommendations

Segmentation according to income groups targets effective marketing strategies. In this respect, marketers have either to develop value-for-money products for low-income groups or exclusive, expensive products to impress high-income consumers. Product positioning and its messaging can be addressed more precisely, thereby enhancing campaign effectiveness.

Lifestyle and health-oriented campaigns: As the habits of spending on lifestyle and health were identified from the factor analysis, campaigns could be designed accordingly. For instance, health-oriented campaigns may be designed to emphasize quality and nutritional value; lifestyle campaigns may be designed to emphasize luxury and exclusivity for high-end consumers.

Better Consumer Engagement Strategies:

Campaign Design Over Recency Segmentation: Since recency has a limited impact on post-acceptance spending, marketers should pay more attention to the value and attractiveness of campaign offers rather than timing alone. Strong, intrinsically valuable campaign design can support spending regardless of the customer's prior frequency of engagement.

Reactivation Campaigns for Inactive Consumers: Among inactive or mid-recent consumers, reactivation campaigns that include personalized incentives or acknowledge past inactivity have a chance of lifting their engagement and spending.

Policy Implications:

Designing programs with a view to the limited spending capacity of low-income consumers will contribute toward supporting these consumers. Policymakers can hence frame policies by subsidizing essential goods or providing tax breaks on necessities, supporting the spending power of this segment and economically contributing to their participation.

Encourage Financial Resilience: Public campaigns on responsible spending and saving by middle-class consumers will go a long way in building financial resilience and ensuring this section of the economy continues to make its positive contribution.

Future Research Recommendations

Longitudinal Patterns:

Future studies might therefore consider a longitudinal approach to understanding how consumer spending behavior might change over time, especially as the campaigns would be exposed one after another. This will provide a more dynamic view of the evolution of engagement and spending patterns.

Additional Predictors of Spending:

Given the limited impact of recency on post-acceptance spending, further research might consider other factors, such as product type, consumer personality traits, or loyalty program participation, to help explain what motivates engagement spending after a campaign.

Refining Research Design:

Future studies can, therefore, be informed by a mixed-methods approach in qualitative interviews or focus groups that capture more profound insights into consumer motivations for spending. This would yield a richer understanding of consumer responses to targeted campaigns as a complement to quantitative results.

Another approach could be cross-cultural studies aimed at finding out how consumer spending behavior might differ across different cultural or regional contexts and give wider applicability of findings.

These recommendations point to several opportunities marketers, policymakers, and researchers have in terms of applying the findings of this study in ways that enhance consumer engagement, refine marketing strategies, and extend existing understanding in the field of consumer behavior.

5.5 Limitations

While this study has given a great amount of insight into consumer spending behavior, several limitations exist.

Limitations of Secondary Data: The analysis is only as good as the quality of the secondary data. Any errors or biases in the source of data will then be directly reflected in the findings. Not all variables of interest could form part of the dataset, or the details might be specific to the study.

Cross-sectional design: The cross-sectional nature of the study cuts across just one point in time in the consumers' behavior, thus limiting insights into how the spending patterns evolve over time. As such, it may not take into consideration the seasonal variations or periods of economic shifts that might affect spending or changes in consumer priorities.

Limited Variable Scope: While it developed variables of income, recency, and campaign acceptance, other potential drivers of spending, like psychological factors, lifestyle, and product preference, were beyond the scope of this study. It is here that the limited scope of variables reduces the depth of understanding the intricacies of consumer behavior.

Sample Specificity: Since the findings are confined to a certain sample, which may not generalize the population, one should be very cautious in generalizing the findings to other demographic groups, other geographical locations, and even across cultures.

These imply that while the study can provide the basic view of the effect of income, recency, and campaign acceptance on spending behavior, further research with a wider scope and longitudinal is necessary to establish and expand the findings.

5.6 Closing Remarks

In a nutshell, the present research has successfully been able to identify the significant roles of demographic variables, acceptance of campaigns, and recency of engagement in driving the spending behavior of consumers. By highlighting income and inherent attractiveness of campaign offers as the main drivers of spending, this study questions assumptions on the influence of recency on post-campaign spending. It thus places greater emphasis on the construction of compelling-value-proposition campaigns that can help ensure maximum consumer engagement and spending across diverse segments.

This paper contributes to the growing literature on consumer behavior by further detailing a mechanism of how targeted marketing can affect spending. The implications extend far beyond marketing into informing policymakers about economic participation across incomes.

In such a dynamically changing marketplace, the ability of effective segmentation and targeting has never been more important, as consumers are getting more and more demanding. The findings in this study underpin the importance of data-driven approaches toward the satisfaction of consumer needs and long-term loyalty. This research makes a meaningful contribution to the literature by providing a theoretical and practical standpoint that might help further research and marketing strategies.

5.7 Appendices

Appendix: Overview of Statistical Methodologies Applied

This appendix provides a succinct overview of the various statistical methodologies applied in analyzing consumer spending behaviors and preference dimensions. Each of these methods is briefly described along with their purpose and applications within the research study.

A. Analysis of Variance (ANOVA)

Purpose: ANOVA tests differences between means of three or more groups to ascertain whether group means are different from each other. This helps test the effects that multiple independent variables have on a dependent variable.

Use in the Study: This analysis was conducted to witness the effect of different demographic factors such as age, income, and family structure on consumer spending across various product categories.

B. Factor Analysis

Purpose: Factor analysis is a statistical technique that helps explain variation among observed variables in terms of fewer unobserved variables called factors. It also allows data reduction by identifying a smaller number of factors explaining a large portion of the variance observed in many variables.

Application in Study: Factor analysis was implemented to uncover latent dimensions of consumer behavior, which may influence spending decisions and are usually not directly measurable by personal preferences and psychological traits.

C. Tukey's Honestly Significant Difference (HSD)

Purpose: This post-hoc test follows ANOVA in determining which specific means in a group differ from one another. It does an effective job of controlling the Type I error rate when several pairwise comparisons are made.

Tukey's HSD in Study: Performing Tukey's HSD established pairwise comparisons across the consumer segments to determine where the differences in spending are significant after an overall significant effect was found by using ANOVA.

D. Correlation Analysis

Purpose: The purpose of a correlation analysis is the measurement of the strength and direction of the linear relationship between two variables. This is important in determining the extent changes in one variable are related to changes in another variable.

Application in Study: This analysis was used to explore the relationships between consumer spending and variables such as customer satisfaction and product preferences.

E. Time Series Analysis

Purpose: Time series analysis involves techniques for analyzing time series data to extract meaningful statistics and other characteristics. It is particularly useful for forecasting future trends based on historical patterns.

Application in Study: Time series analysis was then applied to forecast future trends in consumer spending based on historical data on spending, considering seasonal variations and economic cycles.

What these sophisticated statistical methodologies have evoked is a deep insight into the complex dynamics of consumer spending. Each of these methods uniquely contributed to unraveling the intricacies of consumer behavior, hence feeding into the development of better-targeted marketing strategies and business decisions.

Link to Code Repository

The code supporting the analyses and results of this dissertation is deposited publicly at the following URL which contains all scripts or codes https://github.com/Akwasilight/portfolioproject/blob/main/Consumer%20Spending%20Behavior%20.ipynb. The repository contains all scripts and data files (https://github.com/Akwasilight/portfolioproject/blob/main/Consumer%20Behavir%20Data set.csv.) with a README in sufficient detail that a person could reproduce the findings of the study using the code.

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