“ Market Segmentation Analysis ”

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Team Member 1 : Ms.Kalyani Prashant Bhosale

Team Member 2 : Mr.Mayuresh Ganesh Argade

Team Member 3 : Mr.Muchindla Arun

Team Member 4 : Mr.Nagarjuna

Task Allocation

Team Lead : Mr.Sahil Devanand Khandait

Step4: Exploring Data
Step5: Extracting Segment
Step6: Profiling Segment

Team Member 1 : Ms.Kalyani Prashant Bhosale

Step7: Describing the Segment
Step8: Selecting the Target Segment
Step9: Customizing the Marketing Mix

Team Member 2 : Mr.Mayuresh Ganesh Argade

Step4: Exploring Data
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Step6: Profiling Segment

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Step7: Describing the Segment
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Step4: Exploring Data
Step5: Extracting Segment
Step6: Profiling Segment

1) Mr.Sahil Devanand Khandait

Step1: Deciding (not) to Segment

Market segmentation is a critical marketing strategy but requires a long-term commitment from organizations. Before investing in market segmentation analysis, it's important to understand its implications, including substantial organizational changes and investments. McDonald and Dunbar (1995) highlight that market segmentation involves significant costs related to research, surveys, designing various packages, and creating multiple advertisements and communication messages. Cahill (2006) emphasizes that segmentation should only be pursued if the anticipated increase in sales justifies these expenses, asserting that the profitability of segmentation must outweigh its costs.

Key barriers to the effective implementation of market segmentation strategies.

1. Senior Management Barriers:
    - Lack of leadership,
    - implementation hampers success.
2. Organizational Culture Barriers:
    - Issues such as a lack of market or consumer orientation, resistance to change, lack of creative thinking, poor communication, lack of information sharing, short-term thinking, unwillingness to make changes, and office politics impede implementation
3. Lack of Training:
    - If senior management and the segmentation team lack foundational knowledge of market segmentation or are unaware of its consequences, the strategy is likely to fail.
4. Lack of Formal Marketing Function:
    - Absence of a formal marketing function or qualified marketing experts, particularly in diverse and large organizations, is a significant barrier
5. Objective Restrictions:
    - Financial constraints and inability to make necessary structural changes are major obstacles. Limited resources necessitate focusing only on the best opportunities
6. Process-Related Barriers:
    - Lack of clear objectives, poor planning, unstructured processes, unclear responsibilities, and time pressures can impede effective segmentation
7. Operational Challenges:
    - Simplifying the analysis and using graphical visualizations can facilitate understanding and interpretation by managers.

Step 2: Specifying the Ideal Target Segment

1. User Involvement:

- Users must participate throughout most stages, integrating with the technical aspects of the analysis.

2. Knock-Out Criteria:

- Segments must be evaluated using initial criteria to determine if they qualify for further assessment, include:

    - Homogeneity: Members of the segment should be similar.
    - Distinctness: Segments should be different from each other.
    - Size: Segments must be large enough to justify customization.
    - Organizational Fit: The organization must be capable of meeting segment needs.
    - Identifiability: Segments must be recognizable in the market.
    - Reachability: There must be a way to communicate with segment members.

3. Segment Attractiveness Criteria:

- After passing knock-out criteria, segments are rated on attractiveness criteria, which are not binary but vary in degree of attractiveness. These criteria help determine the overall appeal of each segment.

4. Structured Process:

- A structured approach is recommended for assessing market segments. The most popular method is the segment evaluation plot, which charts segment attractiveness against organizational competitiveness.

Step 3: Collecting Data

1. Segmentation Variables : Data-driven segmentation relies on empirical data, with segmentation variables splitting samples into segments and descriptor variables detailing them.
2. Data from Survey Studies : Key considerations include variable selection to avoid noise and response style biases, choosing suitable response options (binary or metric), and ensuring adequate sample sizes.
3. Data from Internal Sources and Experimental Studies : Internal data like scanner data offers objective insights into consumer behaviour, but may bias towards existing customers.

Step 4: Exploring Data

4.1. A First Glimpse at the Data
After gathering data, the first step is to explore and clean it. This process is known as Exploratory Data Analysis (EDA). EDA helps in understanding the data better and preparing it for further analysis, such as identifying market segments. Here's what EDA involves:
1. Identify Measurement Levels: Determine if variables are nominal, ordinal, interval, or ratio.

2. Univariate Analysis: Examine the distribution of each variable (e.g., mean, median, range).
3. Assess Dependencies: Explore relationships between variables (e.g., correlations).

Preprocessing:

- Handle missing values
- Remove duplicates o Normalize/standardize data o Encode categorical variables Application Example Using a travel motives data set with 20 motives from 1000 Australian residents about their last vacation, you can:
- Load the Data: Use the R package MSA to get the CSV file.
- Explore and Clean: Identify variable types, investigate distributions, and preprocess the data.

This prepares the data for effective market segmentation analysis.

4.2 Data Cleaning

- Data cleaning has to be done before sampling to ensure accuracy and consistency.
- This involves checking for correct recording of values and consistent labels for categorical variables.
- Metric variables like age should fall within expected ranges, while categorical variables like gender should have permissible values.
- In the Australian travel motives dataset, no cleaning is needed for gender and age variables. However, the Income2 variable's summary reveals unordered categories due to how non-numeric data is handled in R. This can be corrected by reordering the categories, ensuring accurate representation of the data.

4.3 Descriptive Analysis

- In R, the summary() function provides a quick overview of numeric variables like AGE, including range, quartiles, mean, and frequency counts for categorical variables, highlighting missing values.
- Histograms are useful for visualizing the distribution of numeric data like AGE, showing patterns and outliers.
- In R, you can use the lattice package for segment-wise histogram creation. Mosaic plots help descriptive statistics and graphical methods offer insights for informed analysis and decision-making.
- Boxplots offer a concise summary of distributions without manual bin selection, showing minimum, quartiles, median, and maximum values. They're widely used in natural sciences, less so in business and social sciences.
- R defaults to displaying the five-number summary and mean in numeric summaries, aiding in understanding central tendency and spread.

4.4 Pre-Processing

4.4.1 Categorical Variables

- Merging Categories: Combine too specific categories to balance the data.
- Converting to Numbers: Assumes equal distances between categories (e.g., income ranges).
- Likert Scales: Can be treated numerically but may be inconsistent in responses.
- Binary Responses: Using "yes" or "no" can improve consistency.
- Conversion in R: Easily convert responses to numbers for simpler analysis.
- Impact: These steps aid manageability but may alter data slightly.

4.4.2 Numeric Variables

• Impact of Value Range: Large range differences can skew segmentation impact.

• Standardization: Transform variables to a common scale (mean = 0, standard deviation = 1).

• Standardization Method: Subtract the mean and divide by the standard deviation using scale() in R.

• Outliers: For data with outliers, use median and interquartile range instead.

4.5 Principal Components Analysis

• Principal Components Analysis (PCA) is a dimensionality reduction technique that transforms a dataset with multiple variables into a new set of variables called principal components.

• These components are uncorrelated and ordered by importance, with the first one capturing the most variability in the data, and so on.

• It typically works with the covariance or correlation matrix of numeric variables. In R, you can use the prcomp() function to perform PCA.

• It helps to identify which variables contribute most to the variation in the data. The rotation matrix obtained from PCA shows how the original variables contribute to each principal component. By plotting the principal components, we can visualize the data in a lower-dimensional space.

• Important to consider the proportion of variance each component explains.A few components explaining high variance suggests non-redundant variables.

• Using PCA components directly for segmentation is not recommended.

• Better used for identifying and removing redundant variables.

• EDA Helps reduce dataset dimensionality while retaining original variables.

• Eda Identifies highly correlated variables.

Step 5:Extracting Segments

1. Nature of Market Segmentation Analysis

• Exploratory Nature: Unstructured consumer data makes market segmentation exploratory.

• Algorithm Assumptions: Results depend on assumptions made by the chosen algorithm.

2. Clustering Methods and Their Impact

• k-Means Clustering: Often fails with non-linear structures due to compact, equally sized cluster formation.

• Single Linkage Hierarchical Clustering: Better for non-linear structures like spirals but can create chains in other scenarios.

• No Single Best Algorithm: Choice depends on data characteristics and segmentation needs. For unstructured data, the algorithm's tendencies significantly influence the solution.

3. Guidelines for Choosing Algorithms

• Considerations: Data set size, scale level of segmentation variables, and special structures in data.

- Expected Segment Characteristics: Similarities within segments and differences between segments.
- Distance-Based Methods: Use similarity or distance measures.

- Common Distance Measures:
  - Euclidean Distance: Straight-line distance.
  - Manhattan Distance: Sum of absolute differences.
  - Asymmetric Binary Distance: Focuses on shared 1s in binary data.

1. Hierarchical Clustering Methods

- Agglomerative Hierarchical Clustering: Merges closest pairs iteratively.
- Divisive Hierarchical Clustering: Splits iteratively.
- Linkage Methods:
- Single Linkage: Minimum distance between points.
- Complete Linkage: Maximum distance between points.
- Average Linkage: Average distance between points.
- Ward's Method: Minimizes increase in within-cluster variance, forming compact clusters.
- Dendrograms: Visual tools for determining the number of clusters.

2. k-Means and k-Centroid Clustering

- k-Means Clustering: Most popular partitioning method. Divides consumers into similar segments using the mean of all members as the centroid.
- k-Centroid Clustering: Generalization of k-means allowing other distance measures.
- Steps of k-Means Algorithm:

1. Specify the number of segments (k).
2. Randomly select k initial cluster centroids.
3. Assign observations to the closest centroid

STEP 6 : Profiling Segments in Market Segmentation

Identifying Key Characteristics of Market Segments

- Aim: Understand the characteristics of market segments derived from data-driven segmentation.
- Commonsense Segmentation: Profiles are predefined (e.g., age groups).
- Data-Driven Segmentation: Defining characteristics are unknown until after data analysis.
- Profiling Purpose: Characterize segments individually and comparatively.
- Challenges: Managers often find data-driven segmentation results difficult to interpret, perceiving them as complex or inconsistent.

Traditional Approaches to Profiling Market Segments
Methods: High-level summaries.
Large tables with exact percentages for each segment, which are difficult to interpret.

Example: Table 8.1 shows percentages for various travel motives across segments.
Comparison Difficulty: Profiling requires comparing many percentages, which is tedious and error-prone.
Statistical Tests: Not appropriate for assessing segment differences due to the way segments are derived.

Segment Profiling with Visualisations

- Importance of Visualisation: Helps interpret complex relationships between variables.
- Segment Profile Plot: Visual representation of segment characteristics compared to the overall sample.
- Variable Ordering: Can be based on total mean values or similarity of answer patterns (e.g., hierarchical clustering)

Github: sahilkhandait/fennylab_code_convert (github.com)

2) Ms.Kalyani Prashant Bhosale

The case study outlines a comprehensive approach to developing a marketsegmentation strategy, emphasizing several key steps and considerations.

Step 1: Deciding (not) to Segment :

- Implications: Implementing market segmentation requires significant commitment and investment. It involves creating or modifying products,adjusting pricing and distribution, and tailoring communications. Organizational structures may need adaptation.
- Barriers: Lack of senior management commitment, insuHicient resources, resistance to change, and lack of market orientation are common barriers.
- Recommendations: Overcoming barriers involves addressing market orientation, communication, training, resource allocation, and process planning. Thorough market segmentation analysis, clear business cases,structured processes, and senior management support are crucial.

Step 2: Specifying the Ideal Target Segment :

- Segment Evaluation Criteria: Criteria include knock-out (essential) and attractiveness factors. The organization evaluates segments based on substantiality, measurability, accessibility, homogeneity, and distinctness.
- Implementing a Structured Process: A structured process involves usingsegment evaluation plots to assess attractiveness and organizational competitiveness based on selected criteria.

Step 3: Collecting Data :

- Segmentation Variables : Data-driven segmentation relies on empirical data, with segmentation variables splitting samples into segments and descriptor variables detailing them.
- Data from Survey Studies : Key considerations include variable selection to avoidnoise and response style biases, choosing suitable response options (binary ormetric), and ensuring adequate sample sizes.
- Data from Internal Sources and Experimental Studies : Internal data like scannerdata oHers objective insights into consumer behaviour, but may bias towards existing customers.

Overall, successful market segmentation hinges on thorough analysis, clear criteria, high-quality data, and organizational commitment to overcome implementation barriers. Each step involves strategic decision-making and alignment across all levels ofthe organization.

Step 7 of the market segmentation process focuses on describing segments through comprehensive profiling and visualization of market data.

7.1 Developing a Complete Picture of Market Segments

- Segment Profiling: Understanding how segmentation variables differ across market segments is essential. These variables are crucial in defining segments and include demographics, psychographics, media exposure, and product/brand attitudes.
- Descriptor Variables: Additional information used to describe segments in detail, such as age, gender, past behaviour, media usage, and spending patterns.
- Methods: Profiling can be done using descriptive statistics, visualizations (like graphs), or inferential statistics to highlight significant differences.

7.2 Using Visualizations to Describe Market Segments

- Charts: Various graphical tools are employed to visualize differences in descriptor variables, catering to different types of data (nominal/ordinal vs. metric).
- Advantages: Visualizations simplify interpretation and integrate statistical significance, preventing misinterpretation of insignificant differences.

7.2.1 Nominal and Ordinal Descriptor Variables

- Mosaic Plots: Specifically used for nominal and ordinal variables, mosaic plots visually represent cross-tabulations of segment membership with variables like gender or education level.
- Interpretation: Colour coding helps highlight deviations from expected frequencies, indicating significant associations between segment membership and these variables.

7.2.2 Metric Descriptor Variables

- Conditional Plots: Tools like lattice and ggplot2 generate conditional visualizations (e.g., histograms, boxplots) that show metric variable distributions across segments.
- Statistical Testing: Differences observed visually need validation through statistical tests like ANOVA to confirm significance.

7.3 Testing for Segment Differences in Descriptor Variables

- Statistical Tests: Methods like $\chi 2$-test for nominal variables and ANOVA for metric variables formally test differences in descriptor variables across segments.
- Pairwise Comparisons: Used to identify which segments significantly differ from each other.

7.4 Predicting Segments from Descriptor Variables

- Regression Models: Techniques like linear regression and generalized linear models predict segment membership using descriptor variables.
- Logistic Regression: Specifically used for binary outcomes (e.g., segment membership).

Step 8: Selecting the Target Segment(s)

8.1 The Targeting Decision : Step 8 involves selecting the target segments. selection process involves evaluating the attractiveness of each segment and the organization's competitiveness in each segment.

8.2 Segment Evaluation : Involves assessing the attractiveness and competitiveness of each segment to select the most viable target(s). A decision matrix or segment evaluation plot can be used to visualize the attractiveness and competitiveness of each segment. The attractiveness and competitiveness values are calculated by assigning weights to each criterion and rating each segment on a scale from 1 to 10.The weighted values are then added up to determine the overall attractiveness and competitiveness of each segment

Step 9: Customizing the Marketing Mix

- Marketing Mix Decisions: Once the target segment(s) are identified, the marketing mix (product, price, place, promotion) is tailored to meet their specific needs and preferences. (STP Approach) Segmentation-Targeting-Positioning is sequential and interdependent. Borden's 12-element mix distilled to Product, Price, Promotion, and Place (4Ps) remains pivotal.
- Decision-making often involves iterative steps before finalizing a target segment. Chosen segments drive tailored adjustments in products, prices, channels, and messaging. Segmentation criteria vary by goal—pricing, advertising, or distribution.

  1. Product Strategy : Products align with customer needs, possibly adapting existing offerings, include naming, packaging, warranties, and post-sales support.
  2. Price Strategy : Set prices and discounts to appeal to targeted spending behaviours.
  3. Promotion Strategy : Determine online/offline channels and direct/indirect sales.

This process ensures that marketing strategies are finely tuned to effectively reach and resonate with the chosen market segments, maximizing the impact of marketing efforts.

Github link : Mcdonaldcasestudy/McDonalds_KalyaniBhosale.ipynb at d1f824de251aaee97532611d6e2daf2f46ad6158 · kdb-source/Mcdonaldcasestudy (github.com)

3) Mr.Mayuresh Ganesh Argade

Step 1: Deciding (not) to Segment

1.1 Implications of Committing to Market Segmentation

Committing to market segmentation involves more than just identifying different customer groups. It requires a significant transformation in how a company operates. Organizations must adopt a customercentric approach, which can lead to better customer satisfaction and loyalty. However, this commitment is not without challenges. Companies must invest in market research, new technologies, and staff training. Moreover, the entire organization needs to be aligned with this new strategy, which can involve a significant cultural shift.

1.2 Implementation Barriers

There are several barriers to implementing market segmentation effectively:

- Lack of Expertise: Many companies lack the necessary expertise in segmentation techniques. Training staff and possibly hiring new talent are essential steps.
- Financial Constraints: Conducting comprehensive market research and implementing new strategies requires financial resources. This can be a significant hurdle for smaller businesses.
- Resistance to Change: Organizational inertia can be a major obstacle. Employees and managers may resist changes to established processes and systems.
- Communication Gaps: Effective market segmentation requires seamless communication across all departments. Misalignment or poor communication can lead to fragmented and ineffective segmentation efforts.

Step 2: Specifying the Ideal Target Segment

2.1 Segment Evaluation Criteria

Once the decision to segment is made, the next step is to specify the ideal target segment. This involves evaluating potential segments based on several criteria, including:

- Segment Size: The segment must be large enough to be profitable.
- Growth Potential: The segment should show signs of future growth.

- Accessibility: The segment must be reachable through existing marketing and distribution channels.
- Compatibility: The segment should align with the company's goals, resources, and capabilities.

2.2 Knock-Out Criteria

Knock-out criteria are used to immediately disqualify segments that do not meet minimum requirements. These criteria include:

- Segments that are too small to generate significant profit.
- Segments that are difficult or impossible to access with current resources.
- Segments where competition is too intense, making market entry unfeasible.

2.3 Attractiveness Criteria

Once potential segments have been narrowed down using knock-out criteria, attractiveness criteria are used to further evaluate them. These include:

- High market growth rates.
- Low levels of competition.
- High customer loyalty within the segment.
- Significant potential for profitability.

2.4 Implementing a Structured Process

To ensure a systematic and thorough evaluation of segments, a structured process should be implemented. This involves:

1. Defining the overall market.
2. Identifying potential segments within the market.
3. Evaluating these segments based on predefined criteria.
4. Selecting the most promising segments for targeting.

Step 3: Collecting Data

3.1 Segmentation Variables

Segmentation involves dividing the market into distinct groups based on various variables. These include:

- **Demographic Variables:** Age, gender, income, education, occupation, etc.
- **Geographic Variables:** Country, region, city, neighborhood, etc.
- **Psychographic Variables:** Lifestyle, personality traits, values, interests, etc.
- **Behavioral Variables:** Purchase behavior, brand loyalty, product usage rate, benefits sought.

3.2 Segmentation Criteria

3.2.1 Geographic Segmentation

Geographic segmentation divides the market based on location. This method is useful for businesses that operate in multiple regions or countries, as it helps them understand regional differences and tailor their marketing efforts accordingly.

3.2.2 Socio-Demographic Segmentation

This approach segments the market based on socio-demographic factors such as age, gender, income, education, and occupation. It helps businesses identify groups with similar demographic profiles and tailor their products and services to meet the specific needs of these groups.

3.2.3 Psychographic Segmentation

Psychographic segmentation considers the psychological aspects of consumer behavior, including lifestyle, personality traits, values, and interests. This method provides deeper insights into the underlying motivations that drive consumer choices and preferences.

3.2.4 Behavioural Segmentation

Behavioral segmentation focuses on consumer behaviors such as purchase history, brand loyalty, product usage rate, and benefits sought. This type of segmentation is particularly useful for tailoring marketing efforts to specific consumer actions and preferences.

3.3 Data from Survey Studies

Surveys are a primary method for collecting data on segmentation variables. Important considerations include:

3.3.1 Choice of Variables

Selecting the right variables to measure is crucial for obtaining relevant and actionable data. This involves identifying variables that are likely to influence consumer behavior in the target market.

3.3.2 Response Options

Providing clear and appropriate response options ensures that the data collected is accurate and useful. This includes using Likert scales, multiple-choice questions, and open-ended questions as needed.

3.3.3 Response Styles

Understanding response styles, such as social desirability bias or the tendency to choose extreme options, helps in designing surveys that minimize these biases and produce reliable data.

3.3.4 Sample Size

Choosing an adequate sample size is essential for the validity and reliability of survey results. Larger sample sizes generally provide more accurate estimates of the population parameters.

3.4 Data from Internal Sources

Internal sources of data, such as sales records, customer databases, and transaction histories, provide valuable insights for segmentation. This data is often readily available and can be used to complement primary research.

Step 4: Exploring Data

4.1. A First Glimpse at the Data

After gathering data, the first step is to explore and clean it. This process is known as Exploratory Data Analysis (EDA). EDA helps in understanding the data better and preparing it for further analysis, such as identifying market segments. Here's what EDA involves:

1. Identify Measurement Levels: Determine if variables are nominal, ordinal, interval, or ratio.
2. Univariate Analysis: Examine the distribution of each variable (e.g., mean, median, range).
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Preprocessing:

- Handle missing values
- Remove duplicates o Normalize/standardize data o Encode categorical variables **Application Example**

Using a travel motives data set with 20 motives from 1000 Australian residents about their last vacation, you can:

- Load the Data: Use the R package MSA to get the CSV file.
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4.3 Descriptive Analysis

- In R, the summary() function provides a quick overview of numeric variables like AGE, including range, quartiles, mean, and frequency counts for categorical variables, highlighting missing values.
- Histograms are useful for visualizing the distribution of numeric data like AGE, showing patterns and outliers.
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4.4.1 Categorical Variables

- **Merging Categories:** Combine too specific categories to balance the data.
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4.5 Principal Components Analysis

- Principal Components Analysis (PCA) is a dimensionality reduction technique that transforms a dataset with multiple variables into a new set of variables called principal components.

- These components are uncorrelated and ordered by importance, with the first one capturing the most variability in the data, and so on.
- It typically works with the covariance or correlation matrix of numeric variables. In R, you can use the prcomp() function to perform PCA.
- It helps to identify which variables contribute most to the variation in the data. The rotation matrix obtained from PCA shows how the original variables contribute to each principal component. By plotting the principal components, we can visualize the data in a lower-dimensional space.
- Important to consider the proportion of variance each component explains.A few components explaining high variance suggests non-redundant variables.
- Using PCA components directly for segmentation is not recommended.
- Better used for identifying and removing redundant variables.
- EDA Helps reduce dataset dimensionality while retaining original variables.
- Eda Identifies highly correlated variables.

Step 5: Extracting Segments

Extracting segments is a critical step in market segmentation analysis. This process involves grouping consumers based on similarities in various characteristics. The aim is to identify distinct segments that can be targeted effectively with tailored marketing strategies.

5.1 Grouping Consumers

Grouping consumers involves categorizing them based on shared characteristics. This can be achieved through various methods that analyze consumer data to find patterns and clusters.

5.2 Distance-Based Methods

Distance measures calculate the similarity or dissimilarity between data points. Common distance measures include:

- **Euclidean Distance:** The straight-line distance between two points in multidimensional space.
- **Manhattan Distance:** The sum of absolute differences between the coordinates of two points.
- **Minkowski Distance:** A generalization of both Euclidean and Manhattan distances.

5.2.2 Hierarchical Methods

Hierarchical clustering builds a tree of clusters.
Two main approaches are:

- **Agglomerative Clustering:** Starts with each data point as its own cluster and merges the closest pairs iteratively.
- **Divisive Clustering:** Starts with a single cluster containing all data points and splits it iteratively.

5.2.3 Partitioning Methods

Partitioning methods divide the dataset into a predetermined number of clusters:

- **K-means Clustering:** Partitions data into k clusters by minimizing the within-cluster variance.
- **K-medoids Clustering:** Similar to K-means but uses medoids instead of means to reduce sensitivity to outliers.

5.2.4 Hybrid Approaches

Hybrid approaches combine hierarchical and partitioning methods to leverage the strengths of both. An example is the Two-Step Clustering technique, which first uses hierarchical clustering to identify the number of clusters and then applies partitioning methods.

5.3 Model-Based Methods

5.3.1 Finite Mixtures of Distributions

Finite mixture models assume that the data is generated from a mixture of several probability distributions. These models can handle overlapping clusters and provide a probabilistic assignment of data points to clusters.

5.3.2 Finite Mixtures of Regressions

This approach extends finite mixture models by incorporating regression models. Each component in the mixture is a regression model, which allows for segment-specific prediction and analysis.

5.3.3 Extensions and Variations

There are various extensions to finite mixture models, including those that handle different data types, such as categorical data or time series data.

5.4 Algorithms with Integrated Variable Selection

5.4.1 Biclustering Algorithms

Biclustering, or co-clustering, simultaneously clusters rows and columns of a data matrix. This is useful in identifying subgroups of consumers that exhibit similar behaviors across specific attributes.

5.4.2 Variable Selection Procedure for Clustering Binary Data (VSBD)

VSBD is a method specifically designed for clustering binary data. It selects relevant variables during the clustering process, improving the interpretability and accuracy of the resulting clusters.

Step-6: Profiling Segments

8.3.1 Identifying Defining Characteristics of Market Segments

- **Understanding Segment Characteristics with Segment Profile Plots**

  Segment profile plots visualize how each market segment differs from the overall sample, translating tabular data into a visual format. They highlight differences in segmentation variables, making it easier to understand each segment's defining characteristics. Rearranging Segmentation Variables for Better Visualization **.**

- **Creating and Interpreting Segment Profile Plots**

Segment profile plots are panel plots that show cluster center for each segment, represented by dots indicating total mean values. Marker variables, which show significant deviations from the overall mean, are highlighted in color. This visualization makes it easier to compare segment values with the overall sample, providing clearer insights than traditional tables.

- **Benefits of Visualizations in Market Segmentation**

Visualizations significantly aid in interpreting segmentation solutions. They facilitate the understanding of segment profiles and the evaluation of segmentation solutions. Graphical representations are quicker and easier to interpret compared to tables, as shown by heat map studies on information processing times.

- **The Value of Effective Visualizations**

Good visualizations are crucial for making strategic decisions based on segmentation results. They reduce cognitive effort and time required to interpret complex data, offering a high return on investment. Effective visualizations enable managers to make informed, long-term strategic decisions with confidence.

- **Profiling Market Segments**

To profile market segments accurately, one must compare each segment's percentages for each variable with those of other segments and the total sample.

8.3 Segment Profiling with Visualization

- **Importance of Graphics in Market Segmentation Analysis**

- Commonly overlooked in favor of overly simple or complex tables.
- Crucial for revealing complex relationships in data.
- Essential for monitoring trends in big data.

- **Benefits of Visualization:**

- Detailed inspection and interpretation of segments.
- Easier evaluation of segmentation solutions.
- Assists in selecting the best solutions

8.3.2. Assessing Segment Separation

- **Segment Separation Plot Overview**

  Segment separation plots show the overlap of data segments across relevant dimensions, providing a quick overview of the data and segmentation solution, especially with few segmentation variables

- **Complexity with Increasing Variables**

  As the number of segmentation variables increases, segment separation plots become more complex. They may require projection techniques to visualize high-dimensional data in a manageable way.

Mayuresh Argade- https://github.com/Mayureshargade/Feynn-Lab-Projects/blob/main/Code_conversion_task2(Mcdonalds).ipynb

4) Mr.Muchindla Arun

Step 1: Deciding (not) to Segment

1.1 Implications:

Market segmentation needs a long-term commitment and significant changes from companies, like new products, pricing, distribution, and communication. It might require internal restructuring to focus on different segments. Top executives should lead this effort. The costs of research and marketing must be justified by expected sales increases to ensure profitability.

1.2 Barriers :

- The barriers to successful market segmentation include:
- Senior Management: Lack of leadership commitment and resources.
- Organizational Culture: Resistance to change, poor communication, and internal politics.
- Training and Expertise: Inadequate understanding and lack of qualified personnel.
- Resource and Structural: Financial constraints and inability to make necessary changes.
- Process-Related: Lack of clear objectives, planning, and structured processes.
- Operational: Difficulty in applying management techniques and analysis.

1.3 Check Lists :

- If the organisation’s culture is market-oriented and genuinely willing to change and takes a long-term perspective and is open to new ideas and if communication across organisational units is good then only we proceed forward or else no.

Step 2: Specifying the Ideal Target Segment

Segment Evaluation Criteria :

User involvement in market segmentation must span all stages, not just the beginning or end. After deciding on a segmentation strategy, organizations must contribute significantly by defining two types of segment evaluation criteria:

2.1 Knock-Out Criteria :

- Homogeneity: Segment members must be similar to each other.
- Distinctiveness: Segment members must differ distinctly from those in other segments.
- Size: The segment must be large enough to justify customizing the marketing mix.
- Organizational match: The organization must be capable of satisfying the segment's needs.
- Identifiability: Segment members must be identifiable in the marketplace.

- Reachability: There must be a way to contact segment members to make the customized marketing mix accessible to them.
- These criteria need to be understood by senior management, the segmentation team, and the advisory committee. While most criteria do not require further specification, some, like the exact minimum viable target segment size, do.

Attractiveness Criteria :

- Attractiveness criteria are not binary in nature.
- Each market segment is rated; it can be attractive with respect to a specific criteria.
- The attractiveness across all criteria determines whether a market segment is selected as a target segment.

Implementing a Structured Process :

Evaluating market segments involves a structured approach using a segment evaluation plot to compare attractiveness and competitiveness. The team decides on criteria, usually six or fewer, which are reviewed by an advisory committee for diverse input. Early criteria selection helps in data collection and choosing target segments. Criteria are weighted by importance through team negotiation, and approval by the advisory committee ensures stakeholder buy-in.

Step 3: Collecting Data :

Segmentation Types:

- **Commonsense Segmentation:** Uses a single characteristic like gender to group consumers.
- **Data-Driven Segmentation:** Uses multiple characteristics, based on reliable data, to identify market segments.

Segmentation Criteria:

- Focuses on consumer benefits rather than simple demographics.
- Important to use good data sources like surveys and experiments, but surveys can sometimes be unreliable.
- Start with basic criteria like demographics or geography before moving to more complex methods like psychographics.

Geographic Segmentation:

- Groups consumers by location, useful for targeted marketing.
- Regaining popularity for international markets but must account for cultural differences.

Psychographic Segmentation:

- Groups consumers based on psychological traits and behaviors.
- More complex but provides deeper insights into consumer motivations.

Behavioral Segmentation:

- Groups consumers based on their behavior, such as purchase habits.

- Uses actual behavior data, which is more reliable but sometimes hard to get for non-customers.

Survey Data:

- Choose relevant variables carefully to avoid noise and redundancy.
- Use clear and distinct response options for effective segmentation.

Sample Size:

- No fixed recommendations, but larger sample sizes generally lead to more accurate segmentation.

Internal Data:

- Reflects actual consumer behavior without biases from surveys.
- Focuses on existing customers, which might miss new customer opportunities.

Experimental Data:

- Uses experiments to test consumer responses and preferences.
-

Step 7: Describing Segments

Developing Market Segments:

- Segmentation Variables: Chosen early to group market segments.
- Profiling and Describing: Understanding differences between segments using variables like demographics, behaviors, and attitudes.

Importance of Descriptions:

- Essential for tailored marketing strategies.
- Use descriptive stats, visualizations, and inferential stats to study segment differences.

Using Visualizations:

- Types of Variables: Charts used for nominal (e.g., gender), ordinal (e.g., education level), and metric variables.
- Advantages: Simplifies interpretation, integrates statistical significance to prevent over-interpretation.
- Effectiveness: Graphical formats are effective and preferred by marketing managers for their clarity.

Nominal and Ordinal Variables:

- Cross-Tabulation: Shows how respondents are distributed across segments and descriptor variables.
- Visualization Techniques: Stacked bar charts and mosaic plots to compare distributions.
- Interpretation: Visual examination of gender differences and other variables across segments.

Metric Variables:

- Visualization Tools: Use R packages to create conditional plots, histograms, and box-and-

whisker plots to show differences across segments.

- Segment Stability: Use modified SLSA plots to track stability and mean values of metrics across segments.

Testing for Differences:

- Statistical Tests: Use chi-squared for nominal/ordinal variables and ANOVA for metric variables.
- Pairwise Comparisons: Use pairwise t-tests and p-value adjustments to compare segment differences.
- Visual Interpretations: Box-and-whisker plots help show directionality of differences, with methods to control error rates.

Predicting Segments:

- Purpose: Predict market segments using descriptor variables.
- Models: Different types, including linear regression and generalized linear models (GLMs).

Linear Regression:

- Assumption: Relationship is linear, and data follows a normal distribution.
- Application in R: Use lm() to fit models and make predictions.

Generalized Linear Models (GLMs):

- Purpose: Handle non-normal data distributions.
- Binary Logistic Regression:
    - Predicts segment membership using variables like age and moral obligation.
    - Coefficients show the impact of variables on segment likelihood.
    - Visualize probabilities and test variable significance with Anova.

Model Selection:

- Process: Use stepwise selection to refine models and avoid overfitting.

Multinomial Logistic Regression:

- Purpose: Predict multiple segment categories.
- Application in R: Use multinom() from the nnet package.
- Coefficients: Show relationships between variables and segment categories.
- Significance Testing: Assess and improve model fit using Anova.
- Model Selection: Use stepwise selection based on AIC.
- Performance Evaluation: Use predictors like age and visualize results with mosaic plots and boxplots.

Tree-Based Methods (CART):

- Purpose: Predict market segments using machine learning.
- Advantages: Selects important variables automatically, easy to understand, handles variable

interactions.

- Disadvantages: Can be unstable and sensitive to small data changes.
- Procedure: Splits data into groups to make predictions.
- Tree Structure: Starts with all data, splits based on variables, ends with predictions.
- R Packages: Implemented with rpart for basic CART and partykit for advanced features.

Step 8: Selecting the Target Segment(s)

- Importance: Market segmentation is crucial in marketing strategy, especially in Step 8 of the process.
- Criteria: Segments must be assessed for size, similarity among consumers, and compatibility with what the organization can offer.
- Evaluation: After profiling, segments are judged on attractiveness and competitive advantage.
- Decision: Choose segments based on preferences and the likelihood that consumers will choose the organization's products over competitors'.

Market Segment Evaluation:

- Matrices: Boston and GE/McKinsey matrices assess segments based on profitability and fit with the organization.
- Positioning: Visual tools in R help compare segments visually, guiding strategic decisions on which segments to target.

Step 9: Customising the Marketing Mix

Focus: Use of 4Ps (Product, Price, Promotion, Place) tailored to market segmentation strategies.

Product: Modify offerings like "MUSEUMS, MONUMENTS & MUCH, MUCH MORE" for cultural experience seekers (Segment 3).

Price: Set premium prices based on spending habits of Segment 3 tourists in Australian vacation data.

Place: Decide on online vs. offline distribution based on customer booking preferences for cultural experience packages.

Promotion: Craft targeted messages and use preferred channels like tourist centers and specific TV channels for Segment 3 cultural heritage tourists.

Github: m-arun99/feynn-labs: performing segmentation on mcdonalds data set (github.com)

5) Mr.Nagarjuna

Step1: Deciding (not) to Segment

Implications of Committing to Market Segmentation

- Marketing segments are very important before invest time andresources
- Market segmentation requires a long-term commitment from the organization, similar to a marriage rather than a date.
- market segment is not free. There are costs of performing theresearch, fielding surveys
- The decision to pursue market segmentation should be made at the highest executive level and must be systematically communicated andreinforced throughout the organization
- The decision to pursue market segmentation should be made at the highest executive level and must be systematically communicated andreinforced throughout the organization

Implementation Barriers

- Some market segmentation books are mainly focused howmarket segmentation implemented in organizations
- The first group of barriers relates to senior management. Lack of leadership, pro-active championing, commitment and involvement
- A second group of barriers relates to organisational culture. Lack of market or consumer orientation, resistance to change and new ideas, lackof creative thinking, bad communication and lack of sharing of information and insights across organisational unit
- Another potential problem is lack of training.
- A company with limited resources needs to pick only the best opportunities to pursue
- by using graphical visualisations we can easily understand market segmentation

Step 2: Specifying the Ideal Target Segment

2.1 segment evaluation criteria

The third layer of market segmentation analysis is critically dependenton user input. Successful market segmentation requires continuous user involvement throughout the process, rather than limiting input to initial briefings or the final development of a marketing mix. Here's a breakdown of key aspects of this approach, along with detailed information on knock-out and attractiveness criteria:
Step 1**:** Commit to investigating the value of a segmentation strategy.Step 2: Major organizational contribution where the user determines two sets of segment evaluation criteria: knock-out and attractiveness criteria.
Subsequent Steps: User involvement is critical in data collection (Step3) and selecting target segments (Step 8).

2.2 KNOCK OUT CRITERIA

Knock-out criteria are essential, non-negotiable features that determine if market segments qualify for further assessment using attractiveness criteria. They automatically eliminate segments that donot meet these criteria

EXAMPLES

- **Homogeneity**: Members must be similar to one another.
- **Distinctiveness**: Members must be distinctly different from other segments.
- **Size**: The segment must be large enough to justify the marketing efforts.
- **Organizational Match**: The organization must be capable of meetingsegment needs.
- **Identifiability**: It must be possible to identify segment members.
- **Reachability**: There must be a way to reach segment members.

2.3 Attractiveness Criteria

Attractiveness criteria assess how appealing each market segment is.Unlike knock-out criteria, they are not binary but are used to rate segments. The combination of attractiveness across all criteria determines whether a market segment is selected as a target

Selecting Criteria: Based on organizational priorities. Rating Segments:
Each segment is rated on these criteria.
Weighted Importance: Criteria are weighted to reflect their relativeimportance to the organization.

2.4 Implementing a Structured Process

Segment Evaluation Plot: Plotting segment attractiveness againstorganizational competitiveness.
Criteria Selection: Identifying the most important criteria throughnegotiation and agreement among team members and advisory committee.
Data Collection and Target Selection: Using the criteria to guidedata collection and simplify target selection.

Step 3:Collecting Data

3.1 Segmentation Variables

- Empirical Data in Market Segmentation: Used to identify and describe market segments.
- Segmentation Variables:
  - Commonsense Segmentation: Uses one characteristic (e.g., gender).
  - Example: Segmentation by gender as shown in Table 5.1.
- Descriptor Variables: Characteristics like age, vacations, and benefits sought, used to describe segments and create effective marketing strategies.
- Commonsense vs. Data-Driven Segmentation:
  - Commonsense: Uses a single variable.
  - Data-Driven: Uses multiple variables.

3.2 Segmentation Criteria

1. Segmentation Criterion:
   - Chosen before data collection.
   - Broader than segmentation variables and related to the type of information used (e.g., benefits sought).
2. Types of Segmentation Criteria:

- Geographic Segmentation: Based on location; easy to implement but may not reflect product preferences.
- Socio-Demographic Segmentation: Based on age, gender, income, education; useful in some industries but often doesn't explain product preferences well.
- Psychographic Segmentation: Based on beliefs, interests, benefits sought; reflects reasons for behavior but is complex and needs reliable measures.
- Behavioral Segmentation: Based on behavior (purchase frequency, amount spent); directly reflects behavior but is limited by the availability of data, especially for potential customers.

STEP 4 : EXPLORING DATA

Exploratory Data Analysis (EDA):

- EDA involves cleaning and pre-processing data.
- It guides the selection of suitable algorithms for market segmentation.
- EDA helps in identifying measurement levels, investigating univariate distributions, and assessing dependency structures between variables.

Data Cleaning:

- Ensures all values are recorded correctly and categorical variables have consistent labels.
- Checks for plausible ranges (e.g., age between 0 and 110).
- Categorical variables must contain only permissible values.
- Example given: the re-ordering of Income2 levels in the Australian travel motives data set.

Reordering Factor Levels:

- Income2 levels are sorted alphabetically by default.
- Reordering the levels to a logical sequence: <30k, 30-60k, 60-90k, 90- 120k, >120k.
- Cross-tabulation confirms correct re-ordering before updating the original data frame.

Reproducibility:

- Data cleaning steps should be coded for reproducibility.

- Cleaning code documents all steps and enables replication and ongoing updates.

 Descriptive Analysis:

- Essential to understand the data to avoid misinterpretation of complex analyses.
- Numeric summaries (e.g., summary() in R) and graphical methods (e.g., histograms, boxplots) provide insights.

 Histograms and Boxplots:

- Histograms show the distribution of numeric variables, revealing patterns like bimodality.
- Boxplots provide a summary of distributions, showing median, quartiles, and potential outliers.

 Example Analyses:

- Histograms for Age reveal bimodal distribution.
- Boxplots for Age show distribution and potential outliers (e.g., a 105- year-old respondent).

 Graphical Representation:

- Visualizing data (e.g., percentages of agreement with travel motives) provides an intuitive overview.
- R commands can efficiently create visual representations of data.

Step 5: Extracting Segments

Nature of Market Segmentation Analysis

- Exploratory Nature: Unstructured consumer data makes market segmentation exploratory.
- Algorithm Assumptions: Results depend on assumptions made by the chosen algorithm.

Clustering Methods and Their Impact

- k-Means Clustering: Often fails with non-linear structures due to compact, equally sized cluster formation.
- Single Linkage Hierarchical Clustering: Better for non-linear structures like spirals but can create chains in other scenarios.

- No Single Best Algorithm: Choice depends on data characteristics and segmentation needs. For unstructured data, the algorithm's tendencies significantly influence the solution.

Guidelines for Choosing Algorithms

- Considerations: Data set size, scale level of segmentation variables, and special structures in data.
- Expected Segment Characteristics: Similarities within segments and differences between segments.
- Distance-Based Methods: Use similarity or distance measures.
    - Common Distance Measures:
        - Euclidean Distance: Straight-line distance.
        - Manhattan Distance: Sum of absolute differences.
        - Asymmetric Binary Distance: Focuses on shared 1s in binary data.

Hierarchical Clustering Methods

- Agglomerative Hierarchical Clustering: Merges closest pairs iteratively.
- Divisive Hierarchical Clustering: Splits iteratively.
- Linkage Methods:
    - Single Linkage: Minimum distance between points.
    - Complete Linkage: Maximum distance between points.
    - Average Linkage: Average distance between points.
- Ward's Method: Minimizes increase in within-cluster variance, forming compact clusters.
- Dendrograms: Visual tools for determining the number of clusters.

k-Means and k-Centroid Clustering

- k-Means Clustering: Most popular partitioning method. Divides consumers into similar segments using the mean of all members as the centroid.
- k-Centroid Clustering: Generalization of k-means allowing other distance measures.
- Steps of k-Means Algorithm:
    1. Specify the number of segments (k).
    2. Randomly select k initial cluster centroids.
    3. Assign observations to the closest centroid

STEP 6 : Profiling Segments in Market Segmentation

Identifying Key Characteristics of Market Segments

- Aim: Understand the characteristics of market segments derived from data-driven segmentation.
- Commonsense Segmentation: Profiles are predefined (e.g., age groups).
- Data-Driven Segmentation: Defining characteristics are unknown until after data analysis.
- Profiling Purpose: Characterize segments individually and comparatively.
- Challenges: Managers often find data-driven segmentation results difficult to interpret, perceiving them as complex or inconsistent.

Traditional Approaches to Profiling Market Segments

- Methods:
  - High-level summaries.
  - Large tables with exact percentages for each segment, which are difficult to interpret.
- Example: Table 8.1 shows percentages for various travel motives across segments.
- Comparison Difficulty: Profiling requires comparing many percentages, which is tedious and error-prone.
- Statistical Tests: Not appropriate for assessing segment differences due to the way segments are derived.

Segment Profiling with Visualisations

- Importance of Visualisation: Helps interpret complex relationships between variables.
- Segment Profile Plot: Visual representation of segment characteristics compared to the overall sample.
- Variable Ordering: Can be based on total mean values or similarity of answer patterns (e.g., hierarchical clustering)

Github: Arjun1303/Feyans-lab (github.com)

Github Repositories Links :

1) Mr. Sahil Devanand Khandait
sahilkhandait/fennylab_code_convert (github.com)

2) Ms. Kalyani Prashant Bhosale
Mcdonaldcasestudy/McDonalds_KalyaniBhosale.ipynb at d1f824de251aaee97532611d6e2daf2f46ad6158 · kdb-source/Mcdonaldcasestudy (github.com)

3) Mr. Mayuresh Ganesh Argade
Feynn-Lab-Projects/Code_conversion_task2(Mcdonalds).ipynb at main · Mayureshargade/Feynn-Lab-Projects (github.com)

4) Mr. Muchindla Arun
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5) Mr. Nagarjun
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