Market Segmentation Analysis.

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Step 1: Deciding (not) to segment.

1.1 Implications of Committing to Market Segmentation.

- Market segmentation is a crucial marketing strategy for many organizations, but it is not always the best decision.
- It requires a long-term commitment from the organization, which involves substantial changes and investments.
- Costs include research, surveys, focus groups, and designing multiple packages.
- Segmentation should only be implemented if the expected increase in sales justifies it.
- Potential changes may include developing new products, modifying existing ones, changing pricing and distribution channels, and adjusting internal structures.
- To maximize benefits, organizations should organize around market segments rather than products.
- The decision to investigate market segmentation should be made at the highest executive level and communicated and reinforced at all levels.

1.2 Implementation Barriers

Market segmentation is a strategy that can be successfully implemented in organizations by identifying and addressing several barriers. These include senior management's lack of leadership, commitment, and resources, as well as organizational culture's lack of market orientation, resistance to change, and poor communication. Lack of training and a formal marketing function or qualified expert can also hinder the successful implementation of market segmentation.

Objective restrictions faced by the organization, such as financial constraints or inability to make structural changes, can also hinder the successful implementation of market segmentation. Process-related barriers include unclear objectives, poor planning, and a lack of structured processes. To counteract these challenges, it is essential to

make market segmentation analysis easy to understand and present results in a way that facilitates interpretation by managers.

By identifying and proactively removing these barriers, organizations can successfully implement market segmentation strategies. If barriers cannot be removed, the option of abandoning the attempt may be considered.

1.3 Checklist

The checklist includes tasks and questions that serve as knock-out criteria, such as market orientation, preventing successful implementation of market segmentation analyses.

Step 2: Specifying the Ideal Target Segment

2.1 Segment Evaluation Criteria.

- The third layer of market segmentation analysis relies heavily on user input, involving them in most stages of the process.
- After investigating the value of a segmentation strategy, the organization must make a significant contribution to market segmentation analysis in Step 2.
- This contribution guides data collection and selecting target segments.
- In Step 2, the organization must determine two sets of segment evaluation criteria: knock-out criteria, which are essential features of segments considered, and attractiveness criteria, which evaluate the attractiveness of remaining market segments.

2.2 Knock-Out Criteria.

- Knock-out criteria are used to assess market segments based on market segmentation analysis.
- These criteria include substantiality, measurability, and accessibility. Additional criteria include homogeneity and distinctness of the segment.
- The ideal target segment should be large enough, matching the organization's strengths, identifiable, and reachable.

- These criteria must be understood by senior management, the segmentation team, and the advisory committee.

2.3 Attractiveness Criteria

- Attractiveness criteria are not binary, but rather rated for each market segment based on specific criteria.
- The attractiveness across all criteria determines if a market segment is selected as a target in Step 8 of market segmentation analysis.

2.4 Implementing a Structured Process

- The segmentation literature suggests that a structured process is beneficial for assessing market segments.
- The most popular approach is a segment evaluation plot, which shows segment attractiveness and organisational competitiveness.
- The segmentation team determines these values, as there is no standard set of criteria for all organizations.
- Factors determining segment attractiveness and organisational competitiveness need to be negotiated and agreed upon.
- This task should be completed by a team of people, including representatives from various organizational units.
- The segment evaluation plot can be completed in Step 2 of the market segmentation analysis, but selecting attractiveness criteria early in the process ensures accurate data collection and makes selecting a target segment easier.
- At the end of this step, the market segmentation team should have a list of approximately six segment attractiveness criteria, each with a weight attached to indicate its importance.

Step 3: Collecting Data

3.1 Segmentation Variables

- Empirical data is the foundation of commonsense and data-driven market segmentation. In commonsense segmentation, a single characteristic is used to create market segments, such as gender.
- Descriptor variables, such as age, vacations taken, and benefits sought, are used to describe these segments in detail.
- This helps develop an effective marketing mix targeting the segment. Data-driven segmentation, on the other hand, uses multiple segmentation variables to identify naturally existing or artificially created market segments.
- This approach allows marketers to reach their target segment with effective communication messages.
- Segmentation studies can use empirical data from survey studies, scanner data, loyalty programs, or experimental studies. However, survey data can be unreliable, especially when socially desirable behaviours are involved. Instead, a range of possible sources should be explored, with the source that provides data most closely reflecting actual consumer behaviour being preferable.

3.2 Segmentation Criteria

- Before segment extraction and data collection, organizations must choose which segmentation criterion to use.
- The term segmentation criterion refers to the nature of information used for market segmentation and can relate to specific constructs like benefits sought.
- Common segmentation criteria include geographic, socio-demographic, psychographic, and behavioural.
- Factors such as profitability, bargaining power, preferences for benefits or products, barriers to choice, and consumer interaction effects are most relevant.
- Choosing the best segmentation criterion depends on the organization's needs and the least possible cost.
- Generally, the simplest approach is recommended, such as using demographic or geographic segmentation if it works for the product or service.

3.3 Data from Survey Studies

Market segmentation analyses often use survey data, which is cost-effective and easy to collect. However, this data can be contaminated by biases, negatively

impacting the quality of solutions. Key considerations include sampling methods.

The methods are:

- Choice of Variables
- Response Options
- Response Styles
- Sample Size

3.4 Data from Internal Sources

- Organizations are increasingly using internal data for market segmentation analysis, such as scanner data, booking data, and online purchase data.
- These data represent actual consumer behaviour, avoiding imperfect memory and response biases.
- They are usually automatically generated and require no extra effort to collect.
- However, the danger is that internal data may be systematically biased, missing information about future customers who may differ from current customers in their consumption patterns.

3.5 Data from Experimental Studies

- Experimental data, derived from field or laboratory experiments, can be used to analyse market segmentation.
- It can be used to determine consumer response to advertisements or to conduct choice experiments or conjoint analyses.
- These studies present consumers with stimuli with specific product attributes, allowing them to indicate their preferences and determine the impact of each attribute on their choice.

Step 4: Exploring Data

4.1 A First Glimpse at the Data

- Data exploration is a crucial stage in data analysis, identifying measurement levels, univariate distributions, and dependency structures between variables.
- It helps in determining the most suitable algorithm for extracting meaningful market segments and may require pre-processing for different segmentation algorithms.

4.2 Data Cleaning

- Before data analysis, clean the data by ensuring all values are recorded correctly and consistent labels for categorical variables.
- For metric variables, the range of plausible values is known, and levels of categorical variables should contain only permissible values.
- Correct any implausible values or incorrect levels of categorical variables as part of the data cleaning procedure.

4.3 Descriptive Analysis

- Understanding data is crucial for accurate interpretation of complex analyses.
- Statistical software packages offer various tools for descriptive analysis, including summary() in R, which provides a numeric summary of data, frequency counts for categorical variables, and the number of missing values.
- Graphical methods for numeric data include histograms, boxplots, and scatter plots.
- Bar plots of frequency counts are useful for categorical visualization, while mosaic plots illustrate the association of multiple variables. Histograms visualize the distribution of numeric variables, revealing if they are unimodal, symmetric, or skewed.
- To create a histogram, bins of values must be created, covering the entire range of observations and being adjacent.

4.4 Pre-Processing

- Categorical Variables
  - Categorical variables can be pre-processed using two procedures: merging levels of categorical variables before further analysis and converting them to numeric ones if it makes sense.

- Merging levels of categorical variables is useful if the original categories are too differentiated.
- For example, the income variable in a survey has categories sorted by the number of respondents, resulting in a new variable with more balanced frequencies.
- Another ordinal scale or multi-category scale, the Likert scale, is often used in consumer surveys.
- It typically offers respondents five or seven answer options, with verbal labelling usually worded as "STRONGLY DISAGREE, DISAGREE, NEITHER AGREE NOR DISAGREE, AGREE, STRONGLY AGREE."
- Binary answer options are less prone to capturing response styles and do not require data pre-processing.
- Binary variables can always be converted to numeric variables, and most statistical procedures work correctly after conversion if there are only two categories.
- For example, to use travel motives as segmentation variables, they can be converted to a numeric matrix with 0 and 1 for NO and YES.

- Numerical Variables
  - The range of values of a segmentation variable affects its influence in distance-based methods of segment extraction.
  - For example, if a binary variable indicates whether a tourist likes to dine out during their vacation and a second variable indicates expenditure in dollars per person per day, a difference in spend per person per day of one dollar is weighted equally as the difference between liking to dine out or not.
  - To balance the influence of segmentation variables on segmentation results, variables can be standardised.
  - The default standardisation method in statistics subtracts the empirical mean and divides by the empirical standard deviation. Standardisation methods may be required if data contains outliers, requiring robust estimates for location and spread.

4.5 Principal Component Analysis

- Principal components analysis (PCA) is a statistical method that transforms a multivariate data set with metric variables into a new set of uncorrelated, ordered principal components.

- The first component contains the most variability, followed by the second, and so on.
- The new data set maintains the same relative positions and dimensionality as the old ones. PCA works off the covariance or correlation matrix of several numeric variables, and is typically used to project high-dimensional data into lower dimensions for plotting purposes.
- The first few principal components capture the most variation, and can be easily inspected in a scatter plot.

Step 5: Extracting Segments

5.1 Grouping Consumers

- Data-driven market segmentation analysis is exploratory due to unstructured consumer data.
- The results of any method used to extract market segments depend on the assumptions made on the segment structure.
- The underlying data and the chosen extraction algorithm shape the segmentation solution.
- Many segmentation methods are taken from cluster analysis, where market segments correspond to clusters.
- Selecting a suitable clustering method requires matching the data analytic features with the researcher's context-dependent requirements.
- It is important to explore market segmentation solutions derived from a range of different clustering methods and understand how different algorithms impose structure on the extracted segments.
- K-means cluster analysis fails to identify naturally existing spiral-shaped segments in the data.

5.2 Distance-Based Methods

- An Example problem statement is used, the problem involves finding groups of tourists with similar activity patterns during vacation.
- A fictitious data set consists of seven people, each with varying preferences for beach, action, and culture.

- Market segmentation aims to group consumers into groups with similar needs or behaviour, such as tourists with similar vacation activities.
- Anna and Bill share the same profile, but Michael's disinterest in beach activities separates him from others.
- To find similar tourists, a distance measure is needed.
- Other methods are Hierarchical methods and Partitioning methods.

5.3 Model-Based Methods

- Model-based methods have gained popularity in market segmentation analysis, with mixture methodologies being the most influential methodological development.
- Pioneers of model-based methods, Wedel and Kamakura, predict that mixture models will be the most influential methodological development spawned by marketing problems.
- Model-based methods are seen as an additional segment extraction method available to data analysts, as they extract market segments in a different way than distance-based clustering methods.
- They assume that the true market segmentation solution has two general properties: each market segment has a certain size, and if a consumer belongs to market segment A, that consumer will have characteristics specific to members of market segment A.
- Model-based methods use empirical data to find values for segment sizes and segment-specific characteristics that best reflect the data.
- These methods can be seen as selecting a general structure and fine-tuning it based on consumer data.
- They are called finite mixture models because the number of market segments is finite, and the overall model is a mixture of segment-specific models.

5.4 Algorithms with Integrated Variable Selection

- Most algorithms extract segments from data, assuming each variable contributes to the segmentation solution.
- However, sometimes segmentation variables contain redundant or noisy ones.
- Pre-processing methods can identify these, but require metric variables. Variable selection for binary data is more challenging as single variables are not informative for clustering.

- When segmentation variables are binary and redundant or noisy variables cannot be removed during data pre-processing, suitable segmentation variables need to be identified during segment extraction.
- Two algorithms for binary segmentation variables are bi clustering and the variable selection procedure for clustering binary data (VSBD).
- A two-step approach called factor-cluster analysis compresses segmentation variables into factors before segment extraction.

5.5 Data Structure Analysis

- Market segmentation is an exploratory process that requires a flexible approach to ensure the most effective segmentation strategy.
- Traditional validation methods, such as calculating and targeting different segments, are not feasible due to the complexity of running multiple segmentation strategies simultaneously.
- Instead, stability-based data structure analysis is used to assess the reliability and stability of solutions across repeated calculations.
- This approach provides valuable insights into the properties of the data, guiding subsequent methodological decisions.
- It helps identify natural, distinct, and well-separated market segments in the data, which can be revealed easily.
- If there is structure in the data, it can help choose a suitable number of segments to extract.
- Four different approaches to data structure analysis are discussed:
- cluster indices,
- gorge plots,
- global stability analysis, and
- segment level stability analysis.

Step 6: Profiling Segments

6.1 Identifying Key Characteristics of Market Segments

- The profiling step is crucial in data-driven market segmentation to understand the market segments resulting from the extraction step.
- It is only necessary when the profiles of the segments are predefined, unlike commonsense segmentation where the profiles are predefined. Profiling aims to identify the defining characteristics of market segments with respect to the segmentation variables, allowing for better strategic marketing decisions.
- It involves characterizing market segments individually and comparing them to other market segments.
- The profiling stage inspects alternative market segmentation solutions, especially if no natural segments exist in the data and a reproducible or constructive approach is needed.
- Good profiling is the basis for correct interpretation of the resulting segments, which is critical for making strategic marketing decisions. However, data-driven market segmentation solutions can be challenging to interpret, with 65% of 176 marketing managers surveyed stating they have difficulties understanding data-driven market segmentation solutions and 71% feel that segmentation analysis is like a black box.

6.2 Traditional Approaches to Profiling Market Segments

- The Australian vacation motives data set was used for segmentation, which was extracted using a neural gas clustering algorithm with varying numbers of segments and 20 random restarts.
- The segmentation solution was reloaded and saved on page 171. Data-driven segmentation solutions are often presented as high-level summaries or large tables with exact percentages for each segmentation variable.
- These tables are difficult to interpret and provide a quick overview of key insights.

- Profiling all six market segments requires comparing 120 numbers if each segment's value is only compared to the total, or 15 pairs of numbers for each row of the table.
- For a complete table with 20 rows, 420 comparisons are required, including those between segments only and between segments and the total.

- Sometimes, information is provided about the statistical significance of the difference between segments for each of the segmentation variables, but this approach is not statistically correct.
- Segment membership is directly derived from the segmentation variables, and segments are created in a way that makes them maximally different, making it impossible to use standard statistical tests to assess the significance of differences.

6.3 Segment Profiling with Visualisations

- Graphics are an essential part of statistical data analysis, particularly in exploratory statistical analysis like cluster analysis.
- They provide insights into complex relationships between variables and offer a simple way to monitor developments over time.
- Visualization techniques make the results of a market segmentation analysis easier to interpret.
- Visualizations are useful in the data-driven market segmentation process to inspect one or more segments in detail for each segmentation solution. Statistical graphs facilitate the interpretation of segment profiles and make it easier to assess the usefulness of a market segmentation solution. The process of segmenting data often leads to a large number of alternative solutions, and visualizations of solutions assist the data analyst and user in making critical decisions.
- Examples of prior use of visualizations of segmentation solutions are provided in various studies.
    - Identifying Defining Characteristics of Market Segments
    - Assessing Segment Separation

MacDonald's Case Study Python code link.

https://colab.research.google.com/drive/1Zc17AHETJ_pXDzON7eLkAUTrh-jTZ5Yw?usp=sharing