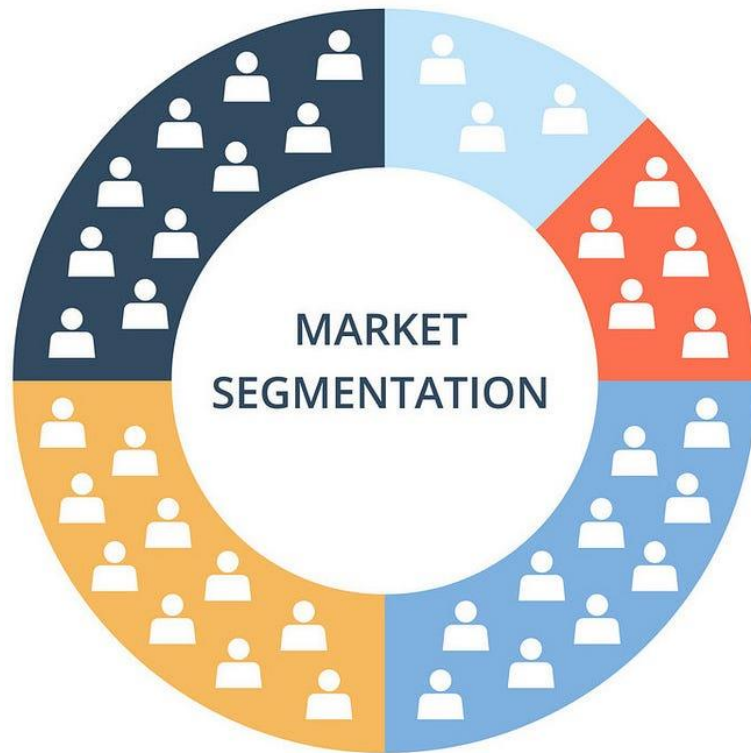# MARKET SEGMENTATION ANALYSIS

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Steps of Market Segmentation Analysis

Step-1: Deciding (not) to Segment:

1. Implications of Market Segmentation:

- Market segmentation is a long-term marketing strategy that requires substantial changes and investments.
- The cost of segmenting a market includes research, surveys, focus groups, package design, and communication messages.
- The expected increase in sales must justify implementing a segmentation strategy.
- Potential changes include the development of new products, modification of existing products, changes in pricing and distribution channels, and adjustments to internal structure.
- To maximize benefits of market segmentation, organizations should organize around market segments, rather than products.

2. Implementation Barriers:

- Senior management's lack of leadership, commitment, and involvement in the market segmentation process can hinder the success of market segmentation.
- Organisational culture's lack of market orientation, resistance to change, creative thinking, communication, short-term thinking, unwillingness to make changes, and office politics can also hinder market segmentation implementation.
- Lack of training and formal marketing function or qualified marketing expert in the organization can also hinder market segmentation.
- Objective restrictions such as lack of financial resources or inability to make structural changes can also hinder market segmentation.
- Process-related barriers include unclear objectives, poor planning, lack of structured processes, lack of responsibilities allocation, and time pressure.
- To counteract this, market segmentation analysis should be easy to understand and present results in a way that facilitates interpretation by managers.
- If barriers cannot be removed, the option of abandoning the attempt of exploring market segmentation as a potential future strategy should be seriously considered.

Step 2: Specifying the Ideal Target Segment:

1. **Segment Evaluation Criteria:**

   - User input is crucial for effective market segmentation analysis.
   - User involvement is essential in most stages of the process, including technical aspects of market segmentation analysis.
   - The organization must determine two sets of segment evaluation criteria: knock-out criteria and attractiveness criteria.

2. **Knock-Out Criteria:**

   - These criteria include substantiality, measurability, and accessibility.
   - Additional criteria include homogeneity, distinctness, identifying members, and reachability.
   - These criteria must be understood by senior management, the segmentation team, and the advisory committee.

3. **Attractiveness Criteria:**

   - A wide range of segment attractiveness criteria are available to the segmentation team.
   - Each market segment is rated, and the attractiveness across all criteria determines whether a market segment is selected as a target segment in Step 8.

4. **Implementing a Structured Process:**

   - A structured process is beneficial when assessing market segments.
   - The segment evaluation plot shows segment attractiveness and organisational competitiveness.
   - Factors forming both segment attractiveness and organisational competitiveness need to be negotiated and agreed upon.
   - The segment evaluation plot should be completed by a team of people, with representatives from a wide range of organizational units.
   - The market segmentation team should have a list of approximately six segment attractiveness criteria, each with a weight attached to it.

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Step-3: Collecting Data

1. Market Segmentation:

1.1. What is Market Segmentation?

Market Segmentation is the process of identifying segments of the target market and then dividing that target market into subgroups based on different factors such as demographics, needs, priorities, common interests, and other psychographic and/or behavioural criteria used to understand the target audience.

1.2. Why is it important?

Market Segmentation is necessary as:

- It can help you to target just the people most likely to become customers of your company or consumers of your content/product.
- By understanding your market segments, you can leverage this targeting in product, sales, and marketing strategies.
- It can also power your product development cycles by informing how you create product offerings for different segments like men vs. women or high income vs. low income.

1.3. Types of Market Segmentation:

There are different types of market segments that you can create. Below are the four major types of Market Segmentation.
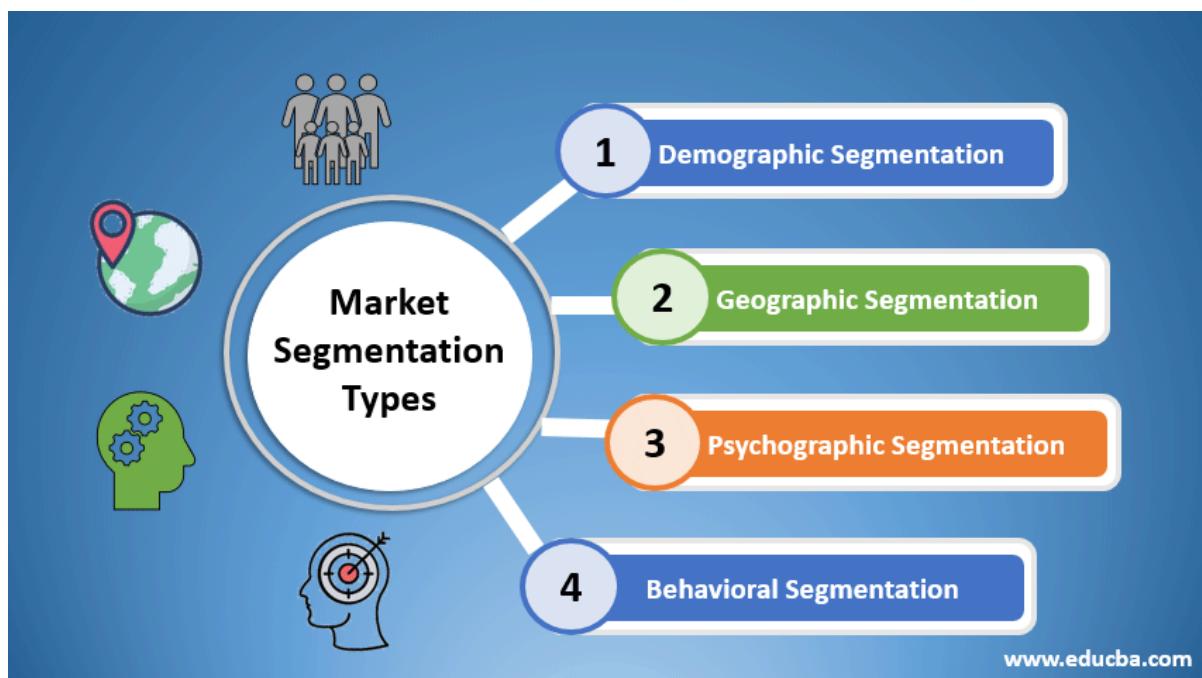
1.3.1. Geographic Segmentation:

Geographic Segmentation splits up your target segment based on locations such as country, state etc. Customers can also be identified by taking into account the characteristics of the area they live in for example language, urban, suburban, rural etc
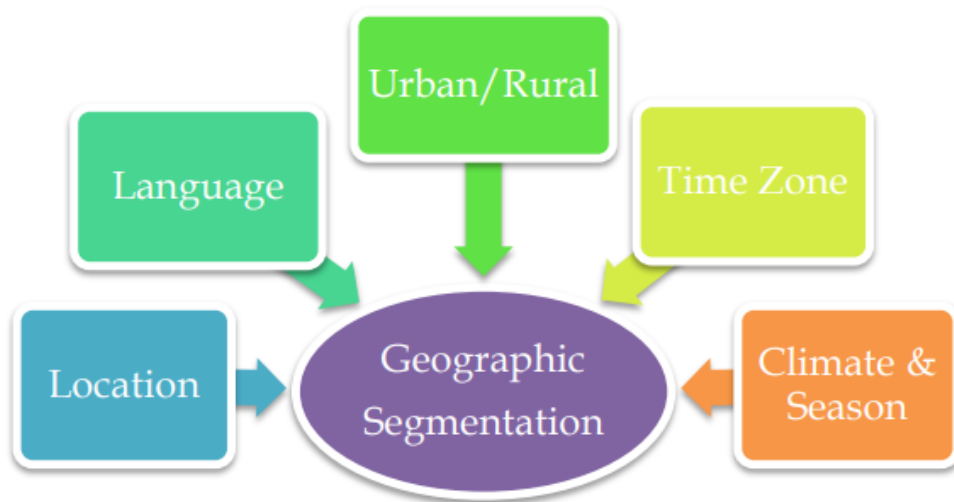
Fig. Geographic Segmentation

1.3.2. Demographic Segmentation:

This type of segmentation technique splits the target audience based on people-based differences. These factors include things like age, sex, marital status, family size, occupation, education level, income, race, nationality and religion.
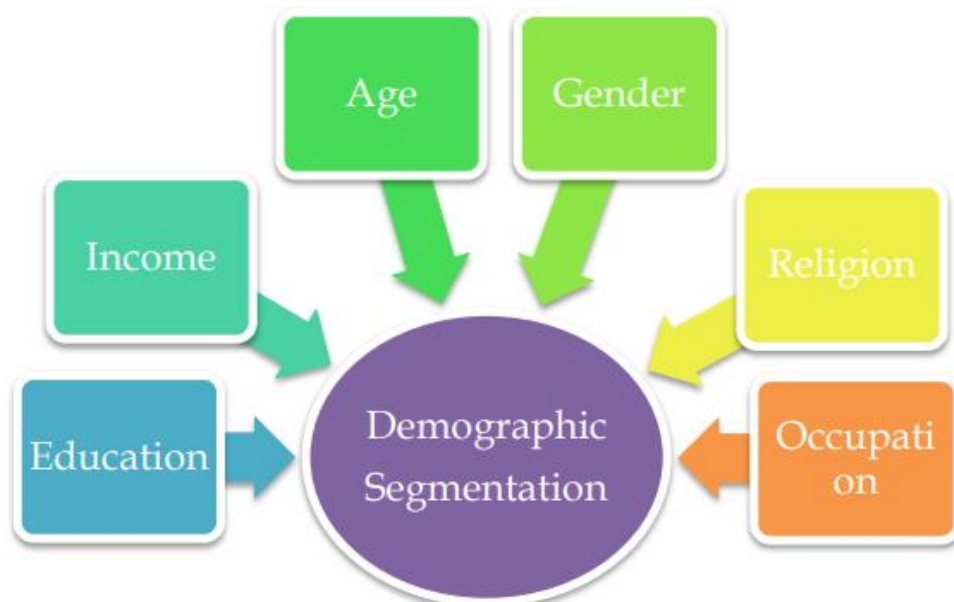
Fig. Demographic Segmentation

1.3.3. Psychographic Segmentation:

Psychographic Segmentation splits the target market based on characteristics that are mental and emotional. Some examples of psychographic characteristics include personality traits, interests, beliefs, values, attitudes and lifestyles.
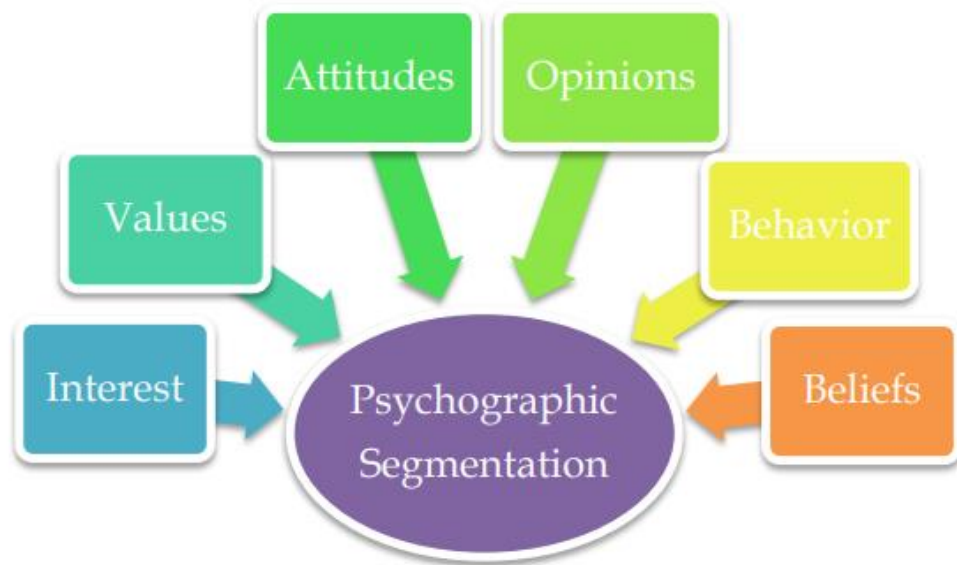
Fig. Psychographic Segmentation

1.3.4. Behavioural Segmentation:

Behavioural segmentation is a form of marketing segmentation that divides the target market based on behavioural patterns exhibited. This segmentation type studies the behavioural traits of consumers - their knowledge of, attitude towards, use of, likes/dislikes of, or response to a product, service, promotion, or brand.
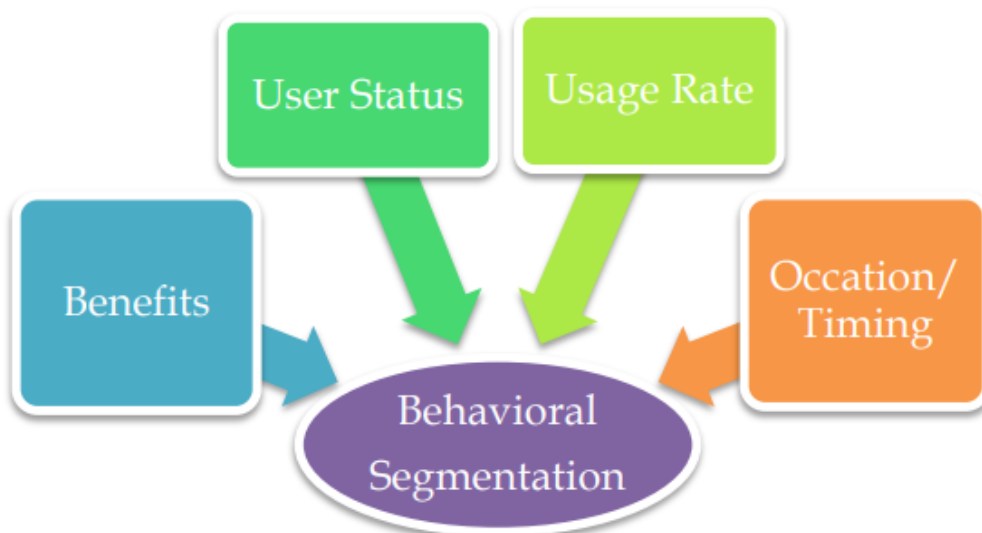
Fig. Behavioural Segmentation

Step-5: Extracting Segments:

1. Grouping Consumers:
- 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 implied by the method.
- Segmentation methods shape the segmentation solution.
- Many segmentation methods used to extract market segments are taken from the field of cluster analysis.
- Selecting a suitable clustering method requires matching the data analytic features of the resulting clustering with the context-dependent requirements desired by the researcher.

2. Extraction Methods:
- Distance-based methods use a notion of similarity or distance between observations (consumers) and try to find groups of similar observations (market segments).
- Model-based methods formulate a concise stochastic model for the market segments.
- Some methods attempt to achieve multiple aims in one step, such as variable selection during the extraction of market segments.

3. Distance Based Methods:
- Common distance measures used in market segmentation analysis include Euclidean distance, Manhattan or absolute distance, and asymmetric binary distance.
- Euclidean distance is the most common, representing the direct "straight-line" distance between two points in two-dimensional space.
- Manhattan distance, derived from the assumption that streets on a grid need to be used to get from one point to another, uses all dimensions of the vectors x and y.

3.1. Hierarchical Methods
- Hierarchical clustering methods mimic human approach to dividing a set of n observations into k groups (segments).
- The goal is to have one large market segment (k = 1), containing all consumers in data X, or as many market segments as there are consumers in the data set (k = n), with each segment containing exactly one consumer.
- Both approaches result in a sequence of nested partitions, where each observation is exactly contained in one group.
- The deterministic algorithm ensures that every time the hierarchical clustering algorithm is applied to the same data set, the exact same sequence of nested partitions is obtained.
- The measure of distance between groups of observations (segments) is determined by specifying a distance measure d(x, y) between observations (consumers) x and y and a linkage method.
- **Single linkage:** distance between the two closest observations of the two sets.
- **Complete linkage:** distance between the two observations of the two sets that are farthest away from each other.
- **Average linkage:** mean distance between observations of the two sets.
- **Ward clustering**, based on squared Euclidean distances, joins the two sets of observations (consumers) with the minimal weighted squared Euclidean distance between cluster centres.
- The correct distance is used as input, either Euclidean distance or squared Euclidean distance.

3.2. Dendrograms in Hierarchical Clustering:
- Dendrograms are tree diagrams representing the results of hierarchical clustering.
- The root represents a one-cluster solution, with leaves representing single observations.
- The branches represent the hierarchy of market segments formed at each step of the procedure.
- Higher branches indicate more distinct market segments.

3.3. Agglomerative Hierarchical Clustering:
- The process starts with identifying two people with the smallest distance.
- Julia and Maria are joined into a market segment due to their second smallest distance.
- Tom joins Anna, Bill, Julia, Maria, and Tom into a group of five.
- The process continues until all tourists are united in one big group.

3.4. Partitioning Methods:
- Hierarchical clustering methods are suitable for small data sets with up to a few hundred observations.
- For data sets containing more than 1000 observations, clustering methods creating a single partition are more suitable.
- For a data set including information about 1000 consumers, the agglomerative hierarchical clustering algorithm would have to calculate (1000×999)/2 = 499,500 distances for the pairwise distance matrix between all consumers.
- For a few segments, optimizing specifically for that goal is better than building the complete dendrogram and then heuristically cutting it into segments.

3.4.1. K-Means and K-Centroid Clustering:
- The algorithm is an iterative method for dividing consumers into segments where they are similar to their fellow segment members but dissimilar to members of other segments.
- It involves five steps:
  - Specifying the desired number of segments k.
  - Randomly selecting k observations (consumers) from the data set X.
  - Assigning each observation to the closest cluster centroid to form a partition of the data.
  - Assigning each consumer to the market segment with the most similar representative.
  - Recompute the cluster centroids by holding cluster membership fixed and minimising the distance from each consumer to the corresponding cluster centroid.
  - Repeat from step 3 until convergence or a pre-specified maximum number of iterations is reached.

3.4.2. Improved k-Means:
- The algorithm is aimed at identifying better segment representatives and determining the optimal centroids.
- The algorithm is improved by initializing it using "smart" starting values, rather than randomly drawing k consumers from the data set.
- Steinley and Brusco (2007) concluded that the best approach is to randomly draw many starting points and select the best set.

3.4.3. Hard Competitive Learning:

- Also known as learning vector quantisation, differs from the standard k-means algorithm in segment extraction.
- It minimizes the sum of distances from each consumer in the data set to their closest representative (centroid).
- The process of achieving this is slightly different from k-means, which uses all consumers in the data set at each iteration of the analysis to determine the new segment representatives.
- This procedural difference can lead to different segmentation solutions, even if the same starting points are used to initialize the algorithm.

3.4.4. Self-Organising Maps:

- Another variation of hard competitive learning is self-organising maps, also referred to as self-organising feature maps or Kohonen maps.
- Self-organising maps position segment representatives (centroids) on a regular grid, usually a rectangular or hexagonal grid.
- The numbering of market segments is not random, but aligns with the grid along which all segment representatives are positioned.
- The sum of distances between segment members and segment representatives can be larger than for other clustering algorithms due to restrictions on permissible locations.
- Comparisons of self-organising maps and topology representing networks with other clustering algorithms, such as the standard k-means algorithm, and for market segmentation applications are provided in Mazanec (1999) and Reutterer and Natter (2000).

3.4.5. Neural Networks:

- Auto-encoding neural networks for cluster analysis use a single hidden layer perceptron.
- The network consists of three layers: the input layer, the output layer, and the hidden layer.
- The input layer has one node for every segmentation variable.
- The hidden layer has no connections to the outside of the network.
- The outputs are weighted combinations of the hidden nodes.
- The network is trained to predict inputs as accurately as possible.
- Parameters connecting the hidden layer to the output layer are interpreted similarly to segment representatives from traditional cluster algorithms.
- The network predicts the same value for all consumers with $h_1 \approx 1$ and all consumers with $h_2 \approx 1$, indicating membership in market segments.
- Neural network clustering is an example of fuzzy segmentation with membership values between 0 (not a member of this segment) and 1 (member of only this segment).

4. Model Based Methods:

- Model-based methods are an alternative to distance-based methods in market segmentation analysis.
- Model-based methods extract market segments in a unique way, offering an alternative extraction technique.
- 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.
- These properties are assumed to hold, but the exact nature of these properties is unknown.
- Model-based methods use empirical data to find values for segment sizes and segment-specific characteristics that best reflect the data.
- The finite mixture models used in this section are finite mixture models, where the number of market segments is finite and the overall model is a mixture of segment-specific models.
- Maximum likelihood estimation of the finite mixture model requires specifying the number of segments to extract in advance.
- Information criteria are typically used to guide the data analyst in their choice of the number of market segments.
- Finite mixture models can capture very complex segment characteristics and can be extended in many different ways.

4.2.1. Finite Mixtures of Distributions:

- Model-based clustering uses segmentation variables, such as consumer activities during vacation, without additional information like total travel expenditures.
- The statistical distribution function depends on the measurement level or scale of the segmentation variables.

1. Normal Distributions:

- For metric data, the most popular finite mixture model is a mixture of several multivariate normal distributions.
- Multivariate normal distributions can model covariance between variables and are used in biology and business.
- For two-dimensional data, each market segment can be shaped like an ellipse, with different shapes, areas, and orientations.
- For mobile phone data set, the procedure correctly identifies that the ellipses are shaped as circles, but the areas covered by the three circles are not the same.
- The BIC values are low for two segments, then dramatically increase for three segments, and show no further significant improvement for solutions with more than three segments.

2. Binary Distribution:

- Binary distributions, also known as latent class models or latent class analysis, are used for binary data.
- The p segmentation variables in the vector y are binary, with all elements being either 0 or 1.
- The mixture model assumes respondents in different segments have different probabilities of undertaking certain activities.

- The model of independent binary distributions does not represent the data well, leading to a discrepancy between observed and expected frequencies.
- A mixture of binary distributions is fitted to the data, with the expected frequencies of a suitable mixture model corresponding to the observed frequencies.

4.2.2. Finite Mixtures of Regressions:
- Similar to distance-based clustering methods, these models often yield similar solutions.
- They offer a different type of market segmentation analysis.
- They assume the existence of a dependent target variable y that can be explained by a set of independent variables x.

4.2.3. Extensions and Variations:
1. **Finite Mixture Models' Flexibility**:
   - Finite mixture models are more complex than distance-based methods, making them flexible.
   - They can accommodate a wide range of data characteristics, including metric data, binary data, nominal variables, and ordinal variables.
   - Mixture models can disentangle response style effects from content-specific responses while extracting market segments.

2. **Clustering and Extracting Segments:**
   - If the data set contains repeated observations over time, mixture models can cluster the time series and extract groups of similar consumers.
   - Segments can be extracted based on switching behaviour of consumers between groups over time using Markov chains.

3. **Segmentation and Descriptor Variables**:
   - Mixture models allow to simultaneously include segmentation and descriptive variables.
   - Segmentation variables are used for grouping, while descriptor variables model differences in segment sizes.
   - Concomitant variables are included to model the segment sizes.

5. Algorithms with Integrated Variable Selection:

- Most algorithms extract segments from data, assuming each variable contributes to the segmentation solution.
- Some algorithms contain redundant or noisy variables, which can be identified through pre-processing methods.
- Variable selection for binary data is more challenging due to the non-informative nature of single variables.
- When segmentation variables are binary, 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.

6. Data Structure Analysis:

- Market segmentation is exploratory, requiring a different approach than traditional validation.
- Validation involves calculating different segmentation solutions, choosing different segments, targeting them, and comparing the most profitable strategies.
- This approach, known as stability-based data structure analysis, assesses the reliability or stability of solutions after modifying the data or algorithm.
- This analysis provides insights into the properties of the data, guiding subsequent methodological decisions.
- It helps identify natural, distinct, and well-separated market segments in the data.
- If there is structure in the data, data structure analysis 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-9: Customising the Marketing Mix

1. Implications of Marketing Mix Decisions:

- Marketing mix initially consisted of 12 ingredients: product planning, packaging, physical handling, distribution channels, pricing, personal selling, branding, display, advertising, promotions, servicing, fact finding, and analysis.
- The most commonly understood marketing mix is the 4Ps: Product, Price, Promotion, and Place.
- Market segmentation is part of the segmentation-targeting-positioning (STP) approach.
- The process starts with market segmentation, followed by targeting, and finally positioning.
- Market segmentation is seen as the first step in the STP approach, but it may need to be revisited before making a long-term commitment to target segments.

2. Product:

- Specifying the product in view of customer needs is a key decision in the marketing mix.
- Other decisions include naming the product, packaging it, offering or not offering warranties, and after-sales support services.
- Target segment selection can influence product design or modification.

3. **Price:**
   - Setting the price for a product and deciding on discounts are key decisions.
   - Confidence intervals for median estimates, box widths should reflect group sizes, and a specific label should be included for the y-axis.
   - The price dimension can be used to best possibly harvest the targeted marketing approach.

4. **Place:**
   - The key decision relates to how to distribute the product to the customers.
   - Questions include whether the product should be available for purchase online or offline only or both.
   - Knowing the booking preferences of members of segment 3 enables the destination to ensure that the product is bookable through these distribution channels (from the example of Australian dataset problem).

5. **Promotion:**
   - Developing an advertising message that resonates with the target market and identifying the most effective way of communicating this message are typical promotion decisions.
   - The best information sources for reaching members of segment 3 are determined by comparing the information sources they used for the last domestic holiday and investigating their preferred TV stations.
   - Having specific information packs on the product available both in hard copy in the local tourist information centre at the destination and on the tourist information centre's web page can help design the promotion component of the marketing mix.

➢ **GitHub link for Code Conversion: [Code Conversion - GitHub link](#)**