

Market Segmentation Report

(By Team Aditya)

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Step 1: Deciding (not) to Segment

Implications of Committing to Market Segmentation

- The key implication is that the organisation needs to commit to the segmentation strategy on the long term.
- There are costs of:
 - performing the research,
 - fielding surveys
 - focus groups
 - designing multiple packages
 - designing multiple advertisements
 - communication messages
- Because of the major implications of such a long-term organisational commitment, the decision to investigate the potential of a market segmentation strategy must be made at the highest executive level.

Implementation Barriers

- The first group of barriers relates to senior management.
 - Lack of leadership
 - Lack of pro-active championing
 - Lack of commitment
 - Lack of involvement in the market segmentation processby senior leadership undermines the success of market segmentation.
- Senior management can also prevent market segmentation to be successfully implemented by not making enough resources available, either for the initial market segmentation analysis itself, or for the long-term implementation of a market segmentation strategy.
- A second group of barriers relates to organisational culture.
 - Lack of market or consumer orientation
 - Resistance to change and new ideas
 - Lack of creative thinking
 - Bad communication
 - Lack of sharing of information and insights across organisational units
 - Short-term thinking
 - Unwillingness to make changes
 - Office politics

have been identified as preventing the successful implementation of market segmentation.

- Other potential problems are:
 - lack of training
 - Lack of a formal marketing function or at least a qualified marketing expert in the organisation.
 - The lack of a qualified data manager and analyst in the organisation
 - The lack of financial resources, or the inability to make the structural changes required.
 - Lack of planning or bad planning
 - A lack of structured processes to guide the team through all steps of the market segmentation process,
 - A lack of allocation of responsibilities
 - Time pressure that stands in the way of trying to find the best possible segmentation outcome.

Note: A Corporation should only proceed if it can commit to all implications to market segmentation and overcome all barriers to it as well.

Step 2: Specifying the Ideal Target Segment

Segment Evaluation Criteria

- Before we start collecting data, we have to decide how does our ideal segments would look like. By doing so we can get a clear picture of the information we require to as for in the data collection step.
- There are two criteria to specify the ideal target segment:
 - **Knock-out criteria:**
 - These criteria are the essential, non-negotiable features of segments that the organisation would consider targeting.
 - **Attractiveness criteria:**
 - These criteria are used to evaluate the relative attractiveness of the remaining market segments – those in compliance with the knock-out criteria.
- Where knock-out criteria automatically eliminate some of the available market segments, attractiveness criteria are first negotiated by the team, and then applied to determine the overall relative attractiveness of each market segment in Step 8.

Knock-Out Criteria

Knock-out criteria are used to determine if market segments resulting from the market segmentation analysis qualify to be assessed using segment attractiveness criteria. Knock-out criteria are used to determine if market segments resulting from the market segmentation analysis qualify to be assessed using segment attractiveness criteria.

According To Knock-Out Criteria:

- The segment must be homogeneous; members of the segment must be similar to one another.
- The segment must be distinct; members of the segment must be distinctly different from members of other segments.
- The segment must be large enough; the segment must contain enough consumers to make it worthwhile to spend extra money on customising the marketing mix for them.
- The segment must be matching the strengths of the organisation; the organisation must have the capability to satisfy segment members' needs.
- Members of the segment must be identifiable; it must be possible to spot them in the marketplace.
- The segment must be reachable; there has to be a way to get in touch with members of the segment in order to make the customised marketing mix accessible to them.

Attractiveness Criteria

- Attractiveness criteria are not binary in nature.
- Segments are not assessed as either complying or not complying with attractiveness criteria. Rather, each market segment is rated; it can be more or less attractive with respect to a specific criterion.
- The attractiveness across all criteria determines whether a market segment is selected as a target segment in Step 8 of market segmentation analysis.

Step 3: Collecting Data

Segmentation Variables

- There are two types of variables:
 - **Segmentation variable** refer to the variable in the empirical data used in common sense segmentation to split the sample into market segments
 - All the other personal characteristics available in the data – like: age, the number of vacations taken, and information about five benefits people seek or do not seek when they go on vacation – serve as **descriptor variables**.
- The quality of empirical data is critical for developing a valid segmentation solution.
- Empirical data for segmentation studies can come from a range of sources:
 - from survey studies
 - from observations such as scanner data where purchases are recorded
 - loyalty programs
 - experimental studies

Segmentation Criteria

- Segmentation criterion relates to the nature of the information used for market segmentation.
- The most common segmentation criteria are:
 - **Geographic Segmentation**
 - The consumer's location of residence serves as the only criterion to form market segments.
 - The key advantage of geographic segmentation is that each consumer can easily be assigned to a geographic unit.
 - The key disadvantage is that living in the same country or area does not necessarily mean that people share other characteristics relevant to marketers.
 - Biases that can occur if surveys are completed by respondents from different cultural backgrounds.
 - **Socio-Demographic Segmentation**
 - Typical socio-demographic segmentation criteria include age, gender, income and education.
 - Socio-demographics do not represent a strong basis for market segmentation, suggesting that values, tastes and preferences are more useful because they are more influential in terms of consumers' buying decisions.
 - **Psychographic Segmentation**

- When people are grouped according to psychological criteria, such as their beliefs, interests, preferences, aspirations, or benefits sought when purchasing a product, the term psychographic segmentation is used.
- Benefit segmentation, Lifestyle segmentation is another popular psychographic segmentation approach.
- The psychographic approach has the advantage that it is generally more reflective of the underlying reasons for differences in consumer behaviour.
- The disadvantage of the psychographic approach is the increased complexity of determining segment memberships for consumers.
- Also, the power of the psychographic approach depends heavily on the reliability and validity of the empirical measures used to capture the psychographic dimensions of interest.

- **Behavioural Segmentation**

- Another approach to segment extraction is to search directly for similarities in behaviour or reported behaviour.
- The key advantage of behavioural approaches is that – if based on actual behaviour rather than stated behaviour or stated intended behaviour.
- Using behavioural data also avoids the need for the development of valid measures for psychological constructs.
- But behavioural data is not always readily available, especially if the aim is to include in the segmentation analysis potential customers who have not previously purchased the product,

Data from Survey Studies

- Survey data is cheap and easy to collect.
- But can be contaminated by a wide range of biases.
- Things to Consider while designing a survey:

- **Choice of Variables**

- Unnecessary variables must be avoided.
- Including unnecessary variables can make questionnaires long and tedious for respondents, which, in turn, causes respondent fatigue.
- Fatigued respondents tend to provide responses of lower quality
- Unnecessary variables included as segmentation variables divert the attention of the segment extraction algorithm away.
- Such variables are referred to as noisy variables or masking variables
- The recommendation is to ask all necessary and unique questions.

- **Response Options**

- Options allowing respondents to answer in only one of two ways, generate binary or dichotomous data.
- Options allowing respondents to select an answer from a range of unordered categories correspond to nominal variables.
- Options allowing respondents to indicate a number, such as age or nights stayed at a hotel, generate metric data.

- Preferably either metric or binary response options should be provided to respondents.
- **Response Styles**
 - If a bias is displayed by a respondent consistently over time, and independently of the survey questions asked, it represents a response style.
 - A wide range of response styles manifest in survey answers, including respondents' tendencies to use extreme answer options (STRONGLY AGREE, STRONGLY DISAGREE), to use the midpoint (NEITHER AGREE NOR DISAGREE), and to agree with all statements.
 - Respondents affected by such a response style must be removed before choosing to target such a market segment.
- **Sample Size**
 - When the sample size is insufficient (left plot), it is impossible to determine which the correct number of market segments is.
 - Sample size should be at least $2p$ (better five times $2p$), where p is the number of segmentation variables.
 - Increasing the sample size improves the correctness of the extracted segments.
 - A sample size of at least $60 \cdot p$ is recommended. For a more difficult artificial data scenario Dolnicar et al. (2014) recommend using a sample size of at least $70 \cdot p$.

Data from Internal Sources

- Typical examples are scanner data available to grocery stores, booking data available through airline loyalty programs, and online purchase data.
- The strength of such data lies in fact that they represent actual behaviour of consumers, rather than statements of consumers about their behaviour or intentions, known to be affected by imperfect memory, as well as a range of response biases.
- Another advantage is that such data are usually automatically generated and – if organisations are capable of storing data in a format that makes them easy to access – no extra effort is required to collect data.
- What is missing is information about other consumers the organisation may want to win as customers in future, which may differ systematically from current customers in their consumption patterns.

Data from Experimental Studies

- Experimental data can result from field or laboratory experiments.

Step 4: Exploring Data

A First Glimpse at the Data

- First, we load the dataset
- Summary provides us the basic information of the datapoints in the dataset.

Data Cleaning

- The first step before commencing data analysis is to clean the data.
- This includes checking if all values have been recorded correctly, and if consistent labels for the levels of categorical variables have been used.
- For many metric variables, the range of plausible values is known in advance. For example, age (in years) can be expected to lie between 0 and 110. It is easy to check whether any implausible values are contained in the data, which might point to errors during data collection or data entry.
- Similarly, levels of categorical variables can be checked to ensure they contain only permissible values.

Descriptive Analysis

- Descriptive numeric and graphic representations provide insights into the data.
- Helpful graphical methods for numeric data are histograms, boxplots and scatter plots.
- Bar plots of frequency counts are useful for the visualisation of categorical variables.
- Histograms visualise the distribution of numeric variables. They show how often observations within a certain value range occur.
- The boxplot is the most common graphical visualisation of unimodal distributions in statistics.
- Boxplot compresses a data set into minimum, first quartile, median, third quartile and maximum. These five numbers are referred to as the five number summary.

Pre-Processing Categorical Variables

- Two pre-processing procedures are often used for categorical variables. One is merging levels of categorical variables before further analysis, the other one is converting categorical variables to numeric ones,
- Merging levels of categorical variables is useful if the original categories are too differentiated (too many).

- Ordinal data can be converted to numeric data if it can be assumed that distances between adjacent scale points on the ordinal scale are approximately equal.
- Nominal data can be dealt by One Hot Encoding them.
- Binary answer options are less prone to capturing response styles, and do not require data pre-processing.

Pre-Processing Numeric Variables

- The range of values of a segmentation variable affects its relative influence in distance-based methods of segment extraction.
- To balance the influence of segmentation variables on segmentation results, variables can be standardised.
- Standardising variables means transforming them in a way that puts them on a common scale.

Principal Components Analysis

- Principal components analysis (PCA) transforms a multivariate data set containing metric variables to a new data set with variables – referred to as principal components – which are uncorrelated and ordered by importance.
- The first variable (principal component) contains most of the variability, the second principal component contains the second most variability, and so on.
- After transformation, observations (consumers) still have the same relative positions to one another, and the dimensionality of the new data set is the same because principal components analysis generates as many new variables as there were old ones.
- Principal components analysis basically keeps the data space unchanged, but looks at it from a different angle.
- In most cases, the transformation obtained from principal components analysis is used to project high-dimensional data into lower dimensions for plotting purposes.
- In this case, only a subset of principal components is used, typically the first few because they capture the most variation.

Step 5. Extracting segments

The result of a market segmentation analysis, is determined as much by the underlying data as it is by the extraction algorithm chosen.

Segmentation methods shape the segmentation solution Many segmentation methods used to extract market segments are taken from the field of cluster analysis. Most popular extraction methods used in market segmentation are:

Distance-based methods

- Use a particular notion of similarity or distance between observations (consumers).
- Try to find groups of similar observations (market segments).
- Euclidean distance is the most common distance measure used in market segmentation analysis.
- Euclidean distance corresponds to the direct “straight-line” distance between two points in two-dimensional space.
- Manhattan distance derives its name from the fact that it gives the distance between two points assuming that streets on a grid (like in Manhattan) need to be used to get from one point to another.
- Both Euclidean and Manhattan distance treat all dimensions of the data equally; they take a sum over all dimensions of squared or absolute differences.

Hierarchical Methods:

- Hierarchical clustering methods are the most intuitive way of grouping data because they mimic how a human would approach the task of dividing a set of n observations (consumers) into k groups (segments).
- Divisive hierarchical clustering methods start with the complete data set X and splits it into two market segments in a first step. Then, each of the segments is again split into two segments. This process continues until each consumer has their own market segment.
- Agglomerative hierarchical clustering approaches the task from the other end. The starting point is each consumer representing their own market segment (n singleton 16 clusters). Step-by-step, the two market segments closest to one another are merged until the complete data set forms one large market segment.
- Both approaches result in a sequence of nested partitions. A partition is a grouping of observations such that each observation is exactly contained in one group. The sequence of partitions ranges from partitions containing only one group (segment) to n groups (segments). They are nested because the partition with k + 1 groups (segments)

Partitioning Methods:

- Instead of computing all distances between all pairs of observations in the data set at the beginning of a hierarchical partitioning cluster analysis using a standard implementation – only distances between each consumer in the data set and the centre of the segments are computed.
- In addition, if only a few segments are extracted, it is better to optimise specifically for that goal, rather than building the complete dendrogram and then heuristically cutting it into segments.
- The Application of Partitioning Methods can be seen in:
 - k-Means and k-Centroid Clustering
 - “Improved” k-Means
 - Hard Competitive Learning
 - Neural Gas and Topology Representing Networks
 - Self-Organising Maps
 - Neural Networks

Hybrid Approaches

- Several approaches combine hierarchical and partitioning algorithms in an attempt to compensate the weaknesses of one method with the strengths of the other.
- The strengths of hierarchical cluster algorithms are that the number of market segments to be extracted does not have to be specified in advance and that similarities of market segments can be visualized using a dendrogram.
- The biggest disadvantage of hierarchical clustering algorithms is that standard implementations require substantial memory capacity, thus restricting the possible sample size of the data for applying these methods.
- Also, dendograms become very difficult to interpret when the sample size is large.
- The strength of partitioning clustering algorithms is that they have minimal memory requirements during calculation, and are therefore suitable for segmenting large data sets.
- The disadvantage of partitioning clustering algorithms is that the number of market segments to be extracted needs to be specified in advance.
- Partitioning algorithms also do not enable the data analyst to track changes in segment membership across segmentation solutions with different number of segments because these segmentation solutions are not necessarily nested.
- The basic idea behind hybrid segmentation approaches is to first run a partitioning algorithm because it can handle data sets of any size.
- But the partitioning algorithm used initially does not generate the number of segments sought. Rather, a much larger number of segments is extracted.
- Then, the original data is discarded and only the centres of the resulting segments (centroids, representatives of each market segment) and segment sizes are retained and used as input for the hierarchical cluster analysis.

- At this point, the data set is small enough for hierarchical algorithms, and the dendrogram can inform the decision of how many segments to extract.
- The Application of Hybrid Segmentation can be seen in:
 - Two-Step Clustering
 - Bagged Clustering

Step 6: Profiling Segments

- The aim of the profiling step is to get to know the market segments resulting from the extraction step.
- Profiling is only required when data-driven market segmentation is used.
- At the profiling stage, we inspect a number of alternative market segmentation solutions.
- This is particularly important if no natural segments exist in the data, and either a reproducible or a constructive market segmentation approach has to be taken.
- Good profiling is the basis for correct interpretation of the resulting segments.
- Correct interpretation, in turn, is critical to making good strategic marketing decisions.

Segment Profiling with Visualisations

- Identifying Defining Characteristics of Market Segments
 - A good way to understand the defining characteristics of each segment is to produce a segment profile plot.
 - The segment profile plot shows – for all segmentation variables – how each market segment differs from the overall sample.
 - The segment profile plot is a so-called panel plot.
 - Each of the panels represents one segment. For each segment, the segment profile plot shows the cluster centres (centroids, representatives of the segments).
 - The dots identical in each of the panels, and represent the total mean values for the segmentation variables across all observations in the data set. These dots serve as reference points for the comparison of values for each segment with values averaged across all people in the data set.
 - To make the chart even easier to interpret, marker variables appear in colour (solid bars). The remaining segmentation variables are greyed out.
- Assessing Segment Separation
 - Segment separation can be visualised in a segment separation plot.
 - The segment separation plot depicts – for all relevant dimensions of the data space – the overlap of segments.
 - Segment separation plots are very simple if the number of segmentation variables is low, but become complex as the number of segmentation variables increases.
 - But even in such complex situations, segment separation plots offer data analysts and users a quick overview of the data situation, and the segmentation solution

Step 7: Describing Segments

Understanding the difference in the segmentation variables across market segments is the purpose of segment profiling. Segment profiling is very similar to describing segments with a slight difference that the variables being used are not the ones used for extracting market segments. These variables known as descriptor variables are used to provide additional information about the segments.

These provide a detailed insight into the segments and thus aid in creating a customised marketing strategy. To make use of these variables and draw insights into the relations it forms with the segments, 2 types of statistics are used namely visualizations and data analysis using inferential statistics. Using visualisation is a more efficient and easy way to understand the differences between segments and draw inferences and deductions.

Descriptor variables can be nominal or ordinal and become the basis for visualizations and tests. These visualizations give an idea about the associations there are between segments.

To test these descriptor variables, various tests are conducted. The simplest one is to test each variable independently.

To predict the segments, a regression model is employed where the segment membership which is the outcome of segment extraction is used as a dependent variable or more like a label in the data and the descriptor variables as independent data. Various machine learning algorithms can be used to carry out the classification. The prediction is done to understand the impact and relevance of the descriptor variable in the segment and how well it defines and relates with it. This also gives an idea which ones have higher relevance.

Various prediction models employed are binary logistic regression, multinomial logistic regression and Tree based methods. These models are chosen based on ease of interpretation and the ability to perform variable selection.

Step 8: Selecting the Target Segment(s)

Once the segments are profiled and described, it is time to select the segments the organisation is targeting. This is based on the previous analysis and steps taken. The criteria for selection have already been discussed and formulated in step 2 i.e., using knock out criteria and attractiveness criteria. As all the data leading to step 8 is available, it is already clear if the segments are large enough, or homogenous or distinct. All the other steps have a different criterion in profiling the segments and thus by reaching step 8, it is evident and clear what the organisation wants and what the segments are offering. Thus, once the segments reach step 8, they are already complying with the knock out criteria. Step 8 runs a double check to see if the criteria is fulfilled or not. Once this is established, attractiveness is evaluated. A set of questions are asked and based on the replies, the organisation moves forward. These questions are descriptive and become decisive when targeting segments. The questions cover the aspects and characteristics of segments as well as that of the organisation. These are asked to draw a relation and create a sort of relevance between the segments and the organisation.

Now the segments need to be evaluated and for this the capabilities of various decision matrix are leveraged. The variations of the decision matrix offer the team the insight into which framework to employ for decision making.

The evaluations are aided by visualisation which cover 2 dimensions namely segment attractiveness and relative organisational competitiveness. These 2 dimensions cover the aspects of both the segment and the organisation.

Step 9: Customising the Marketing Mix

Customizing the Marketing Mix

- Marketing was originally seen as a toolbox to assist in selling products, with marketers mixing the ingredients of the toolbox to achieve the best possible sales results.
- In early days there were 12 ingredients points to focus on:
 - Product Planning
 - Packaging
 - Physical Handling
 - Distribution Channels
 - Pricing
 - Personal Selling
 - Branding
 - Display
 - Advertising
 - Promotions
 - Servicing
 - Fact Finding and Analysis
- However, now it has been trimmed down to just 4:
- Product 2. Price 3. Promotion 4. Place
- Product:
 - One of the key decisions as an organization needs to make when developing the product dimension is to specify the product in view of customer needs. Often this does not imply designing an entirely new product, but rather modifying an existing one. Other marketing mix decisions that fall under the product dimension are: 1. Naming the Product 2. Packaging It 3. Offering or Not Offering Warranties 4. Sales Support Services.
- Price:
 - Typical decisions an organization needs to make when developing the price dimension 32 of the marketing mix include setting the price for a product, and deciding on discounts to be offered.
- Place:
 - The key decision relating to the place dimension of the marketing mix is how to distribute the product to the customers. This includes answering questions such as: should the product be made available for purchase online or offline only or both; should the manufacturer sell directly to customers; or should a wholesaler or a retailer or both be used. Based on the data we can create the following model.
- Promotion:
 - Typical promotion decisions that need to be made when designing a marketing mix include: 1. Developing an advertising message that will resonate with the target market 2. Identifying the most effective way of communicating this message. 3. Other tools in the promotion category of the marketing mix include public relations, personal selling, and sponsorship. Conclusion: The principle of market segmentation is that the product and services need of individual customers differ. Market segmentation involves the

grouping of customers together with the aim of better satisfying their needs whilst maintaining economies of scale

Case Study Replication

The GitHub Link of the replication of the case study in python is given below:

https://github.com/ruck45/mcdonalds_market_segmentation/blob/main/jupyter_notebook.ipynb