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WHITE PAPER©

This unique, proprietary approach to trade-off analysis, developed by MACRO Consulting, Inc., involves a specific data collection procedure as well as a unique analytic protocol.

The Cake Method©

A Proprietary Hybrid Conjoint Approach

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The Cake Method© is a unique, proprietary approach to trade-off analysis, developed by MACRO Consulting, Inc., which offers several advantages over other conjoint methods:

- A large number of product features (50 or more) can be included in the model
- First order interactions can be estimated at both the disaggregate and aggregate levels
- There is complete control over the experimental design, in a full-profile format
- Since product combinations are specified, via traditional experimental design, before the interview takes place, physical exhibits can be easily incorporated into the interview
- Conjoint utilities are calculated for each respondent, removing the issue of heterogeneous samples

The approach involves a specific data collection procedure as well as a unique analytic protocol. The basic steps of the procedure are as follows:

Data Collection

- The data collection procedure has three sections:
  1. Product feature importance ratings
  2. Trade-off exercise
  3. Holdout cards
- In the product feature importance ratings section, respondents are asked to rate each of a list of product features for purchase interest. Several of the features included in the importance ratings will be included in the conjoint exercise as well.
- The respondents then participate in a "full-profile" trade-off exercise. Respondents are typically shown a glossary of terms to review prior to both the importance ratings and the trade-off exercise to be certain they understand all of the attributes tested.

- The full-profile products consist of six attributes , at least one of which is included in the importance ratings above. These products are either rated (metric conjoint) or rank-ordered (non-metric conjoint).
- Several holdout cards, consisting of products similar to those in the conjoint exercise, are then rated for purchase interest.

Analysis

- Estimate utilities in trade-off exercise (data step 2)
- Using any of a variety of available conjoint software, utility weights for each feature in the trade-off exercise (data step 2) can be estimated.
- Bridge utilities from data step 1 with data step 2
- On a per respondent basis, a scalar can be estimated using the common features in data step 1 and data step 2. The formula used to estimate the scalar equals the sum of the utility weights of the common features in data step 2 divided by the sum of the utility weights of the common features in data step 1. The formula for the scalar is as follows:

  $(X_{11} + X_{12} + X_{13})/(X_{21} + X_{22} + X_{23})$

  where X_{ij}= the utility weight of the jth feature in the ith trade-off

- The scalar reduces the feature scores in data step 1 to a size equivalent with data step 2 utility weights.
- On a per respondent basis, this scalar is multiplied by each score in data step 1 to achieve utility weights comparable to data step 2 utility weights.
- Data step 1 and data step 2 utility weights are then merged to create on set of bridged utility weights (with the utility values from data step 2 used for the attributes common to both steps).
- These merged utility weights define the conjoint model from which all subsequent simulations will be based.

Calculate feature importance

- Utility ranges for each feature can be calculated by subtracting the minimum utility value of a feature level from the maximum utility value.
- Data step 1 feature ranges are scaled using a similar scalar formula as the formula used to bridge the utility weights:

  $(X_{11} + X_{12} + X_{13})/(X_{21} + X_{22} + X_{23})$

  where X_{ij}= the utility weight of the jth feature in the ith trade-off

- Data step 1 scaled utility ranges and Data step 2 ranges are combined to form one set of feature ranges.

Correct for excessive feature bias

- When selecting products, respondents are commonly believed to comprehend up to no more than six features at a time. The following step can be performed to eliminate some of the bias associated with too many features in the importance calculations.
- For each respondent, the six features with the largest utility ranges are selected while the remaining features' utility ranges are set to zero for that respondent.
- Aggregate mean utility ranges for each feature are then calculated

using the transformed utility ranges from the step above.

- Mean ranges are standardized by summing across all ranges and then dividing that sum into each range to express each range as a percent of the sum of ranges.

Construct purchase probability model

- Respondents rate each hold out card on a scale of 0 - 10 on how likely they are to purchase the product depicted on each card.
- Utility weights for each feature in a hold out card are summed to yield the total utility for the product configuration on the card.
- A regression model can be built regressing claimed purchase probability against total product utility.
- The model can be created for each respondent to achieve unique purchase probabilities based on an individual's scale of utility.
- Purchase probabilities are estimated for each respondent on a variety of product configurations by inserting the total product utility for a given product configuration into the regression model. The model then predicts the claimed purchase probability for that product configuration.
- Some respondent's models may result in purchase probabilities varying negatively with utility. This implies that the more value the respondent places on a product, the less likely he/she is to purchase that product. This illogical model could result from incorrect scoring by an interviewer or a confused or fatigued respondent. To circumvent this problem, the models of the respondents who act rationally are averaged to yield the mean relationship between utility and purchase probability. The models of the respondents who act irrationally are replaced with this average purchase probability model (mean substitution).

Adjust for No-buy option

- In data step 2, respondents can, as part of a ranking protocol, sort all products into two piles: a pile of those products they would want to buy if available to them and those products they would not want to buy. The products in both piles can then be rank ordered from most liked to least liked. The utility of the most liked product in the no-buy pile yields the utility level at which the respondent ceases to purchase a product. This level is called the critical utility level and varies by respondent. Note: there are several alternative ways to define this critical utility level, e.g., the maximum product utility in the no-buy pile, the minimum product utility in the buy pile and the max-min average.
- All product configurations with a utility level less than or equal to this critical utility are assumed to have a zero percent purchase probability for that respondent.
- Aggregate purchase probabilities can then be calculated for a variety of product configurations and/or respondent segments.
- Note that, based on the purchase probability model, unit sales and gross revenue forecasts can be made for any product configuration definable. See the MACRO white paper Forecasting New Product Sales for more specific information.

Often product developers need to evaluate a large number of product features, measure some interaction terms, e.g., brand and price or a multidimensional pricing structure, and express the product concepts in some realistic, full-profile format. The Cake Method© offers a unique cost and time efficient solution to those requirements.

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