

# Conjoint analysis

## Technote

### What does conjoint analysis do?

Conjoint analysis is a method for consumers to assign value to various features of a product or service. This research technique simulates the consumer choice decision, usually in a written questionnaire. The product designer and brand manager can identify the features or attributes that create the perceived value for the product. In turn, this can support further product design, pricing strategies, and marketing plans. This versatility has led to the wide adoption of conjoint analysis.

### How does it work?

The key concept underlying conjoint analysis is that products and services can be broken down into *attributes*. For example, a car may be visualized in terms of its attributes such as fuel efficiency, acceleration, seating capacity, style, and trunk capacity. Some attributes are objective, such as gas mileage; others are subjective, such as styling.

Once the attributes are identified, the next step is to classify each attribute into a number of *levels*. Fuel efficiency can be described as a specific number such as 7 litres per 100 kilometres (or 25 miles to the gallon) or in categories such as *high*, *medium*, and *low*. Styling attributes may be described as *family*, *sporty*, and *retro*. Consumers must share an understanding of these terms.

If attributes and their levels are not meaningful to the respondents/consumers, the results from conjoint analysis will be disappointing. Qualitative techniques, such as focus groups, are an important part of exploring consumer understanding of the terms used to describe attributes and levels.

### How is conjoint analysis set up?

Imagine we are evaluating three hotels and have identified a conjoint model with three attributes. Two of the attributes (food and beach) have three levels, and the third, amusement, has two levels. An attribute must have at least two levels. The next step is to create a self-administered questionnaire. Respondents are asked to rate “packages” of attributes, usually on a scale from 0 to 10. For example, Package 1 might be:

TABLE 1

Attributes and levels			
Attributes	Level 1	Level 2	Level 3
Food	Snacks	Fast food	Fine dining
Beach	Pebbles	Sand	Sand and boats
Amusement	None	Games room	

**Hotel 1** with food featuring snacks, a beach with sand and boats and no amusements.

**Hotel 2** with food featuring fine dining, a beach with sand and boats and a games room.

**Hotel 3** with food featuring snacks, a beach with pebbles and no games room.

Clearly, Hotel 3 should be rated lowest, while Hotel 2 should rate highest. But consider the following complications:

- ▶ How might a hotel with fast food, a beach with sand and boats and no games room be rated? As we add more brands (hotels), we lose our ability to predict the rankings consumers would offer for each brand.
- ▶ What if we added price? Hotel 2, the apparent leader, may cost \$150 per night, while Hotel 3—the brand with the fewest amenities—may be priced at \$29 per night. How does this affect the rating?
- ▶ What is the influence of a specific attribute on overall rating? Would upgrading the beach make a difference in the ratings offered for Hotel 3?

## The statistical process is based on regression models

Conjoint questionnaires typically feature about 10 alternative packages. Respondents rate each package on a scale from 0 – 10, and this becomes the dependent variable in a regression model.

Each attribute generates one or more dummy indicators that serve as independent variables in the regression. For example, one might code the variable AMUSE with a 1 for hotel with a games room and a 0 for a hotel without. For an attribute with three levels, such as beaches, two dummy variables are needed. For example, BEACH1 could be 1 for sand and 0 otherwise, and BEACH2 could be 1 for sand & boats and 0 otherwise. When BEACH1 and BEACH2 are both 0, the hotel has a pebble beach.

Now we can run a conventional regression. The regression coefficients show the incremental valuation for a change in level. We can measure the increased value for fine dining versus fast foods.

A powerful feature of conjoint analysis is the effective sample size. A focus group of 10 participants rating 15 packages would yield 150 ratings or observations, a very viable sample for a regression model.

Table 2 shows the regression output from a hotel example. This shows that respondents gave an average valuation of 5.5 for all hotels when all attributes were at the lowest level. Adding fast food added .37 to the valuation, and fine dining added .39. Therefore, a hotel that has fine dining, a beach with sand & boats and a games room would have a rating of  $5.5 + .39 + .34 + .57$ , or 6.8 out of 10.

**TABLE 2**

<b>Attribute part worths (hypothetical example)</b>	
Intercept	5.5
<b>Food</b>	
Snacks	0
Fast food	0.37
Fine dining	0.39
<b>Beach</b>	
Pebbles	0.24
Sand	0
Sand & boats	0.34
<b>Amusement</b>	
None	0
Games room	0.57

The packages require careful construction to ensure that each level is properly “balanced” and that maximum information is obtained for a given total number of profiles. The most common failings in conjoint analysis relate to a poor set of attributes, unrealistic profiles, and poor statistical design.

## Benefits

- ▶ Conjoint analysis allows a considerable saving in required sample size. Successful analysis can be accomplished with 50 – 100 respondents, implying that five focus groups can support this advanced quantitative technique. The respondent provides several observations on each attribute, and so the “effective sample size” is dramatically enhanced by conjoint procedures.
- ▶ Conjoint analysis allows simultaneous rating of attributes and levels, while other techniques tend to only allow pair-wise comparisons.
- ▶ The questionnaire simulates the purchase decision, and respondents find it more realistic. Managers can experiment with prices and product attributes to “fine-tune” their product and service line.

## Limitations

- ▶ The number of attributes and levels is restricted. No more than 10 – 15 packages can be realistically rated, since this overburdens the respondent. The number of packages is determined by the number of levels in an attribute.
- ▶ Products and especially services may be hard to describe with attributes and levels. This technique only works when consumers have a common understanding of how the attributes and levels combine to produce a valid description of a product or brand.

## Conclusion

Understanding the needs and preferences of your consumers is the key to success. Whether the objective is to design a new product or to modify or evaluate a current one, conjoint analysis is a powerful tool that has become standard in firms offering advanced marketing research.

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