Conjoint Analysis Demonstration

Report Example

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Introduction

Conjoint analysis is a market research tool for developing effective product design that embody features that are attractive to, and desired by, consumers. Using conjoint analysis, the following questions can be answered:

- What product attributes are important or unimportant to the end-user?
- What levels of product attributes are the most or least desirable ones from the perspective of the end-user?
- What is the preference for a competitor's products versus an existing or proposed product?

Conjoint asks the respondent to make choices in the same fashion as the consumer presumably does – by trading off features, one against another.

In this study, we looked at six product features that are characteristic of the instrumentation. These features, known as factors in the context of conjoint analysis, were mass range, tune/calibration, mode, instrument software control, ionization and price. There were two to four different options to be evaluated for each factor. In conjoint analysis, these different options are called levels. The product factors and levels tested in this analysis are summarized in the following table.

Price	Tune
$60	Manual w External
$70	Automatic w External
$80	Automatic w Internal
$110	
	Mode
Mass	Positive Only
10-800 Grams	Positive or Negative
10-1000 Grams	
10-1500 Grams	Control
	Manual
Basis	Software
ES Only	
ES or APCI	

Each respondent was asked to evaluate 20-specific product combinations (called plancards). Sixteen of the plancards were used to calculate the conjoint results; four of the plancards were not used in these calculations. The latter are called "holdout" plancards. They are not included in the determination of the conjoint importance or preference scores—to be described—but rather they are used as an internal control to validate the conjoint results. Each plancard along with the rating scale was randomly presented in the survey. The respondent was asked to rate each design on a 10-point scale that ranged from "definitely would purchase" to "definitely would not purchase".

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The displays below show the initial descriptive presented to the respondent. Below the descriptive is an example of one configuration for consideration then the rating scheme used in this study. Each configuration along with the rating scale presented randomly. The respondent is asked to rank or score each configuration (profile or plancard) from most to least depending on the particular scheme being applied. This study used a scale that ranged from "definitely would purchase" to "definitely would not purchase."

For the purpose of this study, imagine that you are considering purchasing a new system will include six features and you will be asked to indicate how likely you would be to purchase the system based on the configuration presented. Please read each description carefully. All questions MUST be answered in order to continue the survey.

Mass: 10 - 800 Grams
Tune: Automated with internal
Mode: Positive only
Control: Software control
Basis: ES only
Price: $110

Please indicate how likely you would be to purchase this MS system.

Definitely Would Purchase									**Definitely Would Not Purchase**
10	9	8	7	6	5	4	3	2	1

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Given the collective set of response ratings for the 16-design sets presented, the conjoint model determines an overall factor importance score based on the individual within-factor (levels) utility scores. The derived utility scores for this study are in the table below. (In the context of conjoint analysis, a utility is a regression coefficient.)

Utility	Factor & Levels
	Tune/Calibration
-0.1907	Manual w External
-0.1928	Automatic w External
0.3835	Automatic w Internal
	Mode
-0.3210	Positive Only
0.3210	Positive or Negative
	Control
-0.1028	Manual
0.1028	Software
	Basis
-0.2023	ES Only
0.2023	ES or APCI
	Mass
0.5289	10-800 Grams
1.0578	10-1000
1.5867	10-1500
B =	0.5289
	Price
-0.3835	$60
-0.7669	$70
-1.1504	$80
-1.5339	$110
B =	-0.3835
Constant	4.8022

Pearson's R =	.980
Kendall's tau =	.773

Each factor level score, in combination with the other factor level scores can then determine alternative design configurations. The reader should not view the utility scores as a form of rank ordering of the within-factor levels but simply a derived “utility” to calculate a factor’s average importance. They are, actually, regression coefficients as will be seen later in the paper.

Further, based on both the Pearson and Kendall’s correlation, this model is very representative.

For example, in this study the factor “Tune/Calibration” has three levels, the utility score for each level is:

-0.1907 for “Manual with External CDS”
-0.1928 for “Automatic with External CDS”
+0.3835 for “Automatic with Internal CDS”

Each factor level score, in combination with the other factor level scores, are useful in determining the attractiveness of alternative product configurations. These scores should not be viewed as a form of rank ordering of the levels but simply a derived "utility" to calculate a factor's average importance. Since conjoint analysis models bundles of product features—including price—it can give some insight into how the respondent might be basing the rating decision. Conjoint analysis does not address price sensitivity as an isolated product feature.

For factors with discrete levels, for example, Mode, the resulting utility scores sum to zero and have limited sensitivity usage. In contrast, the factors Mass Range and Price are directionally based, meaning that there are high and low values. Mass Range shows a positive direction, that is, the higher the range the better. Price shows just the opposite direction—a lower price is perceived to be better. In the conjoint model, this directionality was assumed. Had our assumptions been incorrect, then the model would have found the occurrence of "reversals” and none were found in the study results. In addition, the model created from the data is very representative. The Pearson's R and Kendall's tau correlation coefficients for the conjoint analysis are 0.980 and 0.773 respectively. The reference score for each product configuration is the sum of the utility scores for each applicable level plus the regression constant term. For example, the preference score for the following product is 4.79. The larger the derived importance score to more “preferred” the design configuration.

Calculation of a Preference Score

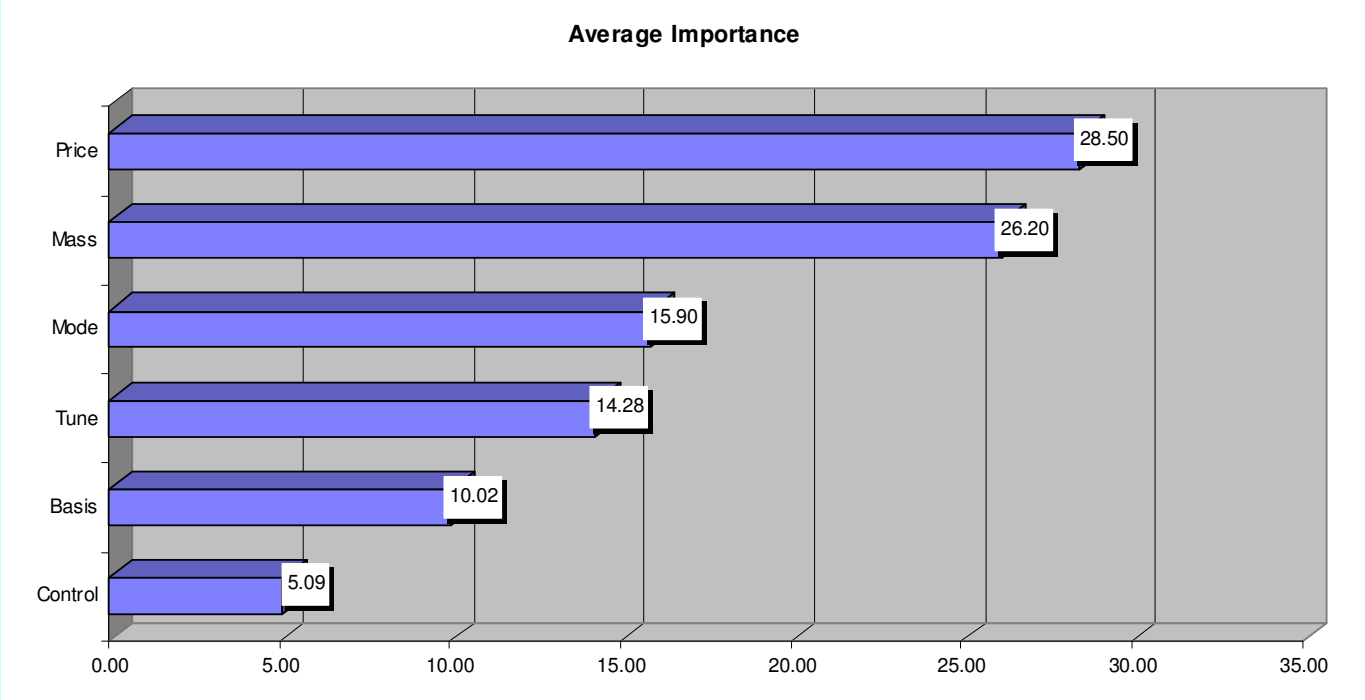
Factor: Level	**Utility**
Mass range: 10-700 AMU	0.5289
Tune/Calibration: Automated with internal CDS	0.3835
Mode: Positive or negative	0.3210
Instrument SW Control: Software control	0.1028
Ionization: ES only	-0.2023
Price: $90,000	-1.1504
Regression constant	+ 4.8022
Preference Score	4.7857

Findings Section

Average Importance

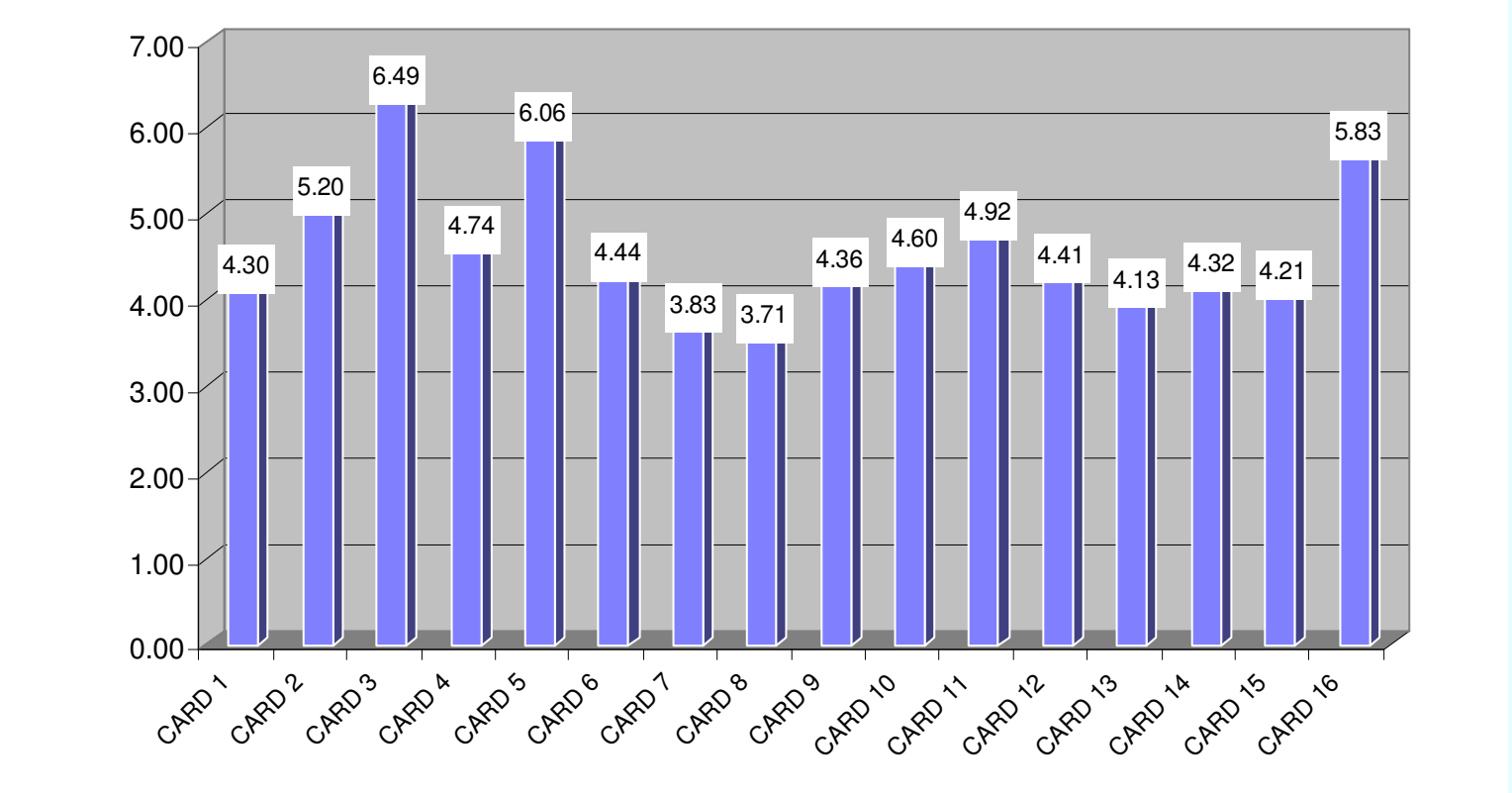
Overall, the result of this survey finds that price (with an overall importance score of 28.50) is the leading factor followed by mass (26.20).

The factor importance scores are derived from the collective set of individual within-factor utility scores and the overall results is shown in the graphic below.



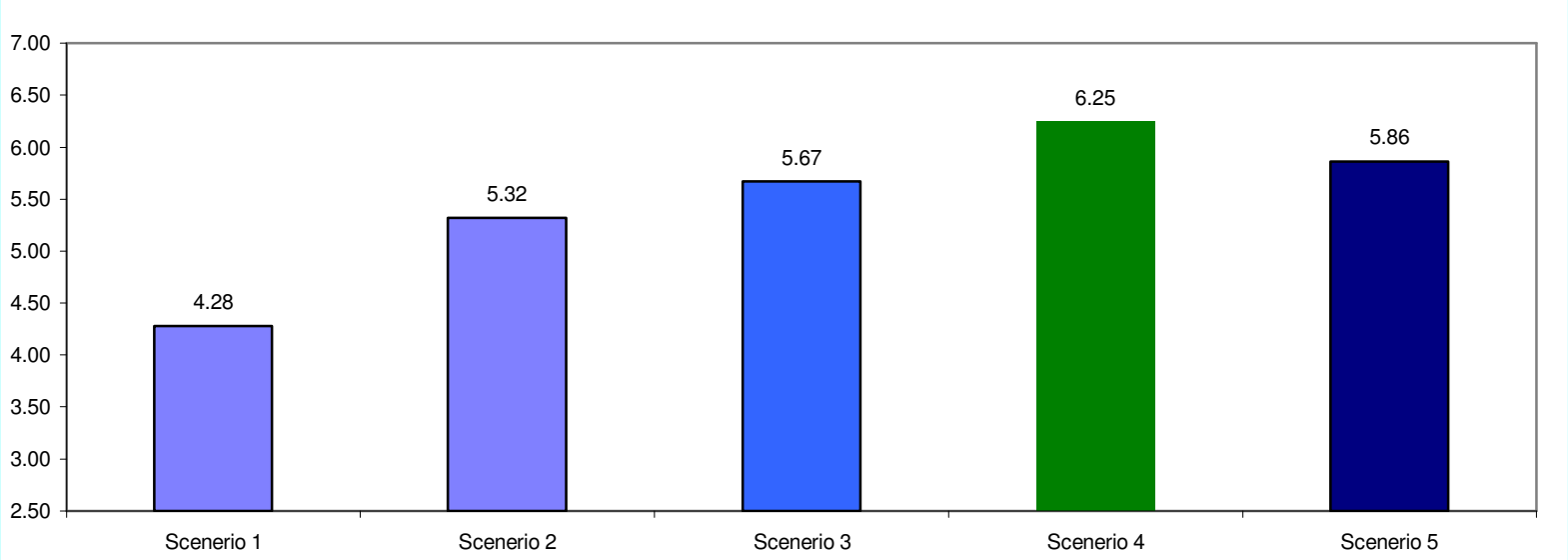
For each factor level, a utility score, or relative weight and similar to a regression coefficient is determined by the conjoint algorithm. The set of scores for this model and based on the 16-design configurations is a follows:

Among the specific 16 product combinations (plancards) presented respondents (refer to graphic below), configuration three (Card 3) is deemed to be the most viable, based on it importance score (6.49) followed by Card 5 (6.06). One cannot say that there is a significant difference between these importance scores only that they are ranked in a particular order based on the preferences of the responding group.



From the results of the conjoint, additional design combination can be derived. The scenarios or simulations considered include …

When the set of simulations/scenarios is entered into the conjoint, along with the original 16 plancards, the model can determine how these test designs might have been rated if shown to the same respondents. As seen below, Scenario 4 is the most preferred (importance score of 6.25) followed by Scenario 5 (5.86).



Combining the results from the original 16 plancards along with the five scenarios, the study finds that the top five viable product configurations are as follows: