The use of conjoint analysis to determine consumer buying preferences: A literature review

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INTRODUCTION

A review of the marketing research literature indicates that academic researchers and practitioners have different viewpoints with respect to the classification, value, and use of experiments as a source of primary data (Cooper & Schindler, 1998:381; Dane, 1990:88; Peter & Donnelly, 2001:37; and Bearden et al, 2001:127). Cooper and Schindler (1998:130), for example, use eight different descriptors to classify a research design. One of these is the power of the researcher to manipulate the variables, in which case two kinds of design can be used, namely experimental and post facto. Burns and Bush (1998:111, 119-128) refer to an experimental design as one of four formal conditions for a causal research design. These authors state that causality “…may be thought of as understanding a phenomenon in terms of conditional statements of the form ‘If \(x\), then \(y\)’” (Burns & Bush, 1998:119). Churchill and Iacobucci (2002:91) also describe a causal research design as one that is concerned with cause-and-effect relationships. Studies of this kind normally take the form of experiments, because they are best suited to determining cause and effect. Sudman and Blair (1998:207) group experiments as one of the three major sources of primary data (the other two being surveys, and focus groups and depth interviews).

According to Sudman and Blair (1998:207), there are no standard rules when a researcher decides to conduct an experiment. The experiment can take many different forms and can be conducted in a laboratory or in the field. In a field study any phenomenon of interest or any research topic is studied in a natural setting. The laboratory experiment, on the other hand, studies the phenomenon outside the natural setting. The term “laboratory” refers to any context other than the natural setting (such as supermarkets, malls and retail stores). In a laboratory experiment the researcher creates a desired condition where one or more causal variables are manipulated, and the effect of this manipulation on one or more dependent variables is measured. For example, a magazine company printed various cover designs and asked the employees in its offices to indicate the design they liked best (Sudman & Blair, 1998:206). Considered by Sudman and Blair (1998:229) to be a special type of experiment, conjoint analysis is mostly applied in a laboratory situation.

AIM OF THE ARTICLE

Conjoint analysis has been used in research for many years (Green & Sprinivasan, 1978). Hair et al
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standing of real-life consumer behaviour and, in par-
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enduring feature of retailing research and frequently
Attempts to construct consumer typologies are an

The main aim of this article is to provide an overview
of the nature and use of conjoint analysis as a re-
search tool, and to indicate its value when, for exam-
ple, a researcher wishes to analyse female consum-
ers’ apparel purchasing decisions based on the value
they attach to certain attributes when making a pur-
chasing decision. Although the apparel industry has
reached maturity and growth is very slow, fashion
trend cycles are accelerating. The presence of more
and more brands has created a competitive environ-
ment unheard-of in the past (Rutter & Edwards,
1999:31).

Past research mostly used survey methods that di-
rectly measure consumers’ attitudes towards products
and their attributes. According to Lang and Crown
(1993), the possibility of interaction effects among
attributes is usually overlooked. The preferences of
female consumers for apparel items may depend on
the joint influence of product attributes such as quality,
style and price. Thus, the joint effect of several prod-
uct attributes on the final decision to purchase a spe-
cific item of clothing should be taken into considera-
tion when researching consumer purchasing deci-
sions.

De Vos (2002) therefore lists the following reasons
why researchers, and local apparel manufacturers and
retailers, for example, could use the information from
a conjoint study:
♦ to gain a better understanding of consumers’ se-
lection criteria when purchasing apparel
♦ to plan their apparel merchandise mixes more effi-
ciently
♦ to plan their promotional messages and strategies
more effectively,
♦ to refine their training strategies for sales consult-
ants.

The article will also refer to recent South African stud-
ies that have been done in this field, and special atten-
tion will be given to the process of designing a conjoint
analysis experiment.

THE NATURE OF CONJOINT ANALYSIS

Description

Attempts to construct consumer typologies are an
enduring feature of retailing research and frequently
centre on economic and demographic characteristics.
Such research highlights the relatively poor under-
standing of real-life consumer behaviour and, in par-
ticular, the need to develop more appropriate methods
of examining the behaviour of consumers in real-life
retail settings. By using a conjoint study researchers
could gain a better understanding of the real value
consumers attach to certain attributes when making
purchasing decisions in a retail situation.

The concept conjoint analysis is described by Hair et
al (1998:392) as follows: “Conjoint analysis is a multi-
variate technique used specifically to understand how
respondents develop preferences for products or ser-
vices. It is based on the simple premise that consum-
ers evaluate the value of a product or service by com-
bining the separate amounts of value provided by
each attribute.” Sudman and Blair (1998:229-230)
warn that it is not a data analysis procedure like factor
analysis or cluster analysis. It must be regarded as a
type of “thought experiment” designed to show how
various elements of products or services (price,
brand, style) predict customer preferences for a prod-
cut or service. Kotler (2000:339) defines conjoint
analysis as “…a method for deriving the utility values
that consumers attach to varying levels of a product’s
attributes.” Churchill and Iacobucci (2002:748) refer
to conjoint analysis as “…conjoint measurement, which
relies on the ability of respondents to make judgments
about stimuli.” These stimuli represent some predeter-
dined combinations of attributes, and during a labora-
tory experiment, respondents are asked to make judg-
m ents about their preferences for various attribute
combinations. The basic aim, therefore, is to deter-
mine the features they most prefer. From the defini-
tions given above it is clear that conjoint studies cen-
tre around certain attributes of products or services
and also various levels within each attribute. Table 1
below summarises a hypothetical situation in relation
to prospective female apparel buyers, indicating some
attributes and the levels that might be considered
during the process of deciding to purchase a white
shirt for everyday wear.

In a real-life situation respondents may find it difficult
to indicate which attributes they considered and also
how they combined them to form their overall opinion.
The value of conjoint analysis lies in the fact that it
estimates how much each of these attributes is val-
ued, and as Churchill and Iacobucci (2002:748) state,
“…the word conjoint has to do with the notion that the
relative values of things considered jointly can be
measured when they might not be measurable if
taken one at a time.” From the information given in

<table>
<thead>
<tr>
<th>ATTRIBUTES</th>
<th>LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>R90</td>
</tr>
<tr>
<td></td>
<td>R170</td>
</tr>
<tr>
<td></td>
<td>R350</td>
</tr>
<tr>
<td>Brand</td>
<td>Designer</td>
</tr>
<tr>
<td></td>
<td>Private label</td>
</tr>
<tr>
<td></td>
<td>Unbranded</td>
</tr>
<tr>
<td>Style</td>
<td>High fashion</td>
</tr>
<tr>
<td></td>
<td>Classical</td>
</tr>
<tr>
<td></td>
<td>Comfortable</td>
</tr>
</tbody>
</table>
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Table 1: A reasonable assumption would be that many buyers would probably prefer the cheaper to medium-priced private label shirt that is comfortable. This may, however, not necessarily always be the case because the premium priced shirt might be more comfortable owing to excellent design and craftsmanship. Prospective buyers may therefore find it necessary to trade off some of one feature to secure more of another. The key question then, is to determine how the buyers value these specific attributes. For example, is low price valued more highly, or are the consumers willing to pay a higher price to secure some of the other features. In the shirt example, the respondents are asked to rank the descriptions or attributes in order of preference. Thus, the shirt description can be constructed by using all 27 possible combinations of the attributes as follows: three dimensions, with three levels each (3x3x3=27). Each combination is then written on a separate card. The following are some examples of such cards:

<table>
<thead>
<tr>
<th>Price R170</th>
<th>Designer brand</th>
<th>Classical style</th>
</tr>
</thead>
</table>

Another card can look as follows:

<table>
<thead>
<tr>
<th>Private label</th>
<th>Comfortable style</th>
<th>Price R350</th>
</tr>
</thead>
</table>

The 27 cards are then arranged in random order, and the respondents are asked to rearrange and rank the cards from least preferred to most preferred. The mean rankings for the various levels (for example Price: R90 vs R170 vs R350) are determined and the respondents’ utilities for the attributes are then calculated with the aid of sophisticated computer programs such as Conjoint Value Analysis (CVA) Version 2.0. A summary outlining the nature and use of conjoint analysis is given in Table 2.

The value of conjoint analysis in research

In conjoint analysis respondents indicate their preference for a series of hypothetical multi-attribute alternatives, which are typically displayed as profiles of attributes. The responses to these profiles are analysed to yield estimates of the relative importance of the attributes and to build predictive models of consumer choice for new alternatives (Oppewal & Vriens, 2000). Conjoint analysis is a dependence technique that has brought new sophistication to the evaluation of objects, such as new products, services or ideas (Hair et al, 1998:15). The theory and methods of conjoint analysis deal with complex decision-making, or the process of assessment, comparison, and/or evaluation. In this process consumers decide which aspects of products or services are important, compare the products or services on each of the important aspects, and decide which one to choose (Louviere, 1988:9).

Schutte (1999:90-92) lists the following to indicate the value of conjoint analysis in assisting marketers to provide answers when strategic marketing and selling decisions have to be made:

Understanding market preferences When a product has, say five key attributes: price, quality, style, brand and packaging, these attributes and their associated levels represent the factors that materially affect consumer preferences.

Predicting market choices Conjoint analysis offers the researcher opportunities to apply certain simulations. The simulation capability of conjoint analysis enables the analyst to explore alternative market scenarios. The impact on market share or changes in the product can be assessed and the impact of competitive moves can then be anticipated (Wyner, 1995).

Developing market strategies It can aid marketers to identify product concepts that are extremely attractive from the consumer's perspective. Concepts that are not technically or financially feasible can be eliminated. The best of the remaining products must be selected, and then the attributes of this product must be fine-tuned to achieve the stated objective. A series of simulation tests must be run to identify the point at which the product performs best (Wyner, 1995).

Segmenting the market Conjoint results are very useful for segmentation purposes. Consumers may be segmented on the basis of utility values or attribute important scores. Thus simulations can be viewed as segmentation analyses that group people together according to their most preferred product among other substitutes or competitive products (Wyner, 1995).

TABLE 2: SUMMARY OF CONJOINT ANALYSIS

<table>
<thead>
<tr>
<th>Technique</th>
<th>What it does</th>
<th>What it is used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjoint Analysis</td>
<td>Allows consumer preferences for a product or service to be broken down into trade-offs among its individual attributes, without separating those attributes from the context in which overall judgments are made.</td>
<td>Optimising product configurations; studying price elasticities of demand; simulating market response to new or modified offerings; diagnosing competitive strengths and weaknesses</td>
</tr>
</tbody>
</table>

(Adapted from Market Decisions Corporation, 1996.)
The information gained from a conjoint study could also be used for the development of a theoretical model towards understanding consumer apparel purchasing decisions. There seems to be a lack in marketing theory when it comes to explaining what is important to consumers concerning apparel purchasing decisions, as well as how they make trade-offs between various product attributes when purchasing apparel. According to Sheth and Sisodia (1999) market-centric concepts are essential and have been fundamental in devising marketing strategies. However, it is no longer sufficient to segment a market based on demographics, socio-economic class, and other segmentation variables only. Today, the marketplace is characterised by higher levels of diversity. Therefore, it would be more appropriate to use a construct such as attribute importance as a basis for segmentation. The results of a scientific conjoint study could therefore be used as a basis for segmenting the women’s everyday western apparel market. A few recent conjoint studies undertaken in South Africa are described below.

Application of conjoint measurement studies in South Africa

Schutte (1999) carried out research in the latter half of the previous decade to determine the role of price sensitivity in the demand for accommodation by local visitors to the Kruger National Park. The research problem stemmed from the fact that the Kruger National Park had experienced a decline in the demand for accommodation by local visitors after 1995. Prior to this period the demand for accommodation exceeded the supply. This was especially true for the December, April, July and October school holidays. During the July holiday period, for example, the demand was 5 times greater than the supply. It was hypothesised that costs or pricing factors may be one of the reasons for the decline in the demand for accommodation. After discussions with senior members of the Park’s management team, the need to conduct a price sensitivity study became apparent. During the quantitative research phase a survey was conducted with the aid of a questionnaire (Afrikaans and English) in which respondents were requested to participate in a pair-wise trade-off conjoint analysis in which a real purchase situation was simulated. This was done because conjoint analysis is generally regarded as the most used category of price sensitivity measurement methods. The Conjoint Value Analysis (CVA), Version 2.0 computer programme was used for this study. One of the primary objectives of the study was to measure the consumer preferences of tourists by making trade-offs between attributes at various levels, enabling them to make complex decisions not only on one factor but on several factors “jointly”.

The conjoint experiment was designed according to the guidelines offered by Hair et al (1998: 564-581). The survey was conducted in six camps of the Kruger National Park among 428 respondents in the late nineties. The respondents were requested to indicate their preferences by ranking a number of different combinations of attribute levels on a nine-point Likert scale. The following were some of the findings of the study:

- Overall, the respondents were satisfied with the quality of accommodation in the Park.
- They were not satisfied with the general price level for accommodation, and specifically the prices of meals in restaurants and goods sold in the shops.
- As expected, the majority of the respondents preferred the more luxurious type of accommodation (cottage, hut with private ablution) to the less luxurious type of accommodation.

Burger and Herbst (2002) used a conjoint approach to determine the importance of certain clothing attributes, such as style, price, brand and outlet choice during the decision-making process of teenagers when purchasing denims. Teachers from two Afrikaans and two English schools in the Pretoria region acted as interviewers, and presented 213 (13-16 years) secondary school pupils with 25 hypothetical paired-wise product profiles. The results indicated, inter alia, that the brand name (for example Levi or Diesel) is the most important attribute teenagers consider before making a purchase. Diesel was the most popular brand, followed by Calvin Klein.

South Africa has never been a major player in the pearl industry. For many years now South African pearl distributors have travelled to the East to purchase oyster pearls and mabês, which they import to South Africa. Many consumers might also have a perception that quality pearls come from the East (Hamman & Kotze, 2001). Pearl dealers need to determine whether consumers would prefer to purchase the raw product or a pearl that has been set in precious metal. These and other questions prompted the management of Hermanus Abalone (Pty) Ltd and other pearl dealers to test local consumers’ perceptions with respect to these and other relevant issues (Hamman & Kotze, 2001). A conjoint study was executed to determine, inter alia, the following: the trade-offs consumers make between factors such as colour and size while considering purchasing abalone mabê pearls, the extent to which the country of origin has an influence on consumers’ perception of quality, consumers’ preferred place of purchase, and whether consumers would prefer mabês in settings to the raw product. Using the method of non-probability sampling, the researcher took a convenience sample by questioning 100 female respondents (18-65 years old). The attributes and levels used in the study included the following: type of mabê, colour, country of origin and price. The results of the study indicated, inter alia, the following:

- The respondents preferred the Oyster Mabè to the Abalone Mabê.
- They preferred white to blue or pink as a colour.
- As could be expected, South Africa ranked first when asked to nominate the country of preference.
- Overall, the colour attribute was ranked the highest with the country of origin in second place.
Conjoint analysis is closely related to traditional experimentation. The conjoint technique developed from the need to analyse the effects of the factors we control that are often qualitatively specified or weakly measured. Conjoint analysis is actually a family of techniques and methods, all theoretically based on the models of information integration and functional measurement (Hair et al, 1998:388). Utility is a subjective judgment of preference unique to each individual. It is the conceptual basis for measuring value in conjoint analysis. It is a measure of overall preference because it encompasses all product or service features, both tangible and intangible. Utility is assumed to be based on the value placed on each of the levels of the attributes and expressed in a relationship reflecting the manner in which the utility is formulated for any combination of attributes (Hair et al, 1998:392).

KEY DECISIONS OR STEPS WHEN DESIGNING A CONJONCT VALUE ANALYSIS

There are many different conjoint methods. The researcher should weigh each research situation and pick the right combination of tools for the project. Sudman and Blair (1998:235) distinguish between an arrangement that uses all possible combinations of features ("full factorial design") and one that uses only some of the combinations ("fractional design"). A general rule of thumb, according to these authors, is to limit the descriptions to no more than 30. Full-profile conjoint value analysis (CVA) is useful for measuring up to about six attributes (Hair et al, 1998:401). CVA is designed for paper and pencil study, but can be computerised by means of the Ci3 System for computer interviewing. CVA calculates a set of utilities for each individual, using traditional full-profile card-sort (either rating or ranked) or pair-wise ratings. CVA can attach prices to each attribute level to measure price sensitivities for individual features. This is realistic for modelling categories in which buyers actually see the prices for each component of the product, such as with restaurant meals, cellular phones and packages (Omre, 2000:4). If the full-profile approach is used, it is important to limit the number of attributes and levels, increase the number of profiles, or use more parsimonious models (such as the vector or ideal point models) so as to increase the degrees of freedom for conjoint estimation (Green & Srinivasan, 1990).

Hair et al (1998:400-436) provide a comprehensive description of the design of a conjoint analysis experiment (see Figure 2). The Hair model consists of seven phases, which include 14 steps. Figure 1 highlights the more critical decision points in a conjoint experiment, according to Churchill and Iacobucci (2002:753).

For the purposes of this article, a brief summary of each of the above-mentioned steps follows.

**Select attributes** The attributes used will stem primarily from the objectives of the study. The researcher should be guided by the principle that the attributes should be both capable of being acted on and important to consumers. These attributes are those that the company can do something about; "... that is, it has the technology to make changes that might be indicated by consumer preferences" (Churchill & Iacobucci, 2002:754).

**Determine attribute levels** The number of levels for each attribute has a direct bearing on the number of stimuli respondents will be asked to judge. The more there are, the heavier the burden that is placed on the consumer. Churchill and Iacobucci (2002:754) suggest that the researcher make the range for the various attributes somewhat larger than the range normally found but not so large as to make the options unbelievable.

**Determine attribute combinations** This will determine what the full set of stimuli will look like. One cannot expect a respondent to provide meaningful judgments if there are five attributes and three levels (3x3x3x3x3=243) each of rank-order judgments.

**Select form of presentation of stimuli and nature of judgments** Basically, three approaches can be used, namely: verbal description, paragraph description, and pictorial representation. When visual aids are used they are normally used in combination with verbal descriptions. The nature of the judgments that must be secured from the respondents is related to the form of presentation. One method is to ask them to rank the alternatives according to preference or intention to buy. Rating scales have recently become more popular, however.

**Decide on aggregation of judgments** This step basically involves the decision whether the responses from consumers or groups of consumers will be aggregated and, if so, how this will be done? If groups are formed, operationally this means estimating the utilities for the individual-level models and then clustering them into homogeneous groups. According to Churchill and Iacobucci (2002:759), this highlights an attractive feature of conjoint analysis because it allows market share predictions for selected product alternatives.

**Select analysis technique** The final step in the design of a conjoint analysis project is to select the technique that will be used to analyse the data. The choice depends largely on the method that was used to secure the input judgments by the respondents. For example, when rank-order data have been obtained, the assumption of a linear relationship may be dubious, so a non-metric regression model may be substituted to estimate the utilities (Churchill & Iacobucci, 2002:759).

**CONCLUSION**

Multiple discriminant analysis helps to understand and explain research problems that involve a single cate-
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It is of critical importance for the researcher to be comfortable with the various research techniques, for it is only once he or she fully comprehends the research method that the research can be expanded to become meaningful. As we are in a period of far-reaching change, where information abounds, organisations recognise the increasing value of making strategic and tactical decisions based on solid research. By conducting a conjoint study the researcher could determine consumer preferences and also expand her or his knowledge to gain an understanding of new emerging techniques as well as older foundational ones. This will ensure solid usable research.

REFERENCES

LANG, J & CROWN, E. 1993. Country-of-origin ef-
## The use of conjoint analysis to determine consumer buying preferences: A literature review

### Research Problem

Select objectives:
- Determine contribution of independent variables
- Establish model of consumer judgements
- Define the total elements of total utility
- Identify the key decision criteria

### Choosing a Conjoint Methodology

<table>
<thead>
<tr>
<th>How many attributes are to be used?</th>
<th>Choice-based Conjoint</th>
<th>Traditional Conjoint</th>
<th>Adaptive Conjoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 or fewer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 or more</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Designing Stimuli:

- **Selecting and Defining Factors and Levels**
  - General characteristics
  - Communicable
  - Actionable
  - Specification issues of factors
  - Number of factors
  - Factors multicollinearity
  - Balanced number
  - Ranger

- **Specifying the Basic Model Form**
  - The composition rule: additive vs. interactive
  - The part-worth relationship: linear, quadratic, or separate part-worths

### Data Collection

<table>
<thead>
<tr>
<th>Choosing a Presentation Method</th>
<th>What type of stimuli will be used?</th>
<th>Will the respondent evaluate all stimuli or only a subset of stimuli?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Collection: Creating the Stimuli</td>
<td>Data Collection: Creating Stimuli</td>
<td>Data Collection: Selecting a Preference Measure</td>
</tr>
<tr>
<td>Develop trade-off Matrix</td>
<td>Will the respondent evaluate all stimuli or only a subset of stimuli?</td>
<td>Data Collection: Selecting a Presentation Method</td>
</tr>
<tr>
<td>Data Collection: Form of Survey Administration</td>
<td>Data Collection: Choosing a Presentation Method</td>
<td>Data Collection: Assumptions</td>
</tr>
<tr>
<td>Personal Interviews</td>
<td>Data Collection: Choosing a Presentation Method</td>
<td>Appropriateness of model form</td>
</tr>
<tr>
<td>Mail surveys</td>
<td>Data Collection: Evaluating Model Goodness of Fit</td>
<td>Representatives of sample</td>
</tr>
<tr>
<td>Phone surveys</td>
<td>Data Collection: Interpreting the Results</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Collection: Validating the Results</td>
<td>Aggregate vs. individual assessment</td>
</tr>
<tr>
<td></td>
<td>Data Collection: Applying the Conjoint Results</td>
<td>Assessing reliability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessing predictive accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relative importance of attributes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Assumptions

- Appropriateness of model form
- Representatives of sample
- Metric method for ratings
- Nonmetric method for rank orders
- Aggregate vs. individual assessment
- Assessing reliability
- Assessing predictive accuracy
- Aggregate vs. disaggregate results
- Relative importance of attributes
- Internal validity
- External validity
- Segmentation
- Profitability analysis
- Choice simulator

### Figure 2: Key decisions when conducting a conjoint analysis (Hair et al, 1998:401-419)


