

How to Use Conjoint in Medical Device Market Research



Introduction

Conjoint analysis is a powerful research technique that evaluates and measures the value customers place on features of a product or service based on trade-offs. Over the years there have been significant developments in the design and methods of conjoint analysis. Over time the use of conjoint has expanded across markets ranging from consumer goods, B2B and from simple products to multi-dimensional product and service solutions. IDR Medical has utilised the range of conjoint methodologies across medical device and pharmaceutical product development and launch initiatives.



Despite the number of conjoint methods that exist, all have one focus; to evaluate customer response to products and provide estimates of the specific preferences that may lead to increased user choice share (potential market share). The advantages of using these methods are many, they can be tailored to measure responses to a products attributes, design, brand perception, value and perhaps most importantly, price sensitivity.

In this month's eBook we will explore five conjoint analysis methods – the traditional full-profile conjoint, adaptive conjoint, choice based conjoint, adaptive choice based conjoint and menu based conjoint. Read on to find out how each method works, and which could be best suited for your market and product scenario...

*Examples provided are purely for illustrative purposes and are unrelated to any IDR Medical projects.

Traditional Full-Profile Conjoint

In full-profile conjoint respondents are shown comprehensive product descriptions to determine their preferences by measuring the value placed on specific attributes and their utility. To gather this information, a set of questions will present different product descriptions (or different products) that will then be evaluated for preference or suitability. By controlling which attributes are displayed the researcher can link the specific attributes a respondent values most to understand an ideal product profile.

Comparative information is all that is necessary for estimating relative part worth utilities and running competitive market simulations. Below is an example of this methodology applied to the evaluation of a new CT scanner / medical devices – in this instance respondents are asked their preference rather than their likelihood of purchase:

Which CT device would you choose?

<p>Siemens Healthineers</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; text-align: center;">General radiology, ED</div> <p style="text-align: center;">128 Rows</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; text-align: center;">Scan time: 100</div> <p style="text-align: center;">Recon time: 55 fps</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; text-align: center;">\$850,000</div>	OR	<p>GE Healthcare</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; text-align: center;">General radiology, Cardiology, Vascular</div> <p style="text-align: center;">256 Rows</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; text-align: center;">Scan time: 120</div> <p style="text-align: center;">Recon time: 65 fps</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 5px; text-align: center;">\$1,050,000</div>						
Strongly prefer left				Indifferent				Strongly prefer right
1	2	3	4	5	6	7	8	9

Full-profile conjoint features:

- ✓ Full-profile conjoint works best when a limited number of product profiles are shown:
 - Too many profiles might result in respondent fatigue and flawed data
 - A study with 5 attributes and 3 levels in each would require approx. 33 tasks
- ✓ This approach should have a limited number of attributes, six is the cut-off point
- ✓ Utilities are estimated from rating scales or rank-order data. These rating scales do not automatically lead to market simulations with appropriate choice probability scaling (otherwise achievable through holdout choice tasks within a survey)

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Adaptive Conjoint Analysis (ACA)

Adaptive Conjoint Analysis (ACA) methods allow for conjoint (trade-off) analysis. The term "adaptive" refers to the fact that the computer-administered interview is customized for each respondent. At each step, previous answers are used to decide which question to ask next and identify the respondent's preferred product features/specifications. The respondent's favoured features are continually re-evaluated as the interview progresses, and each question is chosen to provide additional information given what is already known.

The ACA interview has several sections:

1. Preference for Levels

Respondent rates the levels in terms of relative preference.

Please rate the below CT brands in terms of how desirable they are				
	Extremely Undesirable	Somewhat Undesirable	Very Desirable	Extremely Desirable
Phillips				
GE				
Siemens				
Hitachi				
Toshiba				

2. Attribute Importance

Determine the relative importance of each attribute to the respondent.

If two CT scanners are the same in terms of technical attributes, how important would the following be for you?				
	Not at all important	Somewhat Important	Very Important	Extremely Important
Siemens instead of Hitachi				

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3. Paired-Comparison Trade-Off Questions

Respondent is shown two product concepts; they are then asked which is preferred and to indicate the strength of preference.

Which CT device would you choose?

<p>GE Healthcare</p> <div style="background-color: #e6f2ff; padding: 5px; margin-bottom: 5px; text-align: center;">Cardiology</div> <p style="text-align: center;">64 Rows</p> <div style="background-color: #e6f2ff; padding: 5px; margin-bottom: 5px; text-align: center;">Scan time: 60</div> <p style="text-align: center;">Recon time: 50 fps</p>	OR	<p>Toshiba</p> <div style="background-color: #e6f2ff; padding: 5px; margin-bottom: 5px; text-align: center;">General, ED, Pediatric</div> <p style="text-align: center;">64 Rows</p> <div style="background-color: #e6f2ff; padding: 5px; margin-bottom: 5px; text-align: center;">Scan time: 80</div> <p style="text-align: center;">Recon time: 65 fps</p>
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Strongly prefer left		Somewhat prefer		Indifferent		Somewhat prefer		Strongly prefer right
1	2	3	4	5	6	7	8	9

4. Calibrating Concepts (Optional Section)

The respondent is asked what their likelihood of buying a certain product is. This is done to understand which features they are more likely to choose.

For each CT device, please tell us how likely you are to buy it?

Please answer on a scale from 0 to 100% where 0% means you would not buy it at all and 100% you would definitely buy it.

Philips	GE Healthcare	Toshiba	Siemens
General, Cardiology, vascular	ED, General radiology	Cardiology	Cardiology, cardiology, stroke
64 Rows	128 Rows	256 Rows	128 Rows
Scan time: 60	Scan time: 80	Scan time: 120	Scan time: 120
Recon time: 30 fps	Recon time: 50 fps	Recon time: 65 fps	Recon time: 55 fps
<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>	<input style="width: 100px; height: 20px;" type="text"/>

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Initial utility estimates are based on the respondent's desirability ratings for attribute levels, together with ratings of attribute importance. Utility estimates are updated during the interview to incorporate the answer to each paired-comparison question. As the respondent progresses through the paired comparison section, the initial estimates become less influential.



ACA features:

- ✓ This conjoint methodology can be very engaging thus resulting in higher quality data
- ✓ ACA interviews can study up to 30 attributes, and each attribute can include up to 15 levels
- ✓ More suitable for studies where pricing research is not the goal (ACA often underestimates the importance of price)
- ✓ Most of ACA questions present only small subsets of attributes, so questions do not necessarily become more complex when there are many attributes in the study

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Choice Based Conjoint (CBC)

With this methodology the respondent is shown a series of choice tasks. Each task displays several concepts and requires the respondent to choose one from the set, including the option to not choose any. By showing respondents several full profile descriptions the research can mimic how a typical buying situation would unfold, thus estimating the respondent's choice behaviour. Having also the option to not choose any of the profiles presented the researcher can understand the preference and importance placed on each feature based on trade-offs made.

CBC: Task example

Please select which CT you would buy?			
Hitachi	GE Healthcare	Philips	Siemens
General radiology	General, cardiology, vascular	ED, General radiology	Cardiology,
128 Rows	256 Rows	128 Rows	128 Rows
Scan time: 80	Scan time: 120	Scan time: 60	Scan time: 80
Recon time: 50 fps	Recon time: 65 fps	Recon time: 30 fps	Recon time: 50 fps
\$950,000	\$1,150,000	\$1,050,000	\$850,000

CBC features:

- ✓ Mimics the purchase process in competitive contexts
- ✓ Respondents can decline to purchase by choosing the option "None"
- ✓ Not appropriate for studies involving large numbers of attributes (typically no more than six attributes)
- ✓ Suitable for pricing studies and "off-the-shelf" products
- ✓ Enables "chip allocation" where respondents can distribute the number of products they would purchase from set of product concepts (mimics the real purchase process)
- ✓ Requires larger samples than other conjoint methods – recommended sample is 200-300 respondents if some level of respondent segmentation is envisaged.
- ✓ In IDR Medical's experience the minimum respondent sample per analysed cell should be $N \geq 30$

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Adaptive Choice Based Conjoint (ACBC)

ACBC is a combination of two methods: ACA and CBC. It captures more information at the individual level than traditional CBC surveys and may also be used with small samples. ACBC interviews are structured in three core sections, with the addition of an optional one:

1. BYO (Configurator)

Please select the CT scanner you would be most likely to purchase. For each feature, select your preferred option. The base price for the scanner would be \$700,000. You have the choice to stay with the basic feature options or add options as highlighted below and on the following tasks:

Feature	Select Option	Option Price
Brand	Hitachi + \$0 Toshiba + \$50,000 GE Healthcare + \$80,000 Philips + \$100,000 Siemens + \$100,000	\$ <input type="text"/>
Applications	1 + \$0 2 + \$50,000 3 + \$80,000	\$ <input type="text"/>
Scan Time	120s + \$0 100s + \$40,000 80s + \$60,000 60s + \$80,000	\$ <input type="text"/>
Recon Time	30 Fps + \$0 55 fps + \$75,000 65 fps + \$100,000	\$ <input type="text"/>
		Total price: <input type="text"/>

2. Screening Section

Please select devices which might be a possibility for you

Brand	Philips	Toshiba	GE Healthcare
Applications	General, cardiology, vascular	ED, General radiology	Cardiology
Rows	256	128	128
Scan time	80	120	60
Recon time	30 fps	50 fps	65
	A possibility Won't work with me	A possibility Won't work with me	A possibility Won't work with me

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3. Choice Tasks

Please select which CT you would buy?			
GE Healthcare	Toshiba	Siemens	Hitachi
ED, General radiology	ED, General radiology	General radiology, cardiology	General radiology, cardiology
128 Rows	128 Rows	256 Rows	128 Rows
Scan time: 80	Scan time: 120	Scan time: 80	Scan time: 100
Recon time: 50 fps	Recon time: 60 fps	Recon time: 55 fps	Recon time: 50 fps
\$950,000	\$875,000	\$1,250,000	\$850,000

4. Calibration Section (Optional)

Respondents first configure their preferred product via a BYO (Build Your Own) question. Based on the preferred product a set of similar products are then presented in a Screening Section for the respondent to evaluate. Respondents indicate which of these similar products they would consider also revealing non-compensatory cut-off rules. Finally, a last product selection amongst those screened into the consideration set is made through a Choice Tasks section.

CBC features:

- ✓ ACBC questionnaires generally take longer than CBC
- ✓ Some ACBC respondents report higher satisfaction and interest in the survey than CBC respondents
- ✓ Suitable for studies with more than six attributes
- ✓ Suitable for complex products/services
- ✓ Requires lower sample than CBC

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Menu Based Conjoint (MBC)

MBC is used for analysing a variety of menu- based and discrete choice problems. The idea behind this method is that respondents can select the options they are most interested in from a list and leave out those they do not particularly value.

MBC Task example (price varies in each task)

Please imagine you are selecting a CT Scanner for your hospital, what would you purchase? How you would specify the device?

Philips	GE Healthcare	Siemens	Hitachi
\$800,000	\$750,000	\$800,000	\$700,000

<p>Applications</p> <p>1 +\$0 2 +\$50,000 3 +\$80,000</p>	<p>Rows</p> <p>64 +\$0 128 + \$150,000 256 + \$250,000</p>
<p>Scan time</p> <p>120s +\$0 100s +\$40,000 80s +\$60,000 60s + \$80,000</p>	<p>Recon time</p> <p>30 Fps +\$0 55 fps +\$75,000 65 fps +\$100,000</p>

I wouldn't buy these devices

Total Price \$

MBC features:

- ✓ Respondent can select the options they prefer in order to “build” an ideal product
- ✓ Price of the total solution is shown and updated as respondents “buy” selected items
- ✓ Selections can be restricted (single item choice) or unconstrained
- ✓ There are often constraints on pricing
- ✓ Number of tasks vary from 6 to 12 and prices (and/or availability of items) change each time
- ✓ High sample sizes are required starting from N=800 for typical consumer studies.
- ✓ In IDR Medical’s experience the ideal minimum for healthcare markets is 100-150 respondents

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IDR Medical has over a decade of experience in conducting market research tailored to healthcare markets – including a significant number of projects that have used conjoint methodologies to develop resilient market models and detailed pricing guidance for the success of new products and services.

If you are planning a new medical device or service launch and you would like advice or guidance on which conjoint method to use, please [contact us](#) and we would be pleased to offer a primary consultation free of charge. This would consist of an initial discussion (by telephone or face to face depending on location), followed by a concise presentation outlining IDR Medical’s proposed approach, with explanation and rationale.

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