WILLINGNESS TO PAY

What you need to know when calculating feature willingness to pay

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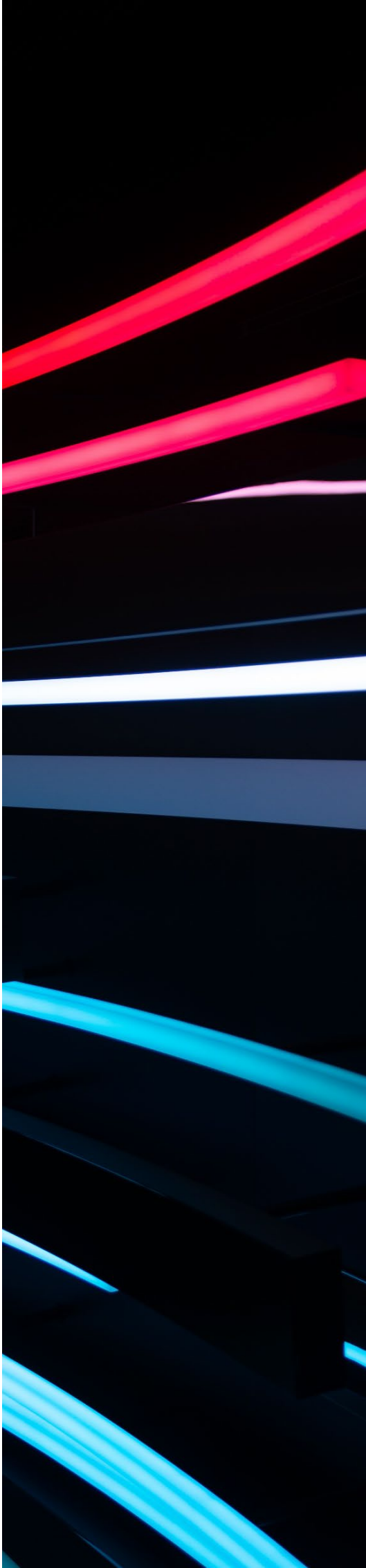
In this paper we will discuss 'Willingness to Pay' (WTP); how to measure it, introducing the latest methods for calculating it, and recommendations based on an extensive evaluation of different methods.

Product optimisation has for a long time been a staple analysis in the market research industry. When we talk about product optimisation, we refer to the optimisation of the features and price of a product or service to maximise some outcome metric, such as market share, revenue, or profit.

A popular method used for conducting product optimisation is Conjoint analysis. The method provides an understanding of what features consumers really value, and at what price. It offers considerable advantages over direct questioning by teasing out which features really matter, rather than taking what people state as being important at face value.

Conjoint works by splitting a product into its constituent parts, known as attributes e.g., Brand, Contract length, Monthly fee, and within each of these attributes we can test different options, known as levels e.g., for contract length we might test 12 months, 18 months, and 24 months. From the resulting output it is possible to determine the impact on consumer preference for any combination of these features and price in a competitive environment.

While Conjoint allows us to identify the optimum price of the product, understanding how much consumers are willing to pay for individual features of that product has become more prevalent and requires additional analysis.



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Key Issues with Calculating Willingness to Pay

A fundamental issue with calculating WTP is there is no single agreed definition. At its most generic level, WTP can be defined as the maximum amount a consumer is willing to pay for a product or service. Other definitions include defining WTP as the price at which the consumer is indifferent between buying and not buying a product, given the alternatives available (Miller 2011).

In addition to uncertainty about the definition, there are many real-world factors that affect what a consumer is willing to pay for a product or feature:

1. **Competition** is a key factor in determining WTP. Knowledge of being able to buy alternative products at a cheaper price elsewhere will affect what a consumer is willing to pay.
2. **Market relevance** can make or break a product. History is littered with products that have been introduced to the market but subsequently rejected. One example is when Microsoft developed a tablet designed on a PC specification in 2002. However, the hardware and software were deemed too primitive at the time. If only they had waited!
3. The standard economic law of **supply and demand** theory states that the price of a product depends on its availability and the demand for that product.
4. When considering **survey design** principles, there will be cognitive and hypothetical biases. The information provided to respondents in the survey and how the features are described prior to answering a Conjoint exercise will influence WTP estimates.

One such example of survey design considerations is a collaboration study between Ipsos and the UK Office for National Statistics. The results show that providing respondents with different stimuli, in this case, different price points, will affect what they are WTP for features of a service. The full findings of that study can be found here.

Methods for Calculating WTP

Numerous methodologies have been developed to estimate WTP, some of which are listed in Figure 1 (not exhaustive).

Figure 1: Some methods for conducting WTP

The algebraic and two-product market compensation approaches have been used in the market research industry for many years despite several weaknesses associated with them. These include no competition being considered and lack of product context e.g., analysis is based on a specific product configuration.

In this paper we will describe three of these WTP methods in more detail, which are available to practitioners and provide alternatives to the algebraic and two-product market compensation approaches.

Market Indifference Price Point (MIPP):

The process for this method is described in Figure 2. A competitive simulation is set up and the simulated share for a product is noted (20%). The configuration for the product is enhanced with the addition of a feature, which results in an increase in simulated share for the product (25%). The price is adjusted to return the product to its original simulated share. The difference in price (£600) is the WTP for the feature that has been included relative to not having that feature.

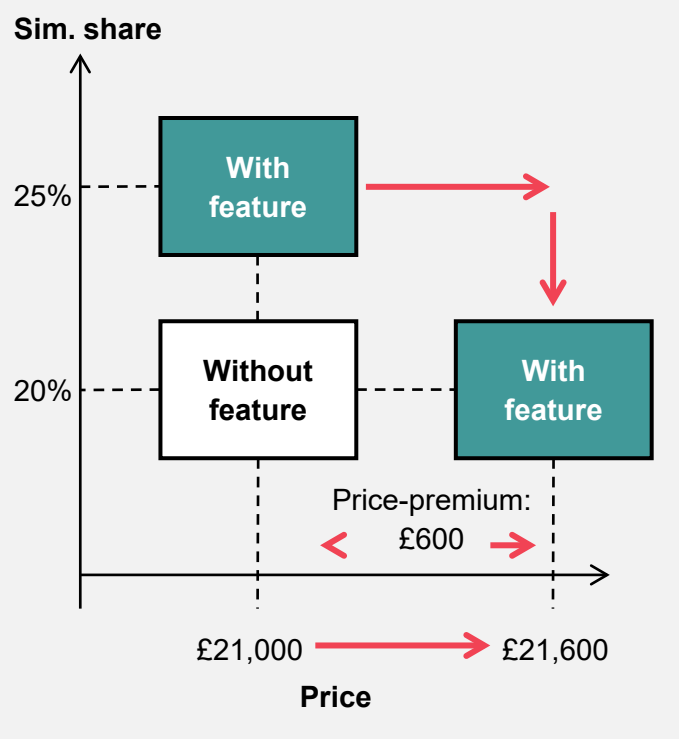


Figure 2: Example of how the MIPP process works

Methods for Calculating WTP

The MIPP approach is an enhancement of the two-product market compensation approach due to its flexibility of being able to simulate competitor products, and through an iterative simulation process it allows the product configuration(s) to vary, thereby accounting for uncertainty in the market. This method was launched in 2021 and is integrated within Sawtooth Software Lighthouse Studio.

logitr:

logitr is a R package developed by John Helveston (George Washington University) to run WTP analysis. The key differentiator for this method compared to others is that WTP is calculated directly from the respondent choice data rather than the standard approach of first calculating the desirability (utility) for each feature, then calculating WTP. Unlike the MIPP approach, competition and uncertainty about the product configuration is not considered.

Find a detailed understanding of the logitr methodology here.

Point of Indifference (POI):

The Point of Indifference (POI) approach is similar to the MIPP methodology, but the main differences are that WTP is calculated for each respondent, and while competitor products can be included in the analysis, they remain fixed.

The approach works by setting up a competitive scenario e.g., three competitors, B, C and D in figure 3. A random combination of features is selected for the 'test' product (A) and added to the simulation. The price of the test product is adjusted (up or down) until the desirability of the product (A) is equivalent to the desirability of the best competitor (A'). The price of the test configuration (A') is noted and the process is repeated many times for different combinations of the test product. WTP is calculated by comparing the median price of simulations which contain a feature against the median price of simulations which do not contain that feature. The difference between those price values is the WTP for the feature.

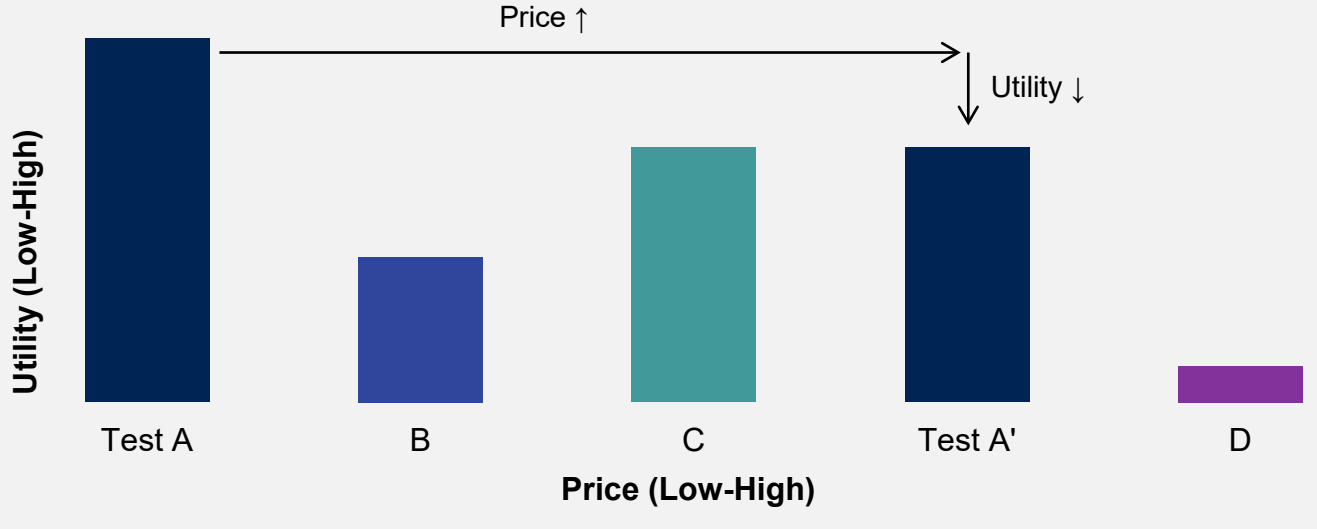


Figure 3: Example of how POI works

Empirical Evaluation of WTP Methods

Ipsos has conducted extensive analysis on these three WTP methodologies; Market Indifference Price point (MIPP), logitr and the Point of Indifference (POI).

In the research, six data sets were used for the evaluation to ensure a wide range of complexity. Different experimental factors were examined to better understand how WTP methods worked under different market conditions.

Key Learnings

1. **WTP estimates for MIPP and logit R are largely comparable:**

To compare the approaches, the WTP values across all features were averaged, then indexed against the overall WTP average (across all methods). An index score above one indicates the WTP is higher in that method compared to the average WTP across all methods.

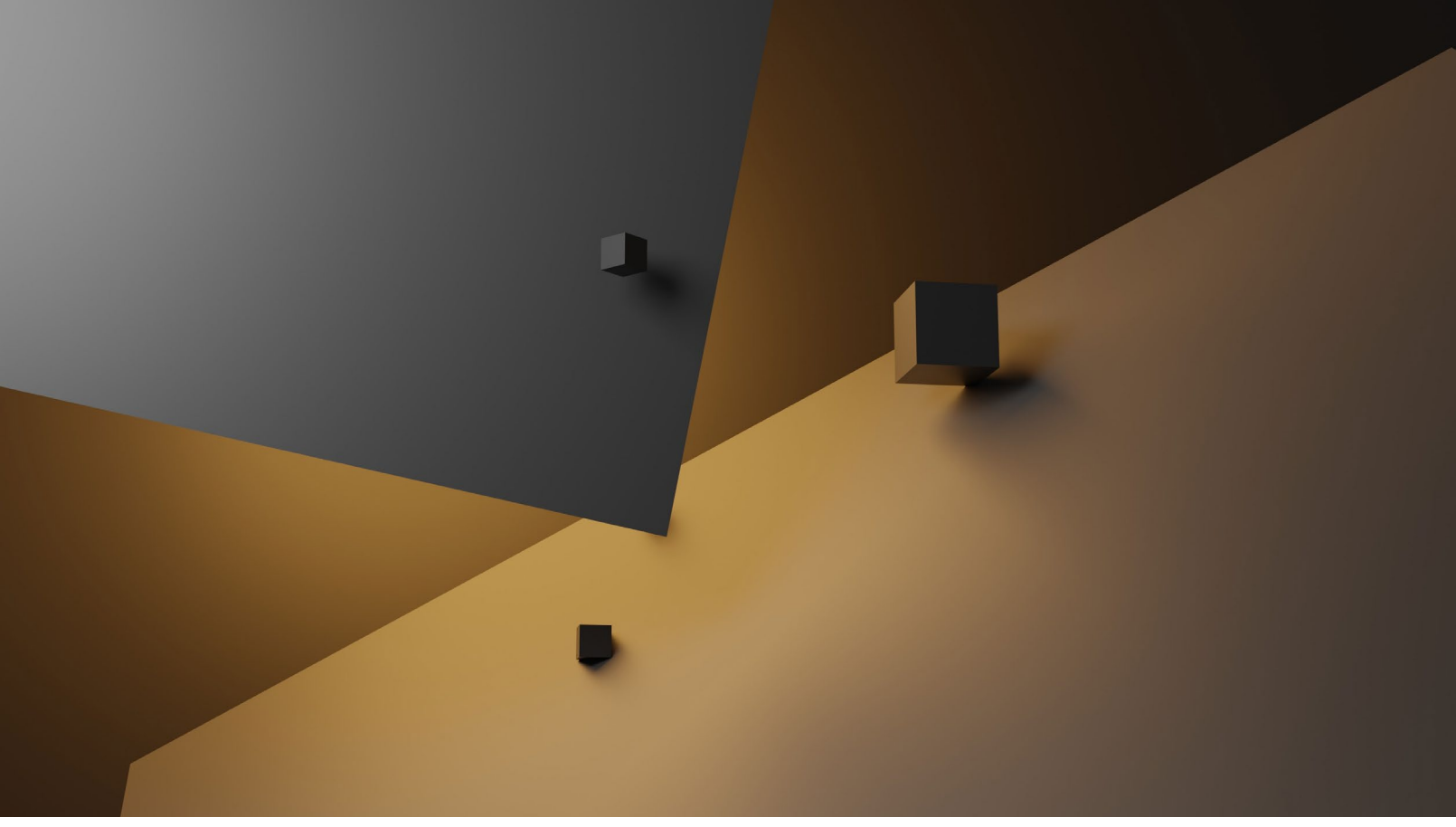
The POI approach produced significantly lower WTP values across all data sets. The principal theory for this is that the POI method calculates WTP for each respondent, whereas logitr and MIPP are aggregate based measures. As such there are many instances where respondents are not prepared to pay for certain features and, therefore, have a WTP of 0. In the case of MIPP, while respondent level data is available, the simulations are run at the aggregate level, which places more weight on respondents whose choice probability is more affected by a change in the desirability of the product i.e., those respondents that are 'on the cusp' of switching between products. As shown in figure 4, the WTP for MIPP and logitr were largely comparable.

Data	MIPP	logitr	POI
Data set 1	1.02	1.60	0.38
Data set 2	1.48	1.33	0.20
Data set 3	1.07	1.27	0.66
Data set 4	1.22	1.36	0.43
Data set 5	1.25	1.12	0.63
Data set 6	1.61	1.38	0.03
Average:	**1.28**	**1.34**	**0.39**

Figure 4: Results of the WTP analysis

2. **Running simulations will simulate uncertainty in the marketplace:**

In the MIPP approach it is possible to run multiple simulations, where the product configurations are randomised. This is to simulate uncertainty in the real-world market environment. As you increase the number of simulations, the robustness of the WTP estimates should stabilise, with WTP estimates converging towards a single value after many thousands of simulations.



The results of the simulations conducted in this research showed that the WTP values stabilised quickly, and 1,000 simulations is sufficient to obtain robust results. The logitr approach is an aggregate measure so a simulation approach is not required, while for the POI approach, the routine iteratively loops through all possible combinations (or subset) of the client product, while keeping the competitor products static.

3. Logit R reports more realistic confidence intervals:

WTP analysis results in a single point estimate of how much consumers are WTP for one feature over another. It may be required to estimate a level of confidence in the results so there is a need to create confidence intervals around that point estimate. Analysis by Orme (2021) showed that the MIPP approach typically understates the 'true' confidence interval size by as much as half. To make WTP confidence intervals more accurate, the recommendation is to include many tasks (at least 15) in the Conjoint design and to include co-variates in the estimation procedure. However, confidence intervals may still be understated by up to 25%.

From the Ipsos research, when comparing the confidence intervals for the MIPP approach against logitr, the confidence intervals using MIPP were approximately half that of logitr in most data sets, suggesting logitr may be reporting more realistic confidence intervals.

4. MIPP can have significant run-time issues:

A significant issue with the MIPP approach is the runtime when working with large data sets. For the bootstrap analysis, required to calculate confidence intervals on WTP estimates, data sets of N = 500 were taking c. five hours to run, whereas data sets with N = 2,000 respondents took c. 10 hours. The complexity of the design (number of attributes and levels) did not appear to impact runtime.

logitr takes only a few seconds to run regardless of sample size and complexity, while run time for the POI approach varies depending on the total number of permutations in the design and sample size, but typically take up to an hour to run 20,000 iterations.

To access the full written journal of the findings from this research click here.

Final thoughts

Willingness to Pay is not an objective concept and the outcome from running a WTP analysis is strongly based on assumptions. The assumption regarding whether competitor products should be included or not, fixed, or unspecified, etc., will depend on the product and category being evaluated.

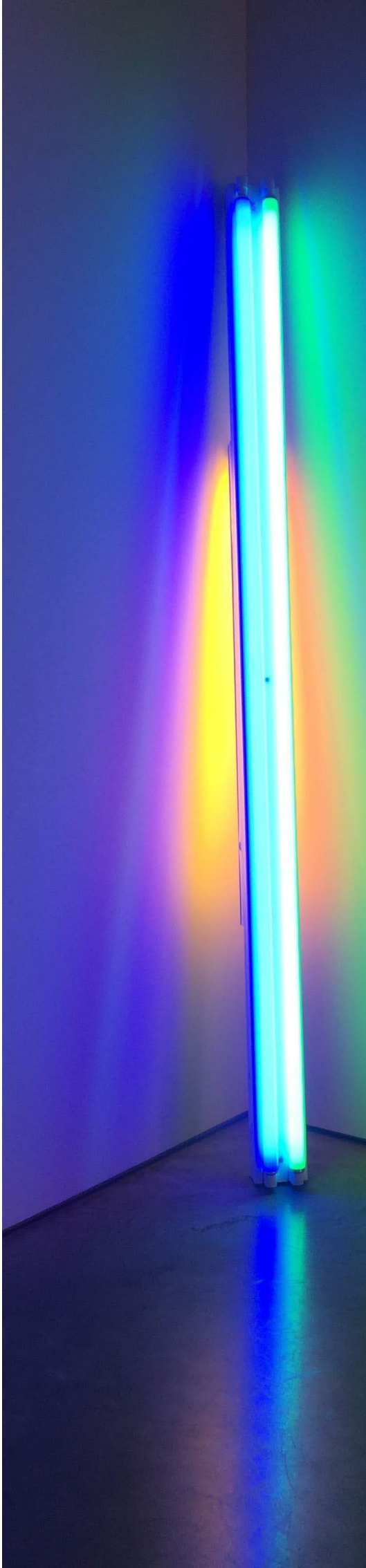
The MIPP approach is flexible and provided consistent results across all data sets tested in the research. It accounts for both competition and uncertainly around the product specification of the products being simulated.

Despite concerns regarding the lack of context, logitr has shown to be a good alternative to MIPP for running WTP. The analysis is quick so it can easily deal with large data sets and confidence intervals via logitr appear more realistic.

The POI approach reported WTP estimates typically at least half that of MIPP and logitr. This is not to say that the POI method is invalid, as the assumptions used in the calculation are different to both MIPP and logitr.

Willingness to pay analysis is becoming more prevalent in the industry, but there are issues associated with calculating it.

You need to have a clear understanding of the competitive landscape, and the wider category to identify the assumptions that you should make, which will determine the most appropriate methodology for running the analysis.



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