PAPER PRESENTED AT THE
Design & Innovations Conference
Berlin 25-27 May, 2005

"Deriving the Real Market Potential of New-to-the-World Products through an Extended Purchase Likelihood Model"

Stefan Binner
Managing Director
bms - marketing research + strategy
(s.binner@bms-net.de)

Introduction

In the mid 90's bms started to apply conjoint analysis in business-to-business markets such as chemicals, building material or control systems. 10 years later we are using this methodology in several sectors including durables and FMCG.

The author of this paper has a long time experience as a 'conjoint practitioner' and selected this case study to discuss a typical conjoint application.

Being a rather exotic research tools many years ago the positioning of Conjoint Analysis in the our current research environment has improved a lot: conjoint analysis is often integrated into strategic marketing research processes such as customer value analysis, price positioning and others.

In view to the accuracy of market predictions and the wide application range of Conjoint Analysis, it's high ROR (return of research) has been widely acknowledged.

There are still discussion about the limitations of this method e.g. the ability to simulate complex purchase situations and the reliability of price elasticity measurement. Most of these criticisms are based on failures when Conjoint Analysis has not been applied in the appropriate way.

Conducting a conjoint analysis together with a business team is a great tool to initiate deeper analysis and discussions about products and customers and to facilitate strategic business decisions.

In the last years the perception of conjoint analysis as research tool improved a lot due to better tools and software, experience, success stories and most of all more skilled researchers.

However, some challenges regarding conjoint analysis still remain. Among the most important there are:

Simulation of complex purchase decisions: Purchase situations are often not independent and sometimes very complex. This complexity might be caused by a large number of aspects, which cannot be built into the conjoint model or by technical or commercial aspects which prevent fast decisions on the spot.

Setting a realistic price context might be the next challenge, given that promotions or cross selling are quite important in many markets. Low price awareness and therefore over- or underestimating the impact of price might be the another issue.

Many products categories need of visual stimuli such as brand logos or package designs in order to simulate realistic customer choices. There haven been large improvements in the quality of pictures and aids used in conjoint software packages.

High resolution pictures, sound, movies or VR like animation can be applied during the interview. However, some aspects such as haptics cannot be simulated this way and still need the presence of the real product.

Some b2b markets are very complex and require technical and commercial evaluation of decision alternatives. In such cases it is very difficult to apply conjoint analysis.

Finally the prediction of the market potential or purchase likelihood for new products is often challenging as described in the following paper.

The Marketing Issue

New-to-the-world products revolutionize existing product categories or define wholly new ones. Examples from the past are microwave ovens, walkman, inline skates, GPS car navigation etc.

Our client, a blue chip company in the wider automotive sector intended to launch a new-to-the-world product into different European markets. While the technology was supplied through an joint-venture partner, some product features such as price, design and others still had to be defined.

Furthermore it was necessary to evaluate the opportunity of this product launch in order to gain enough resources within the company.

The research problem was to identify the optimal specifications for this new-to-the-world product in different market segments and to predict a realistic market potential for this product in each market doing only one study.

In order to solve this research task three steps were defined:

Step 1: To predict the purchase intention of respondents in the most reliable way

Step 2: To weight this results in order to simulate the reality in a most realistic way, not just by using an external factor

Step 3: To create a simulation model which allows the customer to fine-tune the simulation variables according to their business plan

The specific product type and the name of the client cannot be revealed in this paper. The study was done in Autumn 2002.

Step 1: Prediction of Purchase Likelihood

The Conjoint Analysis design which was developed for the study was based on CBC (Choice Based Conjoint - Sawtooth Software ©) with 10 Full Profile Choice Tasks, three Calibration Concepts (questions where respondents indicate their purchase likelihood for different product concepts shown) and 3 fixed designs, also called holdout questions which are used as a measurement of answer consistency.

Out of 6000 persons the interviewers screened out 800 by
- Their general interest in product category
- Their general acceptance of after market products in their car
- Defined market structure segments (car type, demographics etc)

The interview consisted of three parts: screening questions, conjoint measurements and additional questions about purchase intentions and other products.

In order to gain a first understanding of customer preferences especially to analyse the differences between segments and countries we looked a the basic analysis of part-worth utilities.

Individual level utilities were estimated using HB-Regression (HB-Reg).

The analysis of holdouts was used for measurement of respondent consistency and model tuning. However the simulations showed high MAE (mean average errors) in predicting the holdout tasks.

After we applied an Utility Calibration with the ICE tool (Individual Choice Estimation - Sawtooth Software) the MAE's improved significantly (average from 8.4 to 2.7).

Then Purchase Likelihood simulation had been used to find the best product set-up in each country (Product Search Utility was not available at the time). This was the only way as due to he character of a new-to-the-world-product, there was no competitive set for simulations available.

However, we found that the usual Purchase Likelihood based on "Average Likelihood Models" was not realistic enough for this market simulation as it left too many questions open (i.e. "at which purchase likelihood value a market entry will be successful?").

Furthermore it is not granted that e.g. 25% of respondents will buy the product if the purchase likelihood is 25%. If all respondents have a 25% result, maybe nobody would actually buy the product.

Therefore we thought about another approach: our "Likelihood Threshold Model" counts only on those respondents which indicate more than a certain percentage as result for their individual purchase likelihood in the simulation (threshold value). Only those will buy. This method was found more intuitive, like "first choice models" known from conventional conjoint simulations.

´

We defined the Purchase Threshold Value by using a standardized 5 point scale purchase likelihood question at the end of the questionnaire.

In the analysis we looked at the individual purchase likelihood for pre-definde products among customers answering Top-Box (1 = “will definitely buy”).

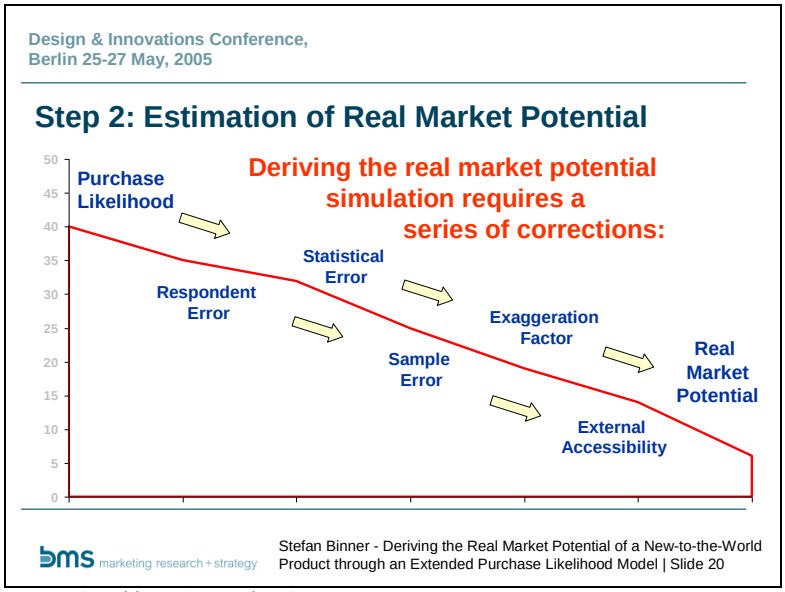
With this method different Purchase Threshold Values were derived for each country (between 55% and 80%). Country specific scale effects based on the differences in mentality were taken care of as well.

For each simulation (e.g. price elasticity) individual PL results were saved into a database. The number of respondents above the Purchase Threshold Value were counted.

The percentage of respondents with answers above the Purchase Threshold Value was taken into further market simulations.

Step 2: Estimation of Real Market Potential

To derive the real market potential simulation requires a series of corrections:



Graphic 1: Correction Steps

1. Correction for Respondent Error

The same purchase likelihood holdout question was repeated throughout the interview. The different results of these holdout questions were defined as Respondent Error and were deducted from the simulation result

These correction factors were between 2 and 4%

2. Correction for Statistical Error

Statistical Error was defined by the standard errors of the conjoint simulation

Although not necessary from a statistical point of view, the different standard errors were also deducted the from the simulation result. This decision was made because we rather wanted to have a conservative model than to overstate the potential. Therefore our hypothesis was that the statistical error will lead to too high results.

3. Correction for Sample Error

In order to project the results to the total market universe the ratio of interested customers in target segments versus the total population was established during the screening phase of the interview (overall 6000 contacts to find 800)

The sample error was calculated using this ratio and the specific sample structure - in our case study owners of specific car categories

4. Correction for Exaggeration

Due to psychological effects purchase intentions are often exaggerated in marketing research interviews.

We therefore included specific products from other product categories (Headset for cellular, CD player, GPS) into the study and compared the expressed purchase intention / ownership with actual sales of these products in the target group.

The result allowed us to calculate the typical exaggeration of the customers in the interview situation.

5. Correction for External Accessibility

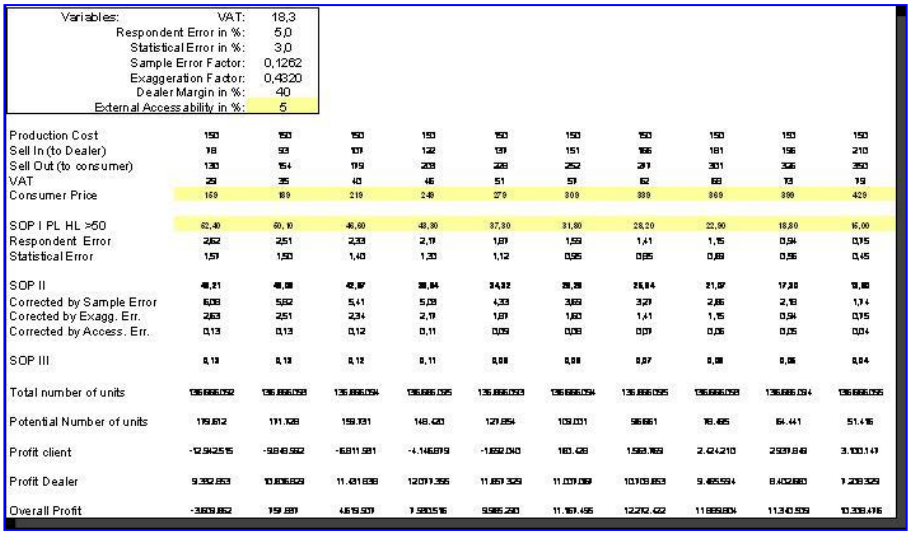
Accessibility of the product to the customer is not granted and heavily depending on the client's strategy and investments regarding advertising, distribution and availability.

Therefore it is one of the most important factors. It was treated as a variable to allow simulation of different distribution and sell-out strategies of the product.

Step 3: Market Simulation Model

Using the results form the Purchase Threshold Model corrected by all factors described we provided a spreadsheet simulator for optimized product designs at variable prices and variable external accessibility.

Simulation models were based on profit margins and provided for different business models (fixed dealer margin in % or fixed sell out price).



Variables:	VAT:	18,3
	Respondent Error in %:	5,0
	Statistical Error in %:	3,0
	Sample Error Factor:	0,1262
	Exaggeration Factor:	0,4320
	Dealer Margin in %:	40
	External Accessability in %:	5

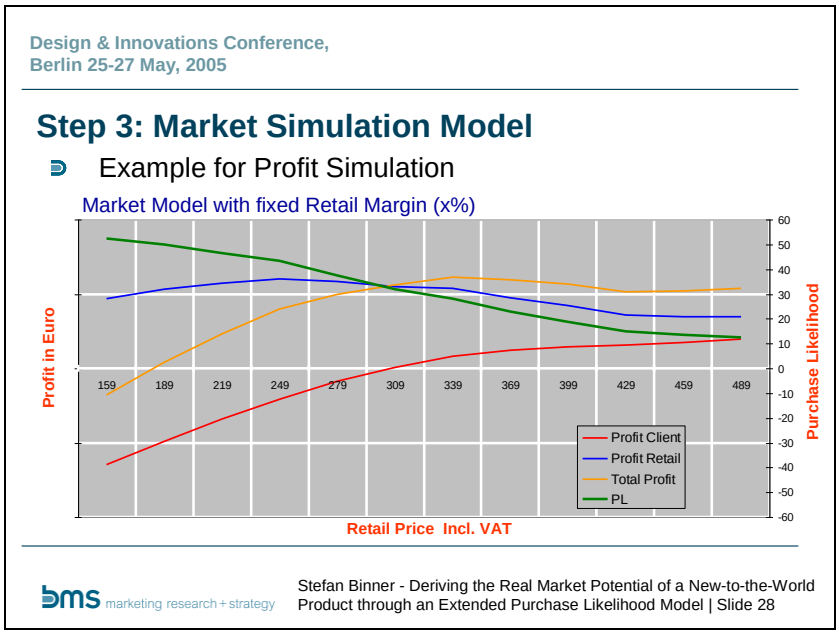
Production Cost	150	150	150	150	150	150	150	150	150	150
Sell In (to Dealer)	78	93	107	122	137	151	166	181	195	210
Sell Out (to consumer)	130	154	178	203	228	252	277	301	326	350
VAT	25	29	34	39	43	48	53	58	62	67
Consumer Price	159	189	219	249	279	309	339	369	399	429
SOP I PL HL >50	62,40	60,10	46,80	48,80	37,20	31,80	28,20	22,80	18,80	16,00
Respondent Error	2,62	2,51	2,33	2,19	1,87	1,59	1,41	1,15	0,94	0,75
Statistical Error	1,57	1,50	1,40	1,33	1,12	0,95	0,85	0,69	0,56	0,45
SOP II	48,21	46,08	42,87	38,84	34,32	29,26	25,84	21,97	17,30	14,80
Corrected by Sample Error	6,09	5,82	5,41	5,03	4,33	3,69	3,27	2,85	2,18	1,74
Corected by Exagg. Err.	2,63	2,51	2,34	2,19	1,87	1,60	1,41	1,15	0,94	0,75
Corrected by Access. Err.	0,13	0,13	0,12	0,11	0,09	0,08	0,07	0,06	0,05	0,04
SOP III	0,13	0,13	0,12	0,11	0,09	0,08	0,07	0,06	0,05	0,04
Total number of units	136.666.052	136.666.052	136.666.054	136.666.055	136.666.053	136.666.054	136.666.055	136.666.052	136.666.054	136.666.055
Potential Number of units	159.612	111.128	159.131	148.420	127.854	109.031	98.661	78.495	64.441	51.416
Profit client	-12.942.515	-9.849.562	-6.811.581	-4.146.679	-1.692.040	183.428	1.583.169	2.424.210	2.939.849	3.100.149
Profit Dealer	9.352.853	10.806.829	11.431.838	12.011.366	11.851.325	11.037.069	10.109.853	9.495.594	8.402.680	7.208.329
Overall Profit	-3.589.662	956.891	4.619.907	7.980.516	9.985.280	11.167.495	12.272.422	11.889.804	11.340.529	10.308.478

Graphic 2: Example for Spreadsheet Simulator

Using different input for VAT, correction factors and external accessibility the spreadsheet simulator calculates

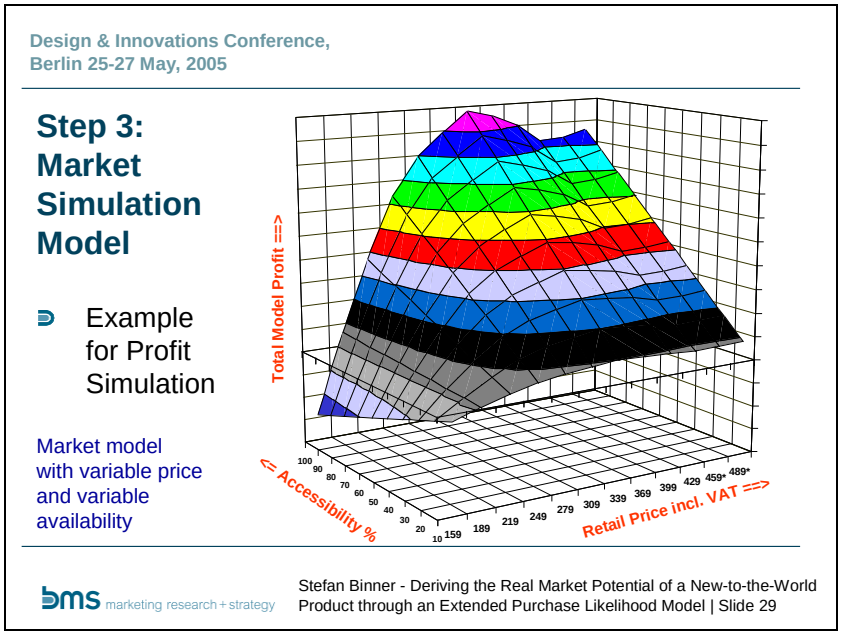
- number of units sold
- profit of the manufacturer
- dealer margin
- overall profit

This simulator was used to find optimised price positioning and to evaluate the impact of investment in accessibility as following example shows:



Graphic 3: Market Model with fixed Retail Margin (x%)

Keeping both axis variable, the retail price and the external accessibility of the product showed furthermore that the accessibility was the key driver for profit simulation while the price dimension showed a clear peak at a specific price point.



Validation of the Model

The study was designed as an optimization and forecast tool for this new-to-the-world product. Furthermore it was used to support the project within the organization and among the distribution chain.

Resources were planned according to the study results. However, due to external circumstances (technical problems, selective distribution and lack of internal backup) we were not able to actually validate the results of the market simulation models one-to-one.

Summary & Conclusion

This case study tried to demonstrate how a specific research challenge could be solved by embedding Sawtooth Software conjoint measurement into a complex research design.

Our method to derive the PL through the Purchase Threshold Model showed another way to reach an approximate purchase likelihood and it solved the problem of lacking benchmark data due to the new product category.

Furthermore it shows how complex simulation models can be established. Latest Sawtooth Software products such as the Advanced Simulation Module make it easier to built such models.

The question how to 100% accurately adjust respondents' stated purchase likelihood into actual purchase might remain unsolved. Validation of conjoint results has always been difficult, however, more validation data would be appreciated.