Application of Conjoint Analysis for Customer Value-based Pricing

Thirarut Worapishet [1]
[1] Kasetsart University, Thailand.
Email : [1] thirarut.s@ku.ac.th

Abstract

This paper aimed to conclude the methods researchers used in each step of customer value-based pricing with conjoint analysis. This would help the practitioners in application to determine an optimal price easier. Research papers in international data based were convenience random sampling. The results showed the percentage of alternatives in each step. In the step of attributes generation, a consumer survey is used mostly. Several methods were used in level generation. The number of attributes ranged from four to six. Mostly, the level scales were non-metric and ranged from two to five in amounts. The choice-based technique was preferred to full profiles. Discrete choice models or pair comparisons were preferred to ranking and rating in the data collection process. The analysis methods were varied but the regression analysis was most used.

Index Terms: —Conjoint analysis, Customer value-based pricing, Optimal pricing.

1.   Introduction

Academicians generally divided pricing methods into cost-based, competitive-based, and customer value-based [15][18]. When using the cost-based method, marketers consider the costs of a product and add some markup or consider target return based on the breakeven point. In the competitive-based method, marketers consider competitors' prices and compare whether their benefits are more or less than competing products. Prices are set according to the comparison. In the customer value-based method, marketers consider consumers' needs and willingness to pay and then develop products according to those needs and budgets.

Liozu, S. M., & Hinterhuber, A. [22] conducted research and found several interesting points worth mentioning here. Among these three methods, customer value-based methods are considered better than the rest two. While all methods help firms to gain price capabilities such as quickly responding to market change, acknowledging competitors' price tactics and change, minimizing discounts, assessing customers' willingness to pay, and developing appropriate price-setting methods, only customer value-based help gain firm performance. The firm performance includes acquiring new customers, increasing sales of current customers, increasing total sales, increasing pricing power, increasing profit of business units, and increasing return on sales as well as return on investment. The competitive-based method is even harming firm performance. Hinterhuber, A. [14] also found several researchers agree on the benefits of the customer value-based method over the other two. The benefits include generating profit potential and maximizing profit. This information implies that focusing on customers' needs is better than keeping competing with competitors or keeping an eye on their costs. The idea is also consistent with the concept of marketing to satisfy customers' needs leading to that firms will gain value back from customers bringing well-being to the whole society [18].

However, the theory does not appear to be the same as the practice. Customer value-based methods are used less often [14][21]. Hinterhuber, A. [14] reviewed published research during 1983 – 2006 and revealed the number of each practice. The practices of competitive-based methods account for 44%, cost-based methods account for 37%, and customer value-based methods account for only 17%, while the rest 3% are left for other approaches. The practices of customer value-based are just about half of the other two. The paper also exposed five important reasons behind this low number. First, the process of assessing value is hard and takes time. Second, it is also hard to communicate values to customers when information is overwhelming. Third, it is hard to define market segments requiring each value. Forth, once a price is set according to value, sales teams give discounts to be equal to competitors anyway. Fifth, managers put pressure to sell products at premium prices set according to value and to sell to reach

volume quota at a discounted price. The first reason is the most important as almost 80% of all executives responded to the survey.

A study showed that the process of value assessment was hard actually. Liozu, S. M., & Hinterhuber, A. [21] proposed a process for defining price point with a customer value-based approach as follow. First, marketers conduct formal market research to assess value. The outcome will be a price point or range recommendation. Then marketers conduct field tests or research to gain market feedback on the recommended prices before making a final price decision. In contrast to customer value-based methods, a cost-based method is a lot easier as cost data can be gathered within companies. Even a little bit harder than gathering cost data, competitors' prices for competitive-based methods can be gathered and compared in an easy way than conducting formal research. In an interview in the paper of Hinterhuber, A. [14], one respondent mentioned a software program helped compare thousands of competitor prices in real-time.

One way to alleviate the problem relating to the difficulty of the value assessment process is to find rigorous methods [14]. Initially reviewed, research papers communicated regarding using various methods for customer value assessment for price setting as follow:

- conjoint analysis as in Arora, R. [3], Christopher, M. [6], Dixit, A., Hall, K. D., & Dutta, S. [9], Gaby, O. S., Hans, O., Jos, L., & Janjaap, S. [11], Guillet, B. D., Liu, W., & Law, R. [12] Hinterhuber, A. [14], Kulshreshtha, K., Tripathi, V., Bajpai, N., & Dubey, P. [19], Liozu, S. M., & Hinterhuber, A. [21], Sánchez, M., & Gil, J. M. [29], Sichtmann, C., & Stingel, S. [30]

- analyzing from demand as in Docters, R., Schefers, B., Korman, T., & Durman, C. [8], Rondan-Cataluña, F. J., Escobar-Perez, B., & Moreno-Prada, M. A. [28]

- calculating from willingness to pay such as Gabor-Granger model or price sensitivity meter's Van Westendorp [23]. as in Ferreira, S. D., & Antunes, C. [10], Habenstein, D., Kirchhoff, K., & Schlesinger, T. [13], Michels, S., Kurz-Levin, M., & Schmitz, C. [25], Raab, C., Mayer, K., Shoemaker, S., & Ng, S. [26].

Among these methods, conjoint analysis was mentioned as the most widely used tool to measure value [14]. However, these conjoint analysis papers presented different approaches.

2. Objectives

Therefore, the objectives of this paper are as follows.

First, to elucidate from diverse papers the approaches in applying conjoint analysis to measure value for price setting purposes in each situation so that marketing practitioners can apply this technique more thoroughly.

Second, to gather the benefits and limitations of this method so that marketing practitioners can choose appropriate situations.

3. Literature Review

A. Conjoint Analysis

Rao, V. R. [27] explained in his book that the author of this paper concluded as follows. Conjoint analysis is a statistical tool to analyze for appropriate combinations of two or more attributes. The tool has become important in the marketing research field since 1971. Therefore, to illustrate, the author used an example of a product to explain the traditional conjoint analysis. A firm may plan to launch a new product but still decides on two attributes A and B which have three levels low, medium, and high. The product could be a mixing of low A - low B, low A – medium B, low A – high B, medium A – low B, medium A – medium B, medium A – high B, high A – low B, high A – medium B and high A – high B. These options are called full profiles. The full profiles could be tremendous upon increasing of attributes and choices in each attribute.

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Respondents are asked to rate their preference on full profiles or samples. The preference rating will be analyzed to be utility scores for each profile. The utility score will expose how much respondents more or less prefer when some things are trade-offs with others. In addition, when applying some dummy variables instead of profiles, data can be transferred into a function, called the part-worth function, of utility based on attributes. For example, the scores and functions may reveal that lowering quality in an attribute may not affect utility much while doing so in another function may affect it a lot. Therefore, the decision-makers will be able to choose the appropriate combinations based on the utility scores or functions and the possibility of production.

B. Designing a Conjoint Analysis Research

Similar to conducting research generally, the methodology for conjoint analysis research also starts with defining the problem and planning the approach, conducting according to a plan before analyzing as well as utilization conclusion. In this case, specifically for conjoint analysis for price setting, the problem will be to define price range or point recommendation. Then the later step, the planning approach, is as follows. First, the researchers have to select attributes and levels, design choices in case full profiles are not used, and plan data collection methods [27].

C. Selection of Attributes and Levels

Attributes will be selected based on previous data such as interviews with consumers, internal brainstorming with salespersons, or literature review. Importantly, the attributes should be actionable from a managerial perspective. The number should not be so much that tremendous profiles are developed. There should be two to six levels in each attribute to limit the number of profiles. The levels should also be tested to ensure realistic choices.

The choices of levels in conjoint analysis can be in both forms: nonmetric (nominal and ordinal scale) and metric (Interval and ratio scale) [27]. Let's use the example of cars. The availability of hybrid functions may be asked and choices can be yes or no. This example is a nonmetric scale. However, if the quality of the hybrid function is asked and the respondents can rate from 1 to 5 which means lowest to the highest quality, the scale is metric.

D. Designing of Profiles and Data Collection

The design of profiles to be asked and data collection are different in each type of conjoint analysis. Basically, there are four types of conjoint analysis: traditional, choice-based, adaptive, and self-explicated [27]. In the traditional type, all profiles including the best profile such as high A – high B in the aforementioned example will also be in choices which is too ideal sometimes. The choice-based type will use only choices respondents have to trade off to decrease the number of choices. The ideal choices are rarely produced anyway. The choices may be cut down by computer programs or manual. The adaptive type lets the respondents compare two choices at a time which lessens confusion for respondents when numerous choices are available. Self-explicated type let respondents evaluate the desirability and importance of each attribute.

E. Analysis Methods

In conjoint analysis, researchers analyze for part-worth function [27]. The analysis methods depend on the characteristics of levels. Nonmetric levels will be assigned for dummy variables before analyzing for piecewise function with dummy variable regression. For example, the quality (Q) attribute has a low, medium, and high level. Dummy variables will include Q1 which is equal to 1 for low, 0 otherwise and Q2 which is equal to 1 for medium, 0 otherwise. If the profile is low quality, Q1 and Q2 will be 1 and 0 respectively. If the profile is medium, Q1 and Q2 will be 0 and 1 respectively. If the profile is high, Q1 and Q2 will be both 0. The model then shows Q1 and Q2 as functions of utility. For the metric level, the attributes will be analyzed as a function of utility by multiple regression.

4.   Conceptual Framework

When applying conjoint analysis in price setting, researchers have to design the approach in several points which will be analyzed in this research. The approaches to be analyzed include attributes and levels selection which will be analyzed in terms of how they are generated and how many they are for

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both, and scale to measure for only levels. The profile selected to be asked is also analyzed together with how these profiles are asked. Analysis methods will then be observed. Finally, benefits and limitations in situations will also be described. The conceptual framework is shown in figure 1.
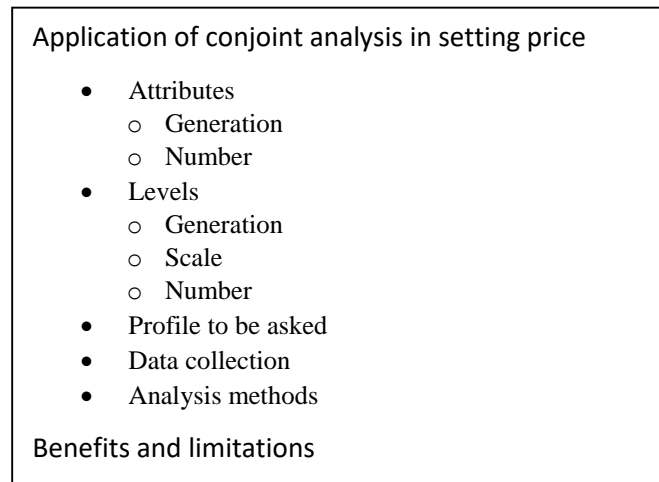
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│ Application of conjoint analysis in setting price │
│                                             │
│      •  Attributes                          │
│         o  Generation                       │
│         o  Number                           │
│      •  Levels                              │
│         o  Generation                       │
│         o  Scale                            │
│         o  Number                           │
│      •  Profile to be asked                 │
│      •  Data collection                     │
│      •  Analysis methods                    │
│                                             │
│ Benefits and limitations                    │
│                                             │
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Figure 1 Conceptual Framework of this research

Source: author

5.   Methodology

This paper can be defined as a conceptual paper as the aim is to synthesize knowledge from previous works and the expected outcome is to provide the integrated approaches in price setting with conjoint analysis. Therefore, this research is designed as exploratory research with the intention to receive ideas in developing research for price sitting with conjoint analysis. The sources of information are papers published. Research papers to be reviewed have to be papers that aim fully or partly to get a price range or point recommendation for setting an appropriate price based on customer value and apply conjoint analysis in defining prices. The papers will be chosen with purposive sampling from papers published in Social Science Citation Index (SSCI) journals from present, 2021, back until 1999 when the conjoint analysis has got several developments in methods and models. However, the size of the sample cannot be defined as of now. The author of this research will try to search as many as possible during this duration to make sure all papers have been reviewed. The analysis method is content analysis.

6.   Results

Twelve pieces of research were analyzed including papers about setting prices for various products from notebook computers, island resorts, sea fish, whitening toothpaste, music download, mobile phone, broiler meat, probiotic functional foods, aesthetic plastic surgeon, food, green hotel, to beef [1][2][3][4][5][7][16][17][20][24][31][32]. The results are in table I.

Table I the percentage and range in each step of the conjoint analysis processes

Attribute generation	
Consumer survey	33%
Literature review	33%
Assume	17%
Available in market	17%
Number of attributes	Range from 4 to 6
Level generation	
Consumer survey	25%
Literature review	25%
Assume	25%

Available in market	25%
Level Scale	
Non-metric	92%
Metric	8%
Number of levels	Range from 2 to 5
Profile to be asked	
Choice-based profile	92%
Full profile	8%
Data collection	
Discrete model/ Pair comparison	50%
Rating	25%
Ranking	25%
Analysis method	
Regression	49%
Adaptive conjoint analysis	17%
Bayesian method	17%
Others	17%

In attribute generation, consumer surveys and literature reviews are mostly used. Level generation was from each method equally including consumer survey, literature review, assumption, and availability. The number of attributes ranges from four to six. The number of levels ranges from two to five. Mostly, the level scale is non-metric. Around ninety-two percent of papers apply a choice-based profile. Data is collected mostly by discrete model or pair comparison. Other data collection methods were rating and ranking. Also, data is analyzed mostly by regression analysis. Other analysis methods were adaptive conjoint analysis, Bayesian method, and others.

The benefit of conjoint analysis in price strategies include finding reservation prices, revenue management, determining optimal prices, and identifying appropriate price techniques. The limitation is that researchers can analyze with a few attributes because many attributes would make the analysis too complex.

7. Conclusion

Conjoint analysis is a method that could help in setting prices. The design can be adjusted according to the objectives of the research in many ways. Practitioners can apply according to their expertise. Some techniques are complex. However, the outcome can be also calculated by simpler design.

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