



Conjoint Analysis Tool for Determining Attributes on Designing a Graduate Degree Program

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ABSTRACT

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In this paper the use of the analysis tool sets for defining attributes and determining the importance rank on the criterion of purchase decision of customers addresses, all of which constitutes one of the fundamental steps for designing of any product. Precisely this problematic a large group of professionals from different areas of knowledge in Santo Domingo de los Tsáchilas it faces. This article discusses the usefulness and analysis procedure set shown as a statistical tool to study the process of decision making of customers on the attributes of products and services at the time of purchase. The result of the application was to define the attributes considered by potential customers in the selection of a training program of graduate degree in correspondence with which their design will be made, taking into account the type of university, price, duration course and days of the week will be taught.

1. Introduction

The labor market requires a high degree of competitiveness demanding highly trained professionals with more knowledge to solve disciplinary and interdisciplinary problems, and also provide basic tools that enable professional in a specific area of science, the arts or technology generating competent leaders focused on research, development and technological and scientific advances (Manzo Rodríguez, Rivera Michelena & Rodríguez Orozco, 2006; Dávila, 2012; Cardoso Espinosa & Cerecedo Mercado, 2011).

Given the challenges presented concern for improving the academic offerings of fourth level of any institution of higher education, depending on their social relevance are encouraged and contribute to the development of the region in which provides services in particular and generally country. This makes it necessary to design and propose new educational products based on the educational interests of the institution concerned and the aspirations and needs of professionals in the particular historical moment (Crochemore, Bassereau, & Duchamp, 2005), this it is so because, among other things, a program is not set to the interests of students who enrolled can accentuate the phenomenon of low rates of terminal efficiency (Sanchez Dromundo, 2007). However, it is said that it is not an easy task because "in a market as competitive as the current one must be

aware that not all elements of a product or service contribute equally to confer attractive and final value for the consumer" (Ferreira Lopes et al., 2009, p.105).

In particular, careers related to economic and administrative sciences Equinoctial Technological University, campus Santo Domingo, Ecuador, contributed to society 411 professionals eager for professional development so that the design of a program of MBA, contribute to the solution of this problem in order to facilitate their entry and professional development help to improve their educational level, important in the workplace requirement. On the other hand it will also be promoted on regional and national recognition of this educational institution offering high quality differentiators against other universities in the city, considering that the university fulfills an important role in educational development and competitive both in the area and the country.

The objective of this article is to present the preferences of potential customers when choosing a graduate degree program (MBA) designed by the authors at the Equinoctial Technological University, campus Santo Domingo with some attributes determined by experts including teachers and potential customers are included.

2. Theoretical Framework

Used in the field of economics and marketing, the Conjoint Analysis is presented as the main multivariate statistical technique that facilitates the effort before commented: analyze the stated preferences of customers on new products and services expected to launch (Arias Rico, 2010; Huertas García et al, 2014. Bouza, 2012; Ramírez Hurtado, 2008; Ferreira Lopes et al, 2009). Through estimating consumer preferences, which tend to be maximized (Jaeger, Hedderley & MacFie, 2001; Mora et al, 2006), facilitates the aim of designing new products or services describing them as a set of attributes to study its intention simulated purchase. So, identify which of these attributes provide more useful to the design, it is of vital importance for a tight design to your needs and preferences (Ramírez Hurtado & Rondán Catalonia, 2008; Marmolejo Duarte et al., 2014; Ferreira Lopes et al, 2009).

When the client expresses a preference for a product or service, it responds to the integration of multiple attributes that are valued at the time of their choice, which will depend on the relative importance attached to these attributes, however, it is the understanding of the whole possible existing combinations which gives the idea of the importance of each attribute (Ramírez Hurtado & Rondán Catalonia, 2008; Bengochea, Strong & Del Saz, 2007; Köbrich, Farias & Maino, 2013; Bouza, 2012; Espinosa Acuna, 2012). For this reason "one of the most important aspects related to the development of this technique, focuses on securing the assembly election should assess respondents" (Huertas García et al., 2014, p.57).

Because it allows to build a set of hypothetical products by combining selected from each attribute that reflects their range of variation levels, these combinations result in the design of the profile presented to respondents so customers provide their assessments on the basis of interest (Rahimi et al, 2014; Hair et al., 1999).

Conjoint Analysis Applications are multiple; literature shows several examples: design of new transport systems (Marmolejo Duarte et al, 2014; Montero Puyan, 2012); financial services (Yusuf Dauda & Lee, 2015); selection of political candidates (Cardenas Bonilla, 2006); analysis of preferences for destinations and tourism products (Ramos Domínguez et al., 2004; Revollo Fernandez, 2010; Ferreira Lopes, 2011); agricultural elements, landscape and natural sites (Sayadi, González Roa & Calatrava Requena, 2004; Bengochea, Strong & Del Saz, 2007; Adasme, Spiller & Díaz, 2006); health economics (Vick & Scott, 1998); veterinary science (Köbrich, Farias & Maino, 2013); studies of human resources (Guerrero Casas, Martínez Blanes & Ramírez Hurtado, 2003); health (Martin Santana et al., 2004. Alcaide Marzal et al, 2009); marketing in general (Gamblea, Jaegerb & Harkera, 2006; Chocarro, Cortinas & Elorz, 2009; Karniouchina et al, 2009; Hailu et al, 2009; Yih Wu, Kai Liao & Chatwuthikrai, 2014).

In the field of education and research we have also found applications (Rico Arias, 2010; Parodi de Camargo, 2006; Harrar

de Dienes & Alcaide, 2010; Biesma et al., 2007) although it is considered that "in education is little that has been able to detect in the literature" (Harrar de Dienes & Alcaide, 2010, p.120).

This, coupled with the fact that the province of Santo Domingo de Los Tsáchilas, Ecuador, professionals face disadvantages when opting for a graduate degree program because of the lack thereof, can recognize the importance of studies to facilitate program design fourth level in particular in the context of Equinoctial Technological University (UTE), Santo Domingo campus. Although in this institution there is an offer of graduate programs (three master's programs from 2011 to 2014) is necessary to increase this offer and diversify the segments of professionals to which direct these programs whenever those offered are aimed at racing agricultural purposes.

3. Methodology

As a modular structure Conjoint Analysis requires several steps that depend on the initial research objectives, steps to follow in the implementation of this tool are presented below (Green, Krieger & Wind, 2001; Arias Rico, 2010; Bengochea, Strong & Del Saz, 2007; Guerrero Casas, Martínez Blanes & Ramírez Hurtado, 2003; Ferreira Lopes, 2011; Martin Santana et al., 2004; Harrar Dienes & Alcaide, 2010; Ferreira Lopes et al., 2009). While opinions are multiple steps are impossible to ignore in the process, which is then presented and served in this article:

1. Identification of attributes and determining ranges
2. Construction and presentation of the stimulus package
3. Estimation of profits
4. Reliability and validity of estimates.

In order to obtain the attributes and levels that define the program, profile pointed out, the method of Kendall concordance coefficient (0.85***), so that the factors or attributes, such as a summary of the general characteristics from obtaining applied program. The results of the consensus of 15 experts consulted in the development of fourth level programs (teachers, program coordinator and potential customers) with a list of 10 attributes are shown in Table 1.

Table 1. Attributes and ranges from consulting experts

Attributes	Levels		
	Preferably university type (Type)	Private University	
Days for classes (Days)	Weekend		A whole week
Program duration (Time)	2 years	2 years and half	3 years
Price	Between 6000.00 and 7000.00	Between 8000.00 and 9000.00	More of 9000.00

The authors agree that there may be other factors, attributes or variables that characterize a fourth level program, but only those of interest to management to make decisions about the design of

the program. Regarding the type chosen to explain the behavior of the potential market to this master's program, model for model partial utility has been selected additive where each of the attributes, each with k different levels, the model more Simple additive responds to a structure in which the utility function would be given by:

$$U(x) = \sum \sum \beta_{ij} x_{ij} \quad i = 1, \dots, m; j = 1, \dots, k$$

Where:

U (x): It represents the overall benefit of an alternative.

Xij: It represents the attributes that define the alternative.

Ij: Partial measures the usefulness of each of the attributes.

To find the ideal combinations of attributes identified was necessary to create an orthogonal design which requires a set of random numbers. The design used in this case was generated with an original value of 2000000 as the basis for randomization. This value is considered large enough to recognize a significant number of combinations. The structure of selected attributes and levels generates 36 possible combinations (alternative 2 x 2 x 3 x 3) of which 20 were selected for the orthogonal design. The exclusion of options increases the accuracy of the estimators and improves model validity indicators (Bengochea, Strong & Del Saz, 2007).

The presentation of stimuli at the stage of collecting information was guided by the choice of the full profile, so that respondents had to choose in a situation as similar as possible to reality answering the question what would be the program you would consider to take depending on the options presented? As previous studies data collection followed the method of full profiles, which involves exposing all attributes simultaneously respondents. This option is closer to the actual situation of the decision process despite having the impediment of a large number of possible combinations are evaluated (Arias Rico, 2010; Bernabeu Olmeda & Díaz, 2005). The assessment was performed by assigning the desired value at least one more desired profile and 20. The application of information collection instrument occurred during the month of February 2015 through individual interviews. All respondents were college graduates land in related careers fourth level program being studied.

The analysis of the collected data requires the use of a specific command syntax, **CONJOINT command** available in the **conjoint.sps** file. For the study that the syntax is realized and expressed in the form below:

```
CONJOINT PLAN='file specification.'
/ DATA='file specification'
/ SEQUENCE=PREF1 TO PREF20
/ SUBJECT=ID
/ FACTORS=TIPO (LINEAR MORE)
TIEMPO (LINEAR MORE)
DIAS (LINEAR MORE) PRECIO (LINEAR LESS)
/ PRINT=SUMMARYONLY.
```

The appearance three and four of said procedure is explained in the section that follows intended for the presentation of results.

4. Results

The information collected and processed with the IBM SPSS 20 showed the results of the estimation model of choice conjoint analysis those shown in Table 2. The table shows the profits of each attribute and their respective standard errors. Higher profits values indicate greater preference. As expected there is an inverse relationship between price and profit, the highest price corresponds to the lowest income (the most negative value means lower profits). The estimated each of the levels of the attributes considered shows that, overall, potential students opt for a master's program that utilities: last 2 years is offered at a public university, the weekends are given and has a value between 6.000,00 and 7.000,00 USD. This variant would be to respond better to the expectations of the target audience. A second variant less successful in the market would be a program that lasts two years and a half, is offered at a public university, it is delivered in a full week and has a value between 8.000,00 and 9.000,00 USD.

Table 2: Utilities obtained

		Estimating utility	Typical error
Time	3 years	,341	,343
	2 years and half	,682	,686
	2 years	1,023	1,030
Price	More of 9000 USD	-1,125	,343
	Between 8000 and 9000 USD	-,750	,686
	Between 6000 and 7000 USD	-,375	1,030
Type	Public	-1,625	1,138
Days	A whole week	,359	,569
	Weekend	,719	1,138
(Constant)		9,005	1,503

The relative importance of program attributes considered shown in Figure 1, these values represent a percentage of the total sum is 100. This information shows the relative importance of each attribute.

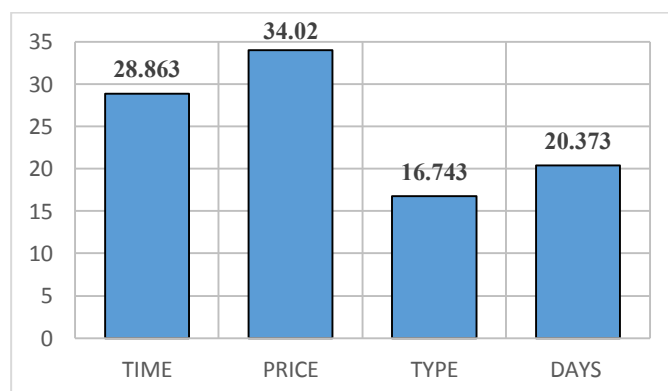


Figure 1: Average rating important attributes

Appreciation of the price of the program is the most valued by respondents attribute, which means that there will be big

differences between preferences between more expensive programs of the least expensive, the price is preceded by the duration of the program, then the days that classes will receive and less important in kind of university that offer because whenever a program that meets the above attributes and university have similar levels of prestige in the territory potential students will opt for that program bid.

Table 3 shows two statistics, Pearson's R and Kendall's tau, which provide the measure of correlation between the observed and estimated preferences. They have discrete values but with high significance.

The true power of the Conjoint analysis is the ability to predict preferences for program profiles that have not been evaluated by consumers, or this case simulation is required. These simulated cases were included as part of the plan along with profiles of orthogonal design and a reserved profile. Given the preference for public universities simulation takes into account the option that the university is private bid the program taking into account the present case.

Table 3: Correlations

	Value	Significant
Pearson R	,544	,015
Kendall Tau	,467	,006

a. Correlations between observed and estimated preferences

Table 4 provides the most preferred under three different models predicting the probability of selecting each of the simulated cases as (Hair, Anderson, Tatham, & Black, 1999):

1. The maximum utility model determines the probability as the number of subjects is expected to choose the profile divided by the total subjects. For each subject, the predicted choice is simply the profile with the most useful.
2. The model BTL (Bradley-Terry-Luce) determines the probability calculated for each individual, the usefulness of each of the alternatives, then add all give the total utility for the individual.
3. The logit model, similar to BTL but uses the natural log of the utilities instead of the utilities alone.

Table 4: Probability of preferences simulations

Card number	ID	Maximum utility	Bradley-Terry-Luce	Logit
1	1	56,2%	53,1%	57,5%
2	2	43,8%	46,9%	42,5%

a. Including tied simulations

b. In the Bradley-Terry-Luce and logic, methods will be used 16 of 16 subjects, since none of the scores of these subjects is negative.

Given the 60 subjects participating in this study used the three models indicate that consumers prefer the simulated profile 1. This profile corresponds to the characteristics shown in Table 5.

Table 5: Card 1 from the simulation

Card number	Type	Time	Price	Days
1	Private University	Two years and half	Between 6000.00 and 7000.00 USD	Weekend

5. Conclusions

The contributions of the Conjoint Analysis in identifying potential consumers preferences have been validated in the study presented. The study succeeded in identifying such presences. Analyzing the results, it was possible to determine the price, and duration of the program are variable keys to its success in the market. It should be emphasized that there are regulations set for them, and that will inevitably have to be met to ensure the approval and future quality of the program mainly as regards the duration of the same in both. However, the study provides an approach to combine what is necessary from a legal point of view and what consumers really expect potential.

This work facilitates decision-making function of organizing the fourth level of the program that is intended to offer at the university studied once by the relevant authorities so as to suit the preferences of potential students to ensure an application is approved for the same.

The conjoint analysis contributed to the understanding of organizational elements to offer master's program represents a novel contribution to make decisions based on academic offer products attractive to target audiences that are intended to serve. Given the 60 subjects participating in this study, the three models used indicate that the first simulated profile will be preferred by consumers. This profile corresponds to a type of private university with a two and half year period, priced between 6.000,00 and 7.000,00 USD, and would be given the weekend.

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