ANALYTICAL HIERARCHY PROCESS VERSUS THE CHOICE EXPERIMENTS: A STATED PREFERENCE ANALYSIS

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ABSTRACT

Our paper tries to compare individuals' preferences for attributes and levels of an agro-food product using two different methodologies. A key question is to know if asking consumer what they "prefer" or what they "buy" would lead to different results. In this context we realized an empirical comparison using two different methodologies; the Choice Experiments (CE) and the Analytical Hierarchy Process (AHP). The use of both methods is justified by their capacity to simulate the "purchasing" and "theoretical" stated preferences respectively. Restaurateur's preference to include rabbit meat in their menus in Catalonia (Spain) has been taken to realize an exploratory study. At the aggregated results, attributes and levels preferences are found to be similar with a 56.6% of a correct rank score from both methods.

Keywords: Analytical Hierarchy Process, Choice Experiments, Consumer preferences.

1. Introduction and objectives

Within the range of techniques that analyze preferences several alternatives are available. The Choice Experiment (hereafter, CE) is one of the most recently used in exploration of individuals' preference (Carlsson *et al*., 2007; Alfens, 2004; Burton and Pearse, 2002 and Burton *et al*., 2001). This method has demonstrated its capacity to analyze preferences for 'complex goods' as are the food products. The Analytical Hierarchy process (hereafter, AHP) has also been used as a suitable method to asses individuals' preference in a hierarchy structure (Sedef *et al*., 2007; Scholz and Decker, 2007; Parra *et al*., 2005; Scholl *et al*., 2005 and Ramanathan and Ganesh, 1994). The last technique allows seeking for relative importance of products' attributes and levels of the analyzed complex goods. In this context, both techniques are willing to construct a ranking structure of the products' attributes and levels offering the opportunity to compare score rank results.

The CE belongs to the stated preference method which is based on the creation of a hypothetical market for the analyzed goods and services. This approach try to simulate the "purchasing stated preference" of individuals since one of the attributes is usually the price of the product. Individuals are asked which product they would buy from a set of competitive products at different prices. The decision to make a trade-off between attributes is based on an individual cost-benefit analysis, i. e. cost-satisfaction analysis.

However, in the AHP technique, products' attributes and levels are evaluated in a direct pair-wise comparison within a structured hierarchy. Price attribute in this case is not included in the comparison since our study try to assess the relative importance of non-monetary attributes preferences. Furthermore, it does not make sense to realize a pair-wise comparison for the different price levels. In this context, the AHP, in studying individuals' preferences, try to seek the "theoretical stated preference" of products' attributes and levels independently of the purchasing decision.

Several studies have compared the individuals' preferences and customer decisions using the AHP and the Conjoint Analysis (CA)[1], a closer method to the CE (Malvinas, *et al*. 2005; Scholz *et al*., 2005 and Meißner, *et al*. 2007) and the Case-Based ranking method (Perini, 2009). However, up to date there are no published papers that try to compare empirical results of the AHP and the CE. The CE differs from the CA in many ways, despite of the fact that researchers call CE as "choice-based conjoint," or simply the traditional CA. While in the CE two or more "choice sets" are offered to respondents from which they are asked to choose the most preferred, in the CA respondents express their degrees of preference for each product (profile or cards). Furthermore, the CE was created to overcome several critical assumptions inherent to the CA design that could lead to incorrect predictions.

In this context, the objective of this study is to assess the differences between the "purchasing" and "theoretical" stated preferences using the CE and the AHP respectively. To make this objective operational, restaurateur's preference toward rabbit meat in Catalonia (Spain) has been taken as a case study. Specifically, an exploratory analysis was applied to test out preferences difference in order to obtain a holistic vision on both method applications and verify the adequate approach of comparison. Within the Spanish sector, the Catalan production and consumption has a high relative importance (Catalan consumption per capita is 74% bigger than national average, MARM, 2007). This sector has suffered from 1993 a continuous decline of farms' number with a fall of 78% in 2007. Both Spanish and local authorities are trying to increase consumption by; a) the creation of quality brand product, focusing on the origin of the product, b) trying to innovate in a new processed rabbit meat product as the precooked dishes, c) promoting the healthy characteristics of the rabbit meat and finally d) trying to increase the presence of rabbit meat in the restaurant' menus. This study will focus on the latter measure by realizing an exploratory analysis comparing the both proposed method.

The rest of the paper is structured as follows. Following this introductory section, we present and justify the methods used to analyze restaurateurs' preferences. We then describe the case study and the empirical application followed by a presentation of the results obtained. The paper ends with some conclusions and insights for further research.

2. Methods

2.1 The Choice Experiment

The CE is based on the characterization of the analyzed product through a series of attributes that can be combined to create hypothetical scenarios that will be evaluated by the subject. There are two principal designs to present these scenarios. In both types the number of scenarios shown to the interviewee is usually three and one of the scenarios is a fixed comparator. In the former design, the fixed comparator represents the status quo alternative defining the reference levels of each attributes with zero price. However, in the latter design the fixed comparator is usually named "no election" option. This alternative

[1] The Conjoint Analysis tries to determine how people value different attributes of an individual product. It determines what combination of attributes is most influential on respondent choice. Several cards representing the products are shown to individuals asking them to make their preferences. As a result, an implicit valuation (utilities or part-worths) of products' attributes are determined.

may have also other labels as “null-option” or “opt-out option”. The other remaining scenarios represent the different levels that imply an improvement over the status quo situation and involve an extra cost or price for the subject. Furthers details of this methodology can be found in Hensher *et al*., (2005), Bennett and Blamey (2001), Louviere *et al*., (2001), Adamowicz et al., (1998) and Hanley *et al*., (1998).

The conceptual foundations of CE rely on two main theories a) Lancaster’s Theory of Value (Lancaster, 1966), which proposes that utilities for goods can be decomposed into separable utilities for their characteristics or attributes, and b) Random Utility Theory (Thurstone, 1927), which explains the dominance judgments made between pairs of offerings. Based on this theoretical framework, subjects choose among alternatives according to a utility function with two components: a systematic (i.e. observable) component plus a random term (non-observable by the researcher). Mathematically:

$$U_{in} = V_{in}(Z_i, S_n) + \varepsilon_{in} \qquad (1)$$

where U_{in} is the utility provided by alternative *i* to subject *n*, V_{in} is the systematic component of the utility, Z_i is the vector of attributes of alternative *i*, S_n is the vector of socio-economic characteristics of the respondent *n*, and ε_{in} is the random term.

Among the probabilistic choice models, the conditional logit (CL) model (McFadden 1974; Ben-Akiva and Lerman, 1985) is the most employed model for dealing with CE-sampled data (Adamowicz et al., 1998). Under this specification, the condition of independent and identically distributed (IID) error must be met according to a Gumbel (or Weibull) distribution. According to the CL model, the probability that an individual *n* will choose alternative i (P_{in}) among other alternatives (*i* = 1 to I) of a set C_n is formulated as follows (McFadden, 1974):

$$P_{in} = \frac{e^{\mu V_{in}}}{\sum_{i=1}^{i=I} e^{\mu V_{in}}} \qquad \forall i \in C_n \qquad (2)$$

where V_{in} is the systematic component of the utility provided by alternative *i*, and μ is a scale parameter which is inversely proportional to the standard deviation of the error terms and is usually assumed to be equal to one (Ben-Akiva and Lerman, 1985).

Equation 2 enables the probability of choice of an alternative to be linked to its utility. To determine the relative importance of the attributes within the alternatives, the functional form of V_{in} must be defined. The most common assumption of this function is that it is separable, additive and linear following this expression:

$$V_{in} = ASC + \sum_k \beta_k X_{ki} \qquad (3)$$

Where;

ASC =Alternative Specific Constant, representing the utility of the fixed comparator

i = 1…I, representing the selected alternative *i* within the set of alternatives (C_n);

k = 1…K, representing the attributes which characterize alternative j;

β_k = model parameter of attribute *k*;

X_{ki} = value of attribute *k* in alternative *i*;

From (3) the basic CL model is given by:

$$P_{in} = \frac{e^{ASC + \sum_k \beta_k X_{ki}}}{\sum_{i=1}^{i=I} e^{ASC + \sum_k \beta_k X_{ki}}} \quad (4)$$

By estimating the basic CL model (4), implicit prices (IP) can be obtained for each attributes and levels (5). These average values for the individuals in the sample can be set in ranking structure determining the preferences of attributes and levels.

$$IP_{\text{Product\_attribute}} = -\left(\frac{\beta_{\text{Product\_attribute}}}{\beta_{\text{monetary\_attribute}}} \right) \quad (5)$$

2.2 The Analytical Hierarchy Process

The AHP methodology in our case aims to cope with individuals' preference in order to measures and determines the relative importance or weights of products' attributes and levels. The AHP is a technique to support multicriteria decision-making in discrete environments (Saaty, 1977 and 1980). AHP allows eliciting weights for each attributes and levels taking them into consideration to explain individuals' behaviour in choosing their preferred product. In order to implement the AHP, one needs to carry out a survey where individuals are asked to value different attributes that follow a hierarchical structure (Figure 1). In our case each attributes in the tree is divided into three different levels to be also valued.

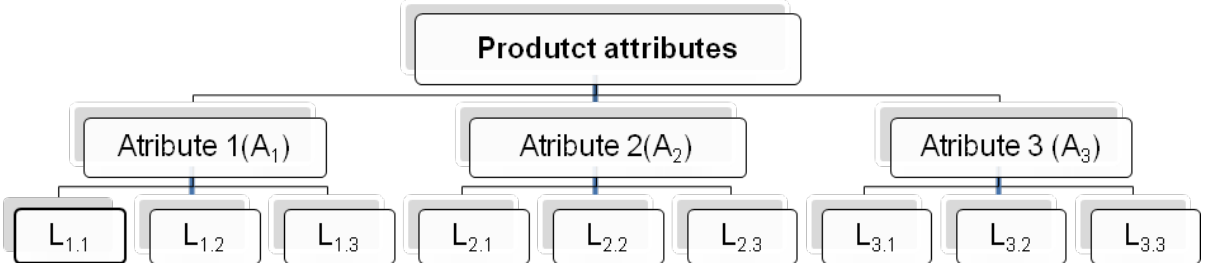

Figure 1: Hierarchical structure used to value product attributes and levels.

The relative importance or weights (w) of attributes (A_n) and levels ($L_{n.p}$), where; n ($1, \ldots, N$) is the number of attributes and p ($=1, \ldots, P$) is the number of levels, are obtained from a pair-wise comparisons. In order to make these comparisons and determine the intensity of preferences for each option, Saaty (1980) proposed and justified the use of 9 points scale. The relative importance of each attributes is obtained by comparing this attribute with all other attributes. From the answers provided, a matrix with the following structure is generated for each individual k (1, ... , K) known as Saaty matrix. In the case of attributes pair-wise comparison the matrix is:

$$S_k = \begin{bmatrix} a_{11k} & a_{12k} & \ldots & a_{1jk} \\ a_{21k} & a_{22k} & \ldots & a_{2jk} \\ \ldots & \ldots & a_{ijk} & \ldots \\ a_{i1k} & a_{i2k} & \ldots & a_{NNk} \end{bmatrix} \quad (6)$$

where a_{ijk} represents the value obtained from the comparison between attribute/level i ($i \in$ N / $i \in$ P) and attribute/level j; ($j \in$ N / $j \in$ P) for each individual k. This square matrix has two fundamental properties: (a)

all elements of its main diagonal take a value of one (a_{iik}=1 $\forall$ i), and (b) all other elements maintain that pair-wise comparisons are reciprocal (if a_{ijk}=x then a_{jik}=$1/x$). If perfect consistency in preferences holds for each decision-maker, it should also hold that $a_{ihk} \times a_{hjk} = a_{ijk}$ for all i, j and h ($h \in$ N / $h \in$ P). This condition implies that values given for pair-wise comparisons represent weights given to each objective by a perfectly rational decision-maker $a_{ijk}= w_{ik}/w_{jk}$ for all i and j. Therefore, the Saaty matrix can also be expressed as follows:

$$S_k = \begin{bmatrix} \frac{w_{1k}}{w_{1k}} & \frac{w_{1k}}{w_{2k}} & \cdots & \frac{w_{1k}}{w_{Nk}} \\ \frac{w_{2k}}{w_{1k}} & \frac{w_{2k}}{w_{2k}} & \cdots & \frac{w_{2k}}{w_{Nk}} \\ \cdots & \cdots & \frac{w_{ik}}{w_{jk}} & \cdots \\ \frac{w_{Nk}}{w_{1k}} & \frac{w_{Nk}}{w_{2k}} & \cdots & \frac{w_{Nk}}{w_{Nk}} \end{bmatrix} \quad (7)$$

Under such circumstances, K weights (w_{Nk}) for each attributes and K weights (w_{Pk}) for each levels can be easily determined from the N(N-1)/2 values and P(P-1)/2 values for a_{ijk}. respectively. However, perfect consistency is seldom present in reality, where personal subjectivity plays an important role in doing the pair-wise comparison. In Saaty matrixes (S_k=a_{ijk}) in which some degree of inconsistency is present, alternative approaches have been proposed to estimate the weight vector that better is able to represent the decision-maker's real weight vector. Saaty (1980 and 2003) proposed two options as the best estimate of real weights: the geometric mean and the main eigenvector. Other authors have proposed alternatives based on regression analysis (Laininen and Hämäläinen, 2003) or goal programming (Bryson, 1995). No consensus has been reached regarding what alternative outperforms the others (Fichtner, 1986). As all criteria meet the requirements to estimate the above-mentioned weights, we choose the geometric mean (Aguarón and Moreno, 2000; and Kallas *et al*., 2007). Using this approach, weights assigned by subject to each attribute and levels are obtained using the following expression:

$$w_{ik} = \sqrt[N,P]{\prod_{i=1}^{i=N,P} a_{ijk}} \qquad \forall\ i,k \quad (8)$$

AHP was originally conceived for individual decision-making, but it was rapidly extended as a valid technique for the analysis of group decisions (Easley *et al*., 2000). Thus, in order to compare attributes weights between AHP and CE results, group preferences must be considered. Therefore, we need to aggregate the corresponding individual weights (w_{ik}) across subjects to obtain a synthesis of weights for each attributes and levels (w_i). The aggregation process should be carried out following Forman and Peniwati (1998), who consider that the most suitable method for aggregating individual weights (w_{ik}) in a social collective decision-making context is that of the geometric mean:

$$w_i = \sqrt[K]{\prod_{k=1}^{k=K} w_{ik}} \qquad \forall\ i \quad (9)$$

In the same context, with the aim to obtain weights' order for levels of each attributes we need to calculate a global weight for each levels ($w_{G\_Ln.p}$). This global levels' weight is obtained by multiplying aggregated levels' weights (w_i for each levels $L_{n.p}$) with its corresponding weight (w_i) of attribute (A_n) as mentioned by Malvinas *et al*. (2005).

$$w_{G\_Ln.p} = w_{An} \times w_{Ln.p} \quad (10)$$

Where, $\sum w_{G\_Ln.p} = 1$, for all levels.

3. The empirical application

As mentioned above, we have selected the rabbit meat consumption sector in Catalonia to realize our exploratory study. This Spanish Autonomous Community is characterized by a high consumption rate with a 2.70 kg per capita compared with the average Spanish consumption (1.53 kg) in 2007. In the last years this sector in Spain and especially in Catalonia has suffered from several problems and limitations. The number of farms has decreased dramatically from 1993 to 2007 reaching a decreasing rate of more than 54% in the case of Spain and 78% in Catalonia.

In this new circumstance and crisis environment, the Local authority in Catalonia has approved in May 2004 a strategic plan to improve the situation of the meat rabbit consumption. They identify in the marketing stage several weaknesses highlighting the "few attractive dishes in the restaurant's menus" as one of the most important point to assess. As mentioned before, our study tries to analyze the "purchasing" and "theoretical" stated preferences of restaurateurs for rabbit meat. We seek to determine if preferences for attributes and levels change using CE and the AHP.

To realize the exploratory study of preferences comparison, the data used in this analysis were obtained from face-to-face questionnaires with restaurateurs carried out during December 2008. The questionnaire collects extensive information on restaurateur's characteristics and their attitudes and perceptions toward rabbit meat. The final sample consists of 50 restaurateurs mainly located at Barcelona province.

In the empirical application of both techniques, the first step is the determination of attributes and levels for rabbit meat preference for restaurateurs. We need to clearly define what we are the attribute that restaurateurs take into consideration for rabbit meat preference. The strategy employed was to identify and specify the most relevant attributes of rabbit meat. Thus, we first relied on prior research performed on rabbit meat preference (Hoffman, *et al*., 2004). This study has identified the following attributes: purchasing format, processing method, size of the body, packaging, visual and physical attributes, age of the rabbit, price, etc. These identified attributes was subsequently discussed in a focus groups comprising university lecturers in the field of marketing, representatives of production association of rabbit meat in Catalonia and consumer associations. All participants agreed the need to include or eliminate some of the above mentioned attributes. The final set of attributes was: origin, format, brand and price. In the same context, a pilot questionnaire was applied where no posterior problems was identified. The final attributes and levels are shown in Table 1.

Table 1: Attributes and levels Rabbit meat preference for restaurateurs

Attributes	Attributes symbols	Levels	Levels symbol
Origin	**(A_1)**	Catalonia (regional) Spain (national) Foreign (international)	**$L_{1.1*}$** **$L_{1.2}$** **$L_{1.3}$**
Format	**(A_2)**	Entire Pieced Boneless	**$L_{2.1*}$** **$L_{2.2*}$** **$L_{2.3}$**
Brand	**(A_3)**	Quality brand Commercial brand Unbranded	**$L_{3.1*}$** **$L_{3.2}$** **$L_{3.3}$**
Price	**(A_4)**	5.50 € 6.00 € 6.50 €	**$L_{4.1*}$** **$L_{4.2}$** **$L_{4.3}$**

*: base level

For the application of the CE, once the attributes and levels are defined an experimental design should be applied. In our case we follow an orthogonal fractional factorial design to estimate all main effects. Thus we only select a fraction of the full factorial experiment (Louviere, 1988). This statistical design enables us to reduce the number of sets from the initial 3^4x3^4 in the full design to 9 choice sets. Figure 2 shows one of these choice sets.

Figure 2: Example of a choice set

ELECTION # 1	**Alternative "A"**	**Alternative "B"**	**Opt_out**
Origin (A_1) 	**Catalonia**	**Spain**	**Neither**
Format (A_2) 	**Boneless**	**Entire**	
Brand (A_3) 	**Unbranded**	**Quality brand**	
Price (A_4) 	**6.50 €**	**5.50 €**	
Supposing these options are the only ones available, which would you buy?	☐	☐	☐

For the econometric modeling, we consider only the attributes as the only regressors taking into consideration the objective of the study. This election is used because its adequacy to compare results with AHP where total utility is based only on attribute's weights. Thus, the utility function in the basic CL model, as explained before, is as following.

$$V_{jn} = ASC + \beta_{L_{1.2}} \times L_{1.2} + \beta_{L_{1.3}} \times L_{1.3} + \beta_{L_{2.2}} \times L_{2.2} + \beta_{L_{2.3}} \times L_{2.3} + \beta_{L_{3.2}} \times L_{3.2} + \beta_{L_{3.3}} \times L_{3.3} + \beta_{A_4} \times A_4$$

where variables are previously explained in Table 2.

For the application of the AHP, the same attributes were used following the proposed hierarchical structure (see Figure 1). As mentioned before, price attribute was not included in the paired comparison. This is because price' levels comparison does not make sense and we are interested in seeking preferences away from a purchasing behavior. The relative importance of attributes and levels are obtained from paired comparisons using a 1 to 9 scale. An example of the application of the AHP to our case study can be shown in Table 2.

Table 2: Example of the AHP questions

Origin									**Brand**							
9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Unbranded									**Quality brand**							
9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Boneless									**Entire**							
9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9
Catalonia									**Spain**							
9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9

In your opinion, what is the most important element that determines your preference for rabbit meat? Indicate the degree of superiority of the preferred element. In case of equality of items, mark the option "1".

4. Results

4.1 CE results

Table 3 shows the results of the basic CL model. As can be seen, at a 99% confidence level, we can reject the null hypothesis that all coefficients are jointly or simultaneously equal to zero. We thus do not reject the overall significance of the model. The goodness of fit of model can be assessed through the McFadden's *pseudo*-R^2 (0.15) which is acceptable.

Table 3: Results of the basic CL models

Variables	Coefficients.	Standard error	p-value
ASC_Opt out	-7.1591	1.0677	0.0000
Spain	-0.0714	0.0980	0.4662
Catalonia	0.7964	0.1006	0.0000
pieced	0.1247	0.1018	0.2207
Entire	0.2769	0.1000	0.0056
Quality brand	0.0987	0.0968	0.3081
Commercial brand	-0.0992	0.1037	0.3388
Price	-1.1405	0.1790	0.0000
Summary statistics			
No. of observations		450	
Log-Likehood (0)		-481.0647	
Log-Likehood (θ)		-410.8064	
Log-Likehood ratio		140.516 (0.000)	
ρ^2 (pseudo R^2)		0.15	

Results show that origin, entire and price parameters are statistically significant. The positive sign of coefficient implies higher levels of utility associated to these attributes' levels. The negative sign implies that an increase in the levels of the attribute (price) decrease utility of alternatives. We should to bear in mind that levels are codified using the effect coding. In this type of codification the reference point is defined as the negative sum of the estimated coefficients of the remaining levels. Thus, the utility of the reference level is equals to: $\beta_1 \times (-1) + \beta_2 \times (-1) + \cdots + \beta_{L-1} \times (-1)$. Following this calculation, we can obtain the reference coefficient of the reference level. Thus, for the "origin" attribute, the level "foreign" have a coefficient equals to -0.0714 ×(-1) + 0.7964×(-1) = -0.7250. For the "boneless" and "unbranded" levels, coefficients are -0.4016 and 0.0006 respectively.

The economic interpretation can be obtained from the implicit price of each level of the attributes. Since these estimates are stochastic, it is usual to calculate their confidence intervals. In this study we employed the method of Krinsky and Robb (1986) through 1000 random repetitions. The results appear in Table 4.

Table 4*:* Implicit prices and confidence intervals for attribute' levels

	Attributes	IP (€/kg)	95% C.I.
Origin (A_1)	$IP_{L1.1}$: Catalonia	0.698	(0.506 ;1.008)
	$IP_{L1.2}$: Spain	-0.063	(-0.213 ; 0.083)
	$IP_{L1.3}$: Foreign	-0.636	(-0.958 ; -0.404)
Format (A_2)	$IP_{L2.1}$: Entire	0.243	(0.097 ; 0.419)
	$IP_{L2.2}$: Pieced	0.110	(-0.036 ; 0.273)
	$IP_{L2.3}$: Boneless	-0.352	(-0.624 ; -0.134)
Brand (A_3)	$IP_{L3.1}$: Quality brand	0.086	(-0.053 ; 0.239)
	$IP_{L3.2}$: Commercial brand	-0.087	(-0.244 ; 0.056)
	$IP_{L3.3}$: Unbranded	0.001	(-0.194 ; 0.223)

As shown in Table 4 only the attributes' levels of "Catalonia", "Foreign", "Entire" and "Boneless" have an IPs statistically different from zero. Restaurateurs are thus willing to pay on average €0.698/kg if the product origin is from Catalonia. However, the "foreign" origin of the meat necessary implies a discount of €0.63/kg in the price. Results show also that the IP of "entire" levels is 0.243€/Kg. As expected, restaurateurs have preference for whole rabbit since it allow them to have more flexibility in its preparation in the menus. The "boneless" level has a negative IP, implying less preference toward this characteristic. This result can be explained by the fact that boneless rabbit is more expensive then entire or pieced meat which can decrease the margin of profits of restaurateurs. Moreover, the suppliers of Boneless meat are scarce threatening the flow of the supply.

The marginal utility derived from the change from one level (L-1) to another one (L) can be obtained by calculating the differences between marginal utilities: $\beta_L - \beta_{L-1}$. Thus, in order to calculate the implicit price of this change we need to use the following expression $-\frac{\beta_L - \beta_{L-1}}{\beta_{\text{Price}}}$.

The results are shown in Table 5.

Table 5: Implicit prices and confidence intervals for change in levels

Levels' change	**Marginal Utility differences**	**IP of change from levels (€)**	**95% C.I.**
Foreign → Catalonia	1.5215	1.3341	(1.920 ; 0.983)
Foreign → Spain	0.6537	0.5732	(0.321 ; 0.984)
Spain →Catalonia	0.8678	0.7609	(0.523 ; 1.134)
Boneless → Entire	0.6785	0.5949	(0.322 ; 0.954)
Boneless → Pieced	0.5263	0.4615	(0.197 ; 0.812)
Pieced → Entire	0.1521	0.1334	(-0.073 ; 0.365)
Unbranded → Commercial brand	-0.0998	-0.0875	(-0.365 ; 0.147)
Unbranded → Quality brand	0.0981	0.0860	(-0.171 ; 0.336)
Quality brand → Commercial brand	-0.1979	-0.1735	(-0.416 ; 0.027)

As shown in Table 5, both "Catalonia" and "Spain" origin is preferred than the "foreign" level. Moreover, the Catalonian origin is preferred than Spanish one. All changes between levels are statistically different from zero. The same thing happens for the "Format" attribute. Thus "entire" and "pieced" are preferred than "boneless" meat. For the brand change, implicit prices are not significantly different from zero.

4.2 AHP results

As noted above, the AHP allows obtaining the weights assigned by each individual to the attributes and their levels using the geometric mean criteria. The results of the aggregation of the weights for the three attributes (w_{A1}, w_{A2} and w_{A3}) across subjects are shown in Table 6.

Table 6: Aggregated weights for Attributes

	Origin w_{A1}	**Format** w_{A2}	**Brand** w_{A3}
Aggregated weight (Geometric mean)	*0.312*	*0.491*	*0.197*
Arithmetic mean	0.323	0.485	0.192
Trimmed mean*	0.392	0.418	0.190
Median	0.183	0.611	0.206
Variance	0.054	0.057	0.017

* Computed discarding the 25% lowest scores and the 25% highest ones.

These results suggest that the "Format" attributes is the most important with an aggregate weight of 49.1%. Origin attribute occupies the second positions with aggregate weights of 31.2%. In the last position we found the brand" attribute with an aggregate weight of 19.7%.

Results from weighting attributes' levels are summarized in Figure 3. As can be seen, there are differences in relative ($w_{Ln.p}$) and global ($w_{G\_Ln.p}$) weights of levels. For the "origin" attribute, the most important level is the Catalonian origin (60.8%) followed by Spain (26.5%) and Foreign (12.7%). In the Format attributes, the highest weight is for the "entire" level (48.6%). In second position of importance we have the "pieced" level (34.3%) followed by "boneless" rabbit (17.2%). For the "brand" attribute, the most important levels, as expected, was for the "quality brand" (54.5%), followed by the "commercial brand" (23.5%) and "unbranded" levels (22.0%).

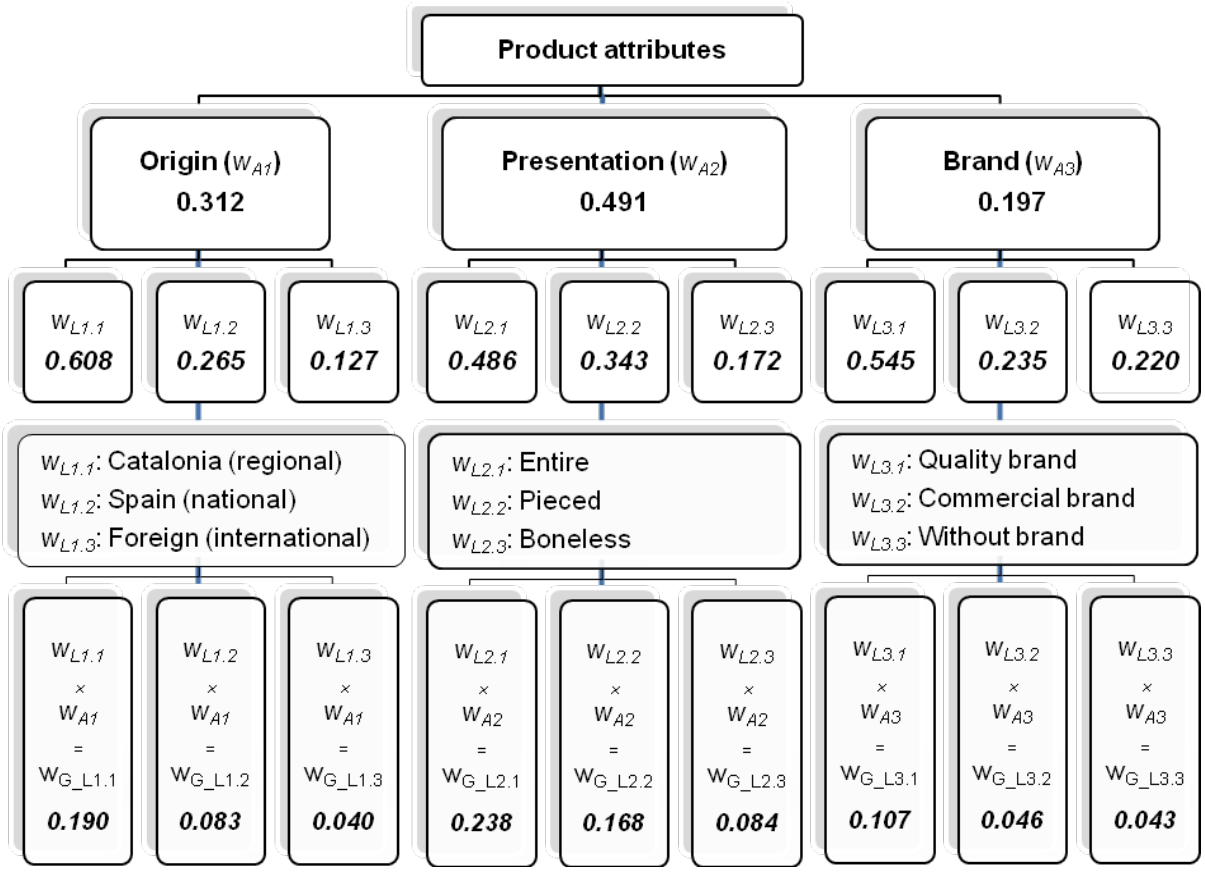

Figure 3: The Hierarchical structure of product attributes

As mentioned, the global weights represent the total preference score or the total relative importance of each level taking into consideration all attributes' levels. Thus, we find that the most preferred level for restaurateurs is the "entire" format of the rabbit meat (23.8%), followed by the "Catalonian" origin (19.0%) and the "pieced" rabbit (16.8%). The lowest weight is for the "foreign" origin (4.0%) followed by "unbranded" product (4.3%).

4.3 AHP versus CE

Due to the qualitative aspects of products' attributes and levels, the CE results presented in Table 6 could be interpreted as an indicator of their relative importance for individuals. Thus, it is possible to consider them from a ranking perspective in order to know the most and the less preferred or important level. In this same context, the AHP global weights of attributes and levels presented in Figure 3 show also a ranking of the most preferred attributes and levels. Both results are summarized in Table 7 where it can be seen the relative importance of attributes and levels obtained from the CE and AHP.

Table 7: Relative importance of attributes and level from CE and AHP

AHP results (Theoretical stated preference)			**CE results (Purchasing stated preference)**	
Levels	$w_{G\_Ln.p}$	**Relative importance**	**Levels**	**IP**
$\mathbf{w_{G\_L2.1}}$**:** Entire	0.2384	1	$\mathbf{IP_{L1.1}}$**:** Catalonia	0.6983
$\mathbf{w_{G\_L1.1}}$**:** Catalonia	0.1899	2	$\mathbf{IP_{L2.1}}$**:** Entire	0.2428
$\mathbf{w_{G\_L2.2}}$**:** Pieced	0.1682	3	$\mathbf{IP_{L2.2}}$**:** Pieced	0.1094
$\mathbf{w_{G\_L3.1}}$**:** Quality brand	0.1072	4	$\mathbf{IP_{L3.1}}$**:** Quality brand	0.0865
$\mathbf{w_{G\_L2.3}}$ **:** Boneless	0.0844	5	$\mathbf{IP_{L3.3}}$**:** Unlabeled	0.0005
$\mathbf{w_{G\_L1.2}}$**:** Spain	0.0827	6	$\mathbf{IP_{L1.2}}$**:** Spain	-0.0626
$\mathbf{w_{G\_L3.2}}$**:** Commercial brand	0.0462	7	$\mathbf{IP_{L3.2}}$**:** Commercial brand	-0.0870
$\mathbf{w_{G\_L3.3}}$**:** Unbranded	0.0433	8	$\mathbf{IP_{L2.3}}$ **:** Boneless	-0.3521
$\mathbf{w_{G\_L1.3}}$**:** Foreign	0.0397	9	$\mathbf{IP_{L1.3}}$**:** Foreign	-0.6357

As can be seen from Table 7, comparing the purchasing (CE) and theoretical (AHP) stated preferences; there is a 56.6 % of coincidence in the ranking of levels. For the remaining levels, there is a small difference in the ranking between the "entire" and "Catalonian" levels. While in the AHP results the former level have the highest rank, in the CE results it comes in the second place. The only relevant difference that could be important is the different ranking position between "boneless" and "unbranded" levels. Malvinas *et al*. (2005) mentioned that CA produces relatively same ranks as AHP. Moreover, Meißner et al. (2007) found that the resulting preference structure between CA and AHP prove to be similar on the aggregate level. However, we should bear in mind that the previous results allow for a qualitative comparison of ranking for the attributes and levels without focus on the intensity of the score.

5. Conclusions

Our paper focuses on assessing and comparing individual's preference using two indirect methods; the CE and AHP. Both approaches have demonstrated their capacity to analyse the relative importance (weights) and to establish a ranking score of attributes and levels. In this context, we carry out an exploratory analysis to seek out the difference in preferences results from both methods. While the CE tries to analyse the "purchasing" stated preference, the AHP focus on the theoretical aspect. Within the CE, individual are faced with different competitive products at different prices and asked if they would buy it. However, the AHP compare directly attributes and levels of product in a pair-wise comparison on the basis of a scale with 9 points. Data were collected though a questionnaire carried out in December 2008 in the restaurateurs sector to analyze preferences toward rabbit meat in the menus. The final set of attributes and levels identified are: origin (Foreign, Spain and Catalonia), format (entire, pieced and boneless), brand (unlabeled, quality brand and commercial brand) and price (5.50 €, 6.00 € and 6.50 €).

Results demonstrate that there is a 56.6 % of coincidence in the ranking of attributes and levels between the AHP and CE results. Both the AHP and the CE has their advantages and disadvantages. While the AHP allow for determining preference scores at individual level, the CE does not. Moreover, in the AHP

application, it seem that the task of a pair-wise comparison of attributes and levels is less hard than comparing two or more complex goods in a competitive environment as is the case of the CE. However, the CE allows for a more sophisticated assumption of the utility function including interaction between attributes and the socio-demographic variables for studying preferences heterogeneity, while the AHP does not.

It is worth to mention that our exploratory analysis don't aim to set out which method is better or worse. However, results allowed us making an insight of the ability of both methods to analyze individuals' preferences correctly. In this context, more efforts are needed to investigate with more details the source of ranking scores difference by applying a more rigorous study.

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