Estimating consumer preferences for extrinsic and intrinsic attributes of vegetables. A study of German consumers

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Abstract

Preference formation developed during the consumer's evaluation of alternatives is one of the most important stages in models of consumer purchasing behaviour. This is especially true for the purchase of vegetables. The purpose of this paper is to analyze the role of extrinsic *versus* intrinsic attributes in the behaviour of consumer when purchasing cucumbers, considering four attributes; price, country of origin and production method (extrinsic), and freshness (intrinsic). Utilizing a sample of German tourists visiting the city of Almería (Spain), conjoint analysis methodology is used. The results suggest that an intrinsic aspect (freshness) is the most important attribute for consumers. Therefore, marketers are advised to consider the importance of this attribute to the consumer and try to position the product in the destination markets on the basis of product freshness.

Additional key words: agro-food marketing; conjoint analysis; consumer preferences; *Cucumis sativus*; fruit and vegetables.

Resumen

Estimación de las preferencias del consumidor por los atributos externos e internos de las hortalizas. Un estudio del consumidor alemán

El proceso de formación de preferencias que tiene lugar durante la fase de evaluación de alternativas constituye una etapa muy importante en los modelos de comportamiento de compra del consumidor, sobre todo cuando éste se enfrenta con la compra de productos hortícolas. El objetivo de este trabajo es analizar el papel que juegan los atributos extrínsecos e intrínsecos en el comportamiento de compra de pepino, considerando, para ello, cuatro atributos: el precio, el país de origen y el método de producción (atributos extrínsecos), y la frescura (atributo intrínseco). Para ello se utiliza la metodología del análisis conjunto en una muestra de turistas alemanes que han visitado la ciudad de Almería (España). Los resultados muestran una mayor preferencia por un atributo intrínseco como es la frescura del producto. Por tanto, los productores deben de tener en cuenta la importancia de la frescura para el consumidor, y utilizarla para posicionar su producto en los mercados de destino.

Palabras clave adicionales: análisis conjunto; *Cucumis sativus*; frutas y hortalizas; marketing agroalimentario; preferencias del consumidor.

Introduction

Consumer preference formation is a process included in the evaluation stage prior to purchase. In this stage, the consumer uses information to arrive at a set of final brand choices (Kotler & Armstrong, 2004).

As suggested by Lilien & Kotler (1983), there are three important aspects to be considered in the development of this alternative evaluation stage: (1) the con-

sumer views the product as a set of attributes, so the product will be perceived in terms of how it conforms with a series of attributes that are relevant to the product class; (2) the relevant attributes may have different levels of importance to the consumer, and (3) the consumer is likely to develop opinions about how each brand rates on each attribute.

While this stage of evaluation can be considered a necessary step in the purchasing process, in the case of products that are low value and frequently purchased, *e.g.,* vegetables, in which buying habits frequently dominate the consumer's evaluation, preference formation might not exist. However, new trends in the consumption of fresh vegetables are leading to important changes in consumer behaviour; in particular, the 'new consumer' is strongly demanding differentiated products containing higher added value, with practical, healthy and environmentally-friendly aspects (Arcas & Munuera, 1998). In this context, both intrinsic aspects and extrinsic attributes are key elements determining the consumer's purchasing process (Segura & Calafat, 2001). On this basis, the buying habit can be considered as the final result of product's attributes that are important to the consumer and, therefore, that will be related to his/her preferences.

This paper focuses on analysing the role of extrinsic *versus* intrinsic attributes in the behaviour of consumer when purchasing cucumbers, considering four attributes; price, country of origin and production method (extrinsic), and freshness (intrinsic). In order to do so, conjoint analysis methodology —a multivariate technique that researchers have only recently begun to use in the study of vegetables— is used. In order to strengthen the statistical consistency of the empirical results, estimations are carried out using both metric and non-metric estimation methods (Green & Srinivasan, 1978). Using both methods led us to determine if there are differences in results depending on the type of estimation methodology employed, as numerous comparative studies that use both metric and non-metric techniques to adjust their models show. We then compare the importance of the four attributes considered using two methods: ordinary least squares (OLS) and ordered Logit.

This work contributes to the literature on agro-food marketing in three ways: (i) comparing the importance of the two groups of attributes (*i.e.,* extrinsic and intrinsic) selected on the basis of an analysis of the consumer's preference structure; (ii) specifically determining such importance in the context of consumer

behaviour in the purchase of cucumbers; (iii) carrying out a conjoint analysis, which has rarely been used to study vegetables, and for which we use two alternative estimation methods. In this way, results show a higher statistical consistency.

Material and methods

The role of the attributes as evaluation criteria

Attributes as evaluation criteria are defined as characteristics or dimensions that consumers use to categorize offers that are presented and thus facilitate the development of purchasing decision processes (Eroglu & Machleit, 1989).

Attributes that signal quality have been categorized into intrinsic and extrinsic cues (Olson & Jacoby, 1972): (1) intrinsic cues involve the physical composition of the product. Intrinsic attributes cannot be changed without altering the nature of the product itself and are consumed as the product consumed (composition, flavour, design, etc.), and (2) extrinsic cues, in contrast, are product-related attributes but not part of the physical product itself; by definition, they exist outside the product (brand, price, country of origin, warranties or services). Thus, whereas the latter are based on technical and objective aspects, intrinsic aspects are based on the subjective-internal processes of individuals, which are very difficult to determine (Solomon *et al.*, 1999).

The literature shows a greater inclination towards extrinsic attributes, since there is empirical evidence showing that such extrinsic aspects are most often used by consumers in their purchasing decisions (Richardson *et al.*, 1994; Lee & Lou, 1996), especially because they have greater knowledge and greater confidence in them (Jamal & Goode, 2001). According to Rodríguez (2003), the stronger preference for extrinsic attributes is due to three main reasons: (1) given that the intrinsic attributes are internal characteristics of the product, it is difficult to perceive them if consumers do not use or consume the product; (2) consumers make a uniform evaluation of internal characteristics of products; so it is not easy to clearly perceive differences between products according to such internal aspects and, hence, the information arising from these attributes is not useful, and (3) given that consumers are more prone to simplify the information management processes, the

cognitive simplification derived from using extrinsic aspects might help them to reduce and to better manage the number of options considered in their purchasing decisions.

With regard to vegetables, there are also many extrinsic and intrinsic attributes affecting the buying process. Among those factors, external appearance can be highlighted as it exerts an immediate impact on any purchase option (Segura & Calafat, 2001) − especially in the context of the purchase of vegetables (Zind, 1990; Babicz-Zielinska & Zagorska, 1998). Such appearance depends on physical characteristics of the product (*e.g.,* size, colour or shape), and also to the fact that the product does not have any physical damage (Riquelme & Roca, 2000). In addition, organoleptic quality — especially centred on aspects such as taste or aroma — plays an important role in consumers' decisions (Albardíaz, 2000). Security is also an important factor (Henson & Northen, 2000; Eiser *et al.*, 2002; Zepeda *et al.*, 2003). In the context of vegetables, this means not containing chemical wastes and being produced in farms using environmentally-responsible practices. A final aspect refers to the intrinsic safety and nutritional value of vegetables. Both aspects arise and they focus on the positive health effects. With regard to the extrinsic characteristics of the product, trust in the production method and the origin of the product are playing a more important role in consumers' decisions (Compés, 2002).

Analysis of preferences through conjoint analysis: a review in the food sector

Conjoint analysis is a multivariate technique specifically used to analyse consumer preferences among a range of products by assessing the utility that consumers confer to individual product characteristics. Individual consumer's utility, which represents the overall preference or total 'worth' of a product, can be disaggregated into 'part-worths' for each of the important product attributes (Hair *et al.*, 1998). In this respect, the most direct application of conjoint analysis is for determining the weight or importance of the different levels or categories of product attributes in the formation of consumer preferences (Múgica, 1989).

Conjoint analysis has gained wide acceptance in marketing since its appearance and a considerable number of studies have used the technique, but its application in the study of consumer preferences only

really took off in the 1980s. Nevertheless, the application of conjoint analysis to foodstuffs has been extremely limited until very recently (Van der Pol & Ryan, 1996), and only really from the 1990s has a substantial scientific literature begun to build up. Clearly, researchers wishing to improve understanding of consumer behaviour when purchasing food will find this methodology potentially useful.

As shown in Table 1, this methodology has been useful for studying consumer preferences in a variety of food products, covering the meat sector and dairy products, wine, olive oil, and more recently, fruits and vegetables for fresh consumption.

Research design

Conjoint analysis has become an important tool for evaluating the preferences that consumers assign to the different attributes of each product (Ruiz & Munuera, 1993). Utility, which is the conceptual basis for measuring this value, is a subjective judgement of preference that is unique for each individual and embraces all the characteristics of a product or service, whether tangible or intangible. As such, utility measures global preference. Preferences are usually heterogeneous and utilities lie on a constructive level and are not directly observable (Slovic, 1995). Two assumptions must be made before running a conjoint analysis (Grossmann *et al.*, 2007): firstly, that the estimation of the preferences reflects individuals' utility, and secondly, that the sample of respondents has a comparatively homogenous preference system (Fishburn & Roberts, 1998; Huber *et al.*, 2002).

The consumer perceives a product —the cucumber (*Cucumis sativus* L.) in this study— as a set of physical, functional or psychological characteristics or attributes, the evaluation of which will condition the final purchase decision. Thus, when evaluating this vegetable, the consumer implicitly associates subjective values —called part-worths— to the perceived attributes. These part-worths express the consumer's system of values, that is, the classification by order of overall preference of the different concepts of the product, each product being represented by a specific combination of attributes.

In this study we analyse the preferences of consumers when purchasing vegetables. In particular, we focused on the German market and the cucumber. The German market is the world's biggest food importer, with almost 40 million tonnes, of which approximately

Table 1. Application of conjoint analysis to food

Sector	Product types		Attributes	Method[1]
Meat	*Sausage*	Steenkamp, 1987	Price; packaging; brand; purchasing place	OLS
		Huang & Fu, 1995	Price; packaging; brand; labelling; store	OLS
	Beef	Walley *et al.*, 1999	Price; packaging; warranty; fat (%); brand	OLS
		Sánchez & Barrena, 2000	Price; origin; brand	OLS
	Veal	Sánchez *et al.*, 2001b	Price; origin; organoleptic properties; quality	Tobit
	Lamb	Sánchez *et al.*, 2001b	Price; origin; organoleptic properties; quality	Tobit
		Bernabéu & Tendero, 2004	Price; origin; certification; type	OLS
Fish	*Salmon*	Holland & Wessells, 1998	Price; production method; seafood inspect	Logit
	Others	Halbrendt *et al.*, 1991	Price; size; shape; season	OLS
Olive oil		Fotopoulos & Krystallis, 2001	Price; local labelling	OLS
		Van der Lans *et al.*, 2001	Price; origin; appearance; colour	OLS
		García *et al.*, 2002	Price; origin; packaging	OLS
		Krystallis & Ness, 2005	Price; origin; organic labelling; packaging	OLS
		Chan-Halbrendt *et al.*, 2010	Price; origin; type; taste; purchasing place	Logit
		Menapace *et al.*, 2011	Price; origin; packaging; appearance; colour; production method	Logit
Milk	*Butter*	Alvesleben & Schrader, 1998	Price; brand; "made in" labelling	OLS
	Cheese	Souza & Ventura, 2001	Price; texture; protection; sale units	OLS
		Murphy *et al.*, 2004	Price; texture; packaging; taste; colour	OLS
		Bernabéu *et al.,* 2004	Price; quality certification; typology	OLS
	Yogurt	Orth & Firbasova, 2003	Price; origin; fat (%); taste; packaging	OLS
Wine		Gil & Sánchez, 1997	Price; year of production; local labelling	OLS
		Sánchez & Gil, 1998	Price; origin; year of production	Tobit
		Bernabéu *et al.*, 2001	Price; origin; typology	OLS
		Bernabéu *et al.*, 2007	Price; origin; year; production method	OLS
		Barroso *et al.*, 2004	Price; colour; alcoholic strength; acidity	OLS
Fruits	*Apple*	Manalo, 1990	Price; size; colour; taste; crunch	OLS
		Baker & Crosbie, 1994	Quality; certification; level of pesticides	OLS
		Jaeger *et al.*, 2001	Origin; variety; other information	Logit
		Fotopoulos & Krystallis, 2003	Price; local labelling	OLS
	*Banana*s	Van der Pol & Ryan, 1996	Price; packaging; quality; location	Probit
	Grapes	Brugarolas *et al.,* 2003	Price; packaging; protect. indications origin; size; variety	OLS
	Pear	Campbell *et al.*, 2004	Price; colour; production method; labelling	OLS
	Mandarins	Van der Pol & Ryan, 1996	Price; packaging; quality	Probit
	Pineapple	Acharya & Elliott, 2001	Price; country of design; brand; country of origin	ANOVA
	Peanuts	Nelson *et al.*, 2005	Price; origin; shape	OLS
Vegetables	*Cabbage*	Van der Pol & Ryan, 1996	Price; quality; packaging; location	Probit
		Dagupen *et al.*, 2009	Price; origin; production method; freshness, shape	n.a.
	Tomato	Sánchez *et al.*, 1998	Price; origin; packaging; farming type	OLS
		Sánchez *et al.*, 2000	Price; origin; farming type; appearance	Tobit
		Sánchez *et al.*, 2001a	Price; origin; farming type; appearance	OLS
	Pepper	Frank *et al.*, 2001	Price; colour; content; C vitamin	OLS
	Potato	Alvesleben & Schrader, 1998	Price; origin; brand	OLS
	Carrot	Dagupen *et al.*, 2009	Price; origin; freshness; colour; size	n.a.
Other	*Honey*	Murphy *et al.*, 2000	Price: origin; colour; packaging; texture	OLS
	Eggs	Ness & Gerhardy, 1994	Price; origin; production method; freshness	OLS
	Organic food	Brugarolas & Rivera, 2002	Price; origin; waste; taste; appearance	OLS
		Rivera & Brugarolas, 2003	Price; origin; production method; taste; appearance	OLS

[1] OLS: Ordinary least squares; n.a: non available.

Table 2. Characteristics of sample

Aspects	
Population	Aged over 18 German tourists
Sample size	378
Maximum admissible error	± 5.05%
Statistical confidence	94.95 % ($p = q = 50$); $k = 2$
Sampling type	Simple random sampling
Fieldwork	Boarding zone (boarding gates of flights to Germany) of the airport of Almería (Spain).
Survey date	July to September 2009

4.2 million correspond to fruit and 2.7 million to vegetables. Germany is also the EU's biggest and the world's second-biggest importer of vegetables. In particular, the cucumber is popular among German consumers; indeed, only tomatoes and carrots are consumed in greater quantity. Thus Germans consume 10.5 kg of tomatoes per household per year, compared with 7.6 kg of carrots and 7.4 kg of cucumbers.

Given the importance of vegetables — and particularly of cucumbers — in the German shopping basket, this paper carries out a preference analysis in order to understand which attributes are the most important in the process of purchas ing this vegetable for German consumers. Information used in this study was obtained from a survey of German tourists, aged over 18, conducted in the boarding area of the airport of Almería (Spain) from July to September 2009. The technical card of the survey is included in Table 2.

The characteristics of the sample are shown in Table 3.

Selection of attributes and attribute levels

The first stage in conjoint analysis is to select the attributes and their different levels. Selecting attributes in this study was based on the following criteria: (1) the opinion of several agro-food sector managers — especially those working in the German market; (2) the most-used attributes reported in previous agro-food marketing literature — especially those studies analysing vegetables — using the methodology of conjoint analysis; (3) the proposals of this investigation. According to these criteria, four attributes were selected: *price*, *country of origin*, *production method* (extrinsic attributes) and *freshness* (intrinsic attribute).

With regard to *price*, it should be noted that practically all the studies focusing on the food sector exam-

ined in the literature review included this attribute (see Table 1). This is the case, for example, of works by Alvesleben & Schrader (1998), Souza & Ventura (2001) or Murphy *et al*. (2004) on the milk sector, Steenkamp (1987), Huang & Fu (1995), Sánchez & Barrena (2000) or Bernabéu & Tendero (2004) on the meat sector, Fotopoulos & Krystallis (2001), Krystallis & Ness (2005) or Chan-Halbrendt *et al*. (2010) on the oil sector, and Van der Pol & Ryan (1996), Frank *et al*. (2001) or Dagupen *et al*. (2009) on the vegetables sector. In

Table 3. Demographic profile of respondents

Variable	Consumers	
	No.	%
Sex		
– Men	164	43.4
– Women	214	56.6
Age		
– 18 - 24	79	20.9
– 25 - 30	38	10.1
– 31 - 40	64	16.9
– 41 - 50	105	27.8
– 51 - 65	63	16.7
– > 65	17	4.5
– No answer	12	3.2
Income (€)		
– < 18,000	33	8.7
– 18,000 - 30,000	67	17.7
– 30,000 - 42,000	106	28.0
– 42,000 - 54,000	48	12.7
– > 54,000	65	17.2
– No answer	59	15.6
Studies		
– Primary	137	36.2
– Secondary	143	37.8
– Middle / Superior	84	22.2
– Without studies	3	0.8
– No answer	11	2.9

addition, and from a methodological point of view, *Multivariate Data Analysis* by Hair *et al.* (1998) supports the inclusion of price in studies using conjoint analysis, as a consequence of this attribute representing a special value component for many products and services. It is true that price is an attribute that might be highly correlated with other attributes (*e.g.,* brand equity). Despite this fact, Hair *et al.* (1998) believe that it is necessary to include price in studies analysing consumers' preferences. The levels used for the price attribute (€1 kg^{-1}; €2 kg^{-1}; €3 kg^{-1}) were selected from the website www.infoagro.com. In this website, it is possible to find retail prices in the main German markets (*i.e.,* Hamburg, Munich and Frankfurt). Once this information was reviewed, selecting these three levels was the best option for taking into account price variability in the German retail market at the moment of the survey.

Country of origin is an important attribute for consumer preferences if we consider that it is one of the most important extrinsic attributes in the evaluation stage and a fundamental aspect for product differentiation. Thus, including this aspect is a consequence of the purpose of this study. Nevertheless, a review of the literature also supports using this attribute (see Table 1). This is the case of the works by Jaeger *et al.* (2001) or Nelson *et al.* (2005) on fruits, Sánchez *et al.* (2000, 2001a), Frank *et al.* (2001) or Dagupen *et al.* (2009) on vegetables, and Huddleston *et al.* (2000), Orth & Firbasova (2003), Bernabéu *et al.* (2007) or Menapace *et al.* (2011) on other food products, *e.g.,* honey, meat, eggs or organic food. Selecting levels for 'country of origin' responds to the goals of the present investigation too. Thus, Germany —in addition to being the context under study— was considered given that this country has a very important summer production. The Netherlands is included because it is one of the most important markets competing with Spanish production. Finally, Spain is one of the most important suppliers of vegetables to Germany. For this reason, along with the fact that this study has been developed in Spain, Spain was also considered.

With regard to *production method*, including it is a consequence of both the literature review and the purpose of this investigation. With regard to the former, there are many previous works highlighting that production method is also an extremely important at-

tribute for evaluating preferences for food purchases (*e.g.,* Holland & Wessells, 1998; Bernabéu *et al.*, 2007; Menapace *et al.*, 2011). There are even many works focused on vegetables that include this attribute (*e.g.,* Sánchez *et al.*, 2001a; Campbell *et al.*, 2004; Dagupen *et al.*, 2009). In addition, considering *production method* makes it possible to analyse consumer preferences for ecological products. This is especially relevant for Germany[1]. Indeed, as Montaner & Uzcanga (2007) point out, about 91% of German households consume some ecological food, while 45% purchase this type of product frequently. With regard to ecological fruit and vegetables, only 2% of Germans declare that they never consume such products, while over 50% purchase them very frequently or always.

Finally, *freshness* was included because of its importance in many previous studies analysing vegetable consumers' preferences (*e.g.,* Zind, 1990; Babicz-Zielinska, 1999; Ragaert *et al.*, 2004). More recently, Dagupen *et al.*'s (2009) conjoint analysis-based study also considered *freshness*. In addition to the main role of *freshness* in previous literature, including this attribute in the present study is a consequence of the conclusions of the study titled "*Fruits and vegetables: change in consumers' habits*", developed by the GfK German Institute and published in 2003 in the German market news bulletin (#4) of the Spanish Trade Office in Dusseldorf (ICEX, 2003). In this study, *freshness* appeared as the attribute most valued by the German consumer. More recently, a study also developed by the Spanish Trade Office in Dusseldorf (ICEX, 2011) related to the Fruit Logistica 2010 Fair also pointed out that German consumers still prefer "fresh vegetables".

Assigning levels to the *freshness* attribute is difficult given that it is an intrinsic attribute. We opted for considering three levels (very fresh, fresh, and not very fresh). Table 4 shows the levels assigned to each attribute. As Table 4 shows, this is a factorial design consisting of three factors at three levels and one factor at two levels. The number of profiles resulting from the combination of all the levels of the four attributes is 54, which is too many stimuli for respondents to be able to make a coherent evaluation. To reduce the number of stimuli, from the different methods available (fully random designs, random block designs, latin square designs, etc.) we used an orthogonal fractional

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[1] A study entitled "*Los mercados mundiales de frutas y verduras orgánicas* (*Global markets of organic fruits and vegetables*)" (FAO, 2003) indicates that "Germany is the country with the longest tradition in the consumption of organic and dietetic vegetables".

Table 4. Attributes and attribute levels

Attribute	Attribute levels		
Price (€ kg^{-1})	1	2	3
Freshness	Very fresh	Fresh	Not very fresh
Origin	Germany	Spain	Netherlands
Production method	Ecological	Non-ecological	

factorial design, since this method requires less information from the respondent (Green & Srinivasan, 1990). This method permits estimation of just the main effects of the attributes, and avoids the interaction between them. Moreover, the orthogonal experimental design also allows the researcher to determine the minimum number of combinations needed to be able to accurately estimate the respondent's preference function, considerably reducing the initial number of stimuli. Thus the *Orthoplan* command in SPSS 14.0 was used, and nine combinations were obtained.

The full-profile method was used to collect the data. With a limited number of factors — as is the case here — and in a context with a high correlation between the factors, the full-profile method probably offers the best predictive validity.

Raghavarao *et al*. (2011) point out that up to four different types of design are now available. Designs can be based only on brands, only on attributes, on both brands and attributes, or on both brands and attributes with interactions at two levels. In the design that uses only attributes, which is the one used in the current work, the utility that the profiles generate breaks down into additive components and if the variable is a ratio or interval scale a vectorial coding may give a good approximation. But if the variable is nominal, the only option is to use the part-worth function for categorisation. In this case, and considering a symmetric factorial experiment, the utility function is as follows:

$$y_i = \beta_0 + \sum_{j=1}^{n} \sum_{i=1}^{m} \beta_{ij} x_i + e_i \qquad [1]$$

where β_0 is the general mean, β_{ij} the effect of factor i at level j, x_i the design matrix, and e_i the random error.

Estimation method

As mentioned previously, metric and non-metric methods were used to test the solidity of the results in terms of consistency of preferences between the meth-

ods. The two estimation methods chosen (OLS and Logit) have some important differences, but in both cases this analysis started from an additive model, since it is considered that the overall judgement of the product is obtained by summing the individual evaluations of each attribute (Steenkamp, 1987). Moreover, the additive preference model is one of the most commonly used models in the marketing literature, and the one that best tends to explain individuals' preferences (Hair *et al*., 1998). This model assumes that each attribute level participates independently, and that the individual's total utility is the sum of the utilities of the different levels (Ness & Gerhardy, 1994).

Given the attributes selected, the conjoint model is expressed as follows:

$$preference = \beta_0 + \sum_{i=1}^{n} \beta_{1i} D_{1i} + \sum_{j=1}^{m} \beta_{2j} D_{2j} + $$
$$+ \sum_{k=1}^{p} \beta_{3k} D_{3k} + \sum_{l=1}^{q} \beta_{4l} D_{4l} + e_t \qquad [2]$$

where β_{1i}, β_{2j}, β_{3k} and β_{4l} are the coefficients (partworths) associated with levels i ($i = 1, 2, …, n$), j ($j = 1, 2, …, m$), k ($k = 1, 2, …, p$), and l ($l = 1, 2, …, q$) of the attributes price (1), freshness (2), origin (3), and production method (4), respectively, and D_{2j}, D_{3k} and D_{4l} are the *dummy* variables of each attribute. The levels of each attribute are deemed to be categorical (except for price, which is continuous).

The following now briefly explains the main differences between the two estimation methods chosen: (1) ordered least squares, and (2) ordered Logit.

Estimation by ordinary least squares

The model to be estimated using the classic least-squares methodology, given the attributes and levels discussed above, is as follows:

$$preference = \beta_0 + \beta_1 PR_t + \beta_2 FR_{1t} + \beta_3 FR_{2t} + $$
$$+ \beta_4 OR_{1t} + \beta_5 OR_{2t} + \beta_6 PM_t + e_t \qquad [3]$$

where PR_t = price; FR_{1t}= dummy variable that equals 1 if freshness of cucumber is very high, 0 otherwise; FR_{2t}= dummy variable that equals 1 if freshness is high, 0 otherwise; OR_{1t} = dummy variable that equals 1 if origin of cucumber is Germany, 0 otherwise; OR_{2t} = dummy variable that equals 1 if origin is Spain, 0 otherwise; and PM_t= dummy variable that equals 1 if cucumber is ecological, 0 otherwise.

The values assigned to *preference* range from 1 (minimum preference) to 10 (maximum preference).

Estimation by ordered Logit models

This type of model assumes that the values of any variable can be classified in a set of ordered categories. In the current case, and bearing in mind the frequency distribution of the values measured in the variable "preference", this study followed Sánchez & Gil (1998) and classified them in three categories: (1) score less than or equal to 3; (2) score between 4 and 7; and (3) score greater than or equal to 8.

The model to be estimated using the ordered Logit methodology is very similar to that of the typical linear regression. The underlying model can be expressed as follows:

$$Y_t = \beta_0 + \beta_1 PR_t + \beta_2 FR_{1t} + \beta_3 FR_{2t} + \\ + \beta_4 OR_{1t} + \beta_5 OR_{2t} + \beta_6 PM_t + e_t \quad [4]$$

where the explanatory variables are the same as those in [3], e_t is a sequence of random disturbances, and Y_t is the underlying preference assigned to the cucumber, the vegetable analysed here. The variable Y_t is not observable, but it is possible to know the category to which it belongs, depending on the preference assigned to the vegetable. In this case, the variable Y_t is assigned the values 0, 1 and 2 for the categories 1, 2 and 3, respectively. Sánchez & Gil (1998) and Holland & Wessells (1998) use this model of conjoint analysis.

Results

Table 5 shows the results of the estimations using the two methods. As Table 5 shows, all the parameters of the attributes are significant regardless of the estimation method, which shows that the initial choice of attributes was appropriate. The signs of the coefficients are similar in the two cases. Thus, the coefficient for price is negative, which indicates that the consumer's preference declines as the price increases, while the positive values associated with the origins Germany and Spain indicate that the German tourists analysed prefer German and Spanish cucumbers to Dutch ones. The positive values of the levels fresh and very fresh indicate that such individuals prefer these to less-fresh cucumbers. It is also interesting to note that the German tourists prefer ecological to non-ecological cucumbers.

The previous parameters were used to determine the utilities of each level in each attribute of the vegetable analysed. However, the partial utilities (part-worths) were used to determine the relative importance of each attribute in the evaluation process (Table 6). The SPSS program itself gives these results in the case of OLS estimation, while the following expression gives the relative importance of attribute (*i*) in the Logit estimations (Halbrendt *et al.*, 1991):

$$\textit{Relative importance } (i) = \\ = \frac{Range(i)}{\sum Range(i)} = \frac{\max U_i - \min U_i}{\sum (\max U_i - \min U_i)} \times 100 \quad [5]$$

Table 5. Parameters estimated from conjoint preference model

Variable	β (OLS[a])	t	β (LOGIT[a])	t
Constant	1.368	4.859	0.782	14.443
PR	−0.336	−3.518	−0.085	−4.626
FR1	3.345	17.501	0.757	19.779
FR2	2.218	11.609	0.553	14.039
OR1	2.378	12.444	0.444	11.961
OR2	1.311	6.860	0.319	8.482
PM	1.934	8.530	0.256	7.764
R^2	0.344		0.237[b]	
Log-likelihood			−2,493.126	
Chi-square			1,606.9513	

[a] All parameters are significant ($p < 0.001$). [b] *McFadden R^2*.

Table 6. Estimated part-worths and relative importance (RI, %) of key attributes

Attributes	Level	OLS utility	RI	LOGIT utility	RI
Price			13.68		4.29
	€1	−0.336		−0.519	
	€2	−0.672		−1.038	
	€3	−1.008		−1.558	
Freshness			37.15		52.24
	Very fresh	1.490		4.682	
	Fresh	0.364		3.181	
	Not very fresh	−1.854		−7.863	
Origin			30.47		30.54
	Germany	1.148		3.150	
	Spain	0.081		1.785	
	Netherlands	−1.230		−4.935	
Production method			18.70		12.94
	Ecological	0.706		1.934	
	Non-ecological	−0.706		−1.934	

where the range of an attribute is the difference between the maximum and minimum utilities.

The results show that the importance of the four attributes differs slightly depending on the estimation method, although their order of importance coincides. With respect to utilities obtained, in both cases the combination of low price, ecological production method, German origin and medium freshness is preferred.

Thus both methods of estimation point to freshness as the most important attribute. Nevertheless, the two methods differ in the level of importance they assign to this attribute. Thus, the relative importance of freshness is stronger in the Logit model (52.24%) than in OLS (37.15%). Relative importance also differs between methods of estimation for both price (13.68% and 4.29% for the OLS and the logit method, respectively) and production method (18.70% and 12.94%). Country of origin — the second most important attribute — is assigned a similar level of importance (about 30%) by both methods.

Discussion

The results of the current work underline the importance of two attributes in the German tourist's process of evaluation of the cucumber; freshness and country of origin. A number of studies in the marketing literature have stressed the importance of freshness as one of the aspects with the most influence on the consumption of food in general (*e.g.* Lappalainen *et al.*, 1998; Sloan, 1999; 2003; Cardello & Schutz, 2003) and of vegetables in particular (*e.g.* Buitrago, 1994; Rivera, 1995; Babicz-Zielinska & Zagorska, 1998; Ragaert *et al.*, 2004). Indeed, Steenkamp (1997) indicates that freshness is the key attribute in the evaluation of the quality of foodstuffs, being more important than aspects such as quality, price and reputation of brand/origin. With regard to the country of origin, our results confirm the conclusion of a large number of studies that have found that consumers' product evaluations and buying intentions are related to the origins of the products (for relevant literature reviews, see Papadopoulos & Heslop, 2003; Srinivasan & Jain, 2003; Pharr, 2005). In addition, our results suggest a certain level of ethnocentrism in German tourists' evaluation of the origin of vegetable products. This result is in accordance with the large role of consumer ethnocentrism in their evaluation of food products shown by many authors (*e.g.,* Huddleston *et al.*, 2000; Orth & Firbasova, 2003; Chinen, 2010). Knowing this characteristic of consumer behaviour is fundamental because highly ethnocentric consumers tend to process information about foreign brands at a much lower level, predisposing them to judge domestic brands much more favourably than foreign ones despite their insufficient knowledge about the latter (Supphellen & Rittenburg, 2001). Consequently, it is clearly very important to consider consumers' ethnocentric tendencies since they could condition the consumers' perception of the attributes and their consideration of each of them in the evaluation process.

From the methodological perspective, the results of this study show a high statistical significance regardless of whether a numerical variable (estimation by OLS) or an ordinal one (Logit estimation) is used to represent consumer preferences. Moreover, the order of importance of the different attributes remains the same, with freshness, an intrinsic attribute, always being the most important attribute in German consumers' evaluation process. Nevertheless, slight differences do exist in the level of importance of the different attributes in function of the estimation methods used, since the difference between the most and least important attributes is greater for both the ordered Logit than for the OLS.

The results of this study offer a number of important implications for the management of vegetable marketing. Thus an understanding of the role of the country of origin and consumers' image of countries — an extrinsic attribute —, may help in the formulation of global marketing strategies. In this respect, we advise marketers to stress the origin of the vegetables using, e.g., distinctive signs. In this context, Protected Designations of Origin (PDOs) as labels indicating a linkage with the geographical environment at every stage of agricultural production and agro-industrial processing might be a plausible way for differentiating vegetables.

Moreover, given that aspects such as freshness continue to be fundamental in the consumer's evaluation of vegetables, marketers should consider the importance of this attribute to the consumer and try to position the product in the destination markets on the basis of product freshness. In order to enhance the freshness of their vegetables, marketers should put special effort into logistic chains and design of the channels of distribution. The objective is to reduce the time that elapses from when the product is ready for eating and when it is available for purchasing at the point of sale. This is especially crucial in the case of vegetables commercialised in foreign markets.

Clearly, this research exhibits limitations, and leaves ample opportunities for future research. The first limitation involves the use of German tourists visiting Almería. Although Almería is a well-known address for German tourists, the question of how representative they are of the overall German population is worth raising. Another limitation is the fact that the sample is drawn from German people who have been visiting Spain. It is conceivable that consumers' product evaluations — especially those evaluations related to the origin of the product — might be significantly influenced by consumers' actual knowledge of country of origin. Generalization of our results using a sample of Germans who have never been in Spain will be a useful area of further research. In addition, the data was collected in the summer — the highest point of vegetable production in Germany. This may have conditioned consumers' perceptions about the different attributes, in particular country of origin. Thus we would recommend that authors of future research collect their data at other times of the year (*e.g.,* winter), when the availability of home-produced vegetables is lower. Another limitation is the fact that the sample It would also be useful to validate the results obtained in the current work with other nationalities and/or other types of vegetables. Researchers could then compare the preference structure they observe with that of the current work, and confirm whether different estimation methods give similar results. Finally, it would be interesting to replicate this research when a particular circumstance is taking place. This is the case of the recent problem (May 2011) with the *Escherichia coli* bacterium which mainly affected the Spanish cucumber. It would be very interesting to know whether a circumstance like this may influence the respective roles of extrinsic and intrinsic attributes.

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