

A NEW MARKETING SEGMENTATION APPROACH BASED ON MARGINAL INDIVIDUAL UTILITIES: APPLYING CRM IS NOT A CHIMERA ANYMORE*

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ABSTRACT

In the advent of Customer Relationship Management, a more accurate profile of the consumer is needed. The objective of this paper is to show the usefulness of knowing consumer's complete utility function through his/her marginal utilities. This approach allows one to form groups of individuals with similar preferences (as traditional segmentation methods do) and to treat them individually (which represents an advance). The empirical application is carried out, on a sample of 2,127 individuals, in the context of tourism, where the customer relationship management philosophy is gaining more and more relevance.

KEY WORDS: Customer Relationship Management, Marginal Individual Utility, Mixed Logit Model.

RESUMEN

Con la llegada de la Gestión Relacional del Cliente, las organizaciones requieren un perfil del consumidor más preciso. En este contexto, el objetivo del presente trabajo consiste en proponer una segmentación apoyada en las utilidades marginales de las funciones de utilidad completas de cada individuo. Este enfoque permite formar grupos de individuos con preferencias similares (como los procedimientos habituales de segmentación) y también tratarlos de forma individual (lo que representa una novedad). La aplicación empírica se desarrolla en una muestra de 2.127 individuos en el contexto turístico, donde la filosofía de la gestión relacional del cliente está cobrando cada vez mayor importancia.

PALABRAS CLAVE: Gestión Relacional del Cliente, Utilidad Marginal Individual, Modelo Logit Mixto.

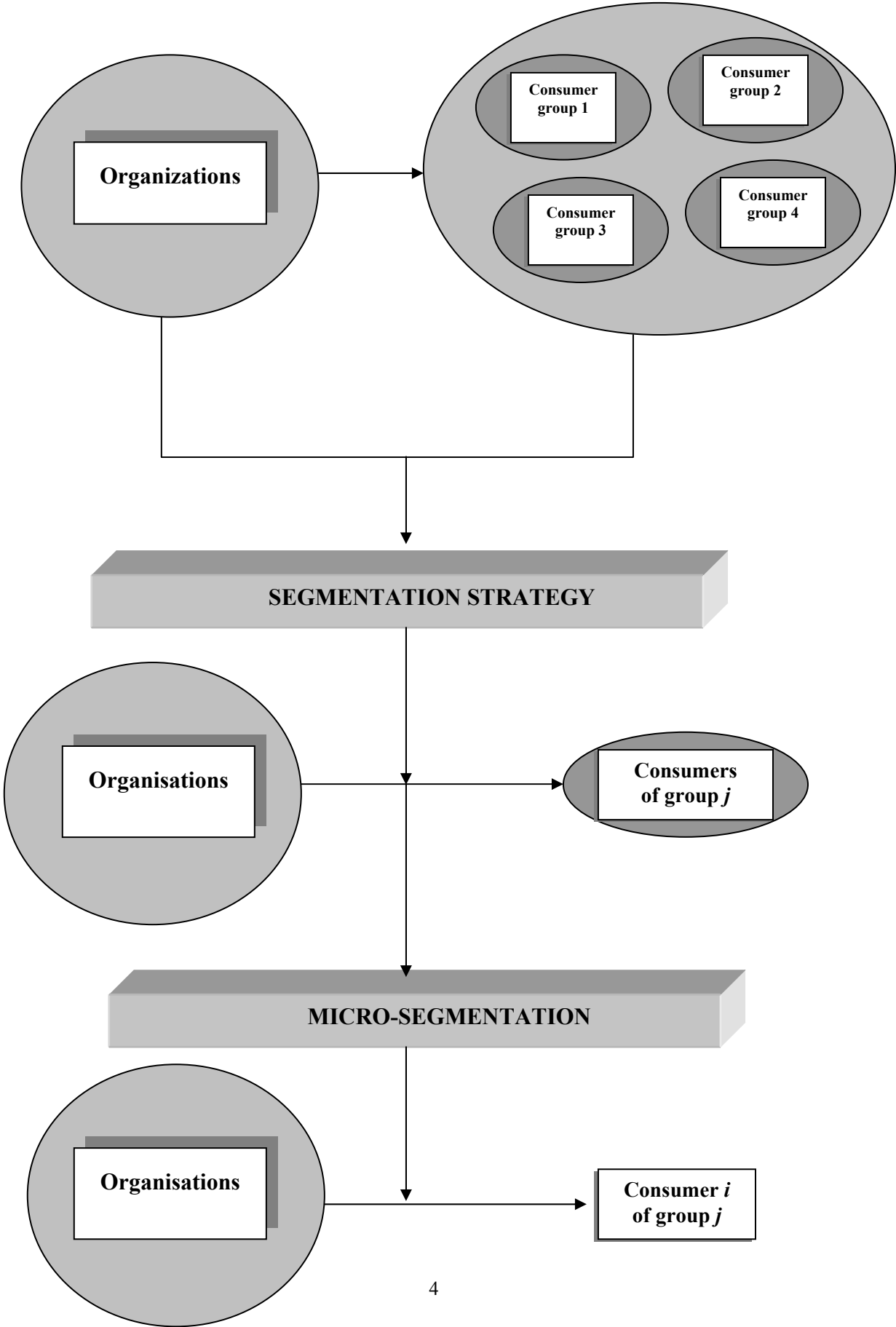
1. INTRODUCTION

The existence of strong heterogeneous demand looking for product and service provision adapted to its specific needs, along with the intensification of competition in the market, has led to segmentation becoming fundamental to the marketing strategies of organizations. Basically, the heterogeneity of the market reflects the existence of a diversity of needs and desires and, therefore, of differentiated consumer behaviour among individuals. Because of this, companies, in order to identify their target customer types and accurately find their characteristics, use market segmentation strategies that form and select typologies or groups of individuals in the market to develop marketing products and programmes adapted to each group. However, despite the fact that segmentation allows the definition of different market segments that group consumers with shared behaviour and needs and with a well defined reaction to the availability of different products, nowadays there is more and more importance attached to personalised service for each client. More pro-active consumers and an intense competition increase the demand for better service, better adapted to their individual needs and, therefore, personalised. Customers expect to be treated as individual clients. This situation leads to the appearance of one-by-one marketing, which entails individual consideration of consumers and a one-by-one service. This approach is the basic pillar of relationship marketing -and, therefore, the application of CRM (*Customer Relationship Management*)-, which is designed to create, strengthen and maintain relationships between companies and their customers, in order to maximise income per customer.

With this relationship marketing approach, the application of the segmentation strategy entails the identification of the most profitable customers to establish a close relationship with them, bearing in mind their needs and adapting products accordingly. In summary, mass marketing has been transformed into fragmented or micro-segmented marketing to satisfy the demands of smaller and smaller segments, even down to the level of the individual customer (see Figure 1).

The maintenance of a continuous long-term relationship with consumers requires knowledge of their behaviour; and this implies observation of their purchase decisions. Underlying this matter is the concept that knowing how individuals make their purchase choices allows us to identify the factors that lead them to opt for particular alternatives; i.e.

FIGURE 1. From mass marketing to micro-segmentation



the choice process that reveals their preferences. In this sense, Bronner and De Hoog (1985) show that the manner in which individuals make decisions is an appropriate aspect to use as a base for market segmentation. Following this proposal, some studies use individual decision making process to identify market segments (Woodside and Carr, 1988; Hsieh et al., 1997; Decrop and Snelders, 2005). However, these decision making processes are analysed at a segment level, with no identification of the decision process at an individual level.

Alternatively, this study presents the innovation of identifying decision processes individual by individual. To achieve this, we propose a segmentation of the tourism market based on revealed preferences towards a destination at an individual tourist level; in other words, the real destination choices made by a tourist. These real choices reveal preferences in tourist destinations; the method has the twofold implication that it allows us to form groups of tourists with similar preferences or to treat them individually¹. Moreover, this analysis is based on *real choices* made by individuals, which avoids the measurement errors of segmentation criteria that use subjective variables, based on evaluations or declarations of intent.

With this objective, the subsequent sections of this study are arranged as follows: The second section reviews the analysis of choice in tourism, in which we state the importance of studying the choice behavior of tourists, we examine the fundamentals of choice through *revealed preferences* and compare them to *stated preferences*, we study how to introduce heterogeneity into the modelization of tourist choice and we review the literature of destination choice in order to propose its determinant attributes. The third section presents the research design, in which we detail the methodology applied and the sample and data used. The fourth section shows the results obtained, both from the estimation of the utility function for each tourist and from the segmentation analysis. In the fifth and final section we summarise the main conclusions reached, the implications for management and future lines of research.

¹ Note that the use of individual data allows us to either treat tourists one by one or to form segments from the individual data. In sections 4.1 and 4.2 we exemplify these options.

2. Choice in tourism and micro-segmentation of the market

Tourist decision making processes are often examined at a segment level, with no identification of individual level processes. Drawing upon the literature, we argue that the way in which individuals make decisions is an important aspect for the segmentation of the tourism market. In this sense, we discuss the importance of analysing tourist choice and its implications to management; and we review revealed as opposed to stated preferences, as well as the introduction of heterogeneity in the modelization and the determinants of tourist choice.

2.1. Choice in Tourism

The analysis of choice in the field of tourism entails the study of one of the fundamental processes of the tourism system (Monfort et al., 1996). We should not forget that choice is a crucial phase in the buying process, from the perspectives of both the tourist and the tourism service provider organizations. For the tourist, the choice of a purchase option represents the end of a process in which s/he has invested effort and time in the search for information and subsequent comparison, in order to satisfy a previously identified need. Therefore, a final decision is of great importance, not only because the tourist has been implicated in a buying process to make the most of the energy and financial outlay involved, but also because the chosen alternative will determine his/her future satisfaction.

From the point of view of tourism organizations -public and private-, the choice made by a tourist to buy their services, is the moment at which their investment is materialised, from the most intrinsic such as R+D, to the most visible such as promotion campaigns. Evidently, when resources are designated for a tourism product or service, from their conception to their commercialisation, the objective is for them to be selected from among the various alternatives available to consumers. However, in the current competitive environment, the reaching of this is complicated, as tourism organizations not only have to adequately meet their customers' needs, but they also have to do so at higher standards than the competition. This is of more importance if we consider that the consumer culture is more and more prevalent in society, so that individuals are not prepared to choose a service that they could obtain with better conditions from a rival destination or company. Hence, success will only be found by organizations that are valued by the market; in other words, those that provide products and services that individuals are willing to buy (Kotler, 2003). In this regard, the concept of

differentiation with respect to rivals reaches its maximum importance (Anderson et al., 1992), being a vital factor for assuring market survival. Therefore, tourism organizations should know the valuation that tourists give to their products and note the aspects that lead to their selection.

In virtue of the above, the analysis of individual choice behavior and its determinants is fundamental for organizations in order to explain the success of tourism marketing actions, identify the aspects most valued by customers and estimate demand changes resulting from modifications to these aspects. Moreover, by recognising the way in which tourists optimise their actions and the circumstances under which they reach this optimum situation, tourism organizations can reproduce them for as many people as possible. In fact, De Rus and León (1997) show that the analysis of holiday choice is of vital importance for both tourism companies and public institutions, insofar as individual tourist decisions act as a guide to their actions. Additionally, tourism companies use the tourist decision making process as a starting point when analysing demand behavior and, in this way, adjust their supply. Therefore, the success of marketing actions is determined by knowledge of the factors that affect tourist choice. In addition, public bodies are interested in this analysis in order to attain better organization and implementation of their tourism policies, whether they are aimed at revitalising already consolidated areas or at identifying new opportunities, which ultimately allows them to foment sustainable tourism development and increase social wellbeing through financial income.

The literature of choice in tourism develops various theories and micro-economic models to formally represent tourist decisions; most of which follow the proposals of Rugg (1973) and Morley (1992) from the extension of the Neoclassical Economic Theory of Lancaster (1966), in which they suggest that the attributes of the available choices are key elements of the decision; and the proposals of Morey (1984, 1985) and Eymann (1995) based on the household production function of Becker (1965), in virtue of which they propose that tourists *produce* their own satisfaction through the products they acquire.

One aspect of these theories to be highlighted is that they are based on the calculation of utility functions, which links them to the Theory of Random Utility. Moreover, the fact that they are not capable of collecting interpersonal and intrapersonal differences among tourists leads the majority of authors to apply discrete choice models (Jen and Fesenmaier, 1996). Discrete choice models distinguish revealed and stated preferences, which we will discuss below.

2.2. *Revealed Preferences vs. Stated Preferences*

Basically, the tourist processes and integrates information to choose an alternative (e.g. destination, type of accommodation or method of transport) that maximises utility. The objective or subjective character with which the researcher examines the result of this choice process determines the different approximations of analysis of choice.

The study of tourist behaviour and, therefore, of the way in which they process, evaluate and integrate the information used to make a decision, is traditionally made in two ways. The first approximation is centred on the analysis of the *real choices* made by individuals (Ben-Akiva and Lerman, 1985). This approach is based on the Neoclassical Economic Theory and the Theory of Discrete Choice, and assumes the existence of *preferences* that are unobservable to the analyst but that tourists implicitly consider when ranking alternatives, and which are only *revealed* through the real purchase choice. Therefore, this approximation is known as the *Revealed Preferences* approach.

The second approach examines the ranking or scoring according to *preferences*, given by individuals to hypothetical choice alternatives. This approximation is based on the Information Integration Theory and the Social Judgement Theory, and assumes that the decision maker is capable of ranking alternatives according to his/her preferences (Timmermans and Golledge, 1989; Batsell and Louviere, 1991). In contrast to the previous case, the analyst does not observe the real purchase choice, given that the individual only makes a *declaration of intent* based on his/her preferences (i.e. which alternative would be chosen if he/she had to choose from the given possibilities). This approximation, therefore, is known as the *Stated Preferences* approach.

To give an example, an individual declares that Hawaii is the destination he/she would like to go to on his/her next holiday. In other words, the individual selects Hawaii from a series of destinations and, through this *declaration*, preferences are analysed. However, this aspect has been widely criticized, due the fact that this approach does not reflect reality in the sense that the declaration of the preferred alternative of an individual does not necessarily coincide with his/her real behaviour, i.e. with the alternative that is really chosen (Kroes and Sheldon, 1988). The fact that an individual *declares* that he/she would like to go to Hawaii on his/her next summer holiday does not necessarily mean that he/she will go there in the end.

Conversely, the *Revealed Preferences Approach* analyses the real choices made by tourists in order to obtain their preferences. In the example above, the individual *reveals* his/her preferences when, from a group of destination choices, he/she chooses and goes to Hawaii.

2.2.1. Individual Revealed Preferences

One of the weak points of the *Revealed Preferences Approach* derives from the fact that the estimation of preferences is made at a global sample level, which does not allow representation of individual level preferences. If U_{in} is the utility of alternative i for tourist n , explained through the personal characteristic x_n of individual n and through attribute z_i of the same alternative i . The utility function is expressed as

$$U_{in} = \alpha_i + x_n \beta_i + z_i \gamma_i + \varepsilon_{in}$$

where α_i is the utility constant, β_i and γ_i are the parameters that measure (respectively) the effects of characteristic x_n of the individual and attribute z_i on the utility of alternative i and ε_{in} is the error term.

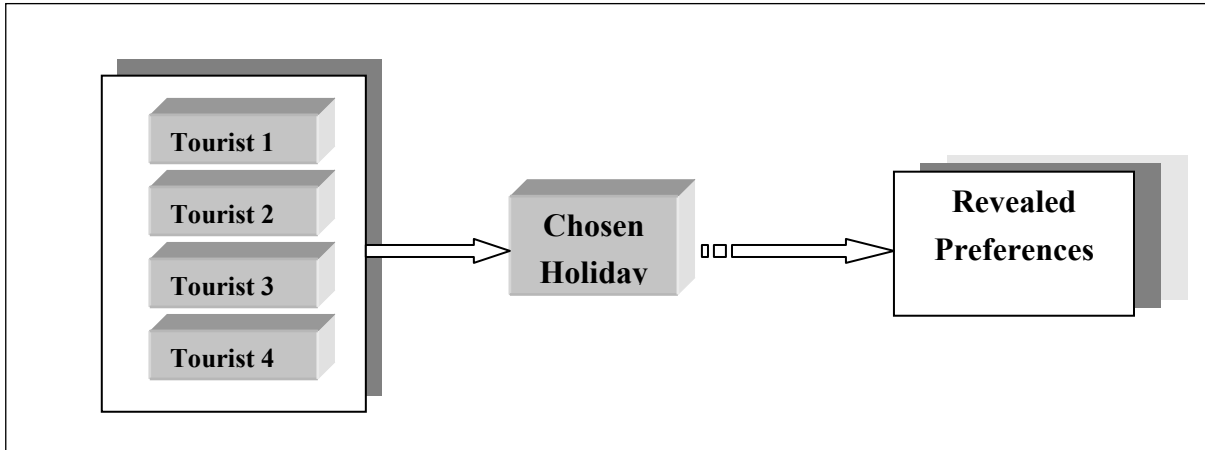
Specifically, β_i and γ_i represent the marginal utilities of individuals of alternative i ; and these parameters allow us to answer questions such as “If a destination improves one of its attributes (for example, the quality and cleanliness of its water), to what extent would preferences for this destination increase?”. The value of this instrument for the decision making of tourism organisations is indubitable, as it allows them to know the responses of a series of people to this improvement. However, note that the estimations of parameters β_i and γ_i are made at the global sample level (similar to the parameters obtained through regression analysis) (see Figure 2).

This is where the study takes tourist choice a step forward by proposing the estimation of these parameters tourist by tourist, so that

$$U_{in} = \alpha_i + x_n \beta_{in} + z_i \gamma_{in} + \varepsilon_{in}$$

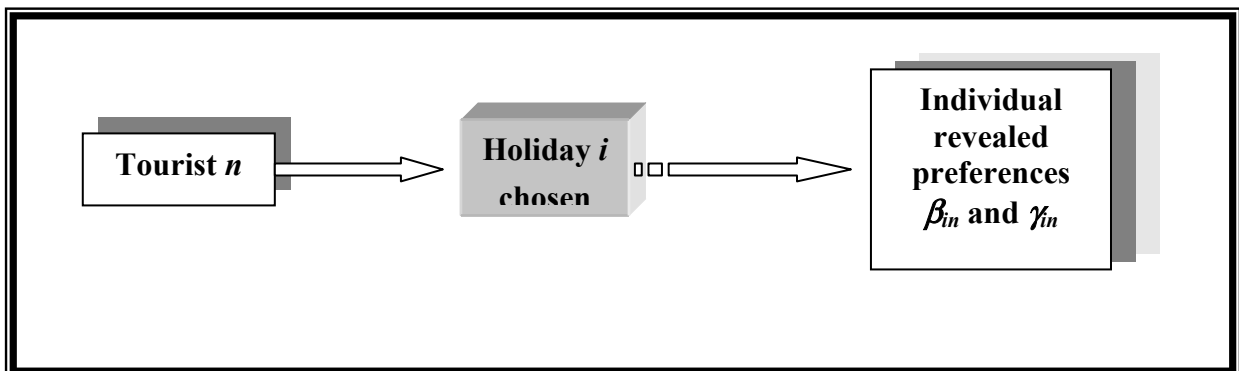
where, in this case, β_{in} and γ_{in} represent the preferences of tourist n around alternative i . Note that now we obtain a parameter for each tourist (and not for the whole sample) (see Figure 3).

FIGURE 2. Obtaining the sample *Revealed Preferences* through the observation of the choices made



Source: Own work.

FIGURE 3. Obtaining Individual Revealed Preferences through the observation of choices made



Source: Own work.

The main implication of knowing the tourist by tourist preference structure is that it allows the adaptation of each product to each individual, as well as the formation of groups of individuals with similar preferences.

In the next section, we review the different ways that the literature deals with this diversity of individual preferences in the choice models, stressing the advantages of our proposal.

Introduction of heterogeneity into choice models

The introduction of the heterogeneity of individual preferences into the analysis of the choice process has awoken growing interest in recent years (Sorensen, 2003). This is due to the fact that the presence of heterogeneous preferences could provoke biased and inconsistent estimations in the choice models that do not explicitly consider it (Hsiao, 1986).

One of the procedures proposed in the literature to avoid this problem incorporates heterogeneity of preferences by estimating choice models that assume the existence of differentiated response parameters for each individual². The most used models in this approach are the random effects models³, which model heterogeneity with the assumption that the coefficients of the utility functions of each individual vary according to the probability distribution, either continuous -which gives rise to the Random Coefficients Logit Model- or discrete -which leads to the Latent Class Logit Model-. Initially, the Latent Class Logit Model has been widely accepted in the literature of segmentation due to the fact that the estimation of the *mass probabilities* - or points where the distribution reaches the greatest *probability masses* (Jain et al., 1994) allows identification of *latent segments* in the market, which are represented by groups of individuals with similar response profiles. Moreover, in order to segment the market, discrete distribution has an advantage over continuous distribution in that there is no need to assume a concrete probability distribution, as the segments are obtained through empirical data⁴ (Cavero and Cebollada, 1999). However, the discrete approach has two important limitations (Allenby et al., 1998; Allenby and Rossi, 1999): i) the estimation becomes complex with six or more *mass probabilities*, which hinders the

² Alternatively, heterogeneity has been collected as follows (González Benito, 2000): i) applying discrete choice models to different market segments, defined a priori through the similitude of certain characteristics of the individuals (Currim, 1981). This implies a priori definition of the segments through certain common personal characteristics in order to estimate a choice model for each group, and finally testing the differences of the parameters of each specification; and ii) directly incorporating the characteristics of the individuals into the models (Ben-Akiva and Lerman, 1985). The personal characteristics are used as covariates, thus allowing prediction of the choice of any individual, independently of his/her socio-demographic profile.

³ For their part, the fixed effect models entail the application of discrete choice modelization to a single individual through a longitudinal sample of his/her choices (purchase history), which allows one to obtain individual estimations of the coefficients (Chintagunta et al, 1991). However, the use of these models has important restrictions derived from the available information; because the number of observations for each individual is usually low, and the choices made are limited to the available options, which leads to the apparition of parameter identification problems (Rossi and Allenby, 1993).

⁴ Heckman and Singer (1984) show that discrete distributions have enough flexibility to approximate any distribution function with a sufficient number of supports.

capture of the complete sample heterogeneity; and ii) the impossibility of identifying the preferences of individuals situated beyond a certain threshold of the distribution function (e.g. in the distribution tails).

Because of this, some authors consider that the optimum method of capturing market heterogeneity is to estimate the parameters of each individual, as this allows the capture of any individual preference structure (Allenby and Rossi, 1999). Following this approach, Revelt and Train (2002) suggest a two-stage market segmentation technique. The first stage is the estimation of the individual utility functions of a Random Coefficients Logit Model with simulation methods (based on the Bayesian estimation of Rossi and Allenby (1993)); this is followed by a second stage application of a cluster analysis to the individual parameters of the attributes of the utility function in order to form segments of individuals. This approach is based on the application of the Random Coefficients Logit as Greene and Hensher (2002) suggest that, although the two approximations (Random Coefficients Logit and Latent Class Logit) offer alternative methods of capturing unobserved heterogeneity, the Random Coefficients Logit Model (even though it is fully parametric) has enough flexibility to provide a tremendous range within which to specify individual unobserved heterogeneity. This flexibility can even offset the specificity of the distributional assumptions.

The logic is the differentiation between the distribution of tastes in the population and the distribution of tastes in the subpopulation of people who make particular choices. The distribution of the random parameter vector β in the population of all people is $g(\beta/\theta)$, where θ are the parameters of this distribution (e.g., mean and variance). Let's assume that every one in the population faces the same choice situation described by the same variables z and some people will choose alternative i . Evidently, the tastes of these people selecting alternative i are not the same, therefore, their distribution is $h(\beta/i,z,\theta)$. Note that this distribution conditions on i , while the distribution of the entire population $g(\beta/\theta)$ does not. If we were to know nothing about an individual's past choices, then the best we can do when describing his/her tastes is to say that his/her coefficients lie somewhere in $g(\beta/\theta)$. However, if we have observed that the person made choice i when facing a situation described by z , then we know that that individual's coefficients are in the distribution $h(\beta/i,z,\theta)$. Since $h(\beta/i,z,\theta)$ is tighter than $g(\beta/\theta)$, we have better information about this individual's tastes by conditioning on his/her past choices.

With the advantages of operating with individual utility functions and the fact that we can find no previous application of this procedure in Tourism Marketing, the objective of this study is to segment the tourism market through the individual revealed preferences of tourists.

In order to place the study within the framework of tourist destination choice, the following section reviews the tourism literature on this subject, in order to propose the determinant attributes to be used as segmentation criteria.

2.3. *Tourist destination choice*

The analysis of tourist destination choice represents one of the most fruitful lines of investigation in Tourism studies (Fesenmaier et al., 2002), and distinguishes various approaches to the definition of tourist destination. One thread bases itself on destination type (discrete nature), such as regional or national natural parks (Wennergren and Nielsen, 1968; Perdue, 1986; Borgers et al., 1989; Fesenmaier, 1988; Morey et al., 1991; Dubin, 1998; Train, 1998; Riera, 2000; Adamowicz et al., 1994; Adamowicz et al., 1998; Schroeder and Louviere, 1999). Another approach defines choice alternatives (destinations) through the aggregation of geographical areas according to administrative units, geographical proximity and individual perceptions of similarity. The first criterion correlates the alternatives with countries as administrative areas (Haider and Ewing, 1990), which implies a consideration within one alternative of all the destinations found in a country. This approach allows for analysis of the global attraction of an administrative unit, which facilitates tourism decision making by public administrators as, in the final instance, it is the administrative division which determines lines of action. However, this partition can present problems in geographical areas which are shared between administrative frontiers. If two neighbouring regions have similar attraction to tourists, their degree of substitution will be higher than that of others, which could violate the assumption of Independence of Irrelevant Alternatives of the Multinomial Logit Model.

The second criterion aggregates the alternatives by their geographical proximity (independently of their administrative partition), defining the so called “macro-destinations” or “macro-site” (Siderelis and Moore, 1998). However, this procedure presents inconveniences (Fotheringham and O’Kelly, 1989): i) this destination grouping by the dimension of *space* is not direct due to its continuous nature, meaning that the delimitation of macro-destinations cannot always be made with clarity with the position of the divisionary lines being left to the discretion of the analyst. Moreover, incoherent

situations can arise, such as the case of two neighbouring destinations which belong to different macro-destinations and are not treated as substitutes when they should be. ii) Among the destinations of a macro-destination there can be a hierarchical order based on spatial separation, which implies that these destinations are not equally substitutable, thus violating the axiom of transitivity. iii) The composition of two groups of alternatives is not constant for all individuals, as people situated in different places have different perceptions of space and, therefore, of macro-destinations.

The third criterion aggregates tourist destinations by similitude of tourist perceptions (Eymann and Ronning, 1997). In essence, it tests whether parameters referring to these individual perceptions vary significantly among the alternatives of different groups, applying the test of Cramer and Ridder (1991).

With this second approach (with three criteria), we avoid an overly-high number of alternatives (e.g. if a tourist wishes to take a holiday on the Mediterranean coast, this option would cover any point in the whole area); which is a consequence of the continuous nature of the spatial dimension (Fotheringham and O'Kelly, 1989). The studies of Eymann and Ronning (1992), Haider and Ewing (1990) and Morley (1994a; 1994b) define destinations in terms of administrative units (countries), whereas Siderelis and Moore (1998) and Eymann and Ronning (1997) resort to the use of macro-destinations through the aggregation of geographical areas and tourist perceptions, respectively.

Within this line of research, it is important to stress that the probabilistic analysis of intra-country destinations defined by administrative units has had little coverage in literature; despite the fact that the majority of national tourism in many countries is domestic, as in the case of Spain (Bote et al., 1991; Martínez, 2002); and that the territorial examination of tourism demand is a valuable element of regional economic planning (Usach, 1998), as it can characterize the tourist flow behaviour of nationals within their own country from the point of view of geographical distribution.

Our study is based upon this destination definition (intra-country administrative units) in order to define the attributes which determine the choice of tourist destinations.

2.3.1. Influence of attributes on the choice of destination

Literature distinguishes the dimensions of “attributes of the destination” and “personal characteristics” in order to explain destination choice (Mak and Moncur, 1980; Borocz, 1990; Gartner, 1993; Sirakaya et al., 1996; Seddighi and Theocharous,

2002). Focusing on the attributes of the destination, we see that they represent dimensions which can contribute to the formation of perceived attraction among tourists; they are also known as pull factors (Mak and Moncur, 1980; Borocz, 1990; Gartner, 1993; Kim and Lee, 2002). Chief among them, due to their greater utilization, are distance (Wennergren and Nielsen, 1968; Stopher and Ergün, 1979; Moutinho and Trimble, 1981; Perdue, 1986; Borgers et al., 1989; Fesenmaier, 1988; Adamowicz et al., 1994; Schroeder and Louviere, 1999; Riera, 2000); and prices (Walsh et al., 1992; Siderelis and Moore, 1998; Schroeder and Louviere, 1999; Riera, 2000). However, there is no consensus among authors on their impact on destination choice, since for each individual the distance and prices of destinations can act as attraction or deterrent factors. Clearly, this fact increases heterogeneity among tourists:

- i) Literature does not reach a consensus on the influence of distance on destination choice. One train of thought holds that distance -or the geographical position of the tourist relative to destinations- is considered a restriction or a dissuasive dimension of destination choice, as the displacement of an individual to the destination entails physical, temporal and monetary cost (Taylor and Knudson, 1976). This is the result reached by the studies of Wennergren and Nielsen (1968), Perdue (1985), Borgers et al., (1988), Fesenmaier (1988), Adamowicz et al. (1994) and Schroeder and Louviere (1999). Alternatively, another line of research proposes that distance can lend positive utility. Baxter (1980) shows that the journey itself, as a component of the tourism product, can give satisfaction in its own right so that, on occasions, longer distances are preferred. Similarly, Wolfe (1970; 1972) indicates that distance does not always act as a dissuasive factor, as the friction derived from it disappears after passing a certain threshold and it becomes a favourable attribute of the utility of a destination. Beaman (1974; 1976) explains this behaviour through a marginal analysis of distance, by observing the reaction of individuals to each unit of distance and concluding that each additional unit travelled offers less resistance than the previous.
- ii) Literature does not reach a consensus on the influence of prices on destination choice. One line of thought holds that demand for tourism products is that of an *ordinary good*, in such a way that price increments diminish consumption (Smith, 1995; Lanquar, 2001; Serra, 2002), meaning that price is considered as a factor which reduces the utility of a destination. At an empirical level, a negative relationship between price and destination

choice is found by Morey et al. (1991), Dubin (1998), Train (1998), Riera (2000) and Siderelis and Moore (1998) in the case of natural parks; by Haider and Ewing (1990), Morley (1994a; 1994b) and Eymann and Ronning (1992) for countries (administrative units) and by Siderelis and Morre (1998) for macro-destinations. Conversely, another line of thought proposes that price does not have a dissuasive effect on destination choice, but that it is an attraction factor. Morrison (1996) indicates that the underlying hedonistic character often found in the consumption of tourism products implies that high prices do not always act against demand; rather that the concept of value for money, which compares the amount spent with the quality of installations and service, takes over (Morrison, 1996). This implies an association of price increase with demand increase.

In summary, these opposite effects of distance and prices are the reason why we base our segmentation on these dimensions, since heterogeneity among tourists is more evident in these attributes.

3. RESEARCH DESIGN

3.1. Methodology

The proposed methodology to segment the tourism market by individual observed choices is based on the *Bayesian segmentation* procedure suggested by Revelt and Train (2002), which allows capture of any individual preference structure and operates with specific information for each individual. This methodology is developed through the following two-stage process (Revelt and Train, 2002): i) Bayesian estimation of individual parameters through a Logit Model with Random Coefficients; and ii) application of a cluster analysis on the individual coefficients estimated.

3.1.1. Estimation of the individual parameters

To estimate the individual parameters of a Random Coefficients Logit Model we apply Bayesian estimation methods⁵. We use the Multinomial Logit Model with random coefficients (RCL) because of: i) its ability to deal with the unobserved heterogeneity of tourists, by assuming that the coefficients of the variables vary among tourists; and ii) its flexibility, which allows representation of different correlation patterns among alternatives.

Following the formal approach of Train (2003), the utility function is defined as

$$U_{in} = \sum_{h=1}^H \beta_{nh} z_{ih} + \varepsilon_{in}$$

where z_{ih} is a vector that represents attribute h of destination i ; β_n is the vector of coefficients of these attributes for each individual n which represent personal tastes; and ε_{in} is a random term that is iid extreme value. The likelihood of the observed choice i for individual n conditional on β is expressed as

$$P(i / z_n, \beta) = \frac{\exp\left\{\sum_{h=1}^H \beta_{nh} z_{ih}\right\}}{\sum_{j=1}^J \exp\left\{\sum_{h=1}^H \beta_{nh} z_{jh}\right\}}$$

Since we do not know β_n , the probability of the person's choice is the integral of the previous expression over the distribution of β :

$$P(i / z_n, \theta) = \int P(i / z_n, \beta) g(\beta / \theta) d\beta$$

By applying Bayes' rule, we can derive $h(\beta / i, z_n, \theta)$:

$$h(\beta / i, z_n, \theta) \cdot P(i / z_n, \theta) = P(i / z_n, \beta) \cdot g(\beta / \theta)$$

⁵Train (2001b) points out the following advantages of Bayesian procedures over classical procedures: i) they avoid the usual problems of global and local maximums, given that they are not based on the maximisation of any likelihood function; and ii) they obtain consistent and efficient estimations under more flexible conditions. The advantages of Bayesian estimation have been little used by choice researchers, and only through the work of Albert and Chib (1993) have different techniques been developed for their application (Allenby and Ginter, 1995; Lenk et al., 1996).

And rearranging,

$$h(\beta / i, z_n, \theta) = \frac{P(i / z_n, \beta)g(\beta / \theta)}{P(i / z_n, \theta)}$$

Therefore, we can obtain β_n through the expression

$$\bar{\beta}_n = \int \beta \cdot h(\beta / i, z_n, \theta) = \int \frac{\beta \cdot P(i / z_n, \beta)g(\beta / \theta)}{P(i / z_n, \theta)} = \frac{\int \beta \cdot P(i / z_n, \beta)g(\beta / \theta)}{P(i / z_n, \beta)g(\beta / \theta)}$$

In order to get the individual parameters, we proceed as follows: i) Take a draw from $N(\hat{\theta}, \hat{W})$, which is the estimated sampling distribution of $\hat{\theta}$. Then take K draws from a standard normal density, and label the vector of these draws η^r , where K is the length of θ . Then create $\theta^r = \hat{\theta} + L\eta^r$, where L is the Choleski factor of \hat{W} . ii) Calculate $\bar{\beta}_n^r$ based on this θ^r . Since the formula of $\bar{\beta}_n$ involves integration, we simulate it using $\frac{\int \beta \cdot P(i / z_n, \beta)g(\beta / \theta)}{P(i / z_n, \beta)g(\beta / \theta)}$. And iii) repeat steps 1 and 2 many times, with the number of times labelled R .

3.1.2. Segment formation

Once we obtain the estimations of the parameters for each individual, we proceed to construct the segments with similar preferences. To this end, we apply cluster analysis (Ward's minimum variance hierarchical algorithm) to the matrix of the parameters of each individual. The final number of segments is reached when the segments observed explain at least 65% of the global variance, and when another segment is added, the increase in the total variance is less than 5% (Lewis and Thomas, 1990). In the opinion of Grande and Abascal (2000) and Gené (2002), this is the most appropriate method when using variables derived from previous statistical procedures; and Sorensen (2003) indicates that this method is regarded as very efficient. Additionally, we apply a Variance Analysis, both univariant (ANOVA) and multivariate (MANOVA), to confirm the segments obtained; i.e. to validate the existence of differences in the preference structures of the individuals.

3.2. *Sample, data and variables*

To reach our proposed objectives, we have used information on tourist choice behaviour obtained from the national survey “Spanish Holidaying Behaviour (III)”, which was carried out by the Spanish Centre for Sociological Research. This is due to the following reasons: i) The availability of information on individual tourist destination choice behaviour in terms of intra-country administrative units; and ii) The survey is directed at a sample (over 18 years old) obtained in origin (at home), which avoids the characteristic selection bias of destination collected samples, leading to a more precise analysis of tourist demand. The sample is taken by using multistage sampling, stratified by conglomerations, with proportional selection of primary units -cities- and of secondary units -censorial sections-. The information was collected through personal, at home, interviews with a structured questionnaire. Of the initial sample of 3,781 individuals, we are left with 2,127 that take holidays. This final sample represents a sample error of $\pm 2.16\%$ for a confidence level of 95.5%.

In order to make the choice models operative, we will define the variables used and identify the dependent and independent variables.

- 1) *Dependent variables.* To represent the set of intra-country destinations (administrative units) available to the tourist, we use 50 dummy variables for the 50 Spanish provinces.
- 2) Independent Variables.
 - a) *Distance to the destination.* In general, studies use different indicators of real distance⁶, such as the Euclidean distance -in kilometres or miles- (Wennergren and Nielsen, 1968; Stopher and Ergün, 1979; Moutinho and

⁶ Psychology and Geography of Behaviour show the existence of discrepancies among perceived distance by individuals -or subjective- and the real distance -objective or geographical-. Ewing (1980) argues the incidence of factors such as the familiarity or monotony of a route. Baxter and Ewing (1981) propose the “perceptual barrier effect”, by which a distance is perceived to increase due to a perceived rather than real barrier (e.g. a mountain pass). Moreover, with the lack of “perceptual barriers”, tourists perceive destinations closer than they physically are (Mayo and Jarvis, 1986). Finally, Baxter and Ewing (1979) propose the so called “intervening opportunities effect”, which considers the flow of people between two destinations *a* and *b* with similar characteristics and equidistant from an origin *o* are influenced by intermediary destinations. Thus, a destination *c* situated between *o* and *a* produces a greater reduction on flows between *o* and *a* than between *o* and *b*, independently of the fact that *c* competes indistinctly with *a* and *b*. In other words, these intermediary opportunities act as “distance amplifiers” between two destinations. The lack of information in our study on the perceptions of individuals prevents us from using subjective measurements of distance.

Trimble, 1981; Peterson et al., 1983; Perdue, 1986; Borgers et al., 1988; Fesenmaier, 1988; Adamowicz et al., 1994; Dellaert et al., 1997; Schroeder and Louviere, 1999), and displacement time (Louviere and Hensher, 1983; Dellaert et al., 1997; Schroeder and Louviere, 1999; Kemperman et al., 2000).

Following these authors, we measure distance in kilometres (DKm) and in time invested in displacement (Dtime), which facilitates a comparison of the results with those of other international studies. The use of both variables implies the construction of two origin-destination matrices of a 50x50 order, in which we include kilometres and time between each origin and destination for the provinces. This information on distances and displacement times between origins and destinations is found in the Campsa Interactive Guide (taking the provincial capitals as reference points).

b) *Destination prices*. Literature measures the prices of a destination with different indicators. For example, costs at the destination in absolute quantities or in terms relative to individual tourist income. However, the difficulties tourists have in knowing, a priori, all costs (e.g. goods bought at destination) and the exact cost of each component, oblige researchers to make simplifications in their empirical applications. Consequently, various authors propose the use of widely available proxies (as opposed to finding detailed price lists of products and services in each destination) to reflect the prices of a destination.

Morey et al. (1991), Dubin (1998), Train (1998), Riera (2000), Siderelis and Moore (1998) and Morley (1994a,b) employ travel costs as a proxy of total price, as it is one of the highest costs to the tourist. However, the measurement of travel costs is not without problems. Travel costs are made up of the following three elements (Ewing, 1980): i) the effective cost of travelling, measurable by the price paid on public transport (Dellaert et al., 1997; Morley 1994a; 1994b) or in a private vehicle; whether by unit of distance (e.g., 24 ptas/km (Riera, 2000) or 0.16\$/mile (Siderelis and Moore, 1998)) or by total fuel costs (Train, 1998); ii) the physical and psychological effort of realising the journey, which, to date, has not been modelled given the impossibility of representing it in monetary terms and by unit of time (Ewing, 1980); and iii) the opportunity costs of the time given to the journey (what an individual would earn if s/he spent the travelling time on money

earning activities) whose measurement has been very limited in literature; using estimations from other fields (value of time spent travelling to work (Cesario, 1976; Edward and Dennis, 1976) - untrustworthy for tourism (Goodwin, 1976; Ewing, 1980); the result of regressing the number of journeys in a period on travelling time, salary and cost of transport (Hof and Rosenthal, 1987); or arbitrarily fixing a value of 1/3 of salary per hour (Train, 1998)).

Another indicator is the exchange rate of the destination country (Witt and Martin, 1987; Morley, 1994a, 1994b). However, authors such as Eymann and Ronning (1992) and Usach (1999) consider that the correct method of reflecting the prices of a certain tourist market is to compare destination prices with those of the home market and those of competing destinations. Along this line, Eymann and Ronning (1992) use purchase parity differentials between the origin and respective destinations, obtained from the corresponding consumer price indexes⁷. In line with these authors, our study measures destination prices of intra-country administrative units through consumer price index differentials among origins and destinations, which are published in the National Institute of Statistics (INE), which represent the cost of living of each origin/destination.

4. Results obtained and discussion

4.1. Estimation of the individual parameters

Firstly, we use Bayesian procedures to estimate the coefficients for each individual of the variables -distance and prices-, which are determinants of destination choice, using Random Coefficients Logit Models. Table 1 presents the aggregated estimation for the whole sample. According to the maximum likelihood function, we observe that the optimum specification of distance is the one that measures it in time. Therefore, we carry out the segmentation analysis by considering prices and distance measured as the time spent on the journey.

⁷ Morley (1994c) demonstrates that the Consumer Price Index of a geographical region is a good indicator of tourist prices, by showing high correlation between the two.

TABLE 1: Influence of prices and distance on destination choice
(Standard errors in brackets)

Independent Variables	Equation 1		Equation 2	
	<i>b</i>	SD (β)	<i>b</i>	SD (β)
Price	-0.222 ^a (0.021)	0.056 ^a (0.012)	-0.210 ^a (0.021)	0.081 ^a (0.020)
Distance (Kilometres)	-0.398 ^a (0.014)	0.146 ^a (0.012)		
Distance (Time)			-0.508 ^a (0.023)	0.535 ^a (0.044)
ML Function	-7399.14		-7295.96	

a=prob<0,1%; b=prob<1%; c=prob<5%; d=prob<10%.

With regard to the impact of distance, we find that this dimension (in kilometres and in travelling time), is significant at a level below 0.1% in all the equations and presents a negative sign, which leads us to characterize distance as a dissuasive factor in the choice of destination province, in line with Taylor and Knudson (1976). In other words, the displacement of an individual to the intra-country destination supposes physical, temporal and monetary investment. Apart from this, the significance of its standard deviation ($SD(\beta)$) at 0.1% in all cases, suggests that distance has a differentiated effect among the individuals of the sample in that longer distances do not suppose less utility for all the sample tourists.

Regarding the impact of prices, we find that this dimension is significant at a level below 0.1% in all the equations, and presents a negative sign, which suggests that tourists tend to choose destinations with lower prices, in line with Smith (1995) and Lanquar (2001). This result allows us to support the idea that tourism products are *ordinary goods*. It is important to stress that, like the variable of distance, the standard deviation parameter of the coefficient ($SD(\beta)$) is significant in all equations, which implies a differentiated effect among the individuals of the sample. The differentiated effect found for both distance and prices suggests that they are good dimensions for segmenting the market.

Evidently, these are global results that represent the preferences of an average tourist. To illustrate the utility of obtaining estimations of individual preferences we

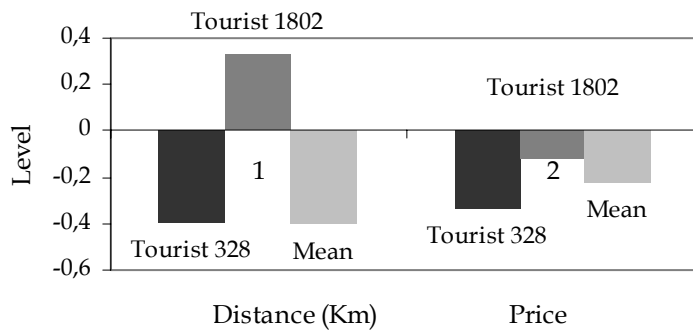
select two tourists from the sample (for example, sample observations 619 and 1276) to compare their preference structures with the average tourist (Table 2).

TABLE 2. Illustration of the individual preferences

	Segmentation	
	Distance (Time)	Price
Tourist 619	-1.0113	-0.0226
Tourist 1276	0.3549	-0.1213
Average Tourist	-0.508	-0.21

Both tourists, 619 and 1276, show a lesser negative price effect in comparison with the average. Distance in time has a negative impact on the first tourist and a positive effect on the second (Graph 1).

GRAPH 1. Individual preferences PDK



This illustration with two observations shows the importance of knowing the individual preferences of each tourist, as in this way, tailor made tourist products can be offered, giving rise to a one by one or tourist by tourist segmentation.

4.2. Formation and characterization of segments

Secondly, we apply Ward's cluster method to the matrix of the estimations of the individual parameters. Applying the double explanation criteria of a minimum of 65% of the total variance, and of least 5% increase in variance when adding a new segment, we select four segments. Table 3 summarises the results of the application of

both criteria; the shaded area represents the number of segments selected in each criterion.

TABLE 3. Determination of the number of segments

Prices and distance in time

N. of segments	σ^{2*}	$\sigma^2(\%)*$	Explained Variance	$\Delta\sigma^{2*}$
10	17.489	2.853	97.15	0.295
9	19.301	3.149	96.85	0.325
8	21.298	3.475	96.53	0.459
7	24.115	3.934	96.07	0.524
6	27.328	4.459	95.54	1.413
5	35.989	5.872	94.13	1.527
4	45.349	7.399	92.60	7.841
3	93.404	15.241	84.76	8.347
2	144.563	23.589	76.41	76.410
1	612.835	100	0.00	0

*Intra-group variance.

The segments identified are significantly distinct at a level of 0.1% with regard to the values obtained from the F tests for the variables considered separately (ANOVA) and simultaneously MANOVA), in the variance analyses applied to the average values of these variables (see Table 4). This confirms the existence of differences in the preference structures of the individuals.

TABLE 4. ANOVA and MANOVA of the segments

Prices and distance in time

Variable	F	Prob.
Prices	13.445	0.000
Distance in time	11,843.08	0.000
MANOVA	2,300.83	0.000

Once we identify the segments according to the proposed criteria, we proceed to characterize them according to the dimensions of distance and prices, and various variables that represent tourist behaviour.

4.2.1. Characterization of the segments obtained through preferences on distance in time and prices

Table 5 characterizes the segments formed according to “distance in time” and “prices”, showing the averages of each segment and the global values for the whole sample. We also indicate distinct or similar segments according to the Scheffé Test. This test shows that the four segments have different preferences for the dimension of “distance measured in time spent on the journey”, but not with regard to prices. In the case of prices, only segment D presents a clearly higher negative effect than A, B and C. In Graph 2, we show the position and dispersion of the segments in these dimensions (with inverted axis values). In general, segments A, B and C present a relatively negative posture towards prices. Segment A derives positive utility from long journeys (0.209 > -0.508 = average sample value), whereas segments B and C are clearly adverse to long journeys (-0.698 and -1.124, respectively). With regard to price, segment D shows the highest negative effect, with a moderately negative reaction to long journeys.

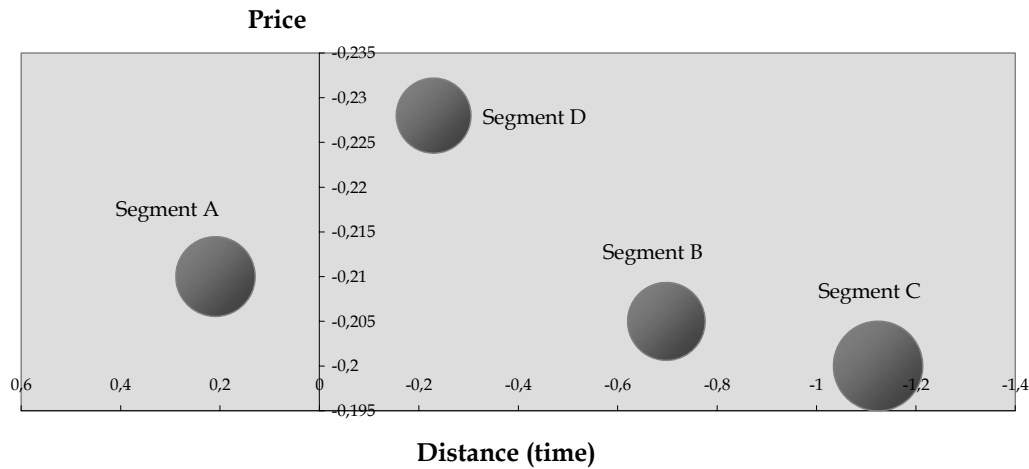
TABLE 5. Characterization of the segments through the marginal effect of prices and distance in time

Segmentation: Prices and distance in time

Segments	Size	Proportion	Prices	Distance in Time
A	518	24.4	-0.210	0.209
B	496	23.3	-0.205	-0.698
C	654	30.7	-0.200	-1.124
D	459	21.6	-0.228	-0.234
Average Values			-0.210	-0.508
Distinct Segments (Scheffé Test)			D	A, B, C, D
Similar Segments (Scheffé Test)			(A- B-C)	None

In summary, of the two dimensions analyzed -distance and prices-, distance shows greater dispersion among the segments with regard to the sample average of either of the two measures used. Also, some segments obtain more utility from a destination from the fact that it is distant, which is in line with the proposals of Wolfe (1970; 1972), Beaman (1974; 1976) and Baxter (1980) that the journey itself can provide satisfaction. The negative posture towards prices has differing degrees of sensitivity according to the segment, although the differences are not as marked as those of distances, as the values are very similar and negative in all cases.

GRAPH 2. Segmentation



5. Conclusions

The implication that individual revealed preferences can be a starting point for market segmentation leads us to examine this phenomenon in the case of tourists with a sample of 2,127 individuals. The operative formalization is developed through a two-stage process, which firstly uses Bayesian procedures to estimate the individual parameters of a Random Coefficient Logit Model and secondly applies cluster analysis to the individual coefficients estimated.

Through the idea that certain attributes can have an impact on destination choice, with differentiated effects for different segments of the population, the empirical analysis carried out on the sample reveals the existence of tourist groups with distinct sensitivities to the dimensions of distance and prices. In short, the use of the attributes of “distance in time” and “prices” finds four segments with distinct preferences towards the dimension of “distance measured by journey time”, but not with regard to prices (with the exception of segment D, which has a higher negative effect than segments A, B and C). In general, segments A, B and C present a relatively negative and similar posture towards prices, and among the three, segment A obtains positive utility from long journeys, whereas segments B and especially C are adverse.

As implications for management, we would like to mention the following: i) Segmentation through *individual revealed preferences* has demonstrated to be useful

insofar as it can identify individually differentiated behaviour patterns. This segmentation is particularly important in that it is based on the preferences of individual people. The application in the study deals with aspects that lead a tourist to choose a certain tourism product type. In other words, it is a segmentation based on the key elements that explain why a tourist goes to a destination. Moreover, the estimation of the individual parameters of the utility function of each individual reveals his/her preference structure and allows us to operate with precise information on each individual. At a time when tourists are increasingly demanding and insist on service provision adapted to their specific needs, knowledge of the profile of each tourist allows tourism organizations to offer the most suitable products. ii) The analysis is based on *real purchase choices* made by individuals (and not on *declarations of intent*), which allows a more accurate representation of the behaviour of each tourist. And iii) The heterogeneity of the preferences detected implies differentiated behaviour among the distinct tourist segments, which reveals the clear need to apply segmentation strategies to the tourism market.

Among the limitations of this study are the following: i) its static character, as it is only based on the main annual holiday of an individual. Alternatively, an analysis of all holidays taken (main holiday, weekend trips etc.) in a year or over various years with panel data would allow us a better understanding of the determinants of the choice, and the accuracy of sensitivities would be considerably improved; ii) the field of study is Spain. It would be useful if the results were reinforced by applications on other geographical areas in order to be able to generalise the conclusions; iii) the lack of available information on certain variables, such as psychological distance and individual perceptions of the attributes of the destinations; and iv) we do not consider a specific destination, rather any of the destinations chosen by Spanish tourists. This could impede knowledge of the impact of the characteristic factors of a particular destination. However, this way of working allows us to find the influence of different dimensions in a general manner.

Possible future lines of research are that the results of this study should be supported by research on other geographical areas in order to make comparisons. Similarly, it would be interesting to carry out the analysis from a longitudinal perspective, which would allow us to observe the temporal evolution of the effects of the proposed dimensions. Also, it would be interesting to compare in a simulation context the results obtained by the continuous (Random Coefficients Logit Model) and

discrete (Latent Class Logit Model) approaches, and the factors that explain the differences in both, the number of segments and the elements within each segment.

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