DESIGNING A CHOICE EXPERIMENTS SURVEY TO ASSESS THE ECONOMIC VALUE OF ROMANIAN NATURAL AREAS

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Abstract

This paper explores the use of choice experiments method to design an efficient survey to assess the economic value of Romanian national and natural parks. The choice experiments method is based on the Lancaster theory according to which the consumer's utility is defined as a function of several attributes that characterize the environmental good or service that is analyzed. A set of six attributes was identified to describe hypothetical natural areas that may be visited by tourists: distance from home to the park, observation of nature, type of information needed for the trip, placement of campsite, congestion level at the campsite and price of fuel. The choice sets are obtained by combining every level of each attribute with every level of all other attributes. The fractional factorial design generated 32 choice sets, which were blocked into eight sets, creating eight different versions of questionnaire. It may be concluded that efficient survey design implies a careful follow of the steps recommended in the literature, with a special attention on the design of choice sets.

Key words: choice experiments, survey design, natural areas

The environmental economic literature presents a lot of studies about the demand for recreation in natural areas. The interest in this topic has increased in the last decades due to the necessity of sustainable use of natural areas in a world where many natural resources are scarce, some of them suffering unexpected phenomena that cannot be always prevented by human being.

The use of non-market valuation methods has been proved as being successful over years because it provides useful information for management purposes of the natural areas under study. Many park administrations and policy makers have embraced the idea of taking into consideration the economic value of the parks as a key factor in the management decisions (Hearne et al., 2002, Hearne et al., 2005, Morey et al., 2002).

More recently, researchers have focused on using the choice experiments method, which provides information about the preferences for several states of a good in question (Champ et al., 2003). It also allows the estimation of benefits people gain from recreating in the natural areas and the estimation of the economic value of environmental goods or services (Adamowicz et al., 1994, Hanley et al., 1998). This will allow the estimation of the willingness to pay for the attributes of the environmental good or service.

The choice experiments method is based on the Lancaster theory according to which the consumer's utility is defined as a function of several attributes that characterize the good (Champ et al., 2003). For instance, visiting a public natural area supposes the consumption of some attributes that characterize the area, such as nature observation, the type of landscape, the entrance fee and other.

This work focuses on the design of the choice sets, which are typical question formats in a choice experiments study. The design requires special attention because of the manner of constructing the alternatives that will be presented to respondents. The literature review presents many study cases conducted all over the world, but those may not be generalized because of the uniqueness of environmental goods. This makes the design of choice sets a more complex process. Therefore the construction of choice sets differs from case to case. Moreover, the quality of the results greatly depends on the quality of data collected.

The choice sets are designed to analyze preferences of tourists in relation to the development of Romanian national and natural parks for recreation with the aim to offer useful information to park administration for management purpose.

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MATERIAL AND METHOD

The choice experiments method uses choice sets as question format, also known as scenarios. Respondents face hypothetical scenarios in which are presented more alternatives. Each alternative is described by several attributes or characteristics with their corresponded levels, among which one is represented by a monetary value. The inclusion of a monetary value as an attribute allows the use of benefit-cost analysis to value the good, and thus to estimate welfare measures.

The identification, choice and description of attributes should be done based on real information about the good in question, to assure an accurate description of the good. This information helps to decide the final attributes to describe the good. The selected attributes are expected to influence respondents' choices. Several levels are defined for each attribute, among which one is considered as base level.

The alternatives presented to respondents are tradeoffs people are prepared to make between different characteristics that describe the good. Respondents analyze and choose the alternative that best describes their preferences by maximizing the utility under a budget constraint.

The choice sets may be obtained by combining every level of each attribute with every level of all other attributes (Champ et al., 2003).

Designing alternatives may be sometimes a very difficult process. An example is presented in Fig. 1, when a good is described by two attributes, the first having three levels and the second two levels. One alternative may be obtained by combining level 1 of attribute 1 with level 1 of attribute 2, the good being described by the two levels. Another alternative would be level 1 of attribute 1 with level 2 of attribute 2.
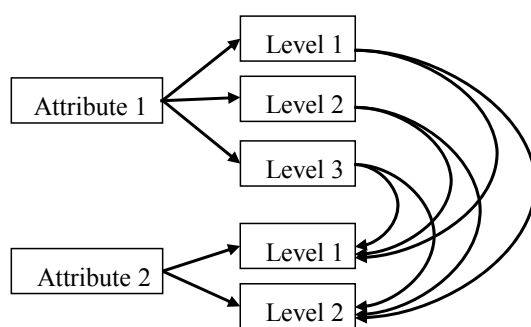

Figure 1 **Alternatives design – example**

However, this is a simple case that leads to 3 x 2 possible alternatives. It is evident that the number of possible alternative increases as the number of attributes and levels increases, leading to a large number. This is known as full factorial design and it is rarely used in practice due to the difficulty of presenting all possible combinations to each respondent separately (Louviere et al., 2000). Fractional factorial design overcomes this issue, by offering subsets of scenarios to respondents. This

involves the selection of subsets of complete factorials. The size may be reduced using the orthogonal fractional design as it is recommended by many experts in the field (Kanninen, 2007). Another way to construct scenarios is by a random choice of alternatives from all possible combinations, each respondent receiving different scenarios. However, this procedure may be expensive and time consuming in the questionnaire design phase.

The choice sets are built based on two alternatives, each representing one statement of the good (Alternative 1 and Alternative 2) and a neutral alternative (the *status-quo* alternative), which offers the possibility of choosing neither of the two alternatives (Alternative 3) (fig. 2). In this phase, respondents need to analyze the offer and take a decision on which is the most preferred alternative.

Figure 2 **Example of choice set**

In this study, the environmental good is represented by national and natural parks from Romania. Hypothetical places are described with the aid of several attributes chosen to describe the places people would be willing to visit for recreation. The choice sets offer the possibility to choose among three alternatives, two alternatives describing a hypothetical natural area and one describing the option of visiting neither place.

The target group is represented by tourists visiting the national and natural parks from Romania. The questionnaire was pretested and following implemented starting July 2010. The data collection process is still on-going.

RESULTS AND DISCUSSIONS

A set of six attributes was identified to describe the areas to be visited, each with different number of levels. The choice of the attributes was based on a comprehensive literature review in the field, respectively similar studies conducted worldwide and information gathered from the park administrations. Since the main goal of the research is to estimate tourists' benefits after recreating in the parks, the information collected referred to recreation and tourism opportunities offered to potential visitors by park administrations.

The first attribute is the one-way distance from home to the park, in kilometers. Distance plays an important role in the decision about where to recreate and how far to drive, being sometimes the key factor when people are time constrained

(tab. 1). Some people prefer to take short-distance trips, other longer-distance trips, thus four levels have been considered for this attribute. This will allow the identification and analysis of several user groups based on the distance traveled.

Table 1
Attribute 1 – One-way distance from home to the park (km)

No.	Levels of Attribute 1
1	Less than 150 km
2	150 – 300 km
3	301 – 450 km
4	More than 450 km

Some parks offer the possibility of taking guided tours, on which the expert guide gives information also about the flora and fauna that may be observed, many species being protected by law. In order to identify how important it is for visitors to have the possibility to take on guided tours, the second attribute was chosen to be the possibility of observing the nature, defined based on two levels: nature observation without assistance of a guide or with assistance of a guide (tab. 2).

Table 2
Attribute 3 – Nature observation

No.	Levels of Attribute 2
1	Without guide
2	With guide

Type of information presented is another important factor in the decision where to recreate. The minimum information offered is marks on the hiking trails. Because some tourists may need to be better informed while performing recreation activities, three more levels were defined to identify if tourists are looking for more sources of information such as an information center, maps, a list with protected species which may be observed in the parks (tab. 3). It should be noted that there is no information point or visitor center in five national parks and four natural parks.

Table 3
Attribute 3 – Type of information

No.	Levels of Attribute 3
1	Marks
2	Marks and information center
3	Marks and map
4	Marks and information center and list with protected species

Tourists may choose to stay overnight in cottages, guesthouses, hotels, villagers' houses, monasteries or campsites. The only type of accommodation that may affect the natural resources is camping, especially if it is placed in unorganized places, with no control from the park administration. Preferences on where to camp are different among tourists, thus the following levels were defined: camping should not be allowed inside the parks, camping should be allowed inside the parks in unorganized places, and camping should be allowed inside the parks but only in organized places with facilities (tab. 4.).

Table 4
Attribute 4 – Camping

No.	Levels of Attribute 4
1	Not inside the parks
2	Inside the parks, in unorganized campsites
3	Inside the parks, in organized campsites

The congestion level at the campsites is the fourth attribute chosen to describe the areas. Crowding is said to happen when the satisfaction of a visitor decrease as regard to the trip because of the presence of other visitors. However, the level of crowding differs among tourists, thus three levels were considered: less congested places with 1-5 groups of tourists, moderate congested with 6-10 groups and highly congested with more than 10 groups of tourists (tab. 5).

Table 5
Attribute 5 – Number of groups at campsites

No.	Levels of Attribute 5
1	1-5 groups
2	5-10 groups
3	More than 10 groups

The last but not the least important attribute included in the choice sets is represented by the fuel price, which definitely affects the transportation costs and the decision how far from home to drive (tab. 6.). Three levels were defined: the average actual price of 5.5 RON/liter, a 10% higher price and a 20% higher price for fuel.

Table 6
Attribute 6 – Fuel price

No.	Levels of Attribute 6
1	Actual (5.5 RON/liter)
2	10% more expensive
3	20% more expensive

The method imposes to choose a base level for each of the six attributes (table 7). The analyses and interpretation of each level will be done with

respect to the base level of the corresponded attributed.

Special attention should be given to the coding process, the researcher having the possibility to choose the manner of data coding (Champ *et al.*, 2003, Louviere *et al.,* 2000). In this case, effects codes were chosen for each attribute, excepting for fuel price which is a continuous variable.

Table 7

Base level chosen for each attribute

Variable	Level
Distance	Less than 150 km
Nature observation	Without guide
Type of information	Marks
Camping	Not in the park
Number of groups at campsites	1-5 groups
Fuel price	Actual (5.5 RON/liter)

The combination of all levels of the attributes presented above implies a full factorial design of $2 \times 3^3 \times 4^2$ or 864 possible choice set combinations. This was reduced using the orthogonal fractional design to 32 choice sets that were blocked into eight versions of four choice sets each. Each respondent was randomly assigned to one questionnaire version.

An example of one of the choice sets is presented in Figure 1. Each choice set presents three alternatives: two alternatives describe hypothetical places to be visited and one alternative - the *status-quo* alternative – represents the option of visiting neither place.

CONCLUSIONS

The choice experiments method is appropriate to analyze tourists' preferences towards recreating in public natural areas. It offers a detailed analysis of each level of the attributes that describe the area and much more, the willingness to pay for each level of the attributes. This information is useful for management decisions taken at the level of park administrations and for policy decisions as well.

Characteristics	Place A	Place B	
Distance from home (one way)	>450 km	150-300 km	
Nature observation	With guide	Without guide	
Information available	Marks + information centre + list with protected species	Marks	**I WILL NOT VISIT ANY PLACE** ✎ ❑
Campsites	Not inside the park	Inside the park, in unorganized campsite	
Number of groups at campsites	1-5 groups	1-5 groups	
Fuel price	10% more expensive	20% more expensive	
	✎ ❑	✎ ❑	

Figure 3 **Example of one choice set offered to visitors of the Romanian national and natural parks**

The choice sets were designed to estimate the economic values associated to the Romanian national and natural parks. This may be done for all parks together or separately, since it is expected that tourists' preferences differ among parks.

The design of choice sets requires special attention especially in the phase of choosing the attributes and the corresponded levels and in the phase of constructing the choice sets. Attributes should be chosen after a detailed analysis of the information gathered about the environmental good. As a final conclusion, it should be mentioned that efficient survey design implies a careful follow of the steps recommended in the literature.

ACKNOWLEDGMENTS

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