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Which factors affect the willingness of tourists to pay for renewable energy?

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ABSTRACT

This study presents insights into the determinants of tourists' intention to pay a premium for accommodation in a hotel with renewable energy sources. The empirical analysis is based on the estimation of binary logistic regression models. Four subsets of independent variables were used in this empirical analysis, namely: (i) demographic factors, (ii) economic variables, (iii) past experience with regard to renewable energy sources, and (iv) variables regarding environmental awareness and information dissemination. Empirical results suggest that middle-aged people are probably more willing to pay for their stay in a hotel using renewable energy. In general, men are more likely than women to pay extra money for accommodation in a "green" hotel. However, the results suggest that marital status and educational level are not statistically significant factors in the willingness to pay more. Rather, environmentally-conscious and adequately informed tourists are more willing to pay for renewable energy than others. Our analysis is focused on intention because we expect that those people willing to pay for staying in a green hotel are a potentially relevant market segment for developing sustainable tourism in Greece.

1. Introduction

Contrary to fossil fuels, the intensive use of renewable energy is inextricably linked to zero greenhouse gas emissions. Thus, the penetration and implementation of renewable energy projects is one of the major goals of European countries in their quest for achieving sustainable development. However, the use of renewable energy sources is strongly related to public acceptance.

Previous studies have focused on attitudes toward green energy and on acceptance of renewable energy sources [1–5]. Others have examined the intention of hotel customers to stay at a green hotel employing the theory of planned behavior [6,7]. In general, consumers who are more receptive to environmental products, and choose to purchase them, are willing to pay more for environmental benefits. A positive attitude of Australian tourists in relation to renewable energy supply for hotel accommodation has been assessed by Dalton et al. [8]. Empirical studies have also focused on the amount that consumers are willing to pay by way of premium for renewable energy investments and the role of socio-demographic determinants in the case of Italy [9] and Korea [10].

Several studies have been conducted on the issue of renewable energy penetration in Crete [11,12]. Crete hosts one-fifth of all tourists visiting Greece. More than 50% of all renewable energy projects in the Greek islands are implemented in Crete [13]. The willingness of Crete's residents to pay for renewable energy sources was investigated by Zografakis et al. [14].

The aim of this study is to examine the determinants that affect tourists' intention to pay more for their stay in a hotel using renewable energy sources. For this purpose, we employ cross-section data from the largest Greek island, Crete. Unlike previous studies, we chose tourists because we expect tourists willing to pay for a stay in a green hotel to be a potential market segment important for the development of sustainable tourism on the island.

The paper proceeds as follows: Section 2 presents the methodological issues and the data used in the empirical analysis. Section 3 presents the empirical results, while the conclusions of the analysis and policy implications are discussed in Section 4.

2. Methodological issues and data

The research provides some insights into the determinants that affect tourists' positive attitude toward renewable energy. The empirical analysis is based on a cross-section data set. We carried out an extensive survey of 400 foreign tourists during their summer holidays in Crete in 2009, using the random stratified sampling method. In particular, we distributed 100 questionnaires in each of the fourth prefectures of the island (Chania, Rethymno, Heraklion

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and Lasithi). The survey was conducted using a structured questionnaire and personal interviews. Given the purpose of our study, we interviewed tourists at hotels as proposed by Veal [15]. We chose hotels at random taking into account the official hotel directory. The response rate was 80% and the survey resulted in a data set of 320 tourists. As a prerequisite, the respondents were above 18 years of age and income-earners.

Empirical results are based on the estimation of logistic regression models. Logistic regression (sometimes called the logit model) is used for predicting the probability of an event occurring by fitting data to a logit function. Logistic regression is a useful way of describing the relationship between one or more independent variables (e.g. age, gender, etc.) and a binary response variable, expressed as a probability, that has only two possible values (such as willingness or unwillingness).

In our case, under the binary logistic model, the estimated value of the dependent variable is interpreted as the probability that a tourist will pay more for accommodation in a "green hotel", as identified by the values of the explanatory independent variables. Thus, binary logistic analysis enables us to measure the impact of each variable on a tourist's intention to stay in a hotel using renewable energy sources. Four subsets of independent variables were used in this empirical analysis, namely: demographic factors, economic variables, past experience with regards to renewable energy sources, and variables regarding environmental awareness and information dissemination. Therefore, in the empirical study, we employed the following expanded specification for a tourist's willingness to pay more for accommodation in a "green" hotel:

$$\begin{aligned}\mathrm{WTP}_i &= b_0 + b_1\mathrm{Age}_i + b_2\mathrm{Age2}_i + b_3\mathrm{Married}_i + b_4\mathrm{Kid}_i \\ &\quad + b_5\mathrm{Degree}_i + b_6\mathrm{Income}_i + b_7\mathrm{Days}_i + b_8\mathrm{Expense}_i \\ &\quad + b_9\mathrm{Rhome}_i + b_{10}\mathrm{Satisf}_i + b_{11}\mathrm{Rinf}_i + b_{12}\mathrm{Envin}_i + u_i \quad (1)\end{aligned}$$

where WTP_i is a binary variable indicating whether the tourist i is willing to pay extra for hotel accommodation using renewable energy sources or not; specifically, the variable takes the value 1 when the tourist is willing and zero otherwise. To be more precise, we asked "Are you willing to pay extra for hotel accommodation with RES?" (Yes/No). A similar question format was followed by Dalton et al. [8] in Australia. Jun et al. [16] had also performed contingent valuation methodology employing dichotomous choice questions. Gender_i is a dummy variable accounting for 1 if the respondent is male and zero if female; Age is the respondent's age; $\mathrm{Age2}_i$ is the square of the respondent's age; $\mathrm{Married}_i$ is a dummy variable taking the value 1 if the respondent is married and zero otherwise; Kid_i is a dummy variable accounting for 1 if the respondent has children and zero otherwise; Degree_i is a dummy variable accounting for 1 if the respondent has completed undergraduate studies and zero otherwise; Income_i is the respondent's monthly private income in euros; Days_i is a quantitative variable indicating the average duration of a hotel stay while on holidays; $\mathrm{Expense}_i$ is a quantitative variable expressing the average holiday cost per person; Rhome_i is a dummy variable accounting for 1 if the consumer has already implemented an energy conservation system at home and zero otherwise; Satisf_i is a dummy variable expressing the tourist's satisfaction with a previous stay in an energy-conserving hotel (yes: 1, 0: otherwise); Rinf_i is a quantitative variable expressing awareness of renewable energy sources; Envin_i is a dummy variable accounting for 1 if the respondent is aware of global environmental problems and zero otherwise; and u is an error term. The empirical results from the estimation of Eq. (1) are presented in Section 3 of this study.

Table 1 summarizes the expected sign for b_i coefficients of Eq. (1). In particular, it is assumed that the people most likely to pay more for accommodation in a hotel with RES are those with a positive previous experience with the implementation of energy-conserving practices. Therefore, the expected sign for variables "Rhome" and "Satisf" is positive. We also assumed that adequately informed consumers are more likely to participate in eco-friendly actions. Thus, a positive relationship should be expected between "Rinf" or "Envin" and willingness to pay. In addition, previous studies reported that higher income groups are more willing than others. Higher income groups tend to spend more money on vacations. Thus, we also expected a positive sign for "Expense". On the other hand, it may be difficult for these groups, who have longer vacation periods, to pay a premium for environmental purposes. In this case, the expected sign for the variable "Days" is negative. Although, it is difficult to predict the impact of demographic characteristics on the decision to pay more for accommodation in a hotel with RES, it is expected that highly educated consumers are more prone to support energy-conserving actions. Thus, a positive sign is expected for the variable "Degree".

Table 1
Expected sign of the variables specified in the empirical binary logistic regression.

Designation	Expected sign	Designation	Expected sign
Gender	+/−	Days	−
Age	+/−	Expense	+
Age2	+/−	Rhome	+
Married	+/−	Satisf	+
Kid	+/−	Rinf	+
Degree	+	Envin	+
Income	+		

3. Results

In this section we present the results of the statistical and econometric analyses to estimate the profile of 'green' tourists. As 'green' tourists we define those consumers willing to pay extra for accommodation in a hotel using renewable energy sources.

3.1. Descriptive statistics

From the sample of 400 tourists in question, 53.1% were women and 46.9% were men. Most respondents were between the ages of 31 and 50 years (36.9%); 18.1% were between 25 and 37 years, 12.8% between 51 and 71 years, and 29.7% between 18 and 24 years. As regards the educational level, 60.9% were university-educated. The majority were employees with 40% working in the private and 21.9% in the public sector, whereas 14.1% were freelancers. The tourists' average monthly private, non property-related, income was €1400, with a large percentage of monthly incomes being no higher than €500 (17.5%). The income of 3.4% of tourists varied between €800 and €1100 and 22.2% declared having an income above €2000. 34.4% of tourists were married. The majority (32.8%) reported holiday expenses between €251 and €500; 25.3% between €751 and €1000 and 7.8% over €1500. As shown in Fig. 1, 45% of tourists were willing to pay more for accommodation in a hotel with renewable energy sources. As to the vacation's purpose, the vast majority of respondents (92.2%) reported recreation and the rest professional reasons. Next, interviewees were asked about their past experience with renewable energy sources. In particular, 71.3% of tourists had previously implemented an energy conservation project at home, and only 25% were satisfied with their past accommodation at an energy-conserving hotel.

3.2. Logistic regression analysis

Several interesting results were obtained from the empirical estimation of Eq. (1). Table 2 summarizes the empirical results of