Article

Peer-to-Peer Tourism: Tourists' Profile Estimation through Artificial Neural Networks

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Abstract: Peer-to-peer tourism is one of the great global trends that is transforming the tourism sector, introducing several changes in many aspects of tourism, such as the way of travelling, staying or living the experience in the destination. This research aims to determine the relationship between the sociodemographic characteristics of tourists interested in peer-to-peer accommodation and the importance they give to various motivational factors about this type of tourism in a "cultural-tourism" city. The methodology used in this research is an artificial neural network of the multilayer perceptron type to estimate a sociodemographic profile of the peer-to-peer accommodation tourist user based on predetermined input values consisting of the answers to the Likert-type questions previously carried out using a questionnaire. Thus, the model developed, through a customized set of answers to these questions, allows the presentation of a "composite picture" of a peer-to-peer tourist based on sociodemographic characteristics. This function is especially interesting for adapting the peer-to-peer hosting offer according to the preferences of potential users.

Keywords: sharing economy; collaborative tourism; tourist profile; peer-to-peer accommodation; artificial neural networks; multilayer perceptron

1. Introduction

This research aims to determine the relationship between the sociodemographic characteristics (gender, age, income and educational level) of tourists interested in peer-to-peer (P2P) accommodation and the importance that they give to various motivational factors about this type of tourism in a city highlighted for its cultural tourism. The survey developed for this study takes as the basis the city of Córdoba, which is one of the main cultural tourist destinations in Spain due to the fact that it has four inscriptions as a World Heritage Site, among other reasons. The methodology used in this research is based on the use of an artificial neural network (ANN) of the multilayer perceptron type (MLP)—originally developed by Rumelhart et al. [1]—to estimate a sociodemographic profile of the P2P accommodation tourist user based on predetermined input values consisting of the answers to the Likert-type questions previously made by a questionnaire. Thus, the model developed, through a customized set of answers to these questions, allows to present a "composite picture" of a P2P tourist based on sociodemographic characteristics. In fact, the analysis of travellers who visit a specific destination is essential to its development [2]. Likewise, the network developed can quantify the variations produced in the Likert scale of each question concerning each of the analysed characteristics of the sociodemographic profile.

The use of neural networks in the tourism sector has been employed mainly in the analysis of the hotel offer, revealing the influence of the characteristics of the accommodation

(location, number of stars, number of rooms, percentage of positive comments, etc.) with its respective Revenue Per Available Room (RevPar) [3]. Thus, one of the main innovations of this research is to apply neural networks to the sociodemographic profile of tourists who visit a certain destination. In fact, neural networks have been used to analyse sociodemographic profiles of respondents, as well as different perceptions and attitudes of workers to their bosses and supervisors, to predict their willingness to use Web 2.0, mobile applications and the so-called "Internet of Things" [4].

As stated, the objective of this paper is to stablish the associations among the sociodemographic characteristics of the sample's profiles with the different motivational aspects about P2P tourism in cultural-tourism cities. Thus, the present study begins with a complete literature review on the topic, followed by the methodology implemented and the results obtained, and finally presents the conclusions and practical implications for the management of different private and public entities at the destination.

2. Literature Review

2.1. Peer-to-Peer Tourism Concept

P2P tourism is one of the great global trends that is transforming the tourism sector, introducing changes in practically all aspects, such as the way of travelling, staying or living the experience at the destination [5–8]. There is an alteration of the traditional model whereby tourism experiences are co-produced by tourism companies, tourists and residents [9]. The entry of new agents into the market and the search for new experiences by tourists—who now have the opportunity to directly contact the local population—leads to a situation in which both companies and individuals wish to offer a wide range of services, consequently posing a challenge for traditional tourism businesses. In Bostman's words [10], we are reinventing things that were already done in town's squares for years: sharing, bartering, renting and exchanging. The difference now is the scope. Technology allows access to goods or services and closing transactions between supply and demand with minimal intermediation costs [5]. New technologies allow individuals to become tourist producers [9], offering either accommodation or transportation, or even providing bicycle rent or services related to gastronomy. From a traditional model, based on the business to consumer (B2C) structure, where the company sells and the consumer buys the products and services it offers, we are moving to a P2P model where individuals offer and demand services [11]; this is more dynamic and offers greater adaptability than the traditional models. New technologies and, especially, smartphones allow tourists to access platforms to demand the services or information requested instantly [11] and to value the services received, thus becoming prescribers: online platforms such as TripAdvisor, with more than 463 Million unique visitors per month in the third quarter of 2019 [12], became a fundamental information tool for tourists when planning their trip or deciding what to do at the destination.

Following Paniagua-Rojano et al. [13], P2P platforms and social networks play an important role in the search for tourist information about destinations by providing first-hand information shared by users [14,15] without being mediated by institutional bias, and consequently offering greater confidence. Therefore, the role previously played by travel agencies is losing relevance; there are alternatives that users perceive as more trustworthy because they come from other users [6,16]. On the other hand, the availability of information is instantaneous, that is, in real-time. A travel guide requires a lengthy development process, while publishing an opinion on a platform such as TripAdvisor only takes a few minutes and will be available in seconds for anyone looking for information [17].

2.2. Motivation in Peer-to-Peer Accommodation

Following Tussyadiah et al. [18], from the consumer's perspective at the time of hiring the accommodation in the P2P mode, the services received are different from those that could be obtained in a traditional hotel, which would lead to different expectations and, therefore, also to a different evaluation of the service. In this sense, the location of

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the accommodation—being located in a tourist area or near restaurants, shops, transport or attractions—is an important motivation for users of this type of accommodation, as is accessing a local experience that can be perceived as authentic [18,19]. The needs that the user of a P2P accommodation tries to cover (community desire, sustainable consumption, lower prices [10,20,21]) are, therefore, different from those that a hotel can satisfy, so the motivations for the use of P2P accommodation are also different from those normally associated with hotel accommodation. Guttentag et al. [22] identify five key factors in motivation: interaction (which encompasses two different motivations: interaction with the owner and interaction with local population), the existence of home comforts, novelty, the feeling of the sharing economy (which refers to three motivations: to help the local economy, to help the environment and to share the Airbnb philosophy), and local authenticity. Hamari [23], for his part, distinguishes between two groups of motivations:

✓ Altruistic motivations, such as concern for the environment, helping others, etc.
✓ Selfish motivations, such as obtaining an economic benefit (either in the form of savings, if you are acquiring the service, or in the form of income, if you are providing the service), free access to certain resources or the achievement of an online reputation.

Hamari [23] proposes a model based on the "Self-Determination Theory", which classifies motivations into intrinsic and extrinsic. The first would be altruistic, and the second would be selfish since it involves seeking to obtain some personal benefit. Hamari [23] concludes that intrinsic motivations, unlike extrinsic ones, are a strong determinant of attitude. However, to predict continued use of this type of accommodation, extrinsic motivations are preferable. On the other hand, economic benefits appear to have a significant effect on behavioural intentions, but not on attitudes towards P2P hosting. The idea of sustainability is an important factor in the formation of positive attitudes towards P2P hosting, but the financial benefits are a stronger motivator in terms of the intention to participate in this type of hosting. However, other studies [24,25] have observed a predominance of extrinsic motivations when choosing this type of accommodation. Razli et al. [26] find that, in addition to economic motivation, other aspects such as seeking new experiences, meeting new people or following the recommendations of other tourists are also relevant motivations to opt for P2P accommodation. In this line, Bellotti et al. [26,27] highlight the importance of the social element in P2P structures (users are more attracted to systems where they can connect with other users and establish relationships). It also points out the need for access to a good or service as a motivation to participate (even in some cases, prevailing over the social aspect) as well as to personal interest. Altruism and morality are important motivations for many tourists as well as the fact that they are helping other people to earn an income [27].

2.3. Peer-to-Peer Tourism and Satisfaction

Tourist satisfaction is essential in the survival of a tourist destination. We can define satisfaction as the evaluation made by the tourist comparing his expectations with what he/she has experienced and received on the trip [28,29]. In the case of P2P tourism, it includes the services and experiences lived during the trip. Various theories have been formulated about satisfaction and behaviour. The most relevant cognitive theories are the expectancy-value theory, the assimilation-contrast theory, the social comparison theory, the exchange theory, the discrepancy theory, the decision-making theory and the self-concept theory:

✓ Expectancy-value theory. Behaviour is a function of the demands of the organism, of the objectives or goals available in the environment, and of the hope of achieving these objectives [30].
✓ Assimilation-contrast theory. This theory was formulated by Hovland et al. [31] to explain the reactions that occurred in individuals who received communication on a controversial subject. The authors affirm that there is an acceptance area, where those contents that the individual considers more or less acceptable based on their current position would be integrated, and a rejection area, where those contents con-

sidered unacceptable from their current point of view would be found. If the content of the communication can be assimilated to the positions of the acceptance area, the behaviour of the individual will tend to change in the desired direction. On the contrary, if the content of the communication enters into the rejection area, it will be considered unacceptable and the behaviour of the individual will be the opposite of that desired.

✓ Social comparison theory. Festinger [32] starts from three hypotheses: the first is that there is a tendency for people to evaluate their opinions and abilities, the second is that people tend to make this evaluation by comparison with the opinions and abilities of others, and the third is that the tendency to compare oneself with others decreases as the difference between one's own opinions and abilities and those of others increases. This last hypothesis is linked to homophilia: we tend to trust and compare ourselves with similar people [33]. A positive self-evaluation leads to an increase in self-esteem, and, conversely, a negative self-evaluation leads to a worsening of self-esteem.

✓ Exchange theory. Thibaut et al. [34] suggest that, in a relationship between two people, the behaviour exhibited by each of them can translate into rewards and costs. The person tends to evaluate these rewards and costs with what Thibaut et al. [34] called the comparison level (CL). The CL would be a function of similar past experiences, behaviours of other people, and expectations about the situation.

✓ Discrepancy theory. According to this theory by Locke [35], satisfaction depends on the discrepancy that could exist between the desired results and those that the individual perceived that he/she was receiving.

✓ Decision-making theory. This theory is based on the existence of decision rules. Montgomery et al. [36] consider that a simple decision can be described as a dynamic process in which the decision-maker seeks and evaluates the information sequentially. Each decision rule can imply certain benefits such as the probability of hitting the decision, the speed with which the decision can be made or the ability to justify the decision, but it can also have costs such as that associated with finding and obtaining the information or the effort needed to assess the best decision [37].

✓ Self-concept theory. It is based on the image that we have of ourselves ("self-concept"). This image would have two aspects: the real (objective) and the idealized (subjective). Sirgy [38] modifies the theory ("Self-image/product-image congruity theory") that measures the congruence between the image that we have of ourselves and the "product" (meaning people, organizations, etc.):

- Positive self-congruence: both our perception of our image and that of the product are positive.
- Positive self-incongruity: the image we have of ourselves is negative, but the image that we have of the product is positive.
- Negative self-congruence: both our perception of our image and that of the product are negative.
- Negative self-incongruity: the image we have of ourselves is positive, but the image of the product is negative.

Sirgy [38] states that an individual will experience greater attraction to the product in the case of positive self-incongruity than in the case of positive self-congruence. Similarly, a negative self-incongruity will be more demotivating than a negative self-congruence. Subsequently, [37] propose the evaluative congruity theory, which compares, for the same reality or object, the perceived value and the evoked value. The result is not only influenced by the degree of congruence or incongruity between both values but also by the strength of perception and belief involved in the process, as well as by the importance for the individual of the context or dimension of the object that he/she are valuing.

Based on these and other theories, numerous models have been developed in recent years to assess tourist satisfaction, like the holiday-satisfaction model [39], based on discrepancy theory, which tries to measure tourist satisfaction with a holiday, a much messier concept to deal with than items like restaurant, hotel, and so on used by other models. The attribution model [40] is used to measure the tourist satisfaction related to

destination services. It may be limited for capturing factors more cognitive than affective, related to satisfaction [41]. The cognitive-affective model [42], more perceptive in analysing the tourist satisfaction process, uses the tourist cognition and emotion to evaluate tourist satisfaction, delving into the mental processes of the tourist.

Following Torres [43], quality and satisfaction would be related concepts, but with different meanings. He considers the services with a higher standard that lead to a greater value than the tourists' expectation, like service quality. A better performance is then a property of service quality.

As previously stated, the importance of tourist satisfaction lies in the influence it has on the choice of destination, the consumption of products and services, and on loyalty to the destination [44]. According to this author, the probability that a tourist will visit the destination again is affected by the level of satisfaction. On the other hand, satisfaction not only influences the possibility of repeating the visit but also the possibility that the tourist recommends the destination to other people, which is a factor of attraction for new visitors (loyalty to the destination). In the field of P2P tourism, Möhlmann [24], in a study on collaborative transport and accommodation, concludes that the savings obtained, familiarity, quality of service, trust and utility positively affect the satisfaction of the tourist with the "collaborative" transport option chosen, as well as the possibility of choosing that option again. On the other hand, regarding accommodation, the savings obtained, familiarity, trust and usefulness were revealed as positive influences on tourist satisfaction, as well as the possibility of repeating. In this sense, Tussyadiah [18] considers that P2P accommodation is consolidating itself as a viable option for tourists. For this author, the savings obtained and the fact of enjoying and having fun are factors that positively influence tourist satisfaction. The available amenities also positively influence satisfaction but are not decisive when choosing an option. Unlike the results obtained by other authors [45–47], the aspects associated with sustainable consumption had a negative effect on satisfaction. Tussyadiah [18] concludes that social aspects have a different influence depending on the type of accommodation that has been chosen. Thus, in the case of tourists who opted for a private room in the owner's home, these social aspects had a positive influence on satisfaction, unlike the cases in which they opted for an accommodation consisting of a complete dwelling, in which the relationship with the owner was minimal, so satisfaction was not affected by these aspects. Likewise, the possibility of having amenities such as access to the kitchen, a washing machine or iron has a favourable impact on satisfaction, although not on the intention of opting for this type of accommodation.

Motivation and satisfaction are closely related concepts. The choice of destination, type of accommodation, and transport is made according to the different motivations that affect the decision process, and the level of satisfaction will vary depending on how expectations are confirmed in reality [29,48–51] and the benefits received [7,52]. On the other hand, studies on the motivations of users of P2P accommodation [53,54] detect the negative influence that lack of trust has on satisfaction, while there is a positive effect on satisfaction with motivations related to obtaining an economic benefit, being able to stay in a better location within the destination, the experience of trying new options, sharing, the feeling of helping the environment, comfort, and finally, the possibility of establishing bonds with local people.

2.4. Peer-to-Peer Tourism and Technology

Technology and information are basic tools for tourism. As the Internet expands, the demand for information grows, and this usually comes from users: it is electronic word of mouth (eWoM) boosted by the expansion of social networks, smart mobile devices, and apps [14,15]. The huge difference from the previous word of mouth (WoM) form is that, now, the opinions, comments and evaluations stated by the users remain in time. The arrival of big data has provided a new way to get low-cost data from users. Movements, choices and behaviours from users are now collected and stored in real-time [55]. In this

sense, [56,57] tourists get the information they need through social media, which is crucial when planning a trip.

On the other hand, there are several drawbacks and collateral damages in the rise of social media networks and aggregators in the tourism sector. Buhalis et al. [58] study the effects that ratings and evaluation systems in the sharing economy have over hosts and users. An increasing pressure to get better scores, rising expectations about services, lead to lose-lose situation where co-destruction is the final consequence. In addition, another consequence is the spreading of P2P tourism out of tourist areas towards residential zones, which is named by Dolnicar [59] as "omnitourism". As Farmaki et al. [7] conclude, blooming P2P accommodation has disrupting effects on hospitality sectors due to changes in practices, roles, and so on.

3. Material and Methods

3.1. Survey Design

The analysis is based on giving a questionnaire to a representative sample of P2P visitors who meet the status of tourist. From a draft survey and through several refinements, a previous test was developed with a starting group of surveyed tourists with analogous characteristics to the final sample, where the definitive set of questions was employed. The survey reached is based on diverse preceding research [10,20–24,26,27]. The final version of the questionnaire had the clearest questions possible to achieve the aims set for the present work, as well as the maximum precision so as not to excessively lengthen the survey. This was displayed in three languages: English, Spanish and French. The survey has two parts. First, questions are asked about the planned daily expenditure, the motivations for opting for P2P tourism, the conditions that influence the accommodation selection, the degree of satisfaction, and future expectations about the accommodation, as well as the reasons for the trip and the perception of the historical heritage of the city. Finally, a second part collects the sociodemographic characteristics of the tourists, such as gender, age, income or educational level. In the survey, questions with open and closed responses were used, using a Likert scale of five points (1 = strongly disagree; 3 = Neither agree nor disagree; 5 = strongly agree).

3.2. Data Obtention

The surveys were carried out by pollsters related to the University of Córdoba. They were presented in the three mentioned languages—English, Spanish and French— and chosen by taking into consideration the mother tongue and place of origin of the visitors. A total of 508 surveys, of which 490 were valid, were completed from October 2017 to May 2018. The surveys were carried out in different places in the historic centre of the city to obtain the widest range possible of situations and people. Convenience sampling criterion was followed for surveys' selection, usually employed in this type of research, where the sample is available to be surveyed in a given space and time [60]. It was not stratified by gender, age, educational level, place of origin or any other variable; rather, it was the procedure of selecting tourists who, having travelled to the destination under the P2P modality, agreed to answer in a stipulated time of ten minutes. The rejection rate of the survey was low and not significant at any point of the questionnaire.

3.3. Data Analysis

Rumelhart and McClelland [61] define the ANN as a network composed of several process elements (PE)—also called nodes—with a small capacity for storing information. These units are composed of an input vector $(x_1, x_2, \ldots, x_n)$, each with corresponding synaptic weights $(w_1, w_2, \ldots, w_n)$ that are applied to these input vectors using a propagation rule (based on its corresponding linear combination, being generally the product of both). The application of an activation function to this result determines the value of these nodes, which are grouped into several layers, such as input, output and intermediate (also called hidden), which can be one or more.

ANN presents a better degree of adjustment than other extrapolate methodologies such as hedonic pricing method, as stated in [62,63]. Although in these last studies, ANN is implemented in price determination, ANNs of MLP type had been also used in other kinds of estimations based on surveys [64–66].

Through SPSS Statistics v.23 software, an ANN of MLP type is developed, in which the input values correspond to the responses obtained in the survey, and the output values to the estimates that the ANN elaborates on the different characteristics of the sociodemographic profile of the tourist interested in P2P accommodation. These data are previously coded to obtain numerical values as a response. During the process of elaboration of the ANN, different topologies and activation functions are tested, finally preserving the network that presents a greater degree of adjustment in terms of coefficient of determination (R^2) and mean absolute relative error (*MAPE*).

4. Results

4.1. Data and Variables

The results referring to the sociodemographic profile of the respondents are presented in Table 1. Parity was observed in terms of gender; there were ages between 26 and 55 years in three out of four cases and respondents had university studies or higher in two out of three cases. The sample shows a greater dispersion in terms of income, although approximately half of the respondents have a purchasing power between 1000 € and 2500 € per month.

Table 1. The respondents' sociodemographic characteristics.

Variables	Percentage	Variables	Percentage
Gender		Educational level	
Male	47.55%	Primary education	8.37%
Female	52.44%	Secondary education	22.24%
Income (monthly)		University graduate	41.84%
Less than 700 €	10.61%	Master/PhD	27.55%
701 € to 1000 €	14.08%	Age	
1001 € to 1500 €	21.84%	Less than 26 years old	20.20%
1501 € to 2500 €	28.78%	26–40 years old	56.73%
2501 € to 3500 €	14.49%	41–55 years old	17.55%
More than 3501 €	10.20%	More than 56 years old	5.51%

The questions asked in the survey, as well as their mean, standard deviation, and minimum and maximum values are shown in Table 2. Except for Q01, all questions are Likert type, which take values from 1 to 5, where 1 is "strongly disagree" and 5 is "strongly agree". There is a general trend as a motivating factor in the choice of this type of accommodation in aspects related to price (Q10), the intention to stay again (Q15), disconnect from everyday life as a reason for the trip (Q16), as well as the factors related to the location (Q06) and the published images of the accommodation (Q12). The options on which there is the greatest disagreement refer to learning the local language (Q19), the possibility of meeting people (Q03), and proximity to the place of residence (Q17).

Table 2. P2P tourism in Córdoba question collection.

Code	Question	Mean	Std. Dev.	Min. Value	Max. Value
Q01	What total amount of money (accommodation, meals, leisure,) do you plan to spend?	399.72	330.78	30	2300
	Motivations for opting to P2P tourism				
Q02	Have more space than in a hotel room	3.40	1.23		
Q03	Possibility of meeting people and establishing new bonds	2.63	1.27		
Q04	Greater accommodation availability and offer to choose	3.63	1.01	1	5
Q05	Possibility of having greater spending capacity at destination	3.69	1.03		
Q06	Accommodation location	3.90	1.04		
Q07	Promotion of the social economy	3.23	1.11		
	Investment of the comparative savings obtained				
Q08	The amount saved on accommodation allows me to have greater spending capacity to enjoy the local leisure offer	3.82	0.99	1	5
Q09	The amount saved on accommodation allows me to enjoy a longer visit to the city of Córdoba	3.50	1.16		
	Factors that motivate the choice of accommodation				
Q10	The price	4.35	0.84		
Q11	The ratings of other users about the host	3.88	0.90		
Q12	The published images about the accommodation	3.90	0.98	1	5
Q13	Ease of access	3.70	1.05		
Q14	Kitchen availability	3.23	1.35		
	Satisfaction with the type of accommodation				
Q15	I think I will use this type of accommodation again	4.19	0.87	1	5
	Reasons for the trip				
Q16	Escaping from everyday life	3.91	1.09		
Q17	The proximity to my place of residence	2.74	1.42	1	5
Q18	Being an affordable tourist destination	3.76	1.12		
Q19	To learn the local language	1.76	1.29		
	Perception of historical heritage in the city				
Q20	The visit to the historical heritage has contributed to my education	3.70	1.09		
Q21	The visit to the historical heritage of the city has thrilled me	3.73	0.93	1	5
Q22	During the visit, I have felt part of the historical heritage	3.17	1.13		

4.2. Artificial Neural Network Architecture and Performance

After several tests of combinations and following the better degree of adjustment, an ANN of the MLP type is reached with an "22, 4, 5" topology, that is, with 22 PE (or nodes), corresponding with the questions of the survey, 4 PE in the hidden layer and 5 in the output layer, corresponding with the socio-demographic characteristics of the respondents. A hyperbolic tangent as the activation function in the hidden layer and identity function in the output layer is employed. Table 3 shows the architecture obtained, presenting the previous coding of the output values to obtain numerical results as estimates.

Table 3. Network architecture.

Input Layer	**Covariates**	Q01 Q02 Q03 Q04 Q05 Q06 Q07 Q08 Q09 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21 Q22
	Number of Units (excluding bias)	22
Hidden Layer	Rescaling Method for Covariates	Standardized
	Number of Hidden Layers	1
	Number of Units in Hidden Layer (excluding bias)	4
	Activation Function	Hyperbolic tangent
Output Layer	Dependent Variables	Gender, male = 1 Gender, female = 2 Age (from 12 to 72) Educational level (from 1 to 4) Income (from 1 to 6)
	Number of Units	5
	Rescaling Method for Scale Dependents	Standardized
	Activation Function	Identity
	Error Function	Sum of Squares

The random subdivision of the sample between the training and testing groups is shown in Table 4 (training, 67.55%, and testing, 32.45%), the error made, ANN training time, and the stopping rule used, consisting in one consecutive step with no decrease in error.

Graphically, the network obtained (Figure 1) shows the relationships between the units of the different layers with their synaptic weights, which take values greater or less than zero. Arithmetically, PEs of the input layer are first standardized and later multiplied by its respective synaptic weights. These results are modified following an activation function of hyperbolic tangent. Next, these results are multiplied by its corresponding synaptic weights, resulting in the standardized estimations of the socio-demographic characteristics of the respondents. These outputs have to invert the standardization to show extrapolate results (e.g., to educational level appears with values from 1 to 4).

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Table 4. Model summary.

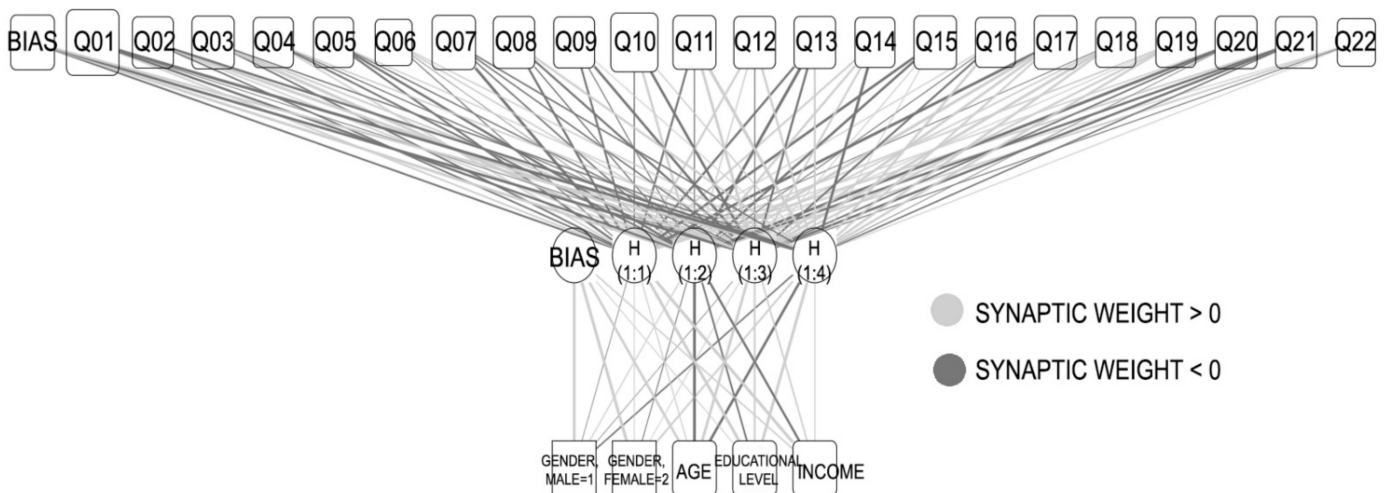|			
Training (N = 331; 67.55%)	Sum of Squares Error		447.187
	Average Overall Relative Error		0.775
	Percent Incorrect Predictions for Categorical Dependents	Gender	37.76%
	Relative Error for Scale Dependents	Age	0.661
		Educational level	0.783
		Income	0.807
	Stopping Rule Used		1 consecutive step(s) with no decrease in error (based on the testing sample)
	Training Time		0:00:00.34
Testing (N = 159; 32.45%)	Sum of Squares Error		243.656
	Average Overall Relative Error		0.917
	Percent Incorrect Predictions for Categorical Dependents	Gender	45.3%
	Relative Error for Scale Dependents	Age	0.890
		Educational level	0.857
		Income	0.971

Figure 1. Graphic representation of the ANN obtained.

As a general assessment of the degree of adjustment of the ANN, Table 5 presents the coefficient of determination (R^2) and the mean absolute percentage error (*MAPE*) obtained for each of the endogenous variables in the model and the mean of these. Although the R^2 shows an almost total adjustment in the case of gender, it presents values around 20–30% for the rest of the estimates. The *MAPE* shows similar values for all outputs, except for a slight increase referred to income. On average, R^2 and *MAPE* are around 40% and 30%, respectively.

Table 5. Adjustment of the ANN obtained.

	Gender	Age	Educational Level	Income	Overall
R^2	99.40%	33.28%	19.36%	17.55%	42.40%
MAPE	30.92%	22.90%	30.12%	47.54%	32.87%

Additionally, the ANN obtained allows quantifying the relevance provided by each of the inputs in relative terms (Figure 2). It essentially highlights the planned money to spend

(Q01) and the price as a deciding factor for choosing a P2P accommodation to stay in (Q10) as the most important input values for the ANN. The promotion of the local economy (Q07) and the previous users' ratings about the host (Q11) are also noteworthy. The least relevant factors refer to the location of the accommodation (Q06) and to feeling part of the historical heritage of the city (Q22).
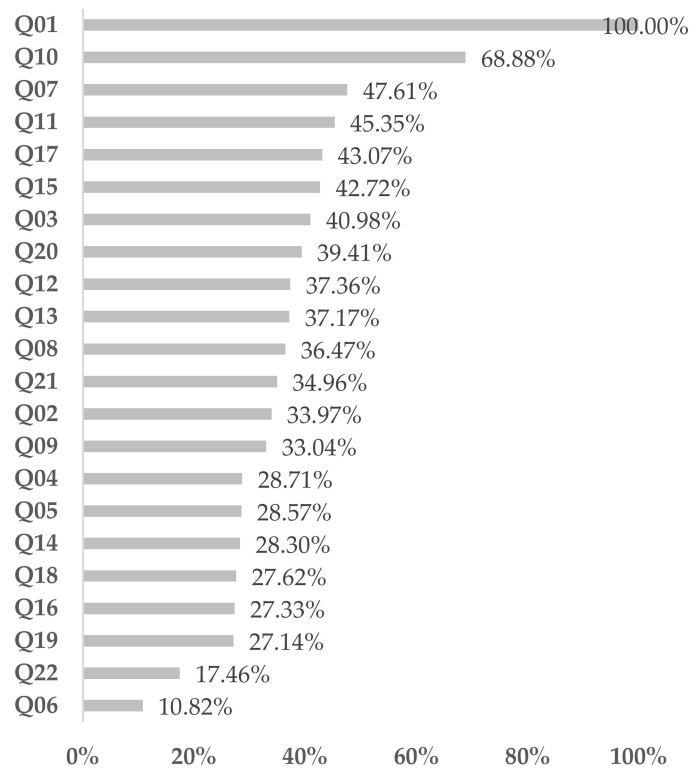
Question	Relevance
Q01	100.00%
Q10	68.88%
Q07	47.61%
Q11	45.35%
Q17	43.07%
Q15	42.72%
Q03	40.98%
Q20	39.41%
Q12	37.36%
Q13	37.17%
Q08	36.47%
Q21	34.96%
Q02	33.97%
Q09	33.04%
Q04	28.71%
Q05	28.57%
Q14	28.30%
Q18	27.62%
Q16	27.33%
Q19	27.14%
Q22	17.46%
Q06	10.82%

Figure 2. Relevance of exogenous variables in the ANN model.

Furthermore, the ANN model developed allows measuring the marginal influence produced in each of the characteristics of the sociodemographic profile that each question makes individually. To collect this information, the different output values are taken while each value of the question to be analysed is modified from position 1 to 5 (In Q01 case, the sample was ordered from lowest to highest, divided into five equal parts and their respective means were used as positions 1 to 5 as the ANN input values for the referred calculation.); the rest of the questions remain in their average values. The results obtained are classified separating those questions that had the greatest influence on a characteristic of the profile determined both directly (Table 6) and inversely (Table 7). In terms of representativeness, a criterion is followed to present the 10 most significant variations in both cases.

Table 6. Questions with the most direct influence in profiles' sociodemographic characteristics.

	Question	Sociodemographic Characteristic	Variation
Q01	What total amount of money (accommodation, meals, leisure,) do you plan to spend?	Age	27.97%
Q20	The visit to the historical heritage has contributed to my education	Age	21.70%
Q02	Have more space than in a hotel room	Age	21.46%
Q15	I think I will use this type of accommodation again	Age	19.20%
Q21	The visit to the historical heritage of the city has thrilled me	Age	16.88%
Q12	The published images about the accommodation	Educational level	15.98%
Q19	To learn the local language	Educational level	15.89%
Q11	The ratings of other users about the host	Educational level	13.45%
Q20	The visit to the historical heritage has contributed to my education	Income	13.27%
Q04	Greater accommodation availability and offer to choose	Educational level	12.98%

Table 7. Questions with the most inverse influence in profiles' sociodemographic characteristics.

	Question	Sociodemographic Characteristic	Variation
Q10	The price	Age	−61.15%
Q12	The published images about the accommodation	Age	−29.66%
Q16	Escaping from everyday life	Age	−26.17%
Q10	The price	Income	−24.28%
Q08	The amount saved on accommodation allows me to have greater spending capacity to enjoy the local leisure offer	Age	−23.81%
Q17	The proximity to my place of residence	Age	−23.49%
Q07	Promotion of the social economy	Educational level	−22.58%
Q22	During the visit, I have felt part of the historical heritage	Age	−19.11%
Q17	The proximity to my place of residence	Income	−18.96%
Q18	Being an affordable tourist destination	Age	−18.03%

The questions that reflect a greater incidence in the different characteristics of the sociodemographic profile of tourists who use P2P accommodation are shown in Table 6. It is observed that as the age of the respondent's profile increases, the latter shows a greater willingness to spend on the trip (Q01), a feeling that the historical heritage has contributed to their education (Q20) and their experienced emotions (Q21) as well as a higher valuation of the available space compared to a hotel (Q02) and the intention to use P2P accommodation again (Q15).

A higher educational level implies, on the other hand, different interests, which are related to the use of the Internet, such as those related to the published images of the P2P accommodation (Q12), the opinions of previous users about the host (Q11), and greater availability and offer of accommodation (Q04). Additionally, a higher educational level also implies a growing interest in learning the local language (Q19).

Table 7 presents the questions with the greatest inverse influence on the different sociodemographic characteristics of the respondents. Thus, younger age and lower-income profiles show greater interest in price (Q10) as a decisive factor to choose P2P accommodation. In the same line, at a younger age, there is also a greater need to dispose of the savings

generated by the use of this type of accommodation (Q08), the choice of an affordable destination (Q18) or the proximity to their place of residence (Q17), which implies a lower cost dedicated to transport, a factor that loses importance as the respondent's income increases. Additionally, a younger age also implies interests different from those related to purchasing power such as the images of the accommodation (Q12), escaping from everyday life (Q16) or feeling part of the historical heritage of the city visited (Q22).

5. Conclusions

The sharing economy is based on the technical and communication capacities of Web 2.0. Its dependence on the technological factor is total: without technology, the information and coordination costs would make the activities that are currently developed in the field of the sharing economy unviable. Within the sharing economy, the two most important sectors are accommodation and transport, accounting for more than 72% of the profits generated and for almost 80% of the transactions carried out. Both sectors are closely related to tourism. The emergence of the sharing economy has led to important economic, social and cultural changes. There has been a paradigm shift: the transformation from a property-based economy to a use-based economy. It does not change the object; it changes the way of consuming. The causes or motives that drive this change are diverse: some of an altruistic nature and others more prosaic and selfish.

The most cited motivations in the field of P2P tourism are economic savings, the search for new experiences, the establishment of bonds with the local population and the recommendations of other tourists. These motivations can be classified into two groups: intrinsic and extrinsic. Among the former would be sustainability and empathy, while the latter would be financial benefits and reputation.

Tourist satisfaction is essential for the survival of a tourist destination. In P2P tourism case, it includes the services and experiences lived during the trip. Its influence lies in how it affects loyalty at the destination: the probability that the tourist would visit the destination again or that he/she would recommend it to other people.

Monetary factors are shown to be the most decisive in the profile of the P2P accommodation tourism user, both from the point of view of the total quantification of the trip expense and the low price as motivation to choose this type of accommodation. However, high income and older profiles imply an intention to spend more, and to give less importance to the low price of accommodation, and, on the contrary, to appreciate the historical heritage of the visited city more. Older age also implies a greater interest in accommodation space (and, thus, in comfort) and a willingness to use this type of accommodation again.

Consequently, and related to the latter, lower age and income make the low price of this type of accommodation more valued, as do the possible increase in the expense available for the trip derived from this saving, looking for destinations affordable to all budgets, and being near to their place of residence. Outside of the purely economic factors, there is a growing interest in those factors related to the use of the Internet among the profiles with a higher educational level in terms of a greater appreciation for accommodation pictures (shared here with the younger profiles), greater availability of offer, the comments of previous users, and even an interest in learning the local language. Finally, through the results obtained, it can be concluded that gender is not a relevant factor concerning the profile of the potential user of P2P accommodation.

The practical contribution of this research consists in, thanks to the ANN developed, the fact that a "composite picture" of the P2P accommodation tourist user can be obtained (specifying their age, gender, income, and educational level) based on the preferences granted to the different input values of the ANN, corresponding to the questions previously asked through the questionnaire. In this way, a customizable collection of answers will result in a specific profile type. This function is especially interesting to adapt the P2P hosting offer according to the preferences of its potential users or to public entities in order to configure its touristic offer based on the profile of the possible visitors.

The main limitation of this research is the time span in which the surveys were carried out; a fuller survey would have required fieldwork for a whole year. In this sense, when the field work is carried out during a full year, some type of different profile could be found, especially due to the fact that holidays in July and August tend to be of a more "family-nature". Another limitation is the uncertainty of the effects that the actual situation with COVID-19 will have on tourism and, specifically, on peer-to-peer tourism.

Thus, a future line of research will be focused on the current health situation world-wide existing as a result of COVID-19, which acts as a "before and after" in the tourism sector; it is necessary to carry out researches that seek safer alternatives for tourist experiences. In this sense, P2P tourism is presented as a safe and reliable tourist typology, which very possibly will result in its use increasing in future years. Consequently, it is proposed to carry out a parallel study in post-pandemic conditions, in order to detect if there are differences in the profile of the traveller who uses this type of accommodation. Likewise, it should also be analysed whether there is a different profile between the tourist who wishes to stay in a hotel and the tourist who opts for P2P accommodation.

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