



Motivation-Based Segmentation of Visitors to a UNESCO Global Geopark

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Abstract

Given the sustained growth that Geotourism has experienced worldwide, it is crucial to gain a better understanding of geotourists. Therefore, this study aims to examine visitors' motivations for visiting geoparks, segment them accordingly, and characterize each segment. An online questionnaire was developed to collect information from visitors of the Arouca Geopark—UNESCO Global Geopark and was completed by 607 who had visited this park at least once. Respondents were asked about their motivations for visiting the park using 18 items that were combined into five dimensions through exploratory factor analysis. These dimensions (*Escape, Relaxation and Enjoyment, Novelty Seeking and Nature, Knowledge, Socialization, and Sports and Adrenaline*) were the basis for a cluster analysis that revealed four segments of visitors: the *Want it All Geotourists* (representing 27% of the sample), that have the highest levels for all motivations; the *True Geotourists* (19.9%) which highest levels of motivations were on the three motivations that typically define a geotourist: nature/adventure, knowledge seeking, and socialization; the *Sensation Seekers* (34.4%) whose strongest motivations were sports/adrenaline and escape from routine; the *Accidental Geotourists* (18.6%) who scored lowest for all motivations and are motivated essentially by the escape from routine and by nature/adventure. These segments were then further profiled based on other variables such as age, gender, satisfaction, and quality of experience. The segmentation and description of each segment found in this study provide a better understanding of the typology of visitors to geoparks, which is crucial for better management of such places.

Keywords Geotourists · Geoparks · Motivations · Cluster analysis

Introduction

Geological formations have long attracted visitors from around the world (Ólafsdóttir and Tverijonaite 2018). Traveling to areas with spectacular natural landscapes or unique landforms is not new. However, the concept of Geotourism only appeared in the early 1990s (Hose 2012), and in the last 20 years, there have been considerable developments in Geotourism (Justice 2018). For example, the Global Network of

Geoparks, created in 2004 under the protection of UNESCO, initially had 21 geoparks and now has 177 geoparks in 46 countries (UNESCO 2022b). Along with this evolution, it appears that many places with historical and geological heritage are more accessible, attracting a greater number of visitors and it is expected that Geotourism will continue to grow (Ólafsdóttir 2019).

In terms of research, since 2002, when the first study dedicated to Geotourism took place, there has been a significant increase in scientific articles, especially from 2010 onwards (Herrera-Franco et al. 2020; Ólafsdóttir and Tverijonaite 2018). Despite this increase in research in Geotourism, Allan et al. (2015) report that there is a lack of studies and that more research is needed, both quantitative and qualitative, for a better understanding of Geotourism. The results of a systematic literature review on geotourism and territorial development also show that more research on social, economic, and geographical areas is needed (Duarte et al. 2020). In another systematic literature review on Geotourism, Ólafsdóttir and Tverijonaite (2018) noted that “the number of published

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papers which have tourists as their main focus is still relatively low” (p.10). In particular, there is scarce literature addressing the motivations of people that visit geosites (Allan et al. 2015; Hurtado et al. 2014; Shavanddasht et al. 2017). Moreover, most studies examining visitors’ motivations were conducted in Asia or Australia.

This study, therefore, aims to fill the scarcity of existing literature on Geotourism and has two main objectives. The first is to identify the main motivations of visitors to a European geopark. The second is to segment visitors based on their motivations and characterize each segment according to age, gender, satisfaction, quality of experience, level of satisfaction, and loyalty, among other characteristics. As with any other product or service, understanding visitors’ motivations and characteristics is relevant and vital for developing Geotourism. Understanding the motivational forces behind visitor behavior can help service providers scale up and adjust their offerings to become more attractive and targeted to visitors (Yousaf et al. 2018). The segmentation and description of each segment found in this study provide a better understanding of the typology of visitors to geoparks, which is crucial for better management of such places.

Study Area

The geopark object of this study is the Arouca Geopark, located in the North of Portugal and covers an area of 328 km² (Fig. 1). It has been recognized by UNESCO as a member

of the Global Geoparks Network since 2009 because of its renowned geological heritage and the existence of a territorial development strategy (Sá and Rocha 2020).

According to UNESCO (2022a), the Arouca Geopark is famous for its remarkable geological heritage and has 41 geosites, representing the value and diversity of the geology of this territory (Fig. 2). Among the 41 inventoried geosites, 24 are of geomorphological interest (Sá and Rocha 2020).

The Arouca Geopark territory is home to a unique geological heritage of great relevance. Two of its geosites are well known internationally: the Canelas Slate Quarry and its on-site Museum, and the Castanheira Nodular Granite, with a phenomenon known as “rocks delivering stones” (European Geoparks 2023).

Due to the resources and specificities that characterize Arouca, this territory has a balanced offer, in line with the surrounding area. Three mountains surround the Arouca Geopark (Freita, Montemuro, and Arada), and several rivers traverse it, providing the ideal conditions for various activities like canyoning, canoeing, kayaking, and mountaineering (Visit Portugal 2023).

The Arouca Geopark has undergone significant changes regarding its infrastructures to support and attract tourists since it was classified as a geopark in 2009. For instance, the Paiva Walkways, inaugurated in 2015, a geotouristic trail, with a length of 8.7 km, sculpted by the river, quickly became an international reference. In 2017, it received two awards, the Geoconservation award, from the Portuguese Association for the Conservation of Geological Heritage, and the National Prize for Architecture in Wood. Within

Fig. 1 Location map of Arouca Geopark



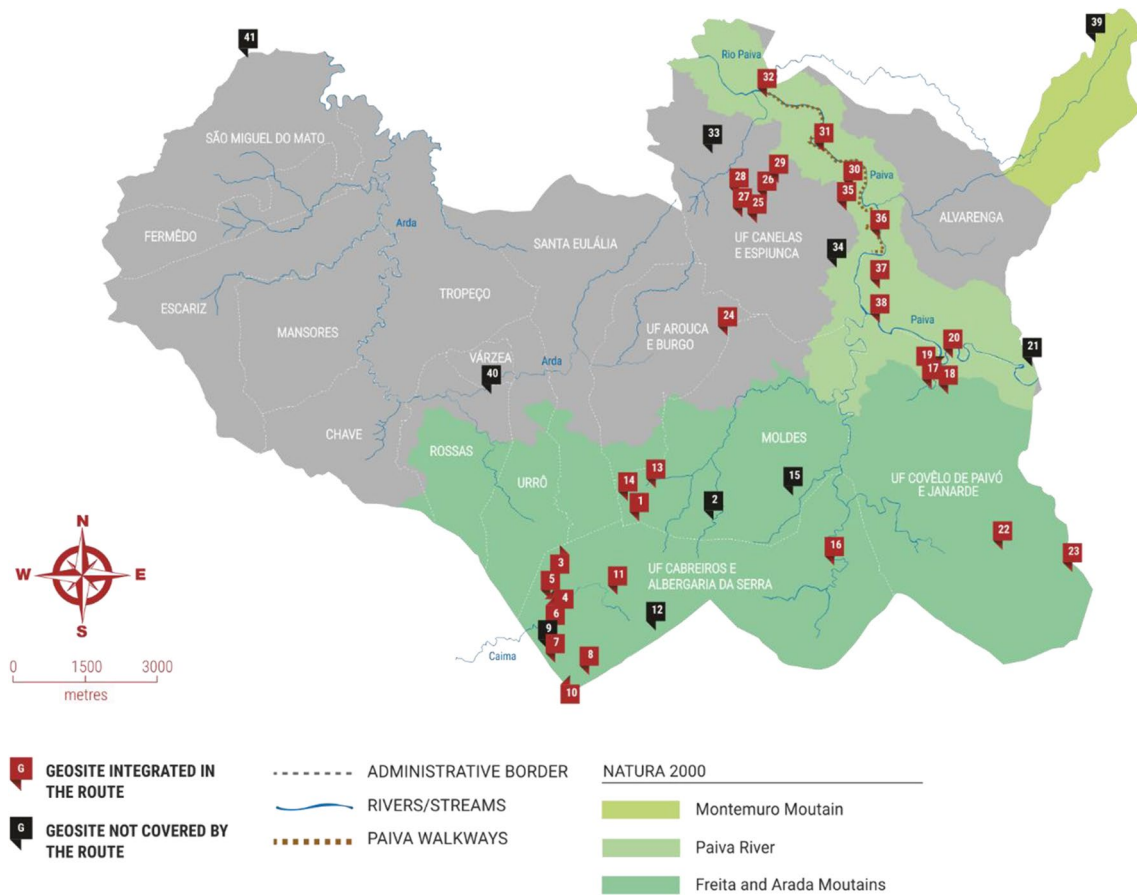


Fig. 2 Geological map of Arouca Geopark. Source: Rocha (2016)

the scope of the World Travel Awards, this trail has been awarded 16 times since 2016.

In 2021, the Arouca Geopark territory inaugurated the 516 Arouca bridge, a suspended pedestrian bridge over the Paiva River. This structure is 516 m long, 1.20 m wide, and 175 m high, making it one of the largest pedestrian bridges in the world (O’Hare 2021).

Literature Review

Geotourism

Although traveling to places with outstanding natural landscapes or unique landforms is not new (Dowling 2013), Geotourism is considered one of the newest concepts within tourism studies today (Ólafsdóttir 2019; Ólafsdóttir and Tverijonaite 2018). Hose (1995) proposed the first official definition of Geotourism, defining it as “The provision of interpretive and service facilities to enable tourists to acquire knowledge and understanding of the geology and geomorphology of a site (including its contribution to

the development of the Earth sciences) beyond the level of mere aesthetic appreciation.” (p.17). Since this definition was made, many other definitions have emerged (see Dowling and Newsome (2018) for an analysis of the evolution of Geotourism definitions).

Geotourism is a form of tourism exploiting natural sites and landscapes containing interesting earth-science features in a didactic and entertaining way (Pralong 2006). It can be seen as the movement of people going to a place to look at and learn about one or more aspects of geology and geomorphology (Joyce 2006). Geotourism definitions do not focus on one particular travel dimension; they include various types of “authentic” travel experiences within a single definition (Bosak et al. 2010).

Numerous studies have highlighted how Geotourism can contribute to local populations’ economy and sustainable tourism development (Dowling 2013; Farsani et al. 2011; Lee and Jayakumar 2021; Ríos et al. 2020; Štrba et al. 2020). In this context, geoparks have played a crucial role in developing Geotourism (Dowling 2011; Farsani et al. 2011, 2014). A geopark is a territory with a unique geological heritage (McKeever et al. 2010), introduced as a tourist

attraction (Farsani et al. 2014). Geopark's importance can be evidenced by the growing numbers of geoparks worldwide (UNESCO 2022b).

Definition and Segmentation of Geotourists

It is not easy to define a geotourist (Dowling 2011), as all tourists can be considered geotourists (Larwood and Prosser 1998). Khoshraftar and Farsani (2019) argue that a geotourist is “someone whose purpose of travelling and making a trip into nature is to observe natural landscapes such as landforms, stones and the processes of their formation” (p.1879). Similarly, Rabassa (2018) claims that geotourists are primarily motivated by “the observation of the Earth's natural heritage and/or the physical exposure of the geological and geomorphological acting processes” (p. 112).

People that visit geosites have different motivations and levels of knowledge and interest in geology. Hose (1998) provided a typology of geotourists based on these differences, comparing them to insects. The most experienced geotourists are the “beetles” and are a minority and, on the opposite end, are the “butterflies” that are the majority. Butterflies are general tourists, that do not commit to geology (Hose 1998). Hose (1998) also names another group as “ants,” which are amateur geologists, and the fourth group as “wasps,” which are students. Gorman (2007) also proposed four visitor types that include “Accidental visitors” (no prior decision made to visit), “General” (family tour, day, education, prior decision made to visit), “Interested” (driven by site), and “Scholarly” (knowledgeable and site-specific). The latter type of visitors are more involved and want to spend more time at the site, than the former visitors. Similarly, Grant (2010) suggested six types of geotourists that can be divided into two main groups: the visitors and the geotourists. The visitor's group is further divided into three subgroups: (1) the unaware visitors, that go to the site with no prior knowledge or expectation, (2) the aware visitor, who arrives at the site with some prior knowledge and mainly interested in visual aspects/something to do, and (3) the interested visitor, with no specific interest in the subject, but likes to discover new things. The geotourists group is also divided in three subgroups: (1) the geo-amateur, with some knowledge about geology and visits the territory out of interest in this subject, (2) the geologist-specialist, with a geo-degree or similar and lastly, and (3) the geo-expert, that is highly informed and interested in the specific geosites or geological resources of the territory. What is common in these classifications is that on one end there are the visitors, that do not have much knowledge and interest, the amateurs, and at the other end there are the geotourists that are highly interested and informed, they are the geotourism experts.

Each segment has different needs that need to be catered for differently.

Instead of segmenting Geotourism visitors based on knowledge and interest, Kim et al. (2008) took a different approach and grouped visitors to a cave in Korea based on their motivations. They found four groups: Escape-seeking, Knowledge and Novelty seeking, Novelty-seeking, and Socialization seeking.

Hurtado et al. (2014) segmented visitors to the Crystal Cave at Yanchep National Park in Western Australia, based on motivations but added experience. The authors found five types of geotourists: (1) The purposeful geotourist (very high motivation/positive experience). The primary motivation for travel is to visit a geosite, and this type of geotourist has a positive experience based on their interest in the geosite and desire to learn more. (2) The intentional geotourist (high motivation/positive experience). Motivation is influenced by the geosite; however, additional motivations are also present. They have a positive experience and enjoy the information delivery. (3) The serendipitous geotourist (medium motivation/positive experience). Geotourism plays a moderate role in the decision to visit a geosite; however, once on-site, they engage in a positive experience. (4) The accidental geotourist (low motivation/positive experience). Motivation is not influenced by Geotourism, and this type of tourist may not even be aware of the geosite prior to visitation. However, once on-site, the experience encountered is positive. (5) The incidental geotourist (low motivation/negative experience). Geotourism plays no meaningful role in destination choice, and the experience encountered is negative.

Fung and Jim (2015) segmented visitors to a geopark, based on their motivations. They found five types of visitors: the nature-seeking escapists, convenience-oriented socializers, heritage enthusiasts, passive visitors, and the want it alls. The nature-seeking escapists have strong nature ambience motivations and desires for relaxation, while the convenience-oriented socializers are motivated by socialization. The heritage enthusiasts have a passion for appreciation and learning about geology, while the want it alls are enthusiastic and motivated by all aspects and have the greatest level of satisfaction. Finally, the passive visitors represented the largest group and were characterized by not having clear motivations and preferring to be elsewhere. Table 1 summarizes the results of studies addressing segmenting visitors to geosites.

Geotourist's Motivations

Several studies in recent decades have explored visitor motivations for seeking out different types of tourism (Cheung and Fok 2013; Fung and Jim 2015). However, in the field of Geotourism, research on visitors' motivations appears to be limited. A close examination of empirical studies revealed

Table 1 Different studies on geotourist segmentation

Authors	Segments	Sample size	Geosite and country
Hose (1998)	Based on knowledge and level of interest: beetles (experiences geologists), ants (amateur geologists), butterflies (general tourists), and wasps (students)	-	-
Gorman (2007)	Based on knowledge and level of interest: Accidental visitors (no prior decision made to visit), General, Interested, and Scholarly	-	-
Kim et al. (2008)	Based on motivations: Escape-seeking, Knowledge and Novelty seeking, Novelty-seeking, and Socialization seeking	537 responses	Hwansun Cave Korea
Grant (2010)	Based on knowledge and level of interest: The visitors (unaware, aware, and interested) and the geotourists (the geo-amateur, the geologist-specialist, and the geo – expert)	-	-
Hurtado et al. (2014)	Based on motivations and experience: the purposeful geotourist, the intentional geotourist, the serendipitous geotourist, the accidental geotourist, and the incidental geotourist	119 respondents	Crystal Cave at Yanchep National Park in Australia
Fung and Jim (2015)	Based on motivations: Nature-seeking escapists, Convenience oriented, socializers, Heritage enthusiasts Passive visitors and Want it Alls	647 respondents	Hong Kong Global Geopark

that there are only nine published articles addressing this topic (as shown in Table 2), which confirms the claims of several studies that there is a lack of literature addressing the motivations of people that visit geosites (Allan et al. 2015; Hurtado et al. 2014; Shavanddasht et al. 2017). Another interesting conclusion is that more than half of the studies were conducted in Asia. Limited research has been conducted in Europe. Moreover, there are also limited studies regarding the motivations to visit a geopark (only three studies), as most are regarding the visitation of caves. Most of

these studies also do not relate motivations to socio-demographic characteristics or other variables.

Dowling and Newsome (2005) were the first to address the topic of geotourist’s motivations. Without having carried out a study with empirical data, but based on their experience in the area, they state that visits to geosites are carried out for reasons related to entertainment, to be part of a sense of wonder, to enjoy and to learn. Joyce (2006) also referred that Geotourism was an activity of people going to a place to look and learn about geology and geomorphology. In turn,

Table 2 Different studies on motivations in Geotourism

Authors	Motivations	Sample size	Geosite and country
Kim et al. (2008)	Escape, Knowledge, Novelty, Socialization	537 responses	Hwansun Cave Korea
Hurtado et al. (2014)	Curiosity, Education, Great interest in caves	119 responses	Crystal Cave in Yanchep National Park, Western Australia
Allan (2014)	Sense of Wonder, Relaxation, Knowledge, Escape (from the pressures of study), Enjoyment, Friendship	147 responses (children aged 14–17)	Dead Sea in Jordan
Allan et al. (2015)	Sense of Wonder, Relaxation, Knowledge, Escape, Enjoyment, Friendship	100 responses	Crystal Cave, Western Australia
Fung and Jim (2015)	Nature ambience, inherent heritage, social and accessibility	647 responses	Hong Kong Global Geopark of China
Cheung (2015)	Enjoyment, Novelty seeking, Social interaction, Escaping	310 Responses	Hong Kong Global Geopark of China
Shavanddasht et al. (2017)	Enjoyment, Relaxation, Novelty Seeking, Escape, Socialization and Knowledge	400 responses	Alisadr Cave Iran
Drápela et al. (2021)	Natural beauty and Socialization	555 responses	Bohemian Paradise Geopark in Czech Republic
Tomić and Marjanović (2022)	Visiting attractions, Research and prestige, Rest and relaxation, Knowledge and Friendship	303 responses	Serbs that had visited geosites within the Middle and Lower Danube region in Serbia

Dowling (2011) also states that one of the five fundamental principles of Geotourism is that it should be educational (Dowling 2011). Therefore, it is not surprising that, in studies on motivations in the field of Geotourism, learning, that is, obtaining knowledge, is one of the main motivations. In fact, this motivation was found in the study by Kim et al. (2008) carried out with visitors to the Hwansun cave, in Korea, in the study by Allan et al. (2015) carried out in a cave in Yanchep National Park, Australia, and in the study by Shavanddasht et al. (2017) on the motivations for visiting the Alisadr cave in Iran. The study by Fung and Jim (2015), carried out in a geopark in Hong Kong, found the motivation they called inherent heritage, which is also closely linked to learning.

However, there are other motivations for pursuing Geotourism. Escaping has also been identified as a motivation (Allan et al. 2015; Kim et al. 2008) and is related to people wanting to escape the routine. Closely related to escaping is the relaxation motivation, which has been identified as one of the main motivations (Allan et al. 2015; Shavanddasht et al. 2017). Studies have also found a motivation to socialize (Allan et al. 2015; Fung and Jim 2015; Kim et al. 2008; Shavanddasht et al. 2017) in which people want to socialize with friends and family or even meet new people. Other motivations found were the search for novelty (Kim et al. 2008; Shavanddasht et al. 2017), fun (Allan et al. 2015; Shavanddasht et al. 2017), the feeling of admiration (Allan et al. 2015), and carrying out activities based on nature and landscape appreciation (Fung and Jim 2015). In short, studies have shown that the main motivations are related to escaping the hustle of the daily routine, relaxation, nature, fun, feeling of wonder, and gaining knowledge.

It is also important to stress that studies addressing geosite's visitors have found that many visitors had gone because they had been taken there by family or friends (e.g., Hurtado et al. 2014).

Methodology

Interviews

Before developing the questionnaire to collect quantitative data, six semi-structured interviews were carried out with Arouca Geopark stakeholders (The Arouca Geopark Association, which manages the geopark, the Arouca Municipality, a Hotel, a Restaurant, an Arouca Geopark Interpreter Guide, and with a Tour Operator and Outdoor Activities Company specialized in the territory of Arouca Geopark). The interviews aimed to explore stakeholders' opinions and perceptions about Arouca Geopark-related issues, such as visitors' motivations, if they were aware of their needs and if they catered for them. Interviews lasted between 30 and

120 min and were recorded. The interviews provided valuable insights to understand the Arouca Geopark better and develop the questionnaire.

Questionnaire and Measurements

The questionnaire was divided into three sections. The first section contained questions about the respondent, such as gender, age, and income. The second section intended to analyze the main motivations for visiting the Arouca Geopark. Thus, respondents had to choose the level of agreement with each of the 18 motivations that led them to visit the Arouca Geopark territory, using a 5-point Likert scale (1 = totally disagree and 5 = totally agree). The motivations used in this study were based on the studies of Mehmetoglu (2005), Allan et al. (2015), and Pearce and Lee (2005). The interviews identified new motivations that were included in the questionnaire, identified as "New Item" (see Table 3). Experience dimensions were measured by adapting Oh et al. (2016) tourist experience scale. Loyalty and satisfaction were measured based on items used in Yoon and Uysal's (2005) study. Finally, the last section contained questions regarding visitors' satisfaction, loyalty, and experience at the geopark. The questionnaire was available in Portuguese, English, French, and Spanish.

Data Collection and Sample

The survey was disseminated through social networks, namely Facebook, through various shares (more than 100 shares) in groups related to travel, cultural, sporting, geology, and nature activities. The link to the online questionnaire was also emailed to all registered entities of the Arouca Geopark, to the Arouca GeoPark Association, to travel agents in Portugal, to schools, to all entities linked to geoparks at the national level, and to the European Geoparks Network. They were kindly asked to answer the questionnaire and to share it with others.

A total of 607 valid questionnaires were obtained for analysis, 55% of which were from female respondents. The average age was 42.94 years old (with a standard deviation of 11.6), 32% were over 50 and 32% were between 40 and 49 years old. Most respondents had a college degree (53.7%) and 17.7% had a master's or doctorate. Interestingly, most respondents had visited the park more than 3 times (51.9%) and only 26.7% had only visited it once. Friends and family are the most frequent company (37.6% and 35.9%, respectively), but some visited the park on a field trip with colleagues. The majority of respondents in the sample were Portuguese (97.7%).

Data Analysis

The 18 motivation items were subjected to an exploratory factor analysis, with varimax rotation. The average of the

Table 3 Measurements

Items	Source
Motivations	
MTV1. To relax mentally	Mehmetoglu (2005)
MTV2. Relieve daily stress	Pearce and Lee (2005)
MTV3. Strengthen relationship with family and friends	Pearce and Lee (2005)
MTV4. Meet people with similar values/interests	Allan et al. (2015)
MTV5. Share knowledge with others	Pearce and Lee (2005)
MTV6. To learn about new things/places/cultures	Mehmetoglu (2005) Pearce and Lee (2005)
MTV7. Develop knowledge and experience about geology and geoheritage	(2005)
MTV8. Develop biodiversity knowledge	New Item
MTV9. To get away from everyday life	Mehmetoglu (2005)
MTV10. Visit spectacular landform	Mehmetoglu (2005)
MTV11. To engage in nature-based activities	Mehmetoglu (2005)
MTV12. Participate in cultural activities	New Item
MTV13. Participate in sports	New Item
MTV14. It is exciting	Allan et al. (2015)
MTV15. To have fun	Allan et al. (2015)
MTV16. To experience adrenaline	New Item
MTV17. Because it is an exotic place	Allan et al. (2015)
MTV18. To visit/explore new places	Allan et al. (2015)
Experience	
Education	
EX1. I learned a lot during my visit to the Arouca Geopark	
EX2. The experience has made me more knowledgeable	
Escapism	
Ex3. I got away from a stressful social environment	
Ex4. I had the opportunity to rest	
EX5. I totally forgot about my daily routine	
Esthetics	
Ex6. Arouca Geopark has quality	
EX7. Arouca Geopark is very attractive	
Entertainment	
EX8. I felt a real sense of harmony	
EX9. I had a different experience	
EX10. I interacted with others	
Ex11. I had fun	
Satisfaction	Yoon and Uysal (2005)
SAT1. The visit to the Arouca Geopark exceeded my expectations	
SAT2. The visit to the Arouca Geopark was worth my time and effort	
SAT3. Arouca Geopark is the best travel destination compared to other similar places I have visited	
SAT4. Overall, I am very satisfied with this visit	
Loyalty	Yoon and Uysal (2005)
LTY1. I intend to revisit Arouca Geopark	
LTY2. I intend to recommend Arouca Geopark to others	

corresponding items was taken for each factor, and reliability was assessed using Cronbach’s alpha coefficient. Cluster analysis was then applied to group geotourists into segments according to their motivations. The five motivational factors

were taken as cluster variables and the k-means method was applied to 50 bootstrap samples to assess the stability of cluster solutions for a different number of groups. Indeed, in a segmentation study employing cluster analysis techniques,

one cannot forget that the methods always end up with a solution whether or not there is a natural structure of groups in the data. If there is a clear structure of groups in the data, that structure will reveal itself repeatedly in different computations. Thus, it is fundamental to assess the stability of a cluster solution in order to establish its validity (Hair et al. 2010). Therefore, the similarity of cluster solutions for different numbers of clusters was examined using the rand index (Dolnicar and Leisch 2009), which is a frequently used measure of agreement between cluster solutions, ranging from 0 (no agreement) to 1 (total agreement). Figure 3 presents the rand index obtained, with the number of clusters ranging from 2 to 7. The plots show that the 2 and 4 groups solutions seem to be the most stable, as the values of the rand index lie closer to one. However, the two-group solution only separates geotourists with high and low motivation levels, not offering a very interesting segmentation from a practical point of view. The 4-group solution, on the contrary, offered a clear and interesting interpretation. Hair et al. (2010) argue that the profile and interpretation of clusters are essential elements in choosing between cluster solutions, so the four-group solution was chosen.

Two hierarchical techniques were applied to further analyze the stability of the four-group solution: Ward's method and average linkage. The four-group solution of these methods was considered to define the initial centroids for the k-means method. Comparing the two solutions obtained, only 4% of geotourists were classified differently, which supports the stability of the 4-group solution. Note that having as a starting point in the k-means method a solution given by a hierarchical method is often recommended to obtain more accurate solutions (Hair et al. 2010). To further describe the profile of the four segments, they were compared regarding other variables. Kruskal–Wallis and chi-square tests were used and a p -value < 0.05 was considered to establish significance. Statistical analyzes were performed using R package

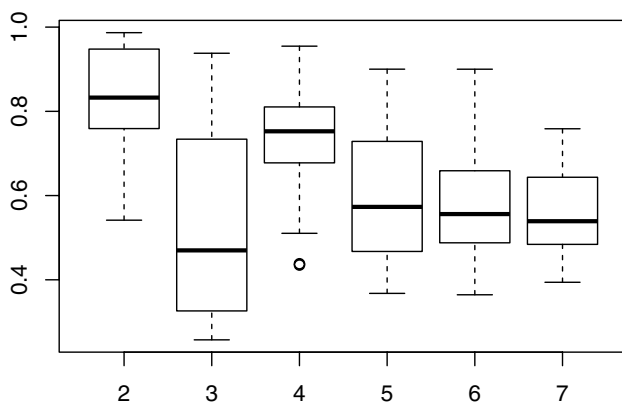


Fig. 3 Similarity of cluster solutions for 2 to 7 groups

flexclust (Leisch 2006; R Core Team 2020) and IBM SPSS statistics.

Results and Discussion

Exploratory factor analysis was applied to the 18 motivational items, revealing five factors which were labeled (1) *Escape, Relaxation and Enjoyment*, (2) *Novelty Seeking and Nature*, (3) *Knowledge*, (4) *Socialization*, and (5) *Sports and Adrenaline* (Table 4). The five factors explain 71.3% of the total variance and Cronbach's alpha is above the recommended threshold of 0.7 for all factors.

This study identifies a new motivation not identified in earlier studies: Sports and Adrenaline. Many geoparks have sports activities and offer thrilling experiences, so it is surprising that earlier studies did not investigate this motivation. Arouca Geopark offers a variety of outdoor activities that include hiking, mountain biking, rock climbing, canyoning, kayaking, rafting, and crossing a suspended bridge that can be an exhilarating experience. Therefore, it is a motivational factor that makes sense for geoparks with similar activities.

Earlier studies had found that visitors go to geosites to escape (e.g., Allan 2014; Allan et al. 2015; Cheung 2015; Kim et al. 2008; Shavanddasht et al. 2017), to relax (e.g., Allan 2014; Allan et al. 2015; Shavanddasht et al. 2017; Tomić and Marjanović 2022), or for enjoyment (e.g., (e.g., Allan 2014; Allan et al. 2015; Cheung 2015; Shavanddasht et al. 2017). In this study, these motivations form one single factor, *Escape, Relaxation and Enjoyment*, which demonstrates that these three emotions are highly related and cannot be disassociated like in other studies.

Similarly, past studies identified novelty seeking as a motivation (e.g., Cheung 2015, Kim et al. 2008; Shavanddasht et al. 2017) and nature aspects as a separate motivation (e.g., Drápela et al. 2021; Fung and Jim 2015). In this study, these motivations are present in a single dimension termed *Novelty Seeking and Nature*, evidencing that geotourists attracted by nature are also seeking for novelty.

Two of the motivation factors found are identical to past studies: knowledge and socialization. The knowledge motivation (for educational purposes) was referred by Dowling (2011) as one of the five fundamental principles of Geotourism and has been indeed identified as a main motivation for geotourism in past studies (e.g., Allan 2014; Allan et al. 2015; Hurtado et al. 2014; Kim et al. 2008; Shavanddasht et al. 2017; Tomić and Marjanović 2022). Socialization has also been identified in several studies as a reason to visit geosites (e.g., Cheung 2015; Kim et al. 2008; Shavanddasht et al. 2017; Tomić and Marjanović 2022). Knowledge and socialization are important motivations, as their means are

Table 4 Motivation factors and internal consistency

Factors and items	Mean	Factor loadings	Cronbach Alpha (α)	Explained variance
Factor 1 – Escape, Relaxation and Enjoyment	4.03		0.87	18.1%
MTV2. Relieve daily stress		0.91		
MTV1. Relax mentally		0.90		
MTV9. To escape from the daily life routine		0.86		
MTV15. To have fun		0.57		
MTV3. Strengthen relationship with family and friends		0.56		
Factor 2 – Novelty Seeking and Nature	4.26		0.78	16.5%
MTV18. To explore new places		0.78		
MTV10. Visit spectacular landform		0.71		
MTV17. Because it is an exotic place		0.60		
MTV11. Engage in nature-based activities		0.66		
MTV14. It is exciting		0.65		
Factor 3 – Knowledge	3.76		0.83	15.0%
MTV8. Develop biodiversity knowledge		0.93		
MTV7. Develop knowledge and experience about geology and geoheritage		0.92		
MTV6. Learn about new things/places and cultures		0.60		
MTV12. Participate in cultural activities		0.58		
Factor 4 – Socialization	3.63		0.78	11.8%
MTV4. Meet people with similar values/interests		0.83		
MTV5. Share knowledge with others		0.78		
Factor 5 – Sports and Adrenaline	3.32		0.76	9.9%
MTV13. Participate in sports		0.84		
MTV16. To experience adrenaline		0.80		

close to four. Past studies have also found these motivations to be the most important ones (e.g., Hurtado et al. 2014). However, other researchers found socialization and knowledge to be the least important (e.g., Cheung 2015; Shavanddasht et al. 2017). Nevertheless, both have been consistently identified as motivational factors to visit geosites.

The results show that the most important motivational factors are *Novelty Seeking and Nature* and *Escape, Relaxation and Enjoyment*, according to the average values (see

Table 4), echoing the results of several studies that have also found these motivations to be the most important ones in visiting geosites (e.g., Allan et al. 2015; Cheung 2015; Shavanddasht et al. 2017).

The items used to measure satisfaction and loyalty were also factor analyzed (Table 5). For the satisfaction items, one factor explained 76.1% of the total variance, all items had loadings above 0.8, and Cronbach’s alpha was equal to 0.88, which indicates that these items may be combined

Table 5 Satisfaction and loyalty factors and internal consistency

Factors and items	Mean	Factor loadings	Cronbach Alpha (α)	Explained variance
Factor – Satisfaction	4.27		0.88	76.1%
SAT1. The visit to the Arouca Geopark exceeded my expectations		0.89		
SAT2. The visit to the Arouca Geopark was worth my time and effort		0.89		
SAT3. Arouca Geopark is the best travel destination compared to other similar places I have visited		0.81		
SAT4. Overall, I am very satisfied with this visit		0.90		
Factor – Loyalty	4.65		0.87	88.3%
LTY1. I intend to revisit the Arouca Geopark Territory		0.94		
LTY2. I intend to recommend the Arouca Geopark Territory to other people		0.94		

to measure geotourist's satisfaction. Satisfaction was then measured by the mean rates on these four items. Likewise, one factor accounted for 88.3% of the total variance in the two loyalty items, with loadings above 0.9 and Cronbach's alpha equal to 0.87. Again, the results support the combination of these items to measure loyalty.

The motivation-based four-cluster solution is represented in Table 6. The first cluster represents the largest segment of the sample, comprising 34.4% of the total ($n=209$). This group's visits to the Geopark are motivated mainly by *Novelty Seeking and Nature* and by *Escape, Relaxation and Enjoyment*, similarly to other groups. However, they also stand out with a Sports and Adrenaline mean above average. Therefore, this group was designated as the *Sensation Seekers*, as they are searching for new and different sensations and experiences. They are not so interested in learning or socializing.

The second cluster is the smallest, with 18.6% ($n=113$) of the total sample. They are essentially motivated by

Escape, Relaxation and Enjoyment and *Novelty Seeking and Nature*, but with below-average means. This group is the less motivated group and hence called the *Accidental Geotourists*. These visitors have most likely gone to the park because they were taken there by family, friends or on a field trip.

The third cluster represents 19.8% ($n=121$) of the total sample. They are motivated by *Novelty Seeking and Nature* and *Knowledge and Socialization*. The park's geological features drive these visitors, and they clearly want to learn and share their knowledge. Therefore, this group was called the *True Geotourists* based on authors that argue that geotourists are primarily motivated by geological aspects and natural landscapes (e.g., Khoshraftar and Farsani 2019; Rabassa 2018) and want to develop their knowledge (Dowling 2011).

Finally, the last cluster, which represents 27% ($n=164$) of the respondents, is the most motivated, as they have the highest levels for all motivations and therefore was labeled the *Want it All Geotourists*.

Table 6 Cluster solution based on tourists' motivations for visiting the geopark

	Segments				
	Sensation Seekers $N=209$ (34.4%)	Accidental $N=113$ (18.6%)	True Geotourists $N=121$ (19.9%)	Want It All $N=167$ (27%)	
Mean	Mean	Mean	Mean	Mean	Mean
Escape, Relaxation and Enjoyment	4.03	4.17	3.34	3.45	4.77
Novelty Seeking and Nature	4.26	4.26	3.36	4.37	4.80
Knowledge	3.76	3.36	2.96	4.28	4.44
Socialization	3.63	3.16	2.16	4.44	4.65
Sports and Adrenaline	3.32	4.00	2.05	1.88	4.40

Table 7 Cluster comparisons for gender, education, and number of park visits

Variable	Segment				Total	Qui-square test p-value
	Sensation Seekers	Accidental	True Geotourists	Want It All		
Gender (Fem)	41.6% _a	59.3% _b	77.7% _c	52.4% _{a,b}	55.0%	$p<0.001$
Education						
<=12 years of education	25.8% _a	9.7% _b	24.0% _a	31.7% _a	24.1%	$p<0.001$
College degree	49.8% _a	60.2% _a	58.7% _a	50.6% _a	53.7%	
Master degree or PhD	24.4% _a	30.1% _a	17.4% _a	17.7% _a	22.2%	
Accompanied by						
Family	39.2% _a	55.8% _b	22.3% _c	28.0% _{a,c}	35.9%	$p<0.001$
Friends	40.7% _{a,b}	28.3% _{b,c}	23.1% _c	50.6% _a	37.6% _b	$p<0.001$
Number of visits to the park						
Once	20.1% _a	32.7% _{a,b}	43.0% _b	18.9% _a	26.7%	$p<0.001$
2-3 times	21.1% _a	25.7% _a	24.8% _a	16.5% _a	21.4%	
More than 3 times	58.9% _a	41.6% _b	32.2% _b	64.6% _a	51.9%	

Different subscripts indicate significant differences in values at $p<0.05$

Higher values are shaded in dark gray; lower values are shaded in light gray

Table 8 Cluster comparison for age, loyalty, and satisfaction

Variable	Segment				Total	Kruskal-Wallis test
	Sensation Seekers	Accidental	True Geotourists	Want It All		
	Mean	Mean	Mean	Mean	Mean	p-value
Age	42.20 _{a,c}	45.26 _{a,b}	47.10 _b	39.21 _c	42.94	p<0.001
Satisfaction	4.09 _a	3.66 _b	4.56 _c	4.70 _c	4.27	p<0.001
Loyalty	4.61 _a	4.20 _b	4.78 _c	4.93 _c	4.65	p<0.001

Different subscripts indicate significant difference in values at $p < 0.05$
 Higher values are shaded in dark gray; lower values are shaded in light gray

Clusters were further profiled using other variables and the results are shown in Tables 7 and 8. Significant differences between clusters were found in gender, age, education, frequency of visits to the park, companions, satisfaction, loyalty, and experience. The female gender is significantly more prevalent in the True Geotourists, while the male gender is significantly more represented in the *Sensation Seekers* segment compared to *Accidental* and *True Geotourists* as shown in Table 7. The *Accidental Geotourists* are typically people with higher education levels and have a significantly lower percentage of people with only high school education. As for age, the *Want it All Geotourists* are younger, showing significant differences with the *Accidental* and *True Geotourists*. *Sensation Seekers* are also younger than True Geotourists (Table 8). The highest percentage of geotourists accompanied by family is found in the *Accidental* segment with significant differences from all other segments. *True Geotourists* travel less with their family, but they do not differ significantly from *Want it All*. The company of friends is more typical in the *Want it All* group, followed by the *Sensation Seekers* group, with no significant difference between the two. *Sensation Seekers* and *Want it All* visit the park more often than *Accidental* and *True Geotourists* (Table 7).

Although *Accidental Geotourists* were generally reasonably satisfied (mean = 3.66 and median = 3.75), this is the segment with the lowest satisfaction level. The *Want it All* and the *True Geotourists* are the segments with higher satisfaction levels (Table 8). Unsurprisingly, these segments are also the most loyal ones, while the *Accidental Geotourist* segment has the lowest loyalty values.

Regarding the geotourists' experience, the *Want it All* segment had the highest average scores on all items (Table 9). The lowest average scores were found in the *Accidental Geotourists* segment (Table 9). *True Geotourists* stand beside *Want it All* in rating higher their learning experience, feelings about the quality and attractiveness of the park (Esthetics), living a different experience, and interacting with others. After *Want it All*, the feeling of escape was more pronounced in the *Sensation Seekers*. No significant differences were found in the Education experience between *Sensation Seekers* and *Accidental Geotourists*, but

the former rated significantly higher on all the other items of Escapism, Esthetics, and Entertainment (Table 9).

In short, segments can be described as follows:

The *Want it All Geotourists* tend to be younger than *Accidental* and *True Geotourists*. In conformity with their profile, they have the highest levels of satisfaction and the highest values of loyalty (intention to revisit and to recommend), with significant differences with other segments except for the True Geotourists. They have visited the park often and were more likely to be accompanied by friends, comparatively to *Accidental* and *True Geotourists*. They also have the highest rates in evaluating their experience in all aspects (Education, Escapism, Esthetics, and Entertainment).

The *True Geotourists* are mostly females (77.7%), with significant differences from all other segments. *True Geotourists* tend to be older than *Sensation Seekers* and the *Want it All Geotourists*. Similar to the *Want it All Geotourists*, they have high levels of satisfaction and loyalty, compared to *Sensation Seekers* and *Accidental Geotourists*. They are also like the *Want it All* in evaluating their experience regarding Education, feelings about quality and attractiveness of the park (Esthetics), living a different experience and interacting with others. However, geotourists in this segment were less frequent in visits to the park than the *Want it All*.

The *Sensation Seekers* segment has the highest percentage of male geotourists (58.4%), with significant differences from all other groups except the *Want it All Geotourists*. They are significantly younger than *True Geotourists*. Similarly to the *Want it All*, this segment has a high percentage of geotourists who had visited the park more than 3 times. As for their experience, they reported lower levels than *Want it All* and *True Geotourists* in all items, except those referring to the feeling of escape from routine (escapism), where they stand in second place after the *Want it All*.

The *Accidental Geotourists* are the less motivated visitors and have the less positive experience. It is the segment with the second highest percentage of women (59.3%). Regarding education, this group has the lowest percentage of visitors with less than the 12th grade and are essentially visitors with a college degree. They have the lowest satisfaction level, although they are reasonably satisfied. Even though their

Table 9 Cluster comparisons for Experience

Items	Segment				Total Mean	Kruskal-Wallis test p-value
	Sensation Seekers Mean	Accidental Mean	True Geotourists Mean	Want It All Mean		
Education						
EX1. I learned a lot during my visit to the Arouca Geopark	3.75 _a	3.39 _a	4.46 _b	4.68 _b	4.08	p<0.001
EX2. The experience has made me more knowledgeable	3.88 _a	3.54 _a	4.50 _b	4.74 _b	4.17	p<0.001
Escapism						
EX3. I got away from a stressful social environment	4.00 _a	3.04 _b	3.63 _c	4.58 _d	3.9	p<0.001
EX4. I had the opportunity to rest	3.83 _a	3.27 _b	3.11 _b	4.41 _c	3.74	p<0.001
EX5. I totally forgot about my daily routine	4.21 _a	3.26 _b	3.87 _a	4.71 _c	4.1	p<0.001
Esthetics						
EX6. Arouca Geopark has quality	4.52 _a	4.09 _b	4.78 _c	4.94 _c	4.6	p<0.001
EX7. Arouca Geopark is very attractive	4.44 _a	3.94 _b	4.73 _c	4.90 _c	4.53	p<0.001
Entertainment						
EX8. I felt a real sense of harmony	4.30 _a	3.71 _b	4.55 _c	4.87 _d	4.39	p<0.001
EX9. I had a different experience	4.27 _a	3.83 _b	4.63 _c	4.82 _c	4.41	p<0.001
EX10. I interacted with others	3.92 _a	3.00 _b	4.52 _c	4.71 _c	4.08	p<0.001
EX11. I had fun	4.57 _a	3.92 _b	4.60 _a	4.95 _c	4.56	p<0.001

Different subscripts indicate significant difference in values at $p < 0.05$

Higher values are shaded in dark gray; lower values are shaded in light gray

intention to recommend to others and to visit again is lower than the other groups, they demonstrate reasonable loyalty. *Accidental Geotourists* rated all dimensions of experience somewhat less than the other segments. Considering the number of visits to the park, this segment is similar to the *True Geotourists* with lower values of previous visits. Further, they are significantly more likely to visit the park with family than all other geotourists. This seems to indicate that they visited the park because their family took them.

Comparing the results of this study to previous empirical studies segmenting visitors to geosites is a difficult task, since the studies have different approaches in categorizing the segments, were conducted in different types of geosites (e.g., caves versus geoparks) and with visitors of different nationalities. Nevertheless, there is the group of *Accidental Geotourists* which is consistent with previous studies that have also identified groups that seem to be less motivated to visit the geosites and that usually represent a significant number of visitors (e.g., Fung and Jim 2015; Gorman 2007; Grant 2010; Hurtado et al. 2014).

The *Want it All Geotourists* group identified in the current study had only been identified in Fung and Jim's (2015) segmentation of Hong Kong Global Geopark visitors. This

study adds some information regarding the evaluation of their experience (Education, Escapism, Esthetics, and Entertainment), which was the highest among all groups.

The *True Geotourist* is similar to the purposeful geotourist and the intentional geotourist (Hurtado et al. 2014) and to the heritage enthusiasts (Fung and Jim 2015). The geological features, natural landscapes, and acquiring more knowledge drive these visitors. Again, this study adds some information regarding their experience.

The *Sensation Seekers* group is unique to this study and has the highest number of visitors (34%). This group is motivated by several motivations and is searching for new sensations and experiences. They are not so interested in learning or in socializing.

Practical Implications

With a better knowledge of the motivations and types of visitors, all stakeholders, including policymakers, tourism operators, and local communities, can make informed decisions on developing, promoting, and managing geoparks. The findings can also improve visitor experience and help

tourism operators create customized and engaging experiences that enhance visitor satisfaction and encourage repeat visits.

This study identified five major motivations to visit a Geopark situated in Europe: (1) *Escape, Relaxation and Enjoyment*, (2) *Novelty Seeking and Nature*, (3) *Knowledge*, (4) *Socialization*, and (5) *Sports and Adrenaline*. It is important for geopark managers to understand that visitors to a geopark are motivated by many different reasons, with one of the most important ones being *Novelty Seeking and Nature*, followed by *Escape, Relaxation and Enjoyment*.

Visitors to a geopark can be segmented into four groups, with different motivations, experiences, and characteristics. Regardless of how visitors to a geopark or geosite are segmented, their satisfaction with the geotourism experience is crucial to all Geotourism stakeholders (Dowling 2011). Therefore, it is essential to fully understand each segment's needs and motivations, to adopt the best management strategies to provide them with the best experience.

First of all, regardless of the group the visitor belongs to, their major motivation is *Novelty Seeking and Nature*. Visitors want to visit and explore new places, with spectacular landforms, and engage in nature-based activities. Given the nature of geoparks, they can easily provide this and therefore these features should be highlighted in Geopark Marketing campaigns. For instance, geoparks should use slogans such as “Outstanding scenery of granite peaks and pillars surrounded by clouds and rainbows” (Sanqingshan UNESCO Global Geopark, China), rather than “Rocher Percé is the starting point in a journey to learn more about 500 million years of Earth's history” (Percé UNESCO Global Geopark, Canada). The former focuses on what motivates the visitors, while the latter focuses on learning, which would not appeal to all groups.

To attract the *Want it All Geotourists*, geopark managers should create group packages that include all the park's activities: nature-based, knowledge-based, and sports, focusing also on relaxation and the escapism. A loyalty program should be created to encourage further visits and recommendations. The marketing for this group needs to focus on younger visitors. Therefore, advertisement on social media could be an effective strategy to captivate them.

True Geotourists can be attracted to geoparks with visits that have activities that focus on the *Novelty Seeking and Nature* and the learning aspects of visiting the park and that at the same time promote socialization. Their high loyalty levels should be rewarded with a loyalty program. Specifically, they could be compensated for recommending the park to other people. Advertisement should be more targeted for woman.

The *Sensation Seekers* segment is less motivated by *Knowledge* and *Socialization* and is looking for all types of experiences that involve nature, adrenaline, sports, and

escaping from the daily routine. They have visited the park several times, so they should also be compensated with a loyalty program.

Geopark managers need to be aware that a significant number of visitors (in the case of this study almost 19%) are less motivated than the other segments to visit the geopark and were mostly likely taken there by family or on a field trip. This segment has been identified in almost all studies examining visitors to geosites (e.g., Fung and Jim 2015; Gorman 2007; Grant 2010; Hurtado et al. 2014). Even though their motivation is low, their experience and satisfaction can be positive.

Conclusions

Many researchers have shown that more research in geotourism is needed for a better understanding of Geotourism. (e.g., Allan et al. 2015; Duarte et al. 2020; Ólafsdóttir and Tverijonaite 2018). The literature review also shows the lack of research regarding segmenting geopark's visitors. It should also be noted that among the studies examining geotourist's motivations, few were conducted in geoparks and only one was conducted in a geopark in Europe (i.e., Drápela et al. 2021).

This study thus contributes to the existing literature on motivations in the field of Geotourism and to a more comprehensive view on the types of visitors to a geopark. The main motivations found in this study are related to exploring new places, participating in nature-based activities, and visiting spectacular landforms. A new motivation is found—*Sport and Adrenaline*—which does not exist in studies carried out to date on motivations to visit geosites. This finding is the base of further research regarding motivations to visit geoparks.

Based on visitors' motivations, a cluster analysis revealed that visitors to Arouca Geopark could be divided into four groups: the *Want It All Geotourists*, the *True Geotourists*, *Sensation Seekers*, and the *Accidental Geotourists*. This was the first study to segment visitors to a geopark in Europe. It therefore contributes to the scarce literature on geotourists segmentation, by refining existing typologies and providing additional insights into the motivations and behavior of different types of geotourists. This helps to identify new opportunities for tourism operators and policymakers to develop and promote geotourism destinations.

The fact that it was not possible to collect data through the on-site completion survey method due to the pandemic hindered obtaining responses from visitors of other nationalities. Despite the effort made on social networks and via email to obtain responses from other nationalities, the survey being available in Portuguese, English, French, and Spanish, most of the responses are of Portuguese nationality (97.6%).

Since in 2019 (before the pandemic), Spanish and French visitors represented 12% and 10%, respectively, of the total number of visitors to the Arouca Geopark; future studies should collect data from these nationalities. Furthermore, comparing visitors from different nationalities concerning their motivations and examining their profiles according to the segments identified in this study would be relevant. Another line of research could be to compare the geotourist segments to other tourism segments, such as cultural tourism, adventure tourism, or ecotourism. This can help to identify similarities and differences in the motivations and behavior of different types of tourists and inform strategies for developing and marketing tourism destinations.

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Data Availability The data supporting this study's findings are available from the corresponding author upon reasonable request.

Declarations

Consent to Participate Informed consent was obtained from all individual participants involved in the study.

Conflict of Interest The authors declare no competing interests.

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