

The public zoo as recreation and environmental education area: Visitor's perceptions and management implications

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Abstract: - The present paper studies the perceptions of visitors to the zoo of Thessaloniki in relation to the animals and urban green areas. With the use of a questionnaire, the visitors evaluated the zoo as a recreation area, along with its suitability and its facilities for visitors. We have also recorded the level of satisfaction of zoo visitors with their visit, the distance they travelled for this purpose, and the frequency, time of year and duration of their visits. Visitors were asked their opinion on whether they agree with the operation of the zoo and then had to evaluate the contribution of the zoo in relation to entertainment, to getting children acquainted with animals and coming into contact with nature, to providing environmental education, to the existence of a shelter for injured animals and also concerning the breeding rate of animals at risk of extinction. The level of suitability of the zoo was also evaluated, along with the quality of its facilities. More specifically, visitors were asked to provide answers concerning ease of access to the site and the existence of a parking area, the total size of the zoo, its landscaping, the available infrastructure, and the services and security offered to visitors. These answers could serve as the base for better management of the zoo.

Key-Words: - Public zoo of Thessaloniki, frequency and duration of visits, quality of facilities, infrastructure, the animals' living and hygiene conditions.

1 Introduction

1.1 The importance of zoological parks

The zoological gardens founded from the 19th century onwards, claimed not only to educate and entertain their audiences, but also to serve science by providing direct access to exotic animals [1]. Confronted with increasing financial difficulties, zoos were forced to make recreation their top priority [2-4]. With the term "recreation" we refer to the sense of relaxation and regenerative enjoyment that the very experience of nature promotes [5, 6].

In the urban societies we live in, the contact of people with wild fauna is becoming increasingly rare, particularly for young children [7, 8]. Zoos seem to be the only solution that can connect the modern world we live in to wildlife [9]. Research has shown that, by enriching their knowledge of animals, zoo visitors develop more positive views about animals kept at zoos and support the relevant efforts for their conservation [10-12]. In fact, the general public usually considers the protection of the species to be the primary role played by modern zoos [13, 14]. Equally important goals for modern

zoos include research, education and recreation, the last two being more directly addressed at zoo visitors [10]. To attract visitors, modern zoo exhibits should be both entertaining and educational. Naturalistic exhibits with active animals appear to be more effective in fulfilling both aims [15]. Another point of interest is that many people seek out nature at times of stress. For example, following the attacks on the World Trade Centre in 2001, managers of national parks observed a pronounced increase in the number of visits [16]. In a similar manner, visits to urban parks and zoos could also provide an outlet for people in large cities in Greece, from the pressure they are experiencing due to the economic crisis.

1.2 Wild animals living in captivity

Animals housed in artificial habitats are confronted by a wide range of environmental challenges [17]. These include abiotic environmental sources of stress, such as artificial lighting, exposure to loud or aversive sounds, unpleasant odours, and uncomfortable temperatures or substrates, such as

concrete [11]. In addition, confinement-specific stressors may also be present, such as restricted movement, reduced retreat space, forced proximity to humans, reduced feeding opportunities, maintenance in non-normal social groups, and other behavioural restrictions [18, 19]. In general, wild animals go through three stages when they are in captivity. During the first stage, the zoos struggle to keep the animals alive. In the second stage, zoos manage to conserve individual animals, which rarely breed; when they do, this is a sporadic occurrence. In the third and final stage, the animals breed routinely and eventually establish self-sustaining captive populations, which enable zoos to conserve whole generations of the aforementioned species [20].

In the past, it was easier and less expensive to supply zoos with recently trapped wild animals. This has changed however, since wild populations have radically decreased; furthermore, the latest legislation in the countries of export and import has made it more difficult for zoos to obtain animals. Thus, in some cases, breeding is the only solution [21]. Therefore, although financial reasons and conditions may initially have been the incentive behind related actions, nevertheless, the need to concentrate on certain species that are indeed at risk of extinction has now made the role of zoos clearly more ecological and pro-environmental. The breeding of various species in zoos can help to achieve their reintroduction into nature, which will help to boost their population numbers [22]. Thus zoos can make a vital contribution by maintaining self-sustaining stocks of species that are threatened with extinction in the wild [21, 22]. The aim of the present study was to form a general opinion of the visitors about their satisfaction to the zoo in relation to recreation and environmental education and to provide answers about the real problems there are in the zoo, so it would be easier for relevant Stakeholders to focus on them.

2 Materials and Methods

2.1 Study area

The research was carried out using face-to-face interviews. The research area was the zoo of Thessaloniki. The “population” under study was the total number of visitors.

In our day and age, various types of zoos have been created that are categorized according to their exhibits. There are zoos which only house a country’s endemic fauna, others with animals found in different parts of the world, and other zoos that

include specific animal classes, e.g. reptiles, insects etc.

The Zoo at Kedrinos Lofos site which belongs to the Municipality of Thessaloniki has been operating since 1987 and houses the wild fauna of Greece. Entry to all areas is free and the zoo is open daily from 9 am until sunset. It was created inside the periurban forest of Thessaloniki, initially on a plot of 3.3 hectares, which was then extended to 5.8 hectares. While it was being built, efforts were made not to tamper with the forest character of the surrounding area, and thus the various animal enclosures are presented to visitors on terraced slopes (Fig. 1). There is also a stream that runs down the center, dividing the site into two parts (Fig. 2). Visitors follow the stone paths and cross from one side of the hill to the other over wooden bridges.



Fig. 1. View from the public zoo garden of Thessaloniki.

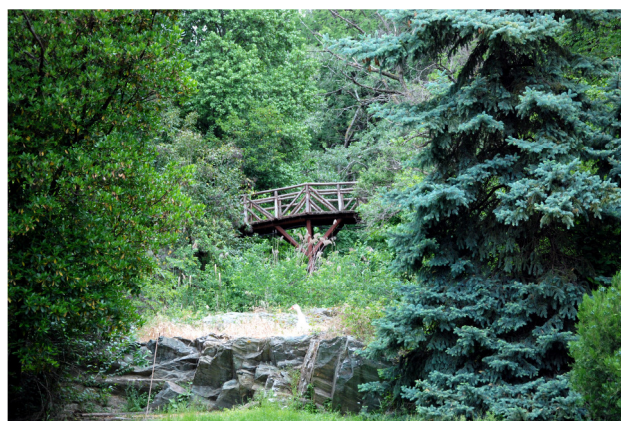


Fig. 2. Forest landscape in which the animal enclosures have been built and the wooden bridges that connect the various parts of the zoo.

There are seven animal categories at the zoo which include: aquatic birds, carnivore mammals, ruminants, birds of prey, farmed birds, herbivorous

monogastric animals and songbirds. In total, there are 22 bird species and 16 mammal species (Fig. 3). There is also the Museum of Natural History which has been operating inside the zoo since 1994, and the House of Reptiles which opened in 2000.



Fig. 3. Brown bear (*Ursus arctus*) enclosure at the zoo.

2.2 Methodology

The lack of and inability to create a sampling framework before the commencement of sampling, led us to select the method of cluster sampling [23-26]. Cluster sampling requires the existence of only one list of groups-clusters and their elements [27-31]. Moreover, the division of the population into clusters reduces sampling costs [28]. In order to apply the sampling method, the examined clusters were the weekends of the year during which the research was conducted [32], i.e. the year 2009.

Before the application of the final sampling, we carried out pre-sampling for which five clusters were selected. The data from the pre-sampling process was used to estimate the final sample (number of clusters) with $d = 0.08$ and for probability $(1-\alpha) = 95\%$ (thus the value $z_{\alpha/2} = z_{0.025} = 1.96$). The maximum size of the sample was calculated to be 13 clusters (days). Thus, the most changing variable is estimated with the desired precision, while the rest are estimated with greater precision compared to the first effort [23]. In this way, during 13 weekends, 570 questionnaires were completed by zoo visitors at the entrance to the park.

For the two groups of variables: a) “satisfaction with the visit”, “acceptance of the operation of zoos” and “frequency of visits” and b) “acceptance of the operation of zoos”, “shelter for injured animals” and “breeding of animals at risk of extinction”, a frequency analysis was conducted per more than two criteria. More specifically, Hierarchical Log-linear Analysis was used. Prior to

the application of Hierarchical Log-linear analysis, it was decided to examine the expected frequencies in the contingency table [24]. A large number of expected frequencies (over 20%) that are under 5 but not lower than 1, can possibly lead to the effectiveness of the applied analysis [33]. Classes were grouped together in order to satisfy the above criteria.

All questions related to the evaluation of recreation areas constitute a polythematic variable, on which reliability analysis was applied. More specifically, in order to find out the internal reliability of the questionnaire [34], i.e. if our data had the tendency to measure the same thing, we used the alpha co-efficient (or Cronbach’s alpha reliability coefficient) [35]. When the alpha coefficient is 0.70 or higher, it is regarded as satisfactory [35]; if it is higher than 0.80, it is regarded as very satisfactory. In practice, lower reliability coefficients, with values no higher than 0.60, are also commonly accepted [24].

The relevant checking must not only be reliable but also credible; this is ensured through the application of factor analysis [24]. Factor analysis is a statistical method which aims to discover the existence of common factors within a group of variables [36]. We used the principal component analysis method, which is based on the spectral analysis of the variance table (correlation) [37, 38]. The selection of the number of factors is a dynamic process, which presupposes the evaluation of the model in a repeating fashion. In this case, we used the Kaiser rule, the percentage of variance that can be explained on the screen plot [38]. Furthermore, we also used the matrix rotation of the main factors and applied Kaiser’s method of maximum variance rotation [39].

3 Results

3.1 Visitor views concerning the zoo

Most visitors to the municipal zoo of Thessaloniki state that they are a little satisfied (43.5%) to very satisfied (41.1%) with their visit (Fig. 4). To experience nature in an urban environment is a source of positive feelings and beneficial services, which fulfills important immaterial and non-consumptive human needs [5]. It has been suggested that the senses of challenge and adventure children experience in nature positively contribute to their development [40]. Children love to visit zoos and parks, which is why they urge their parents to take them there on frequent visits. This also fully explains the answer

given by the majority of visitors (40.2%), when asked about whose wish it was to make that specific visit to the zoo (Fig. 5). Visits to zoos are therefore primarily motivated by the prospect of spending a pleasant day out with the family [13, 41, 42], focusing on the satisfaction of the family’s children. In a similar study conducted at Edinburgh zoo, visitors stated that the main reason for their visit was to go out somewhere with their friends and relatives (36%), followed by entertainment (27%), recreation (12%), a visit to gain knowledge about animals (4%) and, finally, to see rare and exotic species (5%) [13].

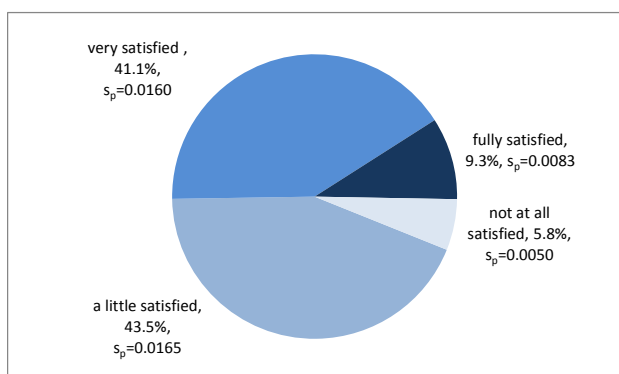


Fig. 4. Satisfaction of visitors with the public zoo of Thessaloniki.

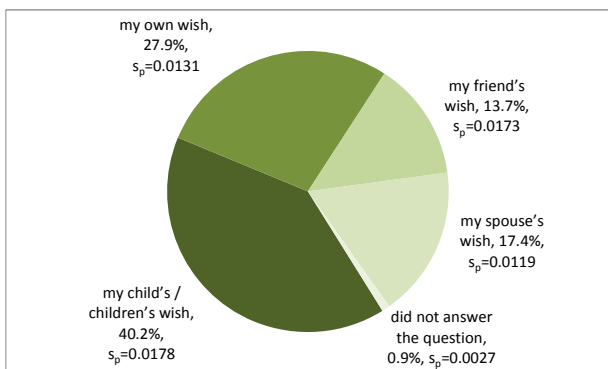


Fig. 5. Whose wish it was to visit the zoo.

In relation to the distance they travelled to visit the zoo, 11.6% ($s_p=0.0149$) travelled 0-5 km, 18.2% ($s_p=0.0168$) travelled 5.1-10 km, 32.6% ($s_p=0.0134$) travelled 10.1-20 km and 25.4% ($s_p=0.0157$) travelled 20.1-50 km, respectively. Finally, 11.8% ($s_p=0.0112$) of visitors travelled over 50 km, while 0.4% ($s_p=0.0020$) did not answer the question.

Regarding the frequency with which they visit the site, most (65.8%, $s_p=0.0297$) answered that they visit at least once a year, while some make even more frequent visits of at least once a month (12.1%, $s_p=0.0115$) or once a week (6.5%, $s_p=0.0094$). In addition, 15.3% ($s_p=0.0226$) of

visitors rarely come to the site, and 0.4% ($s_p=0.0021$) did not answer.

Visits most commonly last from one to two hours (47.4%, $s_p=0.0199$), followed by half an hour to an hour (38.9%, $s_p=0.0202$). Furthermore, 7.5% ($s_p=0.0115$) visit the zoo for over two hours, 3.7% ($s_p=0.0075$) for up to half an hour, while 2.5% ($s_p=0.0060$) gave no answer.

The time of year they consider to be the best for a visit is spring and summertime, at a rate of 53.9% ($s_p=0.0221$) and 31.8% ($s_p=0.0249$) respectively. Autumn is preferable to 11.2% ($s_p=0.0109$) and winter to only 2.6% ($s_p=0.0074$). Those who did not answer the question were 0.5% ($s_p=0.0033$) of visitors.

The crowds of people at the site do not seem to bother visitors. When asked about it, 33.7% ($s_p=0.0167$) answered that they were amused watching all the people around them, while 57.9% ($s_p=0.0185$) said they paid no attention to them. Only 8.1% ($s_p=0.0078$) said they were bothered by the crowds, while 0.4% ($s_p=0.0020$) did not choose any of the standardized answers.

Regarding the operation of zoos, the majority, i.e.70.5% ($s_p=0.0187$) agree with it, while 26.3% ($s_p=0.0165$) disagree. The question was not answered by 3.2% ($s_p=0.0054$) of visitors. It should be noted at this point however, that a large number of those who disagree with the operation of zoos do not actually visit them, and therefore their views cannot be taken into account.

Through the application of Hierarchical Log-linear analysis, after the removal of the third class degree of correlation, it was established that the most appropriate model was the one which included the impact and the interaction of the variables divided by two. We have interaction per 3 criteria, because the X^2 for Pearson’s test is 2.883 with probability (p)=0.090 and because the X^2 likelihood ratio is 3.175 with probability (p)=0.075. The above-mentioned results are confirmed by the zero/“null” controls for the interaction of the k terms and the terms of higher degree, as well as the “null” controls for the interaction of the k terms [43]. In fact, for three pairs of variables there is a statistically significant interaction. In order to interpret this effect, we present the relevant data in the form of crosstabs.

Those visitors who state that they are fully or very satisfied with their visit, agree with the operation of the zoos, while visitors who say that they are a little or not at all satisfied with their visit, disagree with the operation of zoos (Table 1).

In addition, visitors who state that they are fully or very satisfied with their visit, make sure they visit

the zoo more frequently (more times a week or month), while those visitors who state they are a little or not at all satisfied with their visit, limit their visits to only a few times a year or to rare visits (Table 2).

Table 1. Crosstab of variables “satisfaction with the visit” and “acceptance of the operation of zoos”.

Satisfaction with the visit		Acceptance of the operation of zoos		Total
		Yes	No	
Fully or very satisfied	Count	241	43	284
	Exp. count	206.8	77.2	284
	Residual	34.2	-34.2	
A little or not at all satisfied	Count	161	107	268
	Exp. count	195.2	72.8	268
	Residual	-34.2	34.2	
Total	Count	402	150	552
	Exp. count	402	150	552

Table 2. Crosstab of variables “satisfaction with the visit” and “frequency of visits”.

Satisfaction with the visit		Frequency of visits		Total
		Times a week or a month	Times a year or rarely	
Fully or very satisfied	Count	68	219	287
	Exp. count	53.6	233.4	287
	Residual	14.4	-14.4	
A little or not at all satisfied	Count	38	243	281
	Exp. count	52.4	228.6	281
	Residual	-14.4	14.4	
Total	Count	106	462	568
	Exp. count	106	462	568

Table 4. The zoo’s performance rate.

	Completely adequate		Adequate		Inadequate		Totally inadequate	
	P	Sp	P	Sp	P	Sp	P	Sp
Visitor recreation	13.5%	0.0119	65.3%	0.0194	20.4%	0.0158	0.9%	0.0036
Acquainting children with animals	17.4%	0.0120	67.2%	0.0227	14.7%	0.0174	0.7%	0.0027
Environmental education	12.8%	0.0110	67.7%	0.0192	17.7%	0.0123	1.8%	0.0041
Shelter for injured animals	6.0%	0.0087	30.0%	0.0163	52.8%	0.0133	11.2%	0.0087
Animal breeding	3.0%	0.0059	17.7%	0.0139	56.1%	0.0161	23.2%	0.0185

Finally, those who state that they visit the zoo more times a week or month, agree with the operation of zoos, whereas those who limit themselves to only a few times a year or to rare visits, disagree with the operation of the zoo (Table 3).

Table 3. Crosstab of variables “frequency of visits” and “acceptance of the operation of zoos”.

Frequency of visits		Acceptance of the operation of zoos		Total
		Yes	No	
Times a week or a month	Count	90	12	102
	Exp. count	74.4	27.6	102
	Residual	15.6	-15.6	
Times a year or rarely	Count	311	137	448
	Exp. count	326.6	121.4	448
	Residual	-15.6	15.6	
Total	Count	401	149	550
	Exp. count	401	149	550

As we can see in Table 4, visitors consider the zoo to be adequate for the recreation of visitors (65.3%), for getting children acquainted with animals and being in contact with nature (67.2%) and for the visitors’ environmental education (67.7%). On the contrary, visitors believe that the zoo is inadequate in offering shelter to injured animals, and for the breeding of animals at risk of extinction, at a rate of 52.8% and 56.1% respectively. If we fall into the narrower trail of treating animals as mere numbers, we may be in danger of losing sight of the fact that, without a collection of healthy animals, a zoo has no structure [20]. Captive breeding programs have considerable educational value because they are used to inform zoo visitors of the value of conserving biodiversity and to increase public interest in conservation issues [22].

After applying Hierarchical Log-linear Analysis with the second group of variables, it was found that the most suitable model, after removing the third class degree of correlation is the one that also includes the interactions of the variables per two, apart from the main interactions. We have an elimination of the interaction according to the 3 criteria, since the X^2 for Pearson's test is 3.600 with probability (p)=0.165 and the X^2 likelihood ratio is 4.303 with probability (p)=0.116. The above-mentioned results are confirmed by the "null controls". Moreover, there is a statistically significant interaction between two pairs of variables.

Table 5. Crosstab of variables "acceptance of the operation of zoos" and "zoo – shelter for injured animals".

Acceptance of the operation of zoos		Shelter for injured animals		Total
		Completely adequate – adequate	Inadequate – totally inadequate	
Yes	Count	183	219	402
	Exp. count	145.7	256.3	402
	Residual	37.3	-37.3	
No	Count	17	133	150
	Exp. count	54.3	95.7	150
	Residual	-37.3	37.3	
Total	Count	200	352	552
	Exp. count	200	352	552

Table 6. Crosstab of variables "zoo – breeding of animals at risk of extinction" and "zoo – shelter for injured animals".

Breeding of animals at risk of extinction		Shelter for injured animals		Total
		Completely adequate – adequate	Inadequate – totally inadequate	
Completely adequate – adequate	Count	108	10	118
	Exp. count	42.4	75.6	118
	Residual	65.6	-65.6	
Inadequate – totally inadequate	Count	97	355	452
	Exp. count	16.6	289.4	452
	Residual	-65.6	65.6	
Total	Count	205	365	570
	Exp. count	205	365	570

Visitors who state that they are fully or very satisfied with their visit, view the facilities of the zoo as completely adequate or adequate for

sheltering injured animals, whereas those visitors who are a little or not at all satisfied with their visit, view the relevant facilities as being inadequate or totally inadequate (Table 5).

Visitors who consider the zoo's facilities to be completely adequate or adequate for sheltering injured animals, also view as completely adequate or adequate the zoo's facilities for breeding animals at risk of extinction. On the contrary, those who perceive the zoo's infrastructure as being inadequate or totally inadequate to shelter injured animals, also perceive the zoo's infrastructure as being inadequate or totally inadequate for breeding animals who are at risk of extinction (Table 6). Although the visitors' answers were negative as a whole, people are generally now beginning to recognise the role of zoos as a replenisher of endangered species, and hence as important conservation institutions [13, 44].

3.2 Evaluation of the zoo

As we can see in Table 7, visitors find the ease of access to the zoo and the existence of a parking area to be very good (39.1%) and good (55.8%). Similarly, as regards the overall area occupied by the zoo, for 26.7% of visitors it is adequate, while 68.8% say it is completely adequate. Regarding the landscaping of the site, 66.8% state they are very satisfied, while 19.3% say they are fully satisfied with it.

In relation to the infrastructure available at the zoo (wooden kiosks, benches, toilets etc), 73.3% of visitors consider it to be good and 18.4% very good. As regards the services provided to visitors (information, cleanliness etc), 67.7% of visitors believe they are good and 20.2% find them bad. They also accordingly evaluate the security aspects of the site, particularly for children, with 64.6% describing them as good and 23.5% as bad.

Regarding the abundance of animals at the zoo, 55.6% and 19.8% of visitors believe it is low and very low. On the contrary, 63.7% and 24.7% of visitors believe that the variety of plants at the zoo is large and very large. This means that due to the large variety of plants at the zoo, the latter could also be easily termed and used as a botanical garden.

Regarding the extent to which the animals' enclosures represent their natural environment, 47.5% of visitors believe they are adequate, while 43.7% find them inadequate. Furthermore, regarding the animals' living conditions, 48.6% consider them to be minimally satisfactory and 44% satisfactory. Visitors evaluate the animals' hygiene and safety conditions in a similar way,

since 49.6% consider them to be minimally satisfactory and 41.8% of visitors find them satisfactory.

Following the completion of all the relevant checks, we used reliability analysis with the above questions. The value of the alpha coefficient of reliability is 0.840. This constitutes a strong

indication that our data has the tendency to measure the same thing. Indeed, this is also supported by the significantly high partial alpha coefficients of reliability after the deletion of any type of infrastructure; even then no increase of the reliability coefficient is observed.

Table 7. Evaluation of the zoo by visitors.

	P	S _p	P	S _p	p	S _p	p	S _p
Ease of access and existence of a parking area	Very good 39.1%	0.0247	Good 55.8%	0.0248	Bad 4.4%	0.0119	Very bad 0.7%	0.0027
Area covered by the zoo	Completely adequate 26.7%	0.0186	Adequate 68.8%	0.0211	Inadequate 4.2%	0.0099	Totally inadequate 0.4%	0.0021
Landscaping of the site	Fully satisfied 19.3%	0.0144	Very satisfied 66.8%	0.0162	Minimally satisfied 13.0%	0.0097	Not at all satisfied 0.7%	0.0027
Available infrastructure	Very good 18.4%	0.0161	Good 73.3%	0.0202	Bad 7.2%	0.0124	Very bad 1.1%	0.0151
Services provided to visitors	Very good 10.7%	0.0151	Good 67.7%	0.0173	Bad 20.2%	0.0120	Very bad 1.2%	0.0037
Security at the site, particularly for children	Very good 10.5%	0.0146	Good 64.6%	0.0179	Bad 23.5%	0.0132	Very bad 1.4%	0.0053
Abundance of animals	Very high 5.6%	0.0085	High 18.9%	0.0155	Low 55.6%	0.0230	Very low 19.8%	0.0124
Variety of plants	Very large 24.7%	0.0197	Large 63.7%	0.0215	Small 10.2%	0.0112	Very small 1.4%	0.0050
Animal enclosures	Completely adequate 3.9%	0.0082	Adequate 47.5%	0.0208	Inadequate 43.7%	0.0229	Totally inadequate 3.3%	0.0097
Living conditions of the animals	Fully satisfied 3.0%	0.0092	Very satisfied 44.0%	0.0234	Minimally satisfied 48.6%	0.0244	Not at all satisfied 4.0%	0.0065
Hygiene and safety conditions for the animals	Fully satisfied 3.7%	0.0084	Very satisfied 41.8%	0.0220	Minimally satisfied 49.6%	0.0247	Not at all satisfied 4.2%	0.0075

Also, before proceeding with the application of factor analysis, we conducted all the necessary checks. The value of the Keiser-Meyer-Olkin indicator is 0.864. It is suggested that the KMO indicator should be higher than 0.80 but values higher than 0.60 are also acceptable [36]. In addition, Bartlett’s test of sphericity rejects the null hypothesis that the correlation table is unitary and that the partial correlation coefficients are low. Furthermore, the fact that the measures of sampling adequacy (MSA) have high to very high values, supports the view that the factor analysis model is acceptable. The extracted factors were five with the help of a smooth incline in the scree plot (Fig. 6). Table 8 shows the loadings which are the partial correlation coefficients of the eleven variables with

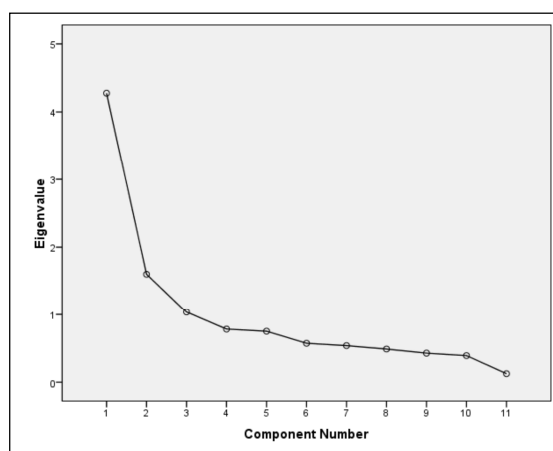


Fig. 6. Schematic representation of characteristic roots (smooth incline change control).

each of the five factors which have been produced by the analysis. The higher the loading of a variable in relation to a factor, the more this factor is responsible for the total variance of values in the variable we study. The variables which “belong” to each factor are those for which the loading is higher than 0.5 for this factor [34].

The first factor includes the variables “Animal enclosures representing their natural environment”, “animals’ living conditions” and “hygiene and safety conditions of animals”, and we can describe it as “infrastructure catering for the animals”. The

second factor includes the variables “ease of access and parking”, “area covered by zoo” and “landscaping of the site”, and we can describe it as “basic planning of the zoo”. The third factor includes the variables “infrastructure for visitors”, “services for visitors” and “security offered, primarily of children” and we can describe it as “infrastructure catering for visitors”. The fourth and fifth factors include one variable each, the variety of plants and the abundance of animals, respectively. We can describe them as richness in plants and richness in animals, respectively.

Table 8. Table with factor loadings following rotation.

Variable	Component				
	1	2	3	4	5
Ease of access and existence of parking area	0.192	0.794	0.076	0.049	-0.068
Area covered by the zoo	0.036	0.823	0.169	0.043	0.104
Landscaping of the site	0.067	0.744	0.273	0.005	0.134
Available infrastructure (wooden kiosks, benches, toilets etc)	0.222	0.324	0.749	0.058	-0.029
Evaluation of services provided to visitors	0.197	0.203	0.827	-0.016	0.123
Security offered on site, particularly for children	0.394	0.076	0.617	-0.104	0.229
Abundance of animals	0.264	0.111	0.158	0.002	0.922
Variety of plants	0.022	0.073	-0.024	0.992	0.000
Animal enclosures representing their natural environment	0.721	0.052	0.197	0.077	0.186
Animals’ living conditions	0.898	0.151	0.215	-0.011	0.078
Hygiene and safety conditions of animals	0.892	0.130	0.218	-0.026	0.094

Table 9. The visitors’ socio-demographic profile.

1. Gender					
Male	Female				
49.1% (s _p =0.0179)	50.9% (s _p =0.0179)				
2. Age					
18-30	31-40	41-50	>50	No answer	
20.4% (s _p =0.0176)	50.4% (s _p =0.0153)	23.3% (s _p =0.0178)	5.4% (s _p =0.0069)	0.5% (s _p =0.0024)	
3. Marital Status					
Unmarried	married	divorced or widowed	did not answer the question		
23.2% (s _p =0.0181)	64.4% (s _p =0.0208)	12.3% (s _p =0.0196)	0.2% (s _p =0.0015)		
4. No. of children					
no children	one child	two children	three children	more than three children	
29.1% (s _p =0.0213)	26% (s _p =0.0171)	30% (s _p =0.0171)	10.4% (s _p =0.0098)	4.6% (s _p =0.0062)	
5. Educational level					
Primary School	Lower Secondary School	Technical School	Upper Secondary School	Technological education	University
4.9 (s _p =0.0053)	5.4% (s _p =0.0079)	16.1% (s _p =0.0120)	22.8% (s _p =0.0196)	20.5% (s _p =0.0169)	28.9% (s _p =0.0231)
6. Profession					
private employees	public servants	self-employed	Students		
37% (s _p =0.0144)	16.5% (s _p =0.0168)	18.2% (s _p =0.0197)	6.3% (s _p =0.0114)		
Unemployed	housewives	farmers or stock-breeders	pensioners	did not answer the question	
3% (s _p =0.0059)	11,6% (s _p =0.0083)	3% (s _p =0.0059)	4% (s _p =0.0068)	0.4% (s _p =0.0021)	
7. Annual income					
<5,000 €	5,000-10,000 €	10,001-15,000 €	15,001-20,000 €	>20,000 €	no answer
5.1% (s _p =0.0101)	7.5% (s _p =0.0058)	26.5% (s _p =0.0218)	21.4% (s _p =0.0189)	5.4% (s _p =0.0074)	34% (s _p =0.0199)

3.3 The visitors' socio-demographic profile

The demographic profile of the zoo's visitors is provided in Table 9. We observe that most are married with children, which also justifies the reason for their visit. They are mainly aged from 31 to 40 years of age. There are very few older visitors, which is due to the fact that the paths at the zoo are quite steep and thus difficult to walk along. Finally, the educational level of the visitors is relatively high.

4 Conclusion

In this study there were examined the attitudes and perceptions of the visitors in the Municipality zoo of Thessaloniki and the main object of the research was achieved.

According to the results of the research conducted at the zoo of Thessaloniki, quite a substantial number of visitors were satisfied with their visit as in other zoos of the world [41, 45]. The zoos represent an opportunity for family based trips [42, 46]. It is encouraging to note that it is the children mainly who wish and urge their parents to visit the zoo, at least once a year, travelling a distance of 10-20 km on average. The mean duration of the visit is between one to two hours, and the most suitable time for visiting was said to be springtime.

The various zoo functions, such as visitor recreation, acquainting children with animals, their contact with nature, as well as environmental education, were found to be adequate as in other similar studies [47, 48].

In general, the majority of visitors agree with the operation of the zoo. However, they consider the existence of shelters for injured animals to be inadequate, as well as the breeding of animals at risk of extinction.

As regards the suitability, the quality and facilities available at the zoo, the following responses were noted: access to the area is easy, and the parking area was found to be quite satisfactory. The overall area covered by the zoo is adequate, and the landscaping of the site was considered to be satisfactory, since the infrastructure was also regarded as being good to a very great extent. Furthermore, regarding the services provided to visitors, and the security provided at the site, the interviewees stated to a great extent that they are good to very good. There is a large variety of plants in contrast to the abundance of animals, which is low, according to the majority of visitors. In addition, visitors had divided opinions in what concerns the animals'

enclosures and whether they represent their natural environment, since half said they were adequate and half inadequate. The same results were also noted in relation to the animals' living conditions, as well as their hygiene and safety conditions.

The above-mentioned evaluation by the visitors reveals that while the zoo largely responds to the needs of its visitors, nevertheless a greater effort must be made to improve the services provided to animals. This is also reinforced by the visitors' views that there should be more animals at the zoo. According to similar study [49] large mammals are most popular to children and adults although they are more expensive to maintain in the zoo. An extension to the zoo and the creation of large, better designed areas that will offer animals more free space to move around in, combined with walking paths for visitors, could be an excellent solution both for the animals and for the visitors. In the future zoos might be able to become centers of conservation rather than living museums [4, 50] and also to replace or supplement trips to nature habitat. For this to happen significant changes to layout would be required [42].

The proposals are focused mainly on the expansion and improvement of the existing infrastructures for injured animals or for animals are in danger. Thus the visitors would be more satisfied and they probably come to the zoo more frequently.

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