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RESEARCH ARTICLE

Investigation of Ecological Footprint of Academicians According to Different Variables

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Abstract

The purpose of this study is to calculate and evaluate the ecological footprints of the academicians in terms of various variables. The survey method was used in the study. Data were collected from academicians (149 males, 57 female) working at a state university in the South-eastern Anatolia of Turkey during the 2017-2018 academic year. The web-based "Ecological Footprint Calculation Tool" with four sub-dimensions (food, travel, housing, other) was used as data collection tool in the research. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to analyse the data. In paired comparisons, t-test was used for independent groups and ANOVA was used for the comparison of more than two groups. The average ecological footprint value of the participants was calculated in terms of global hectares and the carbon footprint was calculated in tons. According to the results, it was determined that most of the academicians were not knowledgeable about the ecological footprint, they were not members of any non-governmental organizations related to the environment, and did not participate in social and sports activities related to the environment. The average ecological footprint value of academicians was determined above Turkey's and global average. It was revealed that there was no significant difference among the groups in terms of gender, knowledge of the ecological footprint, being a member of any non-governmental organization related to environment, academic title, participating in social and sports activities related to environment, age and faculty variables.

Keywords: Ecological footprint, academicians, environment, environmental education.

Introduction

The main cause of the environmental problems in today's world is the natural balance which has deteriorated as a result of the production and consumption activities of living beings. The importance of the interaction between humans and nature is not well understood or is clearly ignored, and the resources provided by nature are perceived as unlimited as if they would never end (Polat, 2012), increasing the production and consumption in an unbalanced manner and accelerating the deterioration of the natural balance (MEB, 2015).

Environmental problems have gained a global dimension (Çelik-Coşkun & Sarıkaya, 2014) and grown to such an extent that countries are no longer able to solve only with their individual efforts. It has long been understood it is possible to prevent environmental problems by taking international common measures (Kılıç, 2001). While the human intervention into nature was limited until the industrial revolution, their effects on the environment increased immensely following the industrial revolution. Excessive population growth, rapid urbanization and technological advances have been influential factors in the deterioration of the environment, and consequently, the natural balance has been gradually destroyed (Güler, 2007). As a result of the developments and

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changes in the industry, technology and society, human beings have been using the natural resources all around the world unconsciously since the beginning of mass production, and have acted without considering ecological values (Tıraş, 2012). The public apathy to the environmental issues has also made it difficult to avoid environmental problems (Juneman & Pane, 2013). However, the constant increase of environmental issues has shown that environmental awareness should be raised in all individuals. Thanks to environmental awareness, people will be able to see the effects of damage to the environment and stop causing more harm to it. It is clear that environmental issues have become global problems which can no longer be ignored, and have grown to such an extent that threaten the lives of all living beings in the world (Çolakoğlu, 2010). It is a necessity to raise environmental awareness effectively in reducing or preventing global environmental problems as accepted by the whole world. To this end, many countries reorganize their teaching programs and carry out many practical activities in order to raise environmentally friendly individuals, starting from an early age.

While environmental education is an important factor in the development of environmental awareness in individuals, another phenomenon that can be used in raising awareness and sensitivity towards the environment in individuals is the concept of ecological footprint (O'Gorman & Davis, 2013). It is possible to achieve environmental sustainability in a balanced manner and understand the extent to which human beings give harm to nature only by measuring the burden of people on nature and knowing what it means. One of the parameters that measure the burden that human beings bring to nature is the concept of ecological footprint.

The concept of footprint was proposed by Rees in 1970s in relation to a carrying capacity. According to Rees, the carrying capacity is expressed as the relationship between a population and the natural environment in which this population lives and relies on in order to survive (Rees, 2000). Based on this definition, the concept of ecological footprint was developed with the works of Rees and Wackernagel in the 1990s, when its present definition was set. According to this definition, the ecological footprint of a certain population refers to the area of fertile soil and water ecosystems needed in any part of the world in order to produce the resources wasted and absorb the waste produced by people (Rees, 1996; Kitzes & Wackernagel 2009; Rees & Wackernagel, 1996; Wackernagel, & Rees, 1998). Ecological footprint, with a simpler description, can also be defined as a biologically efficient area, boundaries of which are defined as a biologically productive area where necessary resources are produced for people or communities, who have a certain quality of life and consumption habits, and the resulting wastes are converted into harmless materials (Lenzen, Hansson & Bond, 2007; Marin, 2004).

There are six categories formed for the ecological footprint calculations, expressed in global hectares (gha). These are the carbon footprint, the cropland footprint, the forest footprint, the grazing land footprint, the built-up land footprint, and the footprint of fishing grounds. The carbon footprint is a measure of the amount of greenhouse gases produced and measured in units of carbon dioxide, causing environmental damage as a result of human activities. The cropland footprint is the element that shows the size allocated for the production of agricultural products to the extent that they are consumed and the production capacity of the area. The forest footprint refers to the calculation of the number of trees consumed by people and the amount of wood they produce from them as well as the amount of forest land required for producing wood. The grazing land footprint is the calculation of the amount of feed crops used by people in line with the demand for animal products. The built-up land footprint refers to the surface area covered by housing, transportation, industrial buildings, power plants, infrastructure and superstructure specified according to human needs. The fishing grounds footprint refers

to the fresh and salt water area required for the survival of fish and other seafood based on the amount of consumption (Wackernagel et al., 2005; WWF, 2012a).

Since the 1970s, the world's population has started to demand more than what our world could offer in a sustainable way. As a result of excessive consumption habits, ecosystems have been shrinking and the amount of carbon in the atmosphere increasing. The ecological footprint data of recent years have shown that the initiatives to reduce the ecological footprint are not sufficient and these initiatives cannot become sustainable and conscious policies. In the twenty-first century, there have been certain periods of rapid rise in the amount of ecological footprint (WWF, 2016). In the late twentieth century, human beings consumed more natural resources than they did ever since they existed in the world. According to experts, if the habit of over-consumption continues at the same pace, an ecological collapse will be inevitable.

The ecological footprint is an important computational tool to understand the carrying capacity of our planet and to calculate ecological requirements for sustainability (Kitzes, Peller, Goldfinger & Wackernagel, 2007; Rapport, 2000). The ecological footprint analysis, a guide for the consumption status of societies (Tosunoglu, 2014), reveals if the country lives within its own ecological boundaries by comparing the footprint of a country with the biologically efficient total land. If a country's footprint is greater than its biological capacity, it means the country's economy consumes forests, land, and other resources more than the country can handle, and produces more waste than the absorbing capacity of the biological environment (TEMA, 2006). In other words, the ecological footprint reveals how much burden each person brings to our planet and how many more planets will be needed if the current consumption habits continue.

Today, the more we know our impact on the natural environment, the better we can understand our dependence on ecological systems supporting life (Gottlieb, Vigoda-Gadot, Haim, & Kissinger, 2012). Ecological footprint studies have become an important parameter in raising awareness towards the future ecological destruction of our planet. In this context, the ecological footprint is considered as an important educational tool used in raising awareness for the environment in the field of environmental education, developing positive attitudes towards the environment, and learning and teaching sustainability, in addition to expressing the negative effects of human beings on the world with numerical data (Akıllı, Kemahlı, Okudan, Polat, 2008; Keles, 2007). The ecological footprint measurement can ensure that individuals become aware of the burden they bring to nature and review their consumption habits. However, the teachers who will raise environmental awareness in younger generations should be environmentally friendly and well-trained in this field. Thus, it will be easier to raise individuals who are environmentally friendly and sensitive to environmental problems. In the literature review as regards the ecological footprint issues in Turkey, limited number of studies were found about the academicians in Turkey. Hence, this study aimed to determine the ecological footprints of university academicians according to their consumption habits and to compare them in terms of different variables.

Methodology

Research Design

Survey method was used in this study with the purpose of identifying the ecological footprints of academicians working at a state university in the southeast of Turkey. Survey is a type of research in which researchers try to obtain information in detail about an existing situation (Fraenkel & Wallen, 2006, Karasar, 2009).

Working Group

All of the academicians who work at a state university in the southeast of Turkey (330 academicians) are involved in the study group. Data collection tool was applied to the academic staff who wanted to participate in the research voluntarily. A particular attention was paid to include the academicians (206 people) who were from different regions of the country and with different socio-cultural characteristics, different habits of consumption, different lifestyles, different titles and income levels.

Data Collection Tool

In the study, ecological footprint calculation tool (ekolojikayakizim.org), developed by the World Wildlife Fund (wwf.org.tr), was used. The calculation tool includes questions on consumption habits in home, travel, food and other areas to help users calculate their consumption habits and effects. Users learn how many planets they need to live in line with their lifestyle questions. In this survey, there are 23 multiple choice questions in total under the headings of food (4 questions), travel (7 questions), home (6 questions) and other (consumer goods and services) (6 questions). Eight questions were added in the first part of the data collection tool to determine the demographic characteristics of the participants (gender, age, academic unit, academic title, seniority, etc.). The web-based format of the tool used on the website- ekolojikayakizim.org- to collect the data was first written down on paper and re-arranged by adding demographic questions to the top. The "Ecological Footprint Calculation Tool" on this website was applied to the academicians working in different faculties of the university. The academicians were given the Ecological Footprint Calculation Tool and asked to complete all the questions in the questionnaire by taking into account their lifestyles and consumption habits. Then all the data in the survey were recorded to Excel spreadsheets.

Analyzing Data

The data on the ecological footprint was entered into the website- ekolojikayakizim.org- and the total ecological footprint of each participant, the percentages of the ecological footprint components and the carbon footprint were calculated and recorded in the work file. Percentage and frequency calculations were made for the demographic data. Then, independent groups t-test was used in the comparison of the two groups, and one-way analysis of variance was performed for the number of groups that are more than two.

Findings

Percentages and frequencies were calculated about the demographic characteristics (gender, age, academic unit, academic title, being informed about ecological footprint, status of membership to a non-governmental organization related to environment, participation in social activities related to environment, sports activities related to environment) of the academicians participating in the study as given in Table 1 below.

Table 1.

Percentages and frequencies of academicians for demographic variables

		f	*%*
Gender	Male	149	72.3
	Female	57	27.7
Age	18-35	124	60.2
	36-45	48	23.3
	46+	34	16.5
Department	Faculty of Education	38	18.4
	Faculty of Science and Letters	50	24.3
	Faculty of Economics and Administrative Sciences	21	10.2
	Faculty of Engineering and Architecture	31	15.0
	Faculty of Theology	17	8.3
	Faculty of Health Sciences	20	9.7
	Vocational High School	29	14.1
Academic Title	Prof./Assoc. Prof.	19	9.2
	Asst. Prof.	54	26.2
	Instructor/Lecturer	65	31.6
	Research Assistant	68	33.0
Knowledge of Ecological Footprint	Yes	57	27.7
	No	149	72.3
Membership Status of Environmental NGOs	Yes	33	16.0
	No	173	84.0
Participation in Environmental Sports Activities	Always	14	6.8
	Sometimes	150	72.8
	Never	42	20.4
Participation in Environmental Social Activities	Always	10	4.9
	Sometimes	121	58.7
	Never	75	36.4

According to the data given in Table 1, the majority of the academicians participating in the study were male (72.3%) and in the 18-35 age range (60.2%). It was observed that the majority of the academicians (72.3%) did not have any information about the concept of ecological footprint and they were not members of any non-governmental organizations (84.0%) related to environment. It was also seen that the majority of them (72.8%) occasionally participated in social activities (conferences, symposia etc.) and sports activities (58.7%) (camping, hiking, etc.) related to the environment.

The ecological footprint and carbon footprint values of the academicians were calculated according to some variables and given in figures as follows.

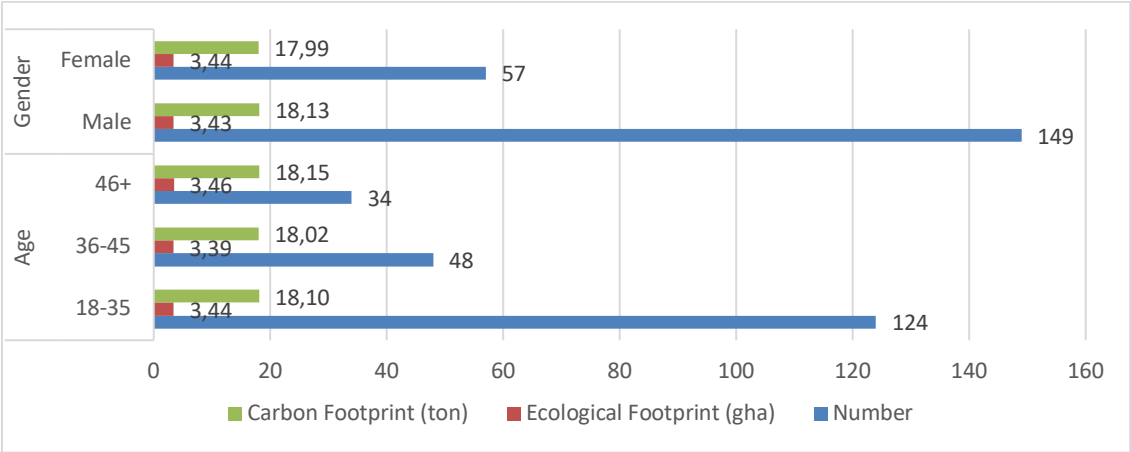

Figure 1. The average ecological footprint and carbon footprint values of academicians according to gender and age

The Figure 1 shows that the average of the ecological footprint of the female academicians is 3.44 global hectares (gha) whereas it is 3.43 gha in the males, which are regarded rather high. Moreover, the carbon footprint of female academicians was found to be 17.99 tons, while that of male academicians was 18.13 tons. According to the age variable, the average of the ecological footprint of the academicians over 46 years of age is 3.46 gha and the carbon footprint value is 18.15 tons, both of which are higher than the other age groups. The ecological footprint of the 36-45 age category is 3.39 gha and the carbon footprint value is 18.02 tons, while that of the 18-35 age category is 3.44 gha and the carbon footprint value is 18.10 tons.

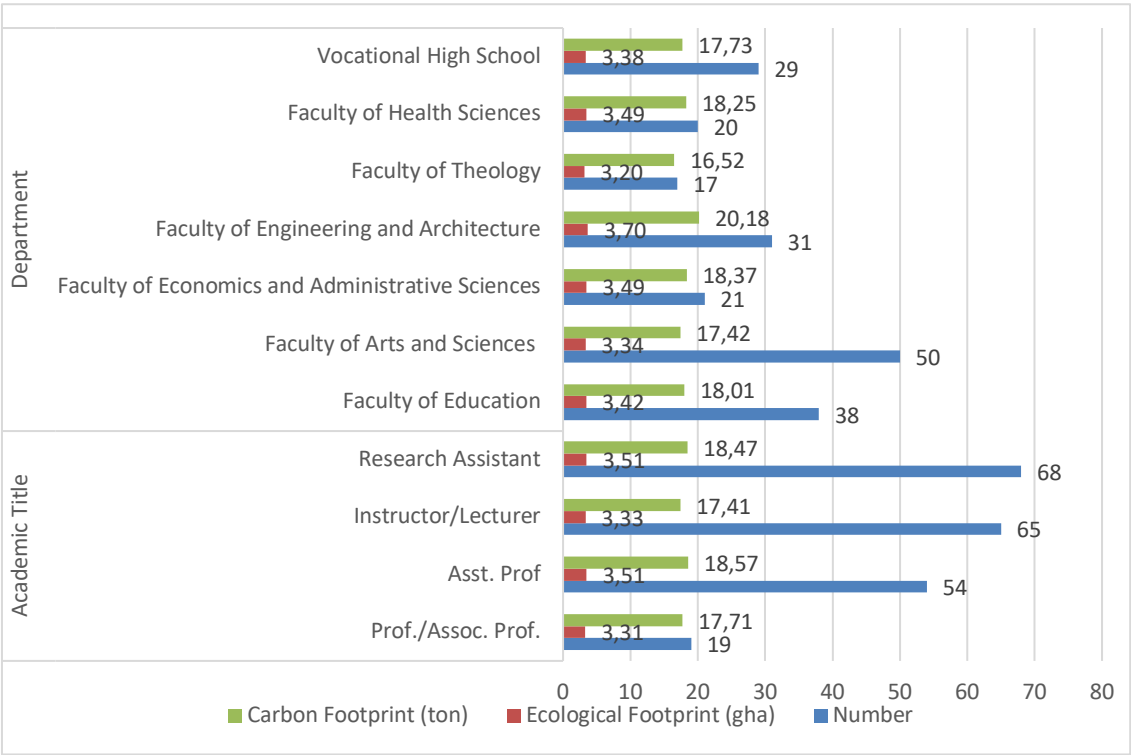

Figure 2. The average ecological footprint and carbon footprint values of academicians according to department and academic title

Figure 2 shows that the ecological footprint of the academicians working in Vocational High School according to the academic department variable is 3.38 gha and the carbon

footprint value is 17.73 tons, whereas the ecological footprint of the academicians working in the Faculty of Health Sciences is 3.49 gha and the carbon footprint value is 18.25 tons. In addition, the ecological footprint of the academicians working at the Faculty of Theology is 3.20 gha and the carbon footprint was 16.52 tons. The academicians who work at the Faculty of Engineering and Architecture have the ecological footprint average of 3.70 gha and the carbon footprint value is 20.18 tons, higher than all the other academic department groups. In the Faculty of Economics and Administrative Sciences, the ecological footprint of the academicians is 3.49 gha and the carbon footprint value is 18.37 tons. In the Faculty of Arts and Sciences the ecological footprint of the academicians is 3.34 gha and the carbon footprint value is 17.42 tons. In the Faculty of Education, the ecological footprint of the academicians is 3.42 gha and the carbon footprint value is 18.01 tons. On the other hand, according to the title variable, the ecological footprint value of Research Assistants is 3.51 gha and the carbon footprint value is 18.47 tons while for those working as a Asst. Prof., the ecological footprint is 3.51 gha and the carbon footprint is 18.57 tons, all of which are very high. The average ecological footprint value of those working with the status of an Instructor/Lecturer is 3.33 gha and the carbon footprint is 17.41 tons while the average ecological footprint of those working with the status of Prof./Assoc. Prof. is 3.31 gha and the carbon footprint value is 17.71 tons.

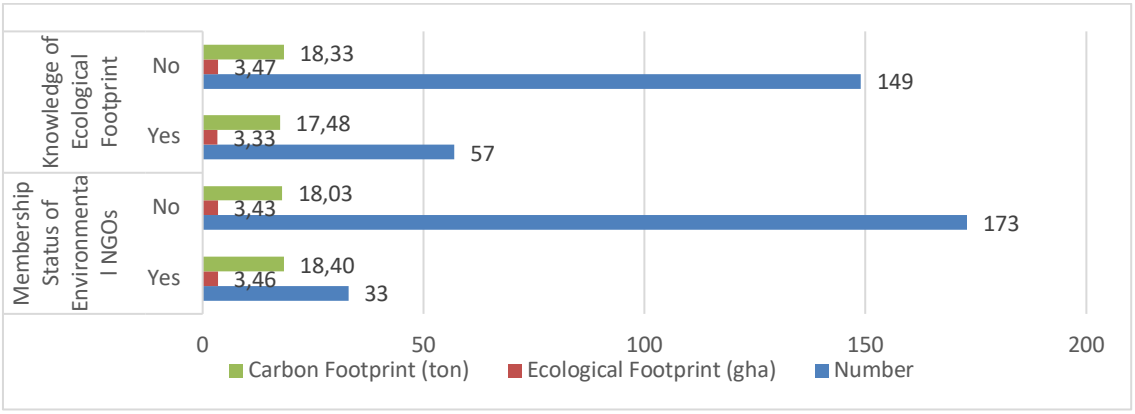

Figure 3. The average ecological footprint and carbon footprint of academicians according to knowledge of ecological footprint and membership status of environmental NGO's

Figure 3 shows that the average ecological footprint (3.47 gha) and carbon footprint values (18.33 tons) of the academicians who are not knowledgeable about the concept of ecological footprint are higher than the average ecological footprint (3.33 gha) and the carbon footprint (17.48 tons) of the academicians who have stated that they are knowledgeable about the concept of ecological footprint. However, the average ecological footprint (3.46 gha) and the carbon footprint value (18.40 tons) of the academicians who are members of environmental organizations are higher than the average ecological footprint (3.43 gha) and the carbon footprint value (18.03 tons).

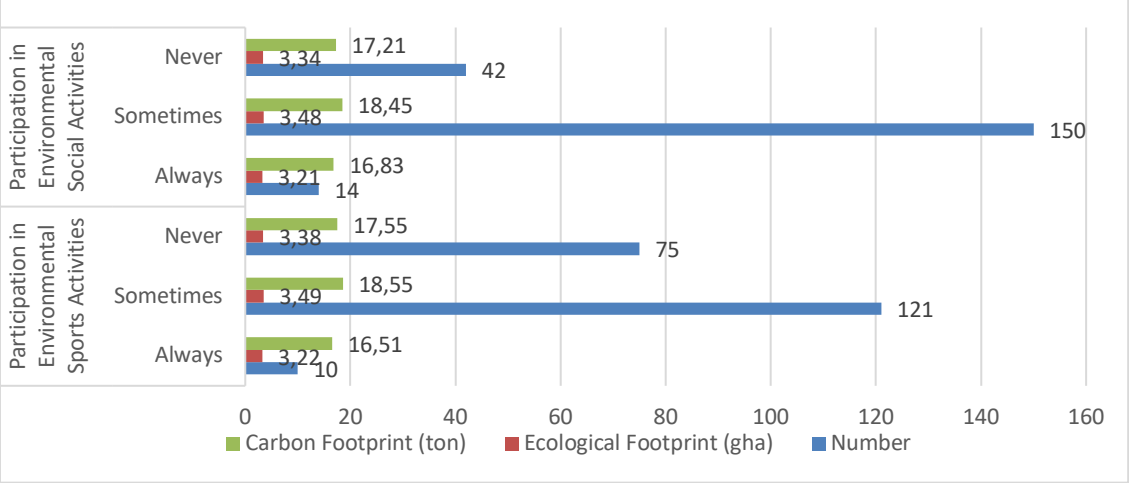

Figure 4. The average ecological footprint and carbon footprint values of academicians according to participation in environmental social and sports activities

Figure 4 shows that the average ecological footprint (3.21 gha) and the carbon footprint (16.83 tons) values of the academicians who have stated that they always participate in environmental social activities (conferences, symposia, panels, etc.) are lower than the average ecological footprint (3.48 gha) and the carbon footprint value (18.45 tons) of those who have stated they sometimes take part in such activities as well as the average ecological footprint (3.34 gha) and the carbon footprint value (17.21 tons) of those stating that they never attend such activities. Similarly, the average ecological footprint (3.22 gha) and the carbon footprint value (16.51 tons) of the academicians who have stated that they always participate in environmental sports activities (camping, trekking, trips, etc.) are lower than the average ecological footprint (3.49 gha) and the carbon footprint value (18.55 tons) of those who have stated they sometimes take part in such activities as well as the average ecological footprint (3.384 gha) and the carbon footprint value (17.55 tons) of those stating that they never attend such activities.

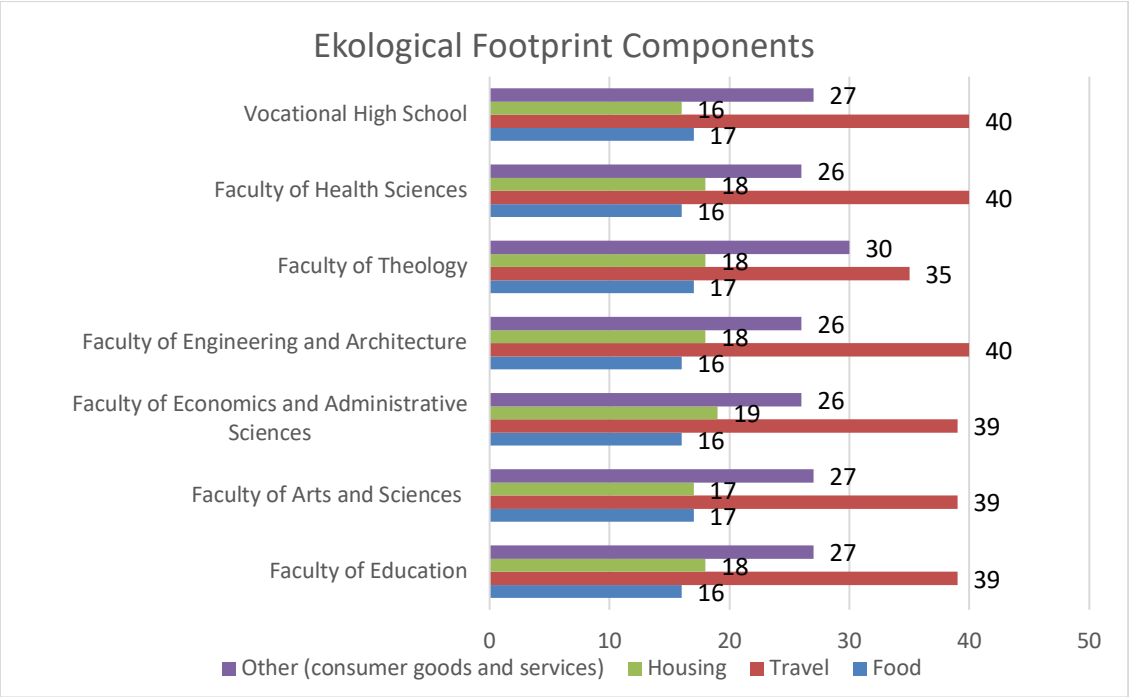

Figure 5. Percentages of ecological footprint components according to department of the academicians

Figure 5 shows that the most common components are travel, other (consumer goods and services) consumption items, housing and food, respectively, according to the percentage of the ecological footprint components of the academicians. Similarly, given the other variables in the study, the highest shares among the ecological footprint components belong to travel, other (consumer goods and services), housing and food as to their percentages.

Kolmogorov-Smirnov test was used to determine whether or not there was a normal distribution among the groups with the purpose of identifying whether there was a statistical significance in terms of gender, knowledge of ecological footprint, membership status of environmental NGOs, age, academic title, academic department and participation in social and sports activities related to the environment,. Test results are presented in Table 2.

Table 2.

Test of normality findings of ecological and carbon footprint averages of the academicians

	Carbon Footprint	Ecological Footprint
N	206	206
Average	18.09	3.43
Std. Deviation	5.77	.81
Test Statistics	.14	.12
Significance (p)	.07	.11

The data given in Table 2 shows that since the significance values calculated for carbon and ecological footprint are greater than .05 (p=.072 for carbon footprint; p=.112 for ecological footprint), it is possible to assume that the data are normally distributed. Therefore, the t-test was used for comparing paired groups, whereas one-way variance analysis was conducted for comparing more than two groups. Table 3 shows the findings obtained by t-test, from among parametric tests, in order to determine whether there was a statistical significance with regards to ecological footprint and carbon footprint average among groups considering the variables such as gender, knowledge of ecological footprint, and membership status of non-governmental organizations related to the environment.

Table 3.

T-test findings of ecological and carbon footprint averages of the academicians in terms of gender, knowledge of ecological footprint and membership status of environmental NGO's

	Variable	Groups	N	$\bar{x}$	sd	df	t	p
Ecological Footprint (gha)	Gender	Male	149	3.43	0.85	204	-0.07	0.94
		Female	57	3.44	0.72			
	Knowledge of Ecological Footprint	Yes	57	3.33	0.71	204	-1.13	0.26
		No	149	3.47	0.85			
	Membership Status of Environmental NGOs	Yes	33	3.46	0.90	204	0.21	0.83
		No	173	3.43	0.80			
Carbon Footprint	Gender	Male	149	18.13	6.05	204	0.16	0.87
		Female	57	17.99	5.03			
	Knowledge of Ecological Footprint	Yes	57	17.48	5.20	204	-0.94	0.35
		No	149	18.33	5.98			

Membership Status of Environmental NGOs	Yes	33	18.40	6.68	204	0.34	0.74
	No	173	18.03	5.61			

Table 3 shows that there was no statistically significant difference between the ecological footprint of male academicians (=3.43, sd=0.85) and that of female academicians (=3,44, sd=0.72) as to the gender variable, t(204)=-0.07, p=.94>.05. Likewise, the average carbon footprint value (=18.13, sd=6.05) of the male academicians and that of the female academicians (=17.99, sd=5.03) did not differ significantly t(204)=-0.16, p=.87>.05. Additionally, there was no statistically significant difference between the average ecological footprint (=3.33, sd=0.71) of academicians who were knowledgeable about the ecological footprint and that of those who were not knowledgeable (=3.47, sd=0.85) t(204)=-1.13, p=.26>.05. Similarly, there was no statistically significant difference between the average carbon footprint value (=17.48, sd=5.20) of academicians who were knowledgeable about ecological footprint and that of those (= 18.33, sd = 5.98) who were not knowledgeable about ecological footprint t(204)=-0.94, p=.35>.05. The difference between the average ecological footprint value (=3.46, sd=0.90) of the academicians who were members of non-governmental organizations related to the environment and that of the non-members (=3.43, ss=0.80) were not statistically significant t=(204)=0.21, p =.83>.05. Similarly, the average carbon footprint (=18.40, sd=6.68) of those who were members of non-governmental organizations related to the environment and that of the non-members (=18.03, sd=5.61) did not differ significantly t(204) =-0.34, p=.74>.05.

Table 4, Table 5 and Table 6 demonstrate the data obtained with the one-way analysis of variance conducted to determine whether there was a statistical significance between the average values of ecological footprint and carbon footprint among groups in terms of age, academic title, academic department and whether or not they were members in an environmental-related social and sports activities.

Table 4.

ANOVA findings of ecological and carbon footprint averages of the academicians in terms of age and academic title

	Variable	Groups	N	x̄	sd	F	Sig.
Ecological Footprint	Age	18-35	124	3.44	0.77	.09	.91
		36-45	48	3.39	0.88		
		46+	34	3.46	0.91		
Carbon Footprint	Age	18-35	124	18.10	5.48	.01	.99
		36-45	48	18.02	6.28		
		46+	34	18.15	6.26		
Ecological Footprint	Academic Title	Prof./Assoc. Prof.	19	3.31	0.85	.86	.46
		Asst. Prof	54	3.51	0.97		
		Instructor/Lecturer	65	3.33	0.68		
		Research Assistant	68	3.51	0.79		
Carbon Footprint	Academic Title	Prof./Assoc. Prof.	19	17.71	7.01	.55	.65
		Asst. Prof	54	18.57	6.67		
		Instructor/Lecturer	65	17.41	4.79		
		Research Assistant	68	18.47	5.56		

Table 4 shows that the average values of ecological footprint and carbon footprint are very close to each other according to age and academic title variables and there is no statistically significant difference among the groups.

Table 5.

ANOVA findings of ecological and carbon footprint averages of the academicians in terms of academic department

	Variable	Groups	N	x̄	sd	F	Sig.
Ecological Footprint	Academic Department	Faculty of Education	38	3.42	0.96	0.97	0.44
		Faculty of Arts and Sciences	50	3.34	0.72		
		Faculty of Economics and Administrative Sciences	21	3.49	0.68		
		Faculty of Engineering and Architecture	31	3.70	0.92		
		Faculty of Theology	17	3.20	0.62		
		Faculty of Health Sciences	20	3.49	0.84		
		Vocational High School	29	3.38	0.81		
Carbon Footprint	Academic Department	Faculty of Education	38	18.01	6.68	1.03	0.41
		Faculty of Arts and Sciences	50	17.42	4.88		
		Faculty of Economics and Administrative Sciences	21	18.37	5.14		
		Faculty of Engineering and Architecture	31	20.18	6.88		
		Faculty of Theology	17	16.52	4.84		
		Faculty of Health Sciences	20	18.25	5.56		
		Vocational High School	29	17.73	5.68		

Table 5 demonstrates that average ecological footprint and carbon footprint values of the groups are very close to each other according to the academic department variable and there is no statistically significant difference among the groups.

Table 6.

ANOVA findings of ecological and carbon footprint averages of the academicians in terms of participation in social and sports activities related to the environment

	Variable	Groups	N	x̄	sd	F	Sig.
Ecological Footprint	Participation in Environmental Social Activities	Always	14	3.21	0.92	1.06	.35
		Sometimes	150	3.48	0.83		
		Never	42	3.34	0.73		
Carbon Footprint	Participation in Environmental Social Activities	Always	14	16.83	7.30	1.12	.33
		Sometimes	150	18.45	5.75		
		Never	42	17.21	5.28		
Ecological Footprint	Participation in Environmental Sports Activities	Always	10	3.22	0.88	.78	.46
		Sometimes	121	3.49	0.79		
		Never	75	3.38	0.84		
Carbon Footprint	Participation in Environmental Sports Activities	Always	10	16.51	7.00	1.09	.34
		Sometimes	121	18.55	5.73		
		Never	75	17.55	5.68		

Table 6 shows that the average ecological footprint and carbon footprint values of the academicians are very close to each other according to the variables of participation in social activities (conferences, symposia, panels, etc.) and sports activities (camping, hiking, trips etc.) related to the environment and there is no statistically significant difference among the groups.

Results and Discusiion

Today, people are using 1.5 times as much as the capacity of the world for providing the resources that they use and absorbing the waste they generate. This means that the world is able to reproduce the resources we use in 1 year, in 1.5 years. In the case that people's current consumption habits continue at this rate, it is clear that by the 2050s, we will need a world with three times as much capacity as the existing world in order to meet our needs. The resources of the world are consumed at a rate well above the sustainable level (WWF, 2012a). The population of our world is expected to reach 11 billion people at the end of the twenty-first century. With such a population, it is stated that the biological capacity per person will decrease (Wackernagel, Kitzes, Moran, Goldfinger, & Thomas, 2006; WWF, 2014; WWF, 2018).

The ecological footprint of the current population in the world is constantly growing. Turkey is also one of those countries in which natural resources are consumed faster than they are produced, and where there is an ecological deficit (WWF, 2012b). Today, it is a necessity to revise our lifestyles and the ecological capacity of the world from the perspective of ecological footprint (Tosunoğlu, 2014). Individuals and countries need to move towards sustainable lifestyles by abandoning their existing consumption patterns. Ecological footprint calculations, which clearly show how quickly we have consumed our resources on earth, are a useful calculation tool with respect to showing the ecological effects of people's lifestyles and the necessity of changing the forms of consumption. This study aimed to raise awareness by calculating the ecological footprints and carbon footprints of the academicians who are considered as more conscious than the other members of the society and who educate the individuals of the future society.

In this study, the average ecological footprint value of the academicians was 3.43 gha and the average carbon footprint value was 18.04 tons. This value is over both Turkey's average ecological footprint value (3.19 gha) and that of the global value (2.87 gha) (WWF, 2017). When examined according to the components of this ecological footprint, it was observed that 39% of it derived from travelling, 27% of it from the other (consumer goods and services), 18% of it from the housing and 16% of it from food consumption. The reason why ecological footprint and the carbon footprint values of the academicians are very high is that the expenses of academicians often increase as they have to travel frequently because of national or international scientific studies, they usually use their own private vehicles for transportation and prefer large vehicles, their living standards increase in line with the rise in their incomes and they have to follow technological advances closely. Some studies in the literature, in which the ecological footprints of the academicians are calculated, (Başoğul, 2018; Eren, Parlakay, Hilal & Bozhüyük, 2017; Akıllı et al., 2008; Akyüz, Atış, Çukadar & Salalı, 2016; Janis, 2007) have demonstrated results with high values similar to those obtained in this study.

Given the average ecological footprint values of the academicians according to the gender variable, it was found that the average of women (3.44 kha) and men (3.43 kha) were very close to each other and there was no statistically significant difference between them. As far as the data about the extent of knowledge about footprint and whether the academicians are members to non-governmental organizations related to the environment was considered, it was revealed that the average values of the groups were very close to each other and there was no statistically significant difference among them. Likewise, the average footprint values of the groups were found to be close to each other and there was no statistically significant difference among the groups with respect to the variables, namely age, academic title, and participation in social and sports activities related to the environment.

As a result, it was concluded that the ecological footprint and carbon footprint values of the academicians were quite high in terms of all variables taken into consideration in this

study, and there were no statistically significant differences among the groups. While measuring the ecological footprint and carbon footprint values, the consumption and recycling habits of individuals under food, travelling, housing and other (consumer goods and services) components were taken into consideration. In the category of travelling, the high level of the ecological footprint and carbon footprint values of the academicians seemed to result from the redundant number of travels and the use of private large vehicles instead of using public transport, causing low level of awareness towards environmental damage due to carbon emission. In the food category, it was concluded that meat and fish were predominant in their diet and the confidence in organic production and consumption was weak. In the category of housing (shelter), it is concluded that the insulation of the houses is not sufficient as well as energy saving systems, as a result of which the academicians maintain their life without paying attention to the ecological balance in fuel and energy saving issues. It was concluded that the number of electronic and household appliances purchased in the other items (consumer goods and services) category, jewellery expenditures and personal care expenditures were high, the recycling of waste was inadequate and thus the expenditures were not balanced in terms of ecological footprint. The results obtained in this study are similar to the results obtained in other studies in the literature (Başoğul, 2018; Eren, Parlakay, Hilal & Bozhüyük, 2017; Akıllı et al., 2008; Akyüz, Atış, Çukadar & Salalı, 2016; Janis, 2007).

In addition, it has also been observed that the academicians, who are expected to have higher levels of awareness and consciousness in terms of sustainable life and ecology, have quite high level of ecological footprint values. According to these results, it is of great importance that academicians should change their lifestyle and consumption habits. For this reason, it would be more appropriate for them to make public transportation a habit, to include local products, organic products and vegetables into their eating habits, to be more sensitive about energy saving, to care for recycling and to pay attention to not spending other than they need. Furthermore, it is possible to reduce ecological footprint values by means of taking measures such as taking care of using existing resources more efficiently with an ecologically sustainable approach, thereby reducing waste, and taking care of using environmentally friendly products. Turkey is one of the countries in which ecological footprint is growing fast (WWF, 2012b). It can be suggested that not only scientists and schools but also other institutions should take necessary measures to reduce this rapid increase, to raise ecological awareness and consciousness in the society, to achieve sustainable consumption habits and to raise environmentally friendly individuals.

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RESEARCH ARTICLE

Üniversite Öğretim Elemanlarının Ekolojik Ayak İzinin Farklı Değişkenlere Göre İncelenmesi**

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Özet

Bu araştırmanın amacı, üniversite öğretim elemanlarının ekolojik ayak izlerinin hesaplanması ve çeşitli değişkenler açısından değerlendirilmesidir. Araştırmada tarama modeli kullanılmıştır. Araştırmanın verileri 2017-2018 eğitim öğretim yılında Türkiye'nin Güneydoğu Anadolu bölgesindeki bir devlet üniversitesinde görev yapan öğretim elemanlarından (149 erkek, 57 kadın) toplanmıştır. Veri toplama aracı olarak dört alt boyutu (gıda, seyahat, ev, diğer) olan web tabanlı "Ekolojik Ayak İzi Hesaplama Aracı" kullanılmıştır. Verilerin analizinde frekans, yüzde, ortalama, standart sapma gibi betimsel istatistikler ile ikili karşılaştırmalarda bağımsız gruplar için t-testi ve ikiden fazla grupların karşılaştırmalarında ise ANOVA kullanılmıştır. Katılımcıların ortalama ekolojik ayak izi küresel hektar cinsinden, karbon ayak izi ise ton cinsinden hesaplanmıştır. Araştırmada elde edilen sonuçlara göre öğretim elemanlarının çoğunluğunun ekolojik ayak izi hakkında bilgi sahibi olmadığı, çevre ile ilgili herhangi bir sivil toplum örgütüne üye olmadığı, çevre ile ilgili sosyal ve sportif etkinliklere katılmadığı belirlenmiştir. Öğretim elemanlarının ekolojik ayak izi ortalamalarının Türkiye ve dünya ortalamasının üzerinde olduğu belirlenmiştir. Cinsiyet, ekolojik ayak izi kavramı hakkında bilgi sahibi olma, çevre ile ilgili herhangi bir sivil toplum örgütüne üye olma, akademik unvan, çevre ile ilgili sosyal ve sportif etkinliklere katılma, yaş, çalıştığı fakülte değişkenleri açısından gruplar arasında anlamlı bir farklılık olmadığı bulunmuştur.

Anahtar Kelimeler: Ekolojik ayak izi, öğretim elemanları, çevre, çevre eğitimi.

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