

The Preferences of University Students Related to Environmental Impacts of Agriculture and Industry

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Abstract – It seems to be rational way to use today's clues in future plans especially in vital matters which are the problems that are not resolved that can be solved in the near or medium term. The fact that the segments which form of the society having different views, socio-economic status, culture accumulation and behaviors bring back the differences in the way of solution of the problems. The most educated, most conscious part of near future is the younger generation that is studying in today's university. In this frame, precautions already taken for today's well-educated individuals and the right policy options for the future with viable conditions are presented to university students. This study seeks the trends of today's young and well-educated youth in the environmental impacts of the agricultural and industrial sectors. The study carried out in the province of İzmir, young people selected as the target group consist of undergraduate students of Ege University. Analytical Hierarchy Process (AHP) was used in the study to determine the trends of the youth for the environmental impacts of the agricultural and industrial sectors. According to young people, the most important role in environmental pollution is the industry sector with degree of impact 0.743. The agricultural sector with 0.257 is less effective in environmental pollution. In the planned AHP for this study; the agricultural and industrial sectors has been tried to determine their role in this pollution in terms of environmental pollution from soil, water and air pollution which are more important. According to this, when the students rate the effects of sectors on pollution factors, while the agricultural sector was effective on soil pollution (0.378) and water pollution (0.344), the industry sector was significantly affected the air pollution (0.444).

Keywords – Analytical Hierarchy Process AHP, Environmental Impacts, Agriculture, Preferences, Pollution.

I. INTRODUCTION

Environmental problems are one of the most important problems of our recent past and today. Since this problem is still continuing, it is possible to reach the result that the measures already taken and the activities shown have not benefited. Environmental pollution is a problem that can be solved by social efforts rather than individual efforts. The duration of the solution depends on the level of consciousness. The fact that the segments of the society have different viewpoints, socio-economic status, cultural accumulation and behavior forms bring about differences in the way of solution of the problems. The most educated, most conscious part of the future is the younger generation who is studying today's university. The preference, implementation and testing of the results of environmentally friendly forms of production in the future will be carried out by this segment. If it is possible to

determine the preferences for this younger generation; in the future the necessary steps for a healthier environment may already be taken.

The aim of this study is to identify the trends of today's young and well-educated youth in the environmental impacts of the agricultural and industrial sectors and to determine what measures to take in relation to the environment. For this purpose, it has been tried to determine the preferences of the university students who are well educated individuals for the agricultural and industrial sectors' pollutant roles.

In this framework survey was conducted with 379 students from Ege University. The Analytical Hierarchy Process (AHP) method was used to determine the trends of youth in environmental impacts caused by agriculture and industry sectors. In the planned AHP; the pollution of the agricultural and industrial sectors has been tried to be determined which of the soil, water and air pollution is more important in terms of environmental pollution.

In the international literature, there are many studies conducted to reveal the perception, attitude and behavior of university students in environmental issues [2]-[4]-[7]. It has been determined that university students do not pollute the nature but are not sensitive enough to solve environmental problems [4] in a study of university students' perceptions and behaviors regarding the future and present environmental problems. The researcher attributes this to the inadequate education about the environment. In a study by Keinonen et al. [7], it was researched that perceptions of highly educated students about environment and how the perceptions are related to the perception of the media. In the study, it was determined that when the students understood that the problem was serious through the media, the media was effective on the perceptions of the students about the environment. In a study [14] in which surveys on university students' perceptions of environmental and development issues in China were discussed, it was found that; students were conscious about the seriousness of environmental problems, both in China and throughout the world. However, they were pessimistic about future environmental conditions. In a study of the level of environmental awareness, attitudes and participation among university students [1], it attempted to find out students' level of knowledge and awareness on environment. Results from the study revealed high level of environmental knowledge and positive attitudes towards the environment among the students, but low level participation in environmental protection activities.

As you can see, there were no studies focusing on the preferences of the environmental impacts of two important

sectors such as agriculture and industry, although there are a number of studies that examine university students' perceptions, attitudes and behaviors towards the environment.

In the literature, there are many studies that utilize the AHP method in different areas. In 2003, Prakash analyzed land suitability for rice crops by considering the many parameters using the AHP method. Zulug [15] described consumer preferences; Atis et al. [3] examined the market preferences of conventional and organic raisin producers by using the AHP method. Gunden et al. [6] have benefited from the AHP to determine priorities in terms of brand, food quality and safety, price, incentives and productivity-efficiency factors that affect the domestic and international competition of the Turkish olive oil sector. In another study, Gunden et al. [5], were revealed consumer preferences for fresh fruit and vegetable purchasing places in terms of food safety, quality and price by AHP.

However, in this research the way of constructing the AHP method is different from the previous studies. This study increases the literacy contribution, on the one hand, the method utilized in the study, on the other hand, to be able to apply environmentally friendly forms of production in the future, and to guide them in taking environmental measures in order to create conditions in which they can exhibit their behavior in parallel. In addition, the study will be implemented in other regions or universities and will lead to practices there, with young people's perspectives on environmental issues and environmental friendly production preferences. Results obtained in such studies will also increase the success of implementing environmental policies in the future.

II. MATERIAL AND METHOD

The primary data source of the study consisted of data from surveys conducted with university students. In order to obtain primary data, students who have undergraduate education at 12 faculties of Ege University were interviewed. The secondary data source of the study was the national and international studies on the subject.

In the faculties of Ege University, the number of students studying in 12 faculties from the first year to the last year, with the exception of the second education, has formed the main population at the undergraduate level in 2013-2014 academic year. The proportional sample volume formula was used to determine the sample volume [8], with a sample volume of 379 for 95% confidence interval and 5% error margin. The number of students interviewed at the faculties is determined according to the share of each faculty in the main population. It has been paid attention to the fact that the distribution of surveys in faculties according to their classes is proportionally close to each other. Face to face surveys were carried out by the students at 12 undergraduate levels at Ege University in the collection of the data.

The Analytical Hierarchy Process (AHP) method was used to determine trends in the environmental impacts of youths caused by the agricultural and industrial sectors. The analytic hierarchy process (AHP) [10] is a decision-

support tool designed to cope with complex multi-criteria problems. It is a subjective tool for analyzing qualitative criteria to generate priorities and preferences among decision alternatives. The method helps to structure and analyze decision problems by breaking down the complex problem in a hierarchical order and by employing pairwise comparisons of its elements to determine the preferences among a set of decision alternatives. The AHP is used in various decision-making areas, such as planning, choosing the best policy alternative, determining requirements, predicting outcomes, analyzing benefit/cost decisions and resource allocations, measuring performance, determining consumer preferences, and optimizing and resolving decision conflicts [11]-[12]. The AHP utilizes a nine-point scale with values 1-9 to rate the relative priority of pairs of items [12].

The most accurate way to compare decision alternatives is by using pairs [13]. The AHP uses pairwise comparisons to establish measures for both the importance of each subproblem in solving the overall problem and the preference of respondents. A pairwise comparison matrix of the relative contribution of each element toward each criterion is constructed in the next higher level. In this matrix, pairs of elements are compared with respect to criterion in the superior level. After developing the matrix of pairwise comparisons, the preference rating of each respondent being compared can be calculated. This step of the AHP is called synthesization. To finalize the estimation procedure, we would combine the importance ratings of the subproblems and the preference ratings obtained for each respondent group contribution to solving the subproblems.

In this study, by determining the most importance of soil, water and air pollution in terms of environmental pollution with AHP, the role of agriculture and industry was determined in the pollution.

III. RESULTS

The average age of the interviewed students is 22 and between 17 and 37 years of age. More than half (% 56,7) of the respondents are female students. The income average of the families of the students is 2768 TL and the average of the pocket money is 505 TL. While 34% of the students living with their own family, 33% stay in the dormitory and 30% stay in the student's residency.

When today's university students are thought to be the most educated and most conscious part of the future, their environmental sensitivities, perspectives on environmental problems and the perceptions and attitudes of the environment regarding the future are of great significance both for today and for future. In this framework, some statements were given to the students participating in the survey about their personal and environmental sensitivities and they were asked whether they agreed in these statements or not.

Some statements were given to the students about the effect of the agriculture sector on the environment and their participation was revealed. According to this, the students agree in the statement "chemical fertilizers pollute

the environment considerably", with an average of 4.21. In addition, agreement of students in all other statements about the influence of various agricultural activities on the

environment shows that agricultural production pollutes the environment (Table I).

Table I. Level of Participation of Students to the Impact of Agricultural Sector on the Environment

Impact of Agricultural Sector on the Environment	1	2	3	4	5	Scale Average
Farmer behavior and decisions have a significant impact on the environment	22	27	74	122	134	3.8417
Excessive irrigation is harmful to plant and soil	12	23	74	128	142	3.9631
Chemical fertilizers pollute the environment considerably	8	21	48	108	194	4.2111
Agricultural pesticides pollute the environment considerably	15	30	62	121	151	3.9578
Farmers have to reduce the use of chemical fertilizers and pesticides to protect the environment	20	23	57	95	184	4.0554

1: Completely disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Completely agree

In this section where the statements about another sector thought to have a negative effect on the environment is related to the industrial sector, the students stated that they completely agree in the statement "Industry-based air

pollution is an important environmental problem", with an average of 4.55 in first rank. Besides, students stated that they agree almost all of the environmental problems from industry-borne (Table II).

Table II. Level of Participation of Students to the Impact of Industrial Sector on the Environment

Impact of Industrial Sector on the Environment	1	2	3	4	5	Scale Average
Industrialists' behavior and decisions have a significant impact on the environment	13	14	42	90	220	4.2929
Chemicals used in the industry harm the environment	8	12	30	65	264	4.4908
Industrial air pollution is an important environmental problem	8	9	26	60	276	4.5488
Industrial water pollution is an important environmental problem	12	13	19	59	276	4.5145
Industrial soil pollution is an important environmental problem	11	6	25	71	266	4.5172
Industrialists have to head environmentally friendly clean technology to protect the environment	15	17	21	53	273	4.4565

1: Completely disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Completely agree

Preference of University Students on Environment in Terms of Effecting Agriculture and Industry Sector

The trends of the university students on the environmental impacts caused by the agricultural and industrial sectors have been determined. In the AHP model developed in this context, it was aimed to determine the roles of agricultural and industrial sectors in this pollution by defining which of the soil, water and air pollution is more important in terms of environmental pollution.

Firstly, the AHP model has been defined regarding the impact levels of the sectors on the environment and the determination of the most important pollution. Sectors in which the youth are required to determine the level of impact on the environment are considered as criterion in the model.

These sectors (criteria) are listed below:

1. Agricultural sector
2. Industrial sector

The decision alternatives of the AHP model are youth's most important pollution trends. Young people are asked to evaluate the pollutants according to the sectors that are effective on the environment. As a result, the importance level of each pollutant element has been determined by the youth.

The pollution elements (alternatives) included in the

model are:

1. Soil pollution
2. Water pollution
3. Air pollution

The AHP model developed to analyze the youth's environmental pollution trends is shown at below Figure 1. The goal in the model is to identify the most important pollution element and identify the roles of the sectors on pollution. As model criteria, two pollution-causing sectors have been taken into consideration. The effects of pollution to each pollution criterion have been calculated. The importance of the three pollution factors considered as an alternative to decision is determined by the statements of youth according to the sectors.

The impact scores and levels of importance calculated in the AHP decision model for determining the trends of youth on pollution are listed below:

1. Determination of impact levels on the environment of two different sectors.
2. Defining the importance of pollution elements according to the agricultural sector.
3. Calculation of importance levels of pollution elements according to industry sector.
4. Finally, determining the number of the most important pollution by considering both sectors.

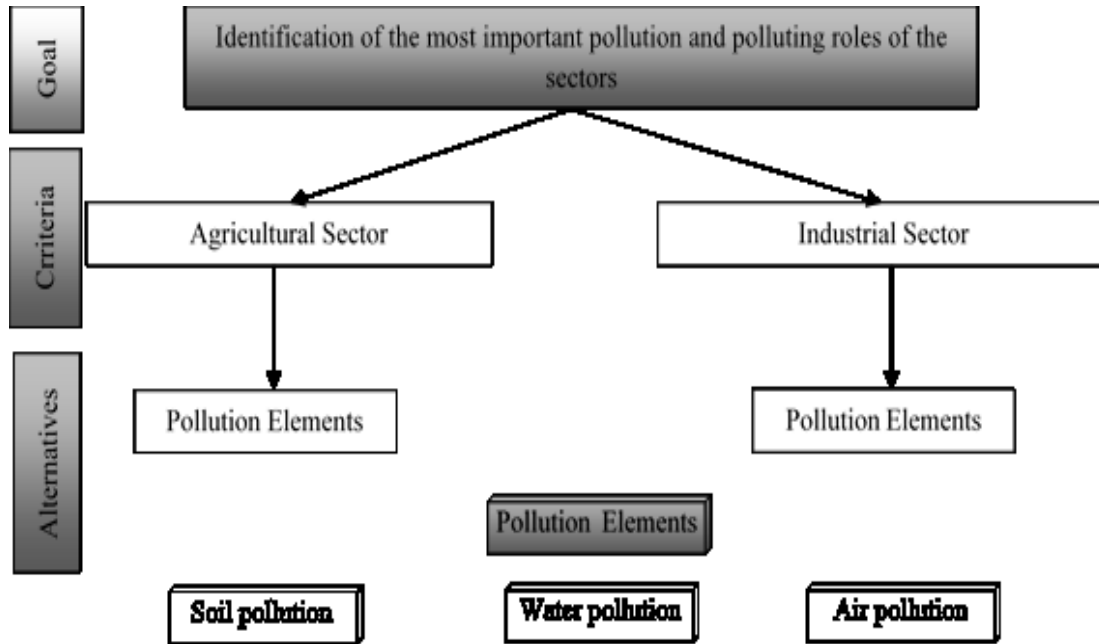


Fig. 1. Determination of university students' trends on pollution

According to young people, the most important role in environmental pollution is the industry sector. The degree of impact of the industrial sector is high (0.743). Young people have tendency that the agricultural sector (0.257) is less effective in environmental pollution. The fact that the

Friedman test is statistically significant confirms this ranking among the sectors. According to this result, it can be said that the youth think that the industrial sector causes more environmental pollution than the agriculture sector (Table III).

Table III. Role of Sectors in Pollution According to University Students

	Mean*	Standard Deviation	Median	Minimum	Maximum
Agricultural Sector	0.257	0.235	0.125	0.100	0.900
Industrial Sector	0.743	0.235	0.875	0.100	0.900

*Friedman test was significant for $p < 0.01$

When young people rate the effects of sectors on the elements of pollution; it can be said that the agriculture sector is effective on soil (0.378) and water pollution

(0.344). On the other hand, it was determined that the industrial sector was significantly effective in air pollution (0.444) (Table IV).

Table IV. Effects of Sectors on the Pollution

	Soil Pollution	Water Pollution	Air Pollution
Agricultural Sector	0.378	0.344	0.278
Industrial Sector	0.231	0.325	0.444

Finally, when the importance ratings of pollution are evaluated; Friedman test statistic is significant. This result indicates that some pollution elements are more important than others. It is possible to say that the most important

pollution in terms of the students is the air pollution (0.414). This is followed by water pollution (0.333) and soil pollution (0.253) (Table V).

Table V. The Most Significant Pollution According to University Students

	Mean*	Standard Deviation	Median	Minimum	Maximum
Soil pollution	0.253	0.158	0.221	0.052	0.727
Water pollution	0.333	0.151	0.317	0.068	0.739
Air pollution	0.414	0.185	0.396	0.052	0.778

*Friedman test was significant for $p < 0.0$

IV. CONCLUSION

With this research, it is aimed to guide the today's university students' environmental awareness, the trends in environmental impacts caused by the agricultural and industrial sectors. Ege University undergraduate students were selected as the target group in the research carried out in İzmir and a face-to-face survey was conducted with 379 students from 12 faculties and different classes.

According to the research results, the university students' agreement rate in the environmental impact of the industrial sector is higher and they think that pollution of air, water and soil originating from industry is absolutely important. University students' trends in environmental impacts caused by agricultural and industrial sectors are revealed by AHP analysis. According to the results, for the youth while the industry sector (0.743) plays the most important role in environmental pollution; the agricultural sector (0.257) is thought to be less effective in environmental pollution. Young people thought for the effects of sectors on natural resources that; the industrial sector considerably effects on air pollution and the agricultural sector effects on soil and water pollution.

When the results of this research are evaluated, it is understood that the students are having high environmental sensitivity and aware of the pressures on the environment caused by agricultural and industrial sectors. Young people think that agriculture is also effective in environmental pollution, but industrial sector is much more effective. In this sense, since the university students will be employed in these sectors, it seems possible to achieve the participation of today's youth in policies to be implemented in order to reduce the impact of agriculture and especially the industrial sector on environmental pollution. In addition, this environmental awareness of the young generation can be taken as reference for raising the environmental awareness of society. These young people can be contributed voluntarily in programs to protect the environment and reduce the environmental pollution. University youth's preferences for the environment are also an indication of their sensitivity to the environment. However, it has also been revealed in various studies that this sensitivity is lack of in finding solutions to environmental problems, and that university students are not sufficiently sensitive to this issue [1]-[4]. This would require both young people to solve problems in the face of environmental problems, as well as taking measures to ensure policy participation. One of the most important things to do at this stage is to conduct trainings towards young people to increase their knowledge and perceptions about the environment. These training activities, which should be continued in the university period as well as in the pre-university period, are indispensable for more sensitive generation to the environment.

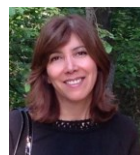
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