



## Environment sensitivity of the families that immigrated from rural to the urban areas

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### Abstract

Factor analysis is an important tool in the determination of factors affecting family's attitudes and thoughts towards the environmental sensitivity and knowledge. This application attempts to collect expressions relating to the environment that have gained significance under the one and the same heading. The data used in the study comprises the data from the questionnaires of 251 families that had migrated to the centre of Tokat province that were respondents in the 2007 'Environmental Survey'. The 27 questions in the questionnaire were ranked in accordance with the Likert scale. The factor analysis technique was applied to these questions designed to test the individuals' environmental sensitivity and consciousness. In the first part of the application of factor analysis 10 factors were identified whose eigen values were equal to or greater than 1. In the research region the most important factors that expressed the sensitivity of families that had migrated from rural areas to urban areas, were sensitivity to air pollution, sensitivity to inadequate feeding habits due to environmental pollution and global sensitivity (urbanization, desertification, the ozone layer depletion, wastes) were all labelled as development sensitivities. The results of the factor analysis show that the sensitivity of families that have migrated to the cities to the environment stems from knowledge on the issues concerning these factors. This means that in individuals knowledge on the environment is limited to certain subjects. It has been determined that families are more sensitive to air pollution and they are more familiar with this factor and more knowledgeable. These results that have emerged due to factor analysis will be of assistance in helping families that have migrated from rural areas to the urban areas to be more sensitive and knowledgeable about the environment and its protection.

**Key words:** Sensitivity of clean air, global sensitivity, development sensitivity, the sensitivity of malnutrition, Varimax rotation, Likert scale.

### Introduction

Sustainable economic development has become the world's political objective to combat the intensified environmental problems and especially the non-reversible degradation of the natural environment. As the intensified environmental degradation has led to the essential disturbance of ecological balance, crucial problems arise nowadays on a global, as well as on a regional and local level<sup>5</sup>. The increase of the effect and impact of the pollution caused an increase in sensitivity to the environment within the development<sup>1</sup>.

Ecosystems are inherently variable and complex, a fact often obscured by the simplicity with which environmental problems are portrayed and policy solutions prescribed<sup>20</sup>. During the last two decades globalisation has become one of the most important concepts for the way we define environmental problems, their causes and their possible solutions<sup>13</sup>. Increasingly protective environmental legislation with an emphasis on conservation and sustainability of our resources is being introduced in most parts of the world<sup>26</sup>. Events throughout the world substantiate the view that planning and decision-making systems need a better integration of environmental, economic and social considerations<sup>8</sup>. This has assumed even greater significance from the need of assessing all developmental infrastructures from the viewpoint of sustainability<sup>9</sup>. It is now well recognised that the better understanding of environmental problems requires an improved

awareness of multi-disciplinary scientific developments. Awareness by itself is, however, not sufficient, and a better research integration is also required at the various stages of policy developments (design, development, implementation and review)<sup>24</sup>. Environmental economics focuses on the impact on human health due to bad environmental conditions, and the effect this has on the individuals and society's productive potential<sup>23</sup>.

International attention paid to sustainable development has occurred at a time when urban areas are gaining an estimated 67 million people per year - about 1.3 million every week. By 2030, approximately 5 billion people are expected to live in urban areas, 60% of the projected global population of 8.3 billion<sup>28</sup>. Most of the world's future population growth will occur in arid regions of the world<sup>4</sup>. The urban population of developed countries will grow faster than their total population, and these countries will remain far more urbanized than the developing world. Urban growth in developing countries is more rapid and, in absolute numbers, much greater. Research of rapid urbanization is important due to the far-reaching impacts urban centers create on the environment not only within the urban core but extending to regions that supply the consumed materials such as energy and water<sup>18</sup>. In many cases, these natural resources are consumed by the urban core to offset the urban heat impacts.

Consideration is that global rapid urbanization is taking place at a time that one of the most contentious international issues facing sustainable development has emerged global climate change<sup>12</sup>. Cities are growing inexorably, causing many to think that inevitably their environmental impact will worsen<sup>19</sup>. The growth of cities in developing countries has been accompanied by a rapid growth of urban inhabitants living in the substandard conditions in slums. Slums are underserviced and or with no service parts of cities where living conditions are often appallingly poor. It is widely acknowledged that slum growth is largely a manifestation of poverty, and that it is impossible to prevent slum settlements where poverty levels are high and urban growth rate is rapid. Slums in the cities of developing countries cannot be wished away<sup>7</sup>.

Turkey took serious steps in founding protection mechanism for environment problems, within last 20 years. The sensitivity to a clean environment and the relative requests are continuously augmenting and the non-government organizations working for environment protection are being instituted. However, despite all these progresses, the economic and social decisions aren't considered important enough<sup>3</sup>. The Ministry of Environment was established in 1991, but the local office (in Tokat) could not be opened until 2001. Some studies were performed in 2003 in the area over air pollution that became an important environmental problem (sulfur dioxide 83.7 µg/m<sup>3</sup>, particles 87.25 µg/m<sup>3</sup>). Of fifteen applications by the local managements for a certificate of compliance to the prerequisites, only 5 were found to comply with the standards and thus production in 2 licences was suspended because of not having a certificate. Within this study, the environment sensitivity of the families that immigrated to Tokat city center from provinces was searched.

### Materials and Methods

The families that immigrated to Tokat city center from provinces were observed to live in shanty towns. The major problem in this area is the unemployment, then the poverty. In the research, the fact, whether they are aware of environmental problems or sensitive, was inquired. Because these people are the major impact of the population growth, they should be informed of the environment issues. Within the research, the sampling body was selected as 251 families, and the margin of error (percentage) of the representation to the general mass was calculated. When the information on general mass and if the general mass is greater than 100,000 (114,567 household persons in Tokat city center, according to census of 2000) the margin of error may be calculated in a certain confidence interval<sup>17</sup>:

$$n = \frac{Z^2 \times p \times q}{e^2}$$

where  $p$  = probability that the unit in question realizes in main population (during this study, because there wasn't any similar study and in order to find maximum samples that represent the general population, this ratio is taken as 50 %);  $n$  = 251;  $q$  = 1- $p$ ;  $e$  = error notion;  $t$  = confidence interval;  $p$  = 0.50;  $q$  = 0.50;  $Z$  = 95% (the table value of 95% confidence interval = 1.96). The margin or error according to the formula 1, where  $e$  = 0.062.

$$e = \sqrt{\frac{Z^2 \times p \times q}{n}} \quad e = \sqrt{\frac{1,96^2 \times 0,50 \times 0,50}{251}}$$

The sample size, preferred as 251, will deviate at maximum 6.2% from the main population at 95% importance level. The inquiries are proportionally dispersed between the quarters, considering the population, in accordance with the records of 2007. The households questioned are randomly selected.

The purpose in the factor analysis is to find the correlative variables in incidence with  $p$  variables, and new unrelated variables given their factor names. This analysis tries to reduce the size and prevent the dependency structure<sup>27</sup>.

The coarse data matrix  $X_{pxn}$  is normalized and normalized data matrix  $Z_{pxn}$  is used. The linear model that shows the correlation between  $Z_j$  variables and common factors is as follows:

$$z_j = a_{j1}f_1 + a_{j2}f_2 + \dots + a_{jm}f_m + b_ju_j; j=1,2,\dots,p \quad (1)$$

where  $a_{jm}$  =  $j$ . The load or weight of the variable on  $M^{\text{th}}$  factor;  $f_m$  =  $M^{\text{th}}$  factor;  $u_j$  = residual factor;  $b_j$  shows the coefficient related to residual factor. It is possible to demonstrate the model (1) in matrix form as follows:

$$Z = AF + BU \quad (2)$$

After implementing the factor analysis, with the factor inversion; size reduction, ensuring perpendicularity or independency and conceptual significance.

In the factor analysis, the minimum factors that explain or consider the correlation between the variables are defined, most appropriate factor solution is obtained by the factor inversion; all factor weights are estimated and the common factors are interpreted. The factor scores are estimated if necessary<sup>14, 15, 25</sup>.

To determine the environment sensitivity and consciousness of the individuals, various questions are asked in 1-5 Likert scale. The relative answers of the individuals were asked to be as 1 = absolutely don't agree, 2 = I don't agree, 3 = I am hesitant, 4 = I agree, 5 = I strongly agree. The answers were resumed by the factor analysis based on SPSS software.

The analysis was implemented in 3 phases. In the first phase, it was decided how many principal components and factors are necessary to explain the environment sensitivity and the change in the consciousness. In the second phase, it was defined which variables form the factors by the mean of Varimax Rotation. In the last phase, obtained factors were interpreted regarding their weights.

### Results and Discussion

The statistical results of the initial solution to the factor analysis are stated in Table 1. The factors with the attribute statistics greater than 1 are described as significant. As we may see in Table 1, the number of the factors with attributes greater than 1 is 10. First factor explained 16.64% of the total variance. Ten factors explained 60.898 % of the total variance.

Another explanatory information is also obtained by Fig. 1. Observing this, a number of factors where the linear graphic of factor analysis begins to lose the curve, may be selected. Regarding this, it's possible to say that the graphic starts to lose the inclination from 5<sup>th</sup> factor. Therefore, the number of the factors may be limited to 5 or 6.

**Table 1.** Initial eigenvalues and extraction sums of squared loading of factors related to environmental sensitivity.

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	%of variance	Cumulative %
1	4.493	16.640	16.640	4.493	16.640	16.640
2	1.940	7.184	23.824	1.940	7.184	23.824
3	1.594	5.905	29.729	1.594	5.905	29.729
4	1.462	5.416	35.146	1.462	5.416	35.146
5	1.328	4.918	40.064	1.328	4.918	40.064
6	1.231	4.558	44.622	1.231	4.558	44.622
7	1.173	4.344	48.966	1.173	4.334	48.966
8	1.135	4.203	53.169	1.135	4.203	53.169
9	1.080	3.999	57.169	1.080	3.999	57.169
10	1.007	3.729	60.898	1.007	3.729	60.898
11	.900	3.334	64.232			
12	.893	3.309	67.541			
13	.802	2.969	70.510			
14	.790	2.926	73.436			
15	.756	2.801	76.237			
16	.752	2.795	79.022			
17	.705	2.611	81.633			
18	.622	2.304	83.936			
19	.602	2.229	86.165			
20	.577	2.139	88.304			
21	.568	2.103	90.407			
22	.531	1.965	92.373			
23	.483	1.790	94.163			
24	.434	1.609	95.772			
25	.423	1.567	97.339			
26	.381	1.411	98.750			
27	.338	1.250	100.000			

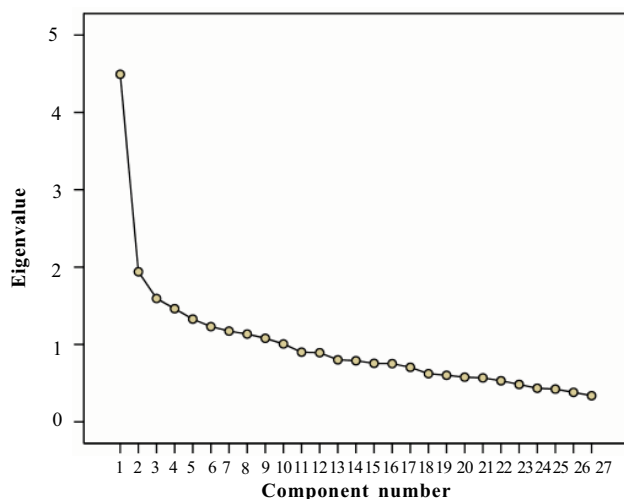
Extraction Method:Principal Component Analysis

Components;

1. Supporting the pollution prevention projects
2. Natural gas usage
3. Gap in the ozone layer
4. Meeting about the pollution
5. Pollution in the sea, river and lakes.
6. Pollution of the fresh waters within the cities as a filtration is required.
7. The sea and sea product protection
8. Desertification
9. The need for forests for clean air
10. Air, water and land, as depletable resources.
11. Protesting nuclear tests
12. Upsurge in population as an environment problem
13. The malnutrition as a result of the environment problems in undeveloped countries.
14. Disposing rubbish or spitting on public fields.
15. Slumming
16. Inappropriate environment protection conception
17. Sensitivity to the environment issues for national development
18. The presence of the environmentalist groups
19. The broadcast and publication in Newspapers and magazines and TV.
20. The need of Ministry of environment
21. The right to change the natural environment
22. Intervention to the nature
23. The existence of an ecological crisis
24. Creating agricultural fields for increasing population.
25. Not to manage randomly the domestic waste and wastewaters
26. Recycling of the domestic and industrial wastes
27. The importance of the environment protection in urbanization and industrialization

The component matrix is stated in Table 2. Factor 1 may be named as “global sensitivity”. These sensitivities are correlating positively with the efforts to save the flippers (0.587), urbanization and industrialization (0.540), desertification (0.514) variables and negatively with the gap in the ozone layer (-0.523), domestic and industrial wastes (-0.517). The variables that have lesser weight than 0.50 have been neglected. Factor 2 may be named as “sensitivity of clean air” considering the factor weights of the variables. This sensitivity is in a positive correlation with meeting the clean air need (0.504) variable. Factors 3 and 4 were not named

as their factor weights were considered. Factor 5 may be named as “the sensitivity of malnutrition”. This sensitivity is in a positive correlation with the variable (0.632), which means that the malnutrition is an outcome of the environment problems. Factor 6 is named as “the sensitivity to the air pollution” and is in a negative correlation (-0.501) with the variable, which means that the usage of natural gas may contribute to the solution to the air pollution. Factor 7 is named “development sensitivity” and is in a positive correlation with the variable that being sensible to environment problems cannot stop the country to develop. Factors 8 and 10



**Figure 1.** Eigenvalues distribution of factors related to environmental sensitivity.

were not named as their factor weights were considered. Factor 9, just like Factor 6, is named as “the sensitivity to the air pollution”, and is in a positive correlation (0.622) with the variable, which means that the usage of natural gas may contribute to the solution to the air pollution.

In consequence, Varimax Rotation solution has been applied to the first solution obtained by Principal Components Method. The result of this method gave the same results as the Principal Components Method.

A study carried out by using the Likert scale in the Tokat Region on the knowledge of farmers on environmental subjects has shown that environmental sensitivity has not been fully developed<sup>16</sup>. In another factor analysis study in the same region using the Likert scale, the most important factor in resolving environmental problems was the inadequacy of knowledge of the people in environmental subjects<sup>10</sup>. In the same study the participation of the local authorities was found to be of a medium scale.

**Table 2.** Component matrix of factors related to environmental sensitivity.

Environment sensivity	Component									
	1	2	3	4	5	6	7	8	9	10
The sea and sea product protection	<b>0.587</b>	-0.037	-0.132	0.257	-0.164	0.054	0.339	0.018	-0.087	-0.112
The importance of the environment protection in urbanization and industrialization	<b>0.540</b>	0.103	0.086	-0.008	-0.052	0.011	0.250	-0.138	-0.171	0.108
Gap in the ozone layer	<b>-0.523</b>	0.088	-0.334	-0.035	0.010	0.119	0.147	0.311	-0.089	0.273
Recycling of the domestic and industrial wastes	<b>-0.517</b>	0.066	-0.125	0.374	0.182	-0.193	-0.223	0.182	-0.181	0.128
Desertification	<b>0.514</b>	0.132	0.449	-0.114	0.185	0.293	-0.012	0.185	0.320	0.060
The broadcast and publication in newspapers, magazines and TV	-0.488	0.129	0.317	0.222	-0.030	-0.251	-0.040	0.255	0.019	0.198
Intervention to the nature	-0.472	0.305	-0.046	0.084	0.061	0.185	0.067	-0.297	0.191	0.202
The right to change the natural environment	0.472	0.433	-0.289	0.004	0.131	-0.048	-0.225	-0.024	0.157	0.146
Disposing rubbish or spitting on public fields	-0.447	0.427	0.259	0.124	-0.139	-0.007	-0.096	0.059	0.106	-0.193
Slumming	0.436	-0.189	0.222	0.235	0.247	0.355	-0.109	0.390	0.018	0.126
Pollution in the sea river and lakes	0.435	0.053	0.190	-0.247	-0.226	-0.144	-0.048	0.295	-0.243	0.412
Meeting about the pollution	-0.380	0.254	-0.261	-0.343	-0.254	0.159	0.144	0.338	0.123	-0.078
The need for forests for clean air	0.343	<b>0.504</b>	-0.119	-0.003	-0.156	0.138	-0.148	-0.111	-0.056	-0.204
Creating agricultural fields for increasing population	0.421	0.455	0.032	-0.147	0.268	-0.094	-0.013	-0.111	0.067	-0.025
Upsurge in population as an environment problem	-0.257	0.437	0.139	-0.349	-0.033	-0.171	0.071	-0.240	-0.205	0.213
Air, water and land, as depletable resources	0.398	0.418	-0.058	0.203	-0.194	0.165	-0.156	0.112	0.006	-0.287
Protesting nuclear tests	-0.265	0.249	0.399	0.257	-0.246	0.107	-0.282	-0.038	-0.094	0.054
Inappropriate environment protection conception	0.416	0.081	-0.119	0.467	0.227	0.250	0.219	-0.008	-0.074	0.160
The presence of the environmentalist groups	0.270	0.234	-0.211	0.466	0.006	-0.408	0.095	-0.012	0.122	0.281
Not to manage randomly the domestic waste and wastewaters	0.363	0.280	0.225	-0.395	0.248	0.008	0.091	0.155	-0.270	0.121
The malnutrition as a result of the environment problems in undeveloped countries	-0.205	0.181	-0.319	-0.091	<b>0.632</b>	-0.009	0.084	-0.099	-0.090	-0.060
Supporting the pollution prevention projects	0.366	0.065	-0.328	0.002	-0.431	-0.135	0.292	0.185	-0.078	-0.016
The existence of an ecological crisis	-0.351	0.075	-0.179	-0.073	-0.183	0.462	0.140	-0.083	0.399	0.381
Sensitivity to the environment issues for national development	-0.394	0.002	0.275	0.000	0.234	-0.060	<b>0.552</b>	0.194	0.066	-0.236
The need of Ministry of Environment	-0.340	0.390	0.326	0.277	-0.065	0.086	0.420	-0.083	-0.186	-0.083
Pollution of the fresh waters within the cities as a filtration is required	-0.222	0.298	-0.293	-0.029	0.161	-0.005	-0.135	0.459	-0.043	-0.231
Natural gas usage	0.278	0.065	0.137	-0.049	0.016	<b>-0.501</b>	0.123	0.117	<b>0.622</b>	-0.029

Extraction method: Principal Component Analysis, 10 Components extracted

As a result of the analysis the factors that emerged were that the local authorities could improve the situation by organizing activities involving awards and prizes to promote environmental knowledge and by organizing meetings on the subject. In another study,<sup>6</sup> where the problems of urbanization were discussed 'it was stressed that migration was the most important factor that gave rise to environmental pollution. Accompanying migration, there was increased activity in fuel, trash, air, water and soil pollution and increased activity threatened the ecosystem from different angles. In other studies conducted it has been declared that since the migration of the 1950's have resulted in faster urbanization. This rapid urbanization has resulted in environmental problems and speed up by settlement in shanty-towns by migration from rural areas<sup>11,21,22</sup>.

The families that immigrated to Tokat city center from provinces are sensitive to the issues related to the clean air. This is caused by the fact that they are used to the clean air in the provincial regions. In addition, the air pollution measurement of level II by the studies conducted by Environment Office of Tokat is proving this sensitivity<sup>2</sup>. Moreover, the fact that the immigrated families are among low-income groups resulted that they are sensitive to the malnutrition caused by poverty. It is obvious that the environment sensitivity cannot be limited to these factors. It is imperative that the immigrated individuals should be informed about how to act to contribute to the sustainable environment and that they should be sensitive to all issues related to the environment.

### Conclusions

In particular, the ecological incidence in late years proved that each individual has attributes and responsibilities for a sustainable life. The responsibility consciousness spreading from individual to the population means that some particular problems should end before they appear. The common consciousness and sensitivity will contribute to the solutions of environment issues and approaches.

The individuals must take part in the solution finding process, integrate and adapt their activities with environmental issues. The environment sensitivity should not begin after the problems appear, and this fact should appear first. These results that have emerged due to factor analysis will be of assistance in helping families that have migrated from rural areas to the urban areas to be more sensitive and knowledgeable about the environment and environmental protection.

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