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Assessment of the Local Government's Efforts in Challenging to Environmental Problems Using Factor Analysis: A Case Study of Turkey

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Abstract: This study aimed to determine the support and contribution of local governments towards the solution of environmental problems. The data was obtained from 19 local units of government in Tokat province of Turkey in 2004 were analyzed by factor analysis. The pollution caused by the over-crowded unpleasant view by orderless traffic occurred as the most serious environmental problem. The staff of local governmental offices appeared in favor of cooperating to solve environmental problems. We concluded that an effective measure against the environmental problems should be accomplished through enhancing public awareness and ensuring contributions of all parties concerned.

Key words: Local governments, environmental problems, factor analysis, Turkey

INTRODUCTION

Environmental pollution, disturbing ecological equilibrium and hazardous wastes are the problems of high importance which almost any country encounters. The countries, in an effort to keep pace with rapid technological progress, are much more affected by the threats to environment. Eventually ecological balance and thus human health are gradually deteriorated and therefore this unbalanced ecology becomes impossible to restore. Possibly more funds are spared to restore the degraded natural life than that spent to catch up with technological progress.

Problems of environmental pollution generally present themselves as polluted inhabited areas (air, water or soil), unplanned urbanization (slums) and deterioration of public health by stress or various diseases). Environmental problems has gained international extent as a result of technological progress and industrialization achieved in the recent decades. Global heating, greenhouse effect, climatic changes, damage in ozone layer and pollution in general appear to be the most urgent issues which are necessary for the support and contribution of all humanity.

Policies to be designed to decrease or prevent environmental problems are worth mentioning. Of certain agents like governmental and non-governmental organizations, the latter seem to be effective in the development of public awareness of environment. Such

organizations could be important parts in solving problems both in national or international scale. Of these organizations, local governmental offices are the most notable in the attempts to be made in this matter.

Many international organizations take part in and make contributions to solve environmental problems. Most of these organizations such as UNEP, WHO and FAO are organic to the United Nations. European Union has also a commission dealing with environment. In addition, non-governmental organizations like Greenpeace have a wide space of action in this area (Meriç, 2001).

The UN Rio Conference conducted in 1992, a plan was designed for the 21st Century under the title of "Global Agenda 21" and the participating countries are engaged to make up a National Agenda 21 and a Regional Agenda 21. A report on the National Agenda 21 was completed on April 2000 by the Ministry of Environment of Turkey. The obligation for the implementation of the Regional Agenda 21 was undertaken by several local governments in the country. Agenda 21 is an expression of global consensus and political responsibility at a higher level, aiming at putting the concept of "perpetual development" into practice which attempts to achieve a balance between economic development and ecological conservation (Anonymous, 2004a).

Turkish Government has already published the following regulations about the preservation of environment (Anonymous, 2004a):

- Regulation for the preservation of air quality
- Regulation for the control of water pollution
- Regulation for the control of noise pollution
- Regulation for the control of noxious chemicals and other products
- Regulations for the control of hazardous wastes
- Regulation for the control of environment
- Regulation for the control of evaluation of extraneous effects
- Regulations for the fundamentals of environmental plans
- Regulation about the funds for the prevention of environmental pollution
- Regulation about sanitation and sanitary inspections

Although the Ministry of Environment and its local offices are officially responsible for the implementation of the above regulations, any social organization should feel itself obligated for collaboration for the purpose of challenging environmental pollution.

In the development of public consciousness of ecological conservation, the primary authority is vested in the local government which implies all state organizations and institutions and voluntary non-governmental organizations. Many studies have been conducted on the activities of such organizations to save environment (Mongkolchaiarunya, 2005; Brugmann, 1996; Baldasana *et al.*, 2003).

This study aimed to determine the most serious environmental problems and measured taken by local authorities to challenge these problems. Tokat province which is located in Mid-Black Sea Region of Turkey, suffering a serious environmental pollution as stressed by individual observers was chosen as study area.

MATERIALS AND METHODS

Although the data for this study was based on the data obtained from the primary and secondary sources, the basic source of it was the horizontal cross section data obtained from the inquiries and questionnaires filled out by local government offices. The secondary material were composed of the records kept by the local offices and several publications and literature related to the field of study.

An inquiry was made through 15 government offices and 4 NGOs (The Non-Governmental Organizations), using the absolute-count method. The questionnaires were composed of questions based on Likert Scale and conducted in December 2004 in Tokat province of Turkey by the researchers. The data were evaluated and analyzed using SPSS 10.0 statistical package program. In the

analysis of the findings, average and standard deviation was used to define the points belonging to the factors. In addition, a factor analysis was conducted to find the appropriation of the numbers of the factors.

Factor analysis is one of the multi-variable analytical techniques frequently used in various fields of study particularly in social sciences in search of the inter-relations between variables (Leilah and AL-Khateeb, 2004; Shen, 2004; Pekey *et al.*, 2004; Sijtsma *et al.*, 2004; Martins and McLeay, 1998; Satyendra and Ranchhod, 2004; Rahardyan *et al.*, 2004; Liu *et al.*, 2003; King and Jacobson, 2001). The number of studies employing this technique has recently increased. The basic aim of this analysis is to eliminate inter-dependent structure of several variables in order to reduce them to dependent variables smaller in number. In other words, it is a mathematical model based on reduced factor analytical solution. In this model matrix X, a data matrix, indicating p times property of n times individuals and matrix X can be divided into three parts as 1) matrix A, signifies factor loads, 2) matrix F, shows factor points and 3) matrix U, indicates the remainder and their equation can be shown as follows (Kim and Mueller, 1987):

$$X_{(p,n)} = A_{(p,m)} F_{(m,n)} + U_{(p,n)} \quad (1)$$

Where, n; number of observations, p; number of variables, m; number of factors.

Factor analysis is conducted with four stages. In the first step the correlation matrix between the variables is calculated. The next step is for the separation of factors to calculate the eigenvalues of variables. The number of factors having an eigenvalue of 1 or above will give the number required to analyze the data obtained. This step is called "the basic factor step" with which factor loadings are calculated. The factor loadings are the square roots of eigenvalues. In the third step the rotated matrix D can be calculated. In the last step the factor scores of each model (or sample) points are calculated (Kim and Mueller, 1987).

In this study factor analysis, principal component analysis method which was followed by Kaiser normalization with Varimax vertical rotation technique was used for the purpose of presenting the structural validity of factors. This method was chosen for its multivariable statistics which has been extensively used in factor analyses and it was also relatively easy to assess (Büyüköztürk, 2002). The factor scores of each item included in this study was 0.50 or above. The interrelation between the total points of the factors was determined by employing Pearson Moments Multiple Correlation Coefficient.

The measurement of credibility of the variables used in the factor analysis was also performed. The credibility value below 80% of behaviours was undesirable. The Cronbach alpha coefficient variable taken from the internal harmony methods is the most extensively used with the highest credibility (Oppenheim, 1992). This coefficient provides single-dimensional measuring of the series of coefficient variables. In order to statistically test the credibility of the factors included Cronbach alpha coefficient was calculated as;

$$\alpha = \frac{N * \bar{r}}{1 + (N - 1) * \bar{r}} \quad (2)$$

Where; N; number of factors, \bar{r} ; means of pearson moments multiple correlation coefficients.

RESULTS AND DISCUSSION

The official units taking part in environmental conservation: Almost every country has a department which is assigned to challenge environmental pollution and to maintain such activities. There are several other institutions and organizations volunteered to combat such problems.

In the field of study there are 15 local governmental offices and 4 NGOs. The governmental offices are;

Tokat Municipality, Provincial Commandership of Gendarmerie, Gaziosmanpasa University, Provincial Directorate of Environment and Forestry, Provincial Directorate of Agriculture, Provincial Directorate of Health, Provincial Directorate of Financial Administration, Provincial Directorate of Housing and Reconstruction, Provincial Directorate of Cultural Affairs and Tourism, Provincial Directorate of Industry and Trade, Provincial Directorate of National Education, Provincial Directorate of Rural Affairs, Provincial Directorate of Highway Department, Provincial Directorate of Irrigation Department.

The Non-Governmental Organizations (NGO) are;

Chamber of Agriculture, Foundation for the Protection of Natural Habitat and Cultural Wealth, Foundation for Fighting against Soil Erosion and Deforestation, Agenda 21 Tokat Branch.

The environmental problems in the study area: The Ministry of Environment was established in 1991, but the local office could not be opened until 2001. Some research studies performed in 2003 in the area over air pollution that became an important environmental problem (Sulfur dioxide $83.7 \mu\text{gram m}^{-3}$, particles $87.25 \mu\text{gram m}^{-3}$). 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.

During the controls and inspections it was observed that solid wastes, except medical ones, were not stored separately water pollution was above normal levels due to pollution by sewage, domestic wastes and discharge of the wastes from chemical industry into the water. Water pollution level sometimes increased to a degree to kill fish in river and lakes. In 2004, 97 liquid and 7 solid material samples were analysed in the laboratories. On the occasion of World Environmental Day (June 5), a campaign was conducted, in collaboration of other organizations, to collect wastes for recycling and a huge amount of material was collected for this purpose (Anonymous, 2004b).

Results of the factor analysis showed (Table 1) that this region has an environmental pollution of medium degree. The highest degree of pollution occurred the one caused by the increase in unpleasant view by orderless traffic. This is followed by air pollution and unplanned urbanization.

A factor analysis was conducted in order to test the credibility of the types of pollutants and to group kinds of pollutions. Cronbach alfa (α) coefficient was 0.83 which is close to the unity (1) is an indicator of the credibility of the factors chosen. The number of factors was reduced by using Kaiser Normalization with Varimax vertical rotation technique employing principal component analysis method. Seven factors occurred based on the eigenvalues with 1 or above. These seven factors obtained described 81.99 % of the total variance. Factor loadings greater than 0.50 were grouped in the same group. Detailed explanation on the factors is given below:

Factor 1 consists of soil pollution, solid waste, chemical, medical and other hazardous wastes and stubble burning which have significantly positive relations. It is called as "Pollution in natural environment".

Factor 2 consists of air pollution, water pollution and soil erosion which have significantly positive relations. It is called as "Pollution in the living space".

Factor 3 industrial pollution and acid rains which have significantly positive relations. It is called as "Pollution of industrialization".

Factor 4 consists of noise pollution and unpleasant view by orderless traffic which have significantly positive relations. It is called as "Pollution due to social life".

Factor 5 consists of liquid waste and fertilizers and pesticides which have significantly positive relations. It is called as "Pollution due to food".

Factor 6 consists of unplanned urbanization and animal shelters which have significantly positive relations. It is called as "Disorderly urbanization".

Table 1: Results of factor analysis showing the types of pollutants and the levels of pollution

Pollutant agents and types of pollution	Mean ^(*)	Standard deviation	Factor loads						
			1	2	3	4	5	6	7
Air pollution	3.63	0.83	-0.05	0.78	-0.28	0.26	0.15	0.13	-0.18
Water pollution	2.58	0.84	0.31	0.57	-0.03	0.35	-0.28	-0.04	-0.16
Soil pollution	2.37	0.90	0.77	0.21	-0.09	-0.11	0.08	-0.14	0.18
Solid waste	2.95	1.13	0.63	0.24	0.28	0.31	-0.19	-0.17	0.02
Noise pollution	2.89	0.66	-0.01	0.02	-0.31	0.84	-0.03	-0.14	-0.04
Unpleasant scenery	2.84	0.83	0.10	0.23	-0.82	0.34	0.07	-0.17	0.06
Deforestation	2.37	1.01	0.33	0.43	0.29	-0.22	0.32	0.12	0.55
Erosion	2.47	0.90	0.24	0.86	0.15	-0.20	0.16	0.13	0.16
Industrial pollution	2.32	0.75	0.14	0.19	0.81	0.05	0.24	-0.36	0.15
Acid rains	1.58	0.77	0.29	-0.01	0.60	0.33	0.39	0.20	0.22
Unplanned urbanization	3.58	0.61	-0.11	0.13	-0.10	0.20	0.03	0.87	0.20
Liquid waste	3.05	0.85	0.12	-0.02	0.01	-0.09	0.79	0.25	0.04
Medical and other noxious wastes	2.21	0.79	0.62	0.00	0.27	-0.07	0.52	0.11	-0.21
Use of arable lands for other purposes	3.00	0.88	0.29	0.09	-0.05	0.16	0.34	-0.17	0.70
Excessive use of fertilizers and pesticides	2.53	1.07	-0.15	0.46	0.22	0.15	0.74	-0.06	0.14
Unpleasant view by orderless traffic	3.89	0.94	0.11	0.10	0.17	0.87	0.02	0.26	0.06
Animal shelters close to inhabited areas	2.37	0.83	0.24	0.09	0.12	-0.15	0.36	0.80	-0.08
Pollution caused by touristic activities	1.16	0.37	-0.07	-0.20	0.11	-0.04	-0.18	0.24	0.85
Burning stubble close to urban areas	1.84	0.96	0.82	-0.03	0.00	0.18	0.08	0.36	0.12
Mean	2.61								
% of variance			13.80	12.34	11.83	11.73	11.68	10.92	9.70
Cumulative variance %									81.99
Cronbach alpha (α) coefficient									0.83

(*) Answers categorized as: 1- none, 2- lower level, 3- medium level, 4- advanced level, 5- excessive

Table 2: The possible effects of pollutions on environment in the study area

Possible effect	Mean ^(*)	Standard deviation	Factor loads 1
On human health	3.11	0.81	0.89
On animal and plant health	3.11	0.81	0.90
On economic life	2.79	0.79	0.76
On social life	3.11	0.88	0.79
On degradation of natural resources	3.11	0.94	0.76
On labour life	3.00	0.94	0.88
Mean average	3.04		
% of variance			69.08
Cumulative variance %			69.08
Cronbach alpha (α) coefficient			0.93

(*) Answers categorized as: 1- none, 2- lower level, 3- medium level, 4- advanced level, 5- excessive

Factor 7 consists of deforestation, use of arable lands for different purposes and pollution caused by touristic activities which have significantly positive relations. It is called as “Pollution due to rural activities and recreation”.

The effects of polluters on the environment: The types of pollutions observed in the study area occurred to have effects of medium degree on every aspect of natural life (Table 2).

The credibility coefficient was 0.93, suggesting that variable factors were selected correctly. In addition, these factors explained 69.08% of the total variants.

Based on the result of factor analysis, a factor with eigenvalue of one or above was allocated. In this case, it seems more reasonable that all other factors listed in the table under different titles may well be considered only one factor. The loads of other factor are above 0.75. Since there is a highly positive correlation between them half of

the factors may be collected in a group titled “ Effects of the Factors on the Preservation of Natural Life”.

The activities of local governments towards the solution of environmental problems:

The local governments in the study area have fairly good contributions to the activities aimed at the conservation of environment. The most frequent action taken by the offices seemed to emphasize the cooperation between the units concerned to find solution to the problems. This action is followed by inspections and controls as required by legislation and submitting reports on the effects of various projects to be implemented by a certain office on environment (Table 3).

Cronbach alfa (α) coefficient was 0.86 which is close to the unity (1) is an indication of the credibility of the factors chosen.

Based on the eigenvalues ≥1 and factor loadings ≥ 0.50, the above activities (variables) may be classified in three groups.

Factor 1 consists of “finding solutions by cooperation of organizations, conducting panels and seminars, publishing books, periodicals and brochures etc., inspections and controls as prescribed by laws and regulations, making it a requirement of obtaining a EIA (Environmental Impact Assessment) certificate when a project is submitted for investment, providing funds for the implementations of projects for conservation of natural resources, collecting, storing and recycling of wastes” which have significantly positive relations. It is called as “Administrative (bureaucratic) activities”.

Table 3: Results of factor analysis showing the activities carried out by the local governments and their degree of contribution to environment conservation

Activities	Mean ^(*)	Standard deviation	Factor loads		
			1	2	3
Finding solutions by cooperation of organizations	3.58	1.07	0.82	0.07	-0.02
Conducting meetings, seminars, publishing books, periodicals, brochures etc.	2.58	1.12	0.75	-0.08	0.55
Inspections and controls as prescribed by laws and regulations	2.90	1.15	0.81	-0.11	-0.18
Take sanctions as deemed necessary	2.47	1.12	0.47	0.05	-0.77
Promoting awareness of environmental conservation by conducting contests	2.26	1.28	0.26	0.22	0.82
Installation of disposal systems	2.42	1.35	0.05	0.95	-0.06
Taking measures for the preservation of natural life	2.53	1.02	0.04	0.83	0.22
Making it a requirement of obtaining a EIA certificate when a project is submitted for investment	2.74	1.28	0.57	0.43	0.00
Performing activities to emphasize health problems originating from pollution	1.95	0.97	0.24	0.58	0.56
Providing funds for the implementation of projects for conservation of natural riches	2.26	1.28	0.65	0.43	0.18
Collecting, storing and recycling of wastes	2.42	1.35	0.56	0.54	0.28
Affiliating to local agenda 21 project and participating the studies	1.68	1.06	-0.04	0.39	0.40
Mean	2.48				
% of variance			27.68	23.48	18.57
Cumulative variance %					69.73
Cronbach alpha (α) coefficient	0.86				

(*) Answers categorized as: 1- none, 2- lower level, 3- medium level, 4- advanced level, 5- excessive

Table 4: Results of factor analysis showing the local governments in the area of study encounter some difficulties in their attempts to solve the problems

Inefficiencies	Mean ^(*)	Standard deviation	Factor loads			
			1	2	3	4
Lack of qualified personnel	3.11	1.45	0.42	0.26	0.69	-0.03
Lack of adequate funds	2.74	1.05	0.18	-0.03	0.90	0.28
Inadequate legislation	3.58	1.12	0.44	0.51	0.56	-0.10
Inadequate public consciousness	1.84	0.83	-0.13	0.20	0.28	0.68
Insufficient cooperation and coordination between offices	3.21	1.27	0.14	0.74	0.30	0.17
Insensitiveness of voluntary societies	2.84	1.01	0.68	0.36	0.31	0.18
Politicians' approach to the issues	3.50	1.12	-0.27	0.89	0.15	-0.01
Lack of qualified education	2.42	0.84	-0.01	0.05	-0.02	0.87
Inadequate research studies	2.74	0.99	0.86	0.21	0.29	0.07
Inadequate inspection	2.74	1.15	0.29	0.76	-0.28	0.31
Insufficient equipment	2.68	1.29	0.84	-0.18	0.15	-0.04
Shortage of technicians and environmental scientist	2.84	1.34	0.81	-0.04	0.05	-0.34
Mean	2.85					
% of variance			26.37	20.84	17.15	13.23
Cumulative variance %						77.59
Cronbach alpha (α) coefficient						0.86

(*) Answers categorized as: 1- excessive, 2- advanced level, 3- medium level, 4- lower level, 5- none

Factor 2 consists of installation of disposal systems, taking measures for the preservation of natural life, performing activities to emphasize health problems originating from pollution which have significantly positive relations. It is called as “Activities for following up the attempts”.

Factor 3 called as “Boasting public awareness on environmental conservation by conducting contests and giving awards” which has a significantly positive correlation and remains as an independent item.

The remained types of activities are not included in any group since the factor loads of their variables proved insufficient.

The hindrances in seeking solutions to the problems:

The local governments in the study encounter some difficulties in their attempts to solve the problems. They have some inadequacies and drawbacks originating from

within the office itself or from outside. Table 4 shows such inefficiencies.

The results of the analysis showed a medium degree of attempts made to find out solutions to the problems. The most serious disadvantage was the lack of public consciousness of the environmental problems. This was followed by inadequate education and insufficient equipment.

Cronbach α coefficient was 0.83 which is close to the unity (1) is an indication of the credibility of the factors chosen.

Based on the eigenvalues ≥ 1 and factor loadings ≥ 0.50 , the variables were classified in four groups.

Factor 1 consists of insensitiveness of voluntary societies, inadequate research studies, insufficient equipment, shortage of technicians and environmental scientist which have significantly positive relations. It is called as “Inadequate education and technology”.

Factor 2 consists of insufficient cooperation and coordination between offices, politicians' approach to the issues, inadequate inspections which have significantly positive relations. It is called as "Inadequate bureaucratic competence".

Factor 3 consists of lack of qualified personnel, lack of adequate funds, inadequate legislation which have significantly positive relations. It is called as "Inadequate funding and legislation".

Factor 4 called as "Inadequate public awareness" which has a significantly positive correlation and remains as an independent item.

The studies done by the governmental offices and the NGOs in the area have to be based on the valid laws and regulations. The most common complaint made by the local authorities was the lack of power of making sanctions.

Approximately sixteen percent of the local governmental offices have been keeping records and statistical data about the environmental issues. It is obvious that it would be harder to come up with solutions to the problems unless accurate records and statistical data have been kept by all the offices concerned.

Local Agenda 21, which is apparently the most important plan for environmental conservation, has just been put into force in the area. Of the offices which filled out the questionnaires, 73.68% seemed to have not been informed about this project and so made no comments about it.

CONCLUSIONS

Increasing environmental pollution has driven public attention to the sources of contaminations. People must take necessary measures before natural disasters take place to reduce the damages and casualties. Being aware of the hazards and having the responsibility of fighting against pollution would help us to solve the problems at the beginning. We live in a world where we are getting more and more anxious about the damage in ozone layer, climatic changes because of greenhouse effect and the earthquakes which seem to happen more frequently. We should admit that all nations no matter they are developed or underdeveloped have played part in the degradation of the natural sources.

There is an obvious inconsistency between the efforts made to conserve the nature and the negligence and carelessness manifested by the inhabitants of this planet.

The government and the local offices which are responsible challenging and solving environmental problems seem to have devoted themselves to this

mission but the investigations as to what degree they have been successful were very limited. The results achieved in the present study, performed with the collaboration of governmental offices and NGOs, will possibly give the similar results obtained at the other parts of Turkey.

It is possible to conclude that in the area of research there is an environmental pollution of medium scale the most serious of which is created by the unpleasant view by orderless traffic. This is followed by air pollution and unplanned housing.

The results of the factor analysis made it possible for us to categorize 19 types of pollution in 7 headlines. To reduce the unpleasant view by orderless traffic pollution new and larger parking areas and new highways must be constructed. It was also found that any type of pollution have a medium-scale effect on all aspects of natural life. It was further observed that the staff of the local offices have a medium-scale attendance in the environmental activities and they mostly emphasize trying to seek solutions by cooperation between offices. The offices encounter various difficulties which constitute an important hindrance for them to be sufficiently productive. The degree of the inefficiencies and hindrances are in medium scale. The most serious disadvantage was the public unconsciousness of the environment. This was followed by the lack of qualified personnel and insufficient equipment.

In spite of the existence of cooperation between the organizations, they face difficulties in applying the rules because of the lack of power of sanctioning in legislation. Such difficulties will only be overcome by making the laws and regulations more effective.

To conclude, we must say that the mission of taking measures and making plans to minimize the hazards of environmental pollution fall on the organizations of higher rank, but it is the local offices that are responsible for putting them into practice. In the communities where every individual feels himself responsible for any problem which may arise in the community, problems could readily be solved without receiving any warning or urge from outside. In this context, we could say that works to be done by local offices seem to be insufficient and only be promoted by participation and encouragement of public.

REFERENCES

- Anonymous, 2004a. <http://www.cevreveorman.gov.tr>
- Anonymous, 2004b. Statistics of Tokat Provincial Directorate of Environment and Forestry, Tokat-Turkey.

- Baldasana, J.M. and E. Valera and P. Jimenez, 2003. Air Quality Data from Large Cities” *The Science of The Total Environ.*, 307: 135-151.
- Brugmann, J., 1996. Planning for Sustainability at The Local Government Level. *Environ. Impact Assessment Rev.*, 16: 363-379.
- Büyüköztürk, Ş., 2002. *The Handbook of Data Analysis for Social Sciences: Statistics, Research Design, SPSS Applications and Interpretation*. Pegem A Publishing, Ankara-Turkey. (In Turkish).
- Kim, J. and C.W. Mueller, 1987. *Factor Analysis, Statistical Methods and Practical Issues*, Sage University Papers, London, pp: 87.
- King, P.R. and E.M. Jacobson, 2001. A Factor Analysis of Supermarket Management Practices. 2001 Annual Meeting, August 5-8, 2001, Chicago, Illinois.
- Leilah, A.A. and S.A. AL-Khateeb, 2004. Statistical Analysis of Wheat Yield Under Drought Conditions. *J. Arid Environ.*, (In pres, accepted 21 october 2004) inc. (www.elsevier.com/locate/jnlabr/yjare)
- Liu, C.W., K.H. Lin and Y.M. Kuo, 2003. Application of factor analysis in the assesment of groundwater quality in a blackfood disease area in Taiwan. *Sci. Total Environ.*, 313: 77-89.
- Martins, S. and F. McLeay, 1998. The Diversity of Farmers’ Risk Management Strategies in a Deregulated New Zeland Environment. *J. Agric. Econ.*, 49: 218-233.
- Meriç, N., 2001. (<http://www.turkiyevesiyaset.com/sayi4/0411.htm>).
- Mongkolchaiarunya, J., 2005. Promoting a Community-Based Solid-Waste Management Initiative in Local Government: Yala Municipality, Thailand. *Habitat International*, 29: 27-40. (www.elsevier.com/locate/habitantint).
- Oppenheim, A.N., 1992. *Questionnaire Design, Interviewing and Attitude Measurement*, Cassel, London, pp: 303.
- Pekey, H., D. Karakaş and M. Bakoğlu, 2004. Source Apportionment of Trace Metals in Surface Waters of a Polluted Stream using Multivariate Statistical Analysis” *Marine Pollution Bulletin*, 49: 809-818. (www.elsevier.com/locate/marpolbul).
- Rahardyan, B., T. Matsuto, Y. Kakuta and N. Tanaka, 2004. Residents’ concerns and attitudes towards solid-waste management facilities. *Waste Management*, 24: 437-451.
- Satyendra, S. and A. Ranchhod, 2004. Market orientation and consumer satisfaction: Evidence from British machine tool Industry. *Industrial Marketing Manage.*, 33: 135-144.
- Shen, H.H., 2004. An Investigation of Chinese-character Learning Strategies Among Non-native Speakers of Chinese”, article in preS, (www.elsevier.com/locate/system).
- Sijtsma, S.J., G.B.C. Backus, A.R. Linnemann and W.M.F. Jongen, 2004. Consumer orientation of product developers and their product perception compared to that of consumers. *Trends in Food Science and Technology*, 15: 489-497.