

A TWO-STEPS PROCEDURE FOR SELECTING PROJECTS AT REGIONAL LEVEL

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Summary: *In this paper the AHP method is used to evaluate projects for finance support from the Third Community Support Program. The evaluation is based on two hierarchies. The first hierarchy is used to evaluate the five prefectures of the Eastern Macedonia and Thrace region according to their objective needs. The evaluation is performed via development indicators and the allocation of funds to prefectures is determined according to their priorities. The second hierarchy is used to rank fifty-five projects of a prefecture that local authorities have been proposed for financing.*

1 Introduction

This paper aims in determining the priorities of a large number of projects of the 3rd Community Support Framework in order to serve the development goals of the Eastern Macedonia and Thrace region, a bordering region in the Northeast end of Greece. These goals are in accordance with the land-planning policy of the 3rd Community Support Framework and the Regional Operational Program [Eastern Macedonia and Thrace Region (2000), Ministry of National Economy (2001)].

The model for the evaluation of the projects in the five Prefectures of the Eastern Macedonia and Thrace Region developed in this paper includes the structure of two hierarchies. The projects will be financed from the 3rd Community Support Framework by the Regional Operational Program (R.O.P.) and the decisions for the kind and the number of incorporating projects are taken by the region authorities.

The 1st hierarchy is used to determine the priorities of the prefectures according to their objective needs. This goal is achieved with the use of development indicators. The priority that acquires each one of the five prefectures multiplied with the total sum of the funds estimated by the R.O.P. for the entire region will determine the funds allocation between the five prefectures of the region.

Five sectors with granted financing have been shaped by the region authorities in order to finance projects. Each project is enlisted in one of these sectors according to the estimations of the decision makers. Then a second hierarchy, one for each prefecture, is shaped in order to rank the projects and enlist them to the R.O.P. financing according to the estimated from the 1st hierarchy funds. The criteria that are used to structure the hierarchy are the five sectors determined by the region authorities, as well as the cost of each project. This model allows to rank the projects separately for each one of the five prefectures.

The last twenty years multicriteria and quantitative methods have been extensively used in regional planning [NijKamp et al. (1992), Papadaskalopoulos Ath. (2000)]. Although many efforts have been made for regional development in Greece [Konsolas et al. (2002)], the use of solid procedures as support to deci-

sion making, in particular multicriteria analysis methods, is particularly limited. We attempt to develop comprehensive models for the Greek authorities, which are responsible for decision-making [Anagnostopoulos et al. (2001a), Anagnostopoulos et al. (2001b)]. The use of development indicators as parameters for the evaluation allows the enlargement of the hierarchies with all the necessary elements for the evaluation without surcharging the decision maker with an equivalent number of weights determinations for the members of the hierarchy. Finally, as a more general conclusion it should be noticed that applications of the Analytic Hierarchy Process with the use of development indicators are more comprehensible for the Greek authorities which have the responsibility for the projects selection.

2 The Eastern Macedonia and Thrace Region

The Eastern Macedonia and Thrace Region in the NE end of Greece, borders on Turkey to the East, Bulgaria to the North, the Central Macedonia region to the west, while to the south lies the Aegean Sea. The region consists of 5 prefectures and occupies an area of 14,154 km² that is 10.7 per cent of the total Greek territory. Its population amounts to 561,838 inhabitants (NSAG, 1998) representing 5.3% of the country's total population.

The rich natural environment of region characterized by areas of wide biodiversity and a large number of rare species and ecosystems protected by international agreements [Koroni and Associates (1999)].

The region's urban centers are situated on the main transport network and with the exception of Orestiada, –the smaller (population of 15,000) and newer (1922) extremely bordering urban center– form a grid whose elements lie either on the plains (Drama, Xanthi, Komotini) or are situated by the coast and serve as ports (Kavala, Alexandroupoli). These centers are 50-60 km apart one another and characterized by the same population range (40,000 people, Kavala being the bigger with a population of 60,000).

The region presents important comparative advantages, as well as limitations. The basic advantages are:

- Its geographical position, given that the region is crossed by national trans-european transport and energy networks, as well as the existence of a potential sizeable foreign market in the neighborhood (Balkan area and Black Sea countries).
- The rich environment, the natural resources and the mineral wealth.
- The newly established industrial base, due to investment incentives.

The main problems and the subsequent limitations of the development are:

- The frontier character of the region.
- The unfavorable demographic situation, especially with respect to the depopulation of border areas.
- The influx of neo-refugees that demand special integration policies.
- The intra-regional development and the social disparities, which are also related to the presence of the Muslim minority.

According to the new development policy for the period 2000-2006 the general development goal for the Region is related to demographic issues. The main strategic objectives for achieving this goal are the following [Eastern Macedonia and Thrace Region (2000)]:

- Exploitation of the region's geographical position.
- Creation of a self-supporting, modern economy with strong outward character.
- Protection and utilization of the natural environment and exploitation of mineral resources.
- Mitigation of intra-regional and social inequalities and improvement of quality of life.

The 3rd Community Support Framework is expected to finance facilities of functional organization and exploitation of the already planned projects (which are not included in the present planning data) and also to promote the development of combined transport systems [Ministry of National Economy (2001)].

The already planned and in progress projects mainly concern the completion of Via Egnatia (inter-European road axis, a part of which crosses the region in a length of 258 km), its links with trans-European networks and improvement of infrastructures in two ports and in two state civil airports of the region.

The projects under evaluation concern: a/ Competitive reformation of production; b/ Connection with wider economic areas; c/ Completion and reinforce of infrastructures; d/ Growth of mountainous areas of the region and e/Human resources.

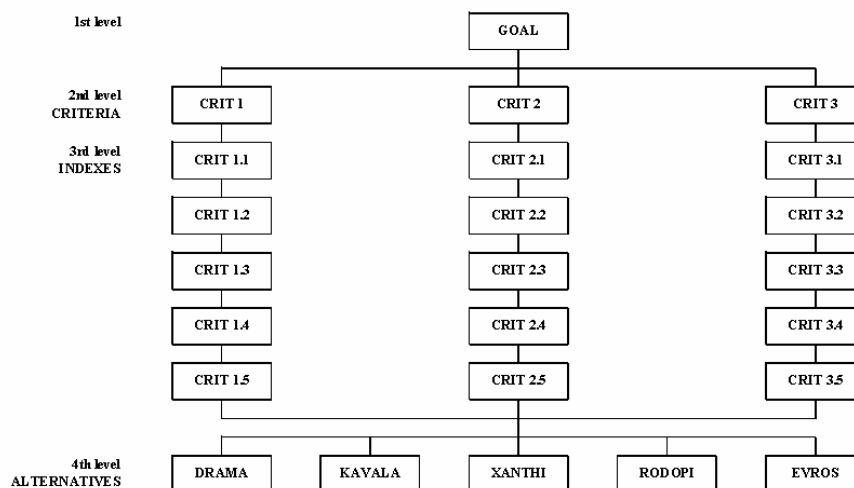


Table 1: Evaluation of the five prefectures (1st Hierarchy)

3 Structuring the hierarchies of the problem

3.1 First Hierarchy

The 1st hierarchy is consisted of four levels (table 1). In the 1st level is placed the goal of the hierarchy, i.e. the evaluation of the five prefectures of the region according to their objective needs. The 2nd level is formed by the classes of development indicators (criteria). Three classes of indicators are formed:

- 1 Indicators of productive infrastructure.
- 2 Indicators of social infrastructure.
- 3 Indicators of technical infrastructure.

The development indicators for each category evaluate the growth level or the handicaps of each prefecture in common scales, which are related with the interventions of R.O.P.. In that manner, the indicators of productive infrastructure measure the level of growth and the dynamism of productive tissue, the indicators of social infrastructure refers to the social level of growth and also to the needs in social level, while the indicators of technical infrastructure can give a representative picture of the level of growth of infrastructure for each prefecture. Environmental indicators were not included because of data deficiency.

The 3rd level of hierarchy (subcriteria) is formed by the development indicators that have been chosen in order to approach the problem.

The choice of these specific indicators is taking into account: a/ The reference level of indicators (prefecture¹); b/ The broadness of covered sectors; c/ The plenitude and the well-balanced cover of objectives of the various sectors; d/ The comparability of values of indicators and e/ the topicality of those values.

¹ The prefecture is a relative small administrative, economic and statistic space unit in Greece.

The productive infrastructure indicators are:

- Gross Domestic Product (GDP) per employee 1998 (CRIT 1.1).
- Comparative change of GDP for the periods 1982-1990, 1991-1998 (CRIT 1.2).
- Private investments for the period 1990-1998 (CRIT 1.3).
- Employees in manufacturing per 1,000 inhabitants 1995 (CRIT 1.4).
- Irrigated areas per 100 inhabitants 1998 (CRIT 1.5).

The social infrastructure indicators are:

- Unemployment as percentage of people employed 1998 (CRIT 2.1).
- Private saving per capita 1998 (CRIT 2.2).
- Cars per 1,000 inhabitants 1998 (CRIT 2.3).
- Percentage of population aged 65 years and over 1998 (CRIT 2.4).
- Percentage of urban and semi-urban population 2001 (CRIT 2.5).

Criteria	Normalized eigenvectors	Composite relative priorities	Subcriteria	Normalized eigenvectors	Composite relative priorities
crit.1	0.614	0.614	crit 1.1	0.255	0.157
			crit 1.2	0.147	0.090
			crit 1.3	0.471	0.289
			crit 1.4	0.075	0.046
			crit 1.5	0.052	0.032
crit.2	0.268	0.268	crit 2.1	0.519	0.139
			crit 2.2	0.239	0.064
			crit 2.3	0.130	0.035
			crit 2.4	0.045	0.012
			crit 2.5	0.067	0.018
crit.3	0.117	0.117	crit 3.1	0.382	0.045
			crit 3.2	0.094	0.011
			crit 3.3	0.054	0.006
			crit 3.4	0.200	0.023
			crit 3.5	0.270	0.032

Table 2: Local and global priorities for the 1st and 2nd level criteria (1st hierarchy)

Subcriteria	Alternatives									
	DRAMA		KAVALA		XANTHI		RODOPI		EVROS	
	Normalized eigenvectors	Composite relative priorities	Normalized eigenvectors	Composite relative priorities	Normalized eigenvectors	Composite relative priorities	Normalized eigenvectors	Composite relative priorities	Normalized eigenvectors	Composite relative priorities
crit 1.1	0.353	0.055	0.205	0.032	0.160	0.025	0.148	0.023	0.135	0.021
crit 1.2	0.198	0.018	0.239	0.022	0.200	0.018	0.192	0.017	0.172	0.016
crit 1.3	0.364	0.105	0.484	0.140	0.065	0.019	0.042	0.012	0.044	0.013
crit 1.4	0.123	0.006	0.140	0.006	0.166	0.008	0.304	0.014	0.267	0.012
crit 1.5	0.144	0.005	0.173	0.006	0.452	0.014	0.128	0.004	0.103	0.003
crit 2.1	0.160	0.022	0.201	0.028	0.228	0.032	0.189	0.026	0.221	0.031
crit 2.2	0.166	0.011	0.166	0.011	0.236	0.015	0.243	0.016	0.190	0.012
crit 2.3	0.173	0.006	0.176	0.006	0.198	0.007	0.250	0.009	0.203	0.007
crit 2.4	0.216	0.003	0.219	0.003	0.155	0.002	0.188	0.002	0.221	0.003
crit 2.5	0.199	0.004	0.187	0.003	0.194	0.003	0.205	0.004	0.215	0.004
crit 3.1	0.186	0.008	0.161	0.007	0.222	0.010	0.240	0.011	0.191	0.009
crit 3.2	0.156	0.002	0.211	0.002	0.213	0.002	0.237	0.003	0.182	0.002
crit 3.3	0.332	0.002	0.120	0.001	0.189	0.001	0.186	0.001	0.172	0.001
crit 3.4	0.214	0.005	0.221	0.005	0.195	0.005	0.227	0.005	0.143	0.003
crit 3.5	0.170	0.005	0.207	0.007	0.162	0.005	0.231	0.007	0.230	0.007
TOTAL		0.256		0.278		0.166		0.154		0.144

Table 3: Local and global priorities of the alternatives (1st hierarchy)

The technical infrastructure indicators are:

- Main telephone connections 1998 (CRIT 3.1).
- Percentage of paved road network 1997 (CRIT 3.2).
- Density of road network 1997 (CRIT 3.3).
- Public investments 1982-1996 (CRIT 3.4).
- Total electricity consumption 1997 (CRIT 3.5).

PREFECTURES	PRIORITIES	FUNDS (€)
DRAMA	0.256	41876480
KAVALA	0.278	45475240
XANTHI	0.166	27154280
RODOPI	0.154	25191320
EVROS	0.144	23555520
REGION	1.000	163580000

Table 4: Funds allocation in the five prefectures

In the last level of hierarchy the five prefectures of the region are placed. It is reminded that the prefectures are evaluated with the use of development indicators. When an indicator reveals growth the priorities are reversed, while they remain the same when the indicator reveals underdevelopment. Thus the overall evaluation and the calculation of priorities will be arranged in a way that reflects the real needs between the prefectures of region (table 3).

The European Union funds destined to R.O.P. are 1,140,563,463€ for the period 2000-2006 and they will be allocated in six periods. In the present period the total amount that corresponds to the year 2002 is 163,580,000€ Table 4 indicates how these funds are allocated between the five prefectures of the region using the priorities derived from the 1st hierarchy.

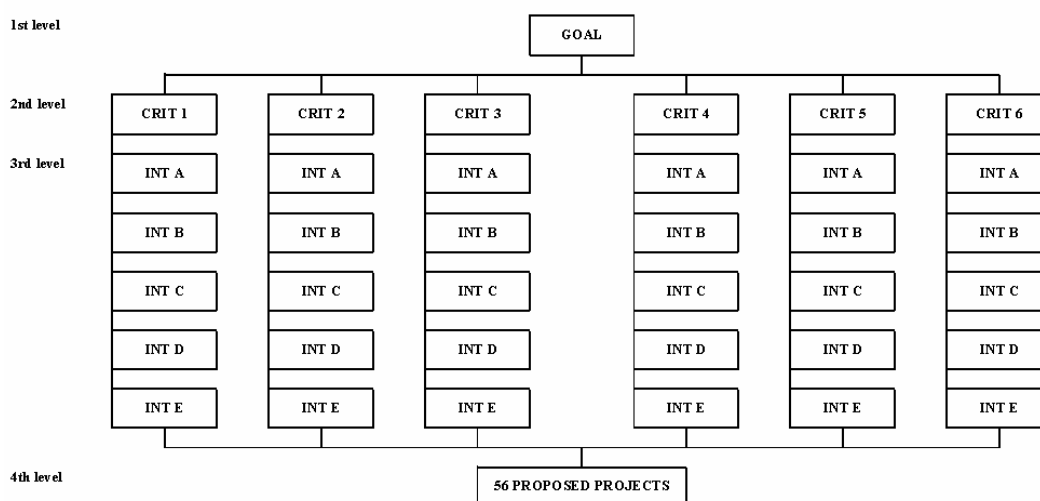


Table 5: Evaluation of the fifty-five projects (2nd hierarchy)

3.2 Second Hierarchy

The second hierarchy is formed in order to evaluate the projects in each prefecture (table 5). In this paper for brevity's sake the evaluation of projects in Xanthi Prefecture is presented. As it has already been

mentioned region authorities have determined five sectors of interventions with given budget in which the projects are enlisted according to their expected reciprocity. The five sectors plus the cost of the projects are the evaluation criteria.

Criteria	Normalized eigenvectors	Composite relative priorities	Intensity scales				
			A	B	C	D	E
Crit. 1	0.262	0.262	0.1344	0.0684	0.0338	0.0165	0.0086
Crit. 2	0.064	0.064	0.0328	0.0167	0.0083	0.0040	0.0021
Crit. 3	0.257	0.257	0.1318	0.0671	0.0332	0.0162	0.0085
Crit. 4	0.103	0.103	0.0528	0.0269	0.0133	0.0065	0.0034
Crit. 5	0.106	0.106	0.0544	0.0277	0.0137	0.0067	0.0035
Crit. 6	0.208	0.208	0.1067	0.0543	0.0268	0.0131	0.0069

Table 6: Local and global priorities for the elements of the 2nd hierarchy

More specifically these criteria are:

- Competitive reformation of production (CRIT 1).
- Connection with wider economic areas. (CRIT 2).
- Completion and reinforcement of infrastructures (CRIT 3).
- Growth of mountainous areas of the region (CRIT 4).
- Human resources (CRIT 5).
- Cost of the project (CRIT 6).

In the criteria matrix of pair wise comparisons the weights between the first five criteria are formed according to the ratio of the already determined budgets while the AHP scale is used in order to form the weights concerning the comparisons between the cost criterion and the remaining five criteria.

The number of the projects imposes the choice of ratings model in order to evaluate them according to each criterion satisfaction level. For the first five criteria the levels of intensity scale used are:

- Particularly important (INT A)
- Very important (INT B).
- Important (INT C).
- Very little important (INT D)
- Negligible (INT E).

For the cost criterion the levels of intensity are the following:

- Particularly low cost (INT A: Cost range 0-1.75 M€).
- Low cost (INT B: Cost range 1.75-3.50 M€).
- Satisfactory cost (INT C: Cost range 3.50-5.25 M€).
- High cost (INT D: Cost range 5.25-7.0 M€).
- Particularly high cost (INT E: Cost range 7.0-8.75 M€).

4 Conclusions

As it is calculated from the 1st hierarchy, the expected financing for the Prefecture of Xanthi covers the realization of the twenty-six projects that derive the highest priority, in total of fifty-five projects. The selected projects concerns (table 7):

- Urban and welfare infrastructures: New projects and increase of the effectiveness of the existing ones (particular to those that support the municipalities of the region), with accent to the urban environment (urban road network - open spaces: 4th, 7th, 8th, water supply network: 21st) and in the welfare

installations for special categories of population (drug-addicts: 18o, elderly: 19th, 20th, mentally handicapped: 25th).

- Infrastructures that combine land reclamation works and environmental protection: Flood-preventing and environmental protection projects (4th, 17th, 24th).
- Infrastructures that encourage cultural and tourist activities: Strengthening of folklore activities (10th, 12th). Strengthening tourist promotion of the prefecture (22nd), educational programs for management and protection of ecosystems (2nd).
- Infrastructures in environmental sensitive or isolated sectors of the region: Viable exploitation of the ecosystems (1st, 6th), improvement of infrastructures at the mountainous areas (16th).
- Supporting infrastructures for the agricultural exploitations (completion of land redistributions and other projects) (3rd, 5th, 9th, 23rd).

FINAL RANKING OF THE PROJECTS							
ACCEPTED PROJECTS				REJECTED PROJECTS			
	PROJECTS	PRIORITIES	COST (millions EURO)		PROJECTS	PRIORITIES	COST (millions EURO)
1	PROJ 34	0.452	0.587	27	PROJ 25	0.314	0.734
2	PROJ 30	0.434	0.147	28	PROJ 40	0.314	0.440
3	PROJ 15	0.430	1.174	29	PROJ 41	0.314	0.352
4	PROJ 5	0.406	0.293	30	PROJ 45	0.314	0.147
5	PROJ 14	0.403	1.555	31	PROJ 42	0.314	1.321
6	PROJ 32	0.401	1.467	32	PROJ 52	0.308	0.587
7	PROJ 3	0.401	1.012	33	PROJ 51	0.308	0.563
8	PROJ 4	0.400	0.587	34	PROJ 19	0.308	1.614
9	PROJ 12	0.397	1.673	35	PROJ 35	0.308	1.291
10	PROJ 33	0.390	0.587	36	PROJ 36	0.308	0.293
11	PROJ 7	0.387	0.734	37	PROJ 48	0.308	0.561
12	PROJ 54	0.374	0.587	38	PROJ 49	0.308	0.484
13	PROJ 55	0.374	0.587	39	PROJ 50	0.308	0.563
14	PROJ 38	0.342	0.117	40	PROJ 22	0.308	1.168
15	PROJ 37	0.333	0.293	41	PROJ 11	0.295	2.230
16	PROJ 18	0.333	0.704	42	PROJ 39	0.294	0.176
17	PROJ 47	0.333	0.141	43	PROJ 43	0.294	0.352
18	PROJ 17	0.328	0.792	44	PROJ 27	0.291	1.761
19	PROJ 31	0.328	0.176	45	PROJ 8	0.285	3.956
20	PROJ 20	0.328	0.572	46	PROJ 23	0.285	0.059
21	PROJ 46	0.327	0.825	47	PROJ 10	0.281	0.734
22	PROJ 28	0.324	0.587	48	PROJ 44	0.281	0.734
23	PROJ 13	0.324	0.376	49	PROJ 9	0.278	1.805
24	PROJ 16	0.321	8.804	50	PROJ 21	0.275	0.440
25	PROJ 26	0.319	2.201	51	PROJ 6	0.275	0.293
26	PROJ 2	0.316	0.235	52	PROJ 24	0.275	0.587
TOTAL COST OF THE ACCEPTED PROJECTS (MILLIONS EURO)			26.813	53	PROJ 53	0.272	2.201
				54	PROJ 29	0.253	2.494
				55	PROJ 1	0.156	3.668
TOTAL COST OF THE PROJECTS: 58.424 MILLIONS EURO							

Table 7: Accepted and rejected projects

It is also pointed out that the selection includes projects with different level of financing as well as many projects of regional scope.

The substantial approach of the projects evaluation problem includes the analysis of a large number of parameters. Even if it is particularly difficult, the exploitation of those parameters in the decision making process is necessary. Analytic Hierarchy Process provides a functional framework in order to deal with the problem's complexity and to ground the final decision on the entire set of parameters.

In Greece the use of multicriteria analysis methods is particularly limited. It is also very interesting to note that empirical rules and political considerations traditionally dominate the selection of projects. Given that our approach is in accord with the «intuitive» evaluation of projects, as we know it until now, local authorities despite their initial mistrust have accepted the method very well. The operational use of the model was achieved by introducing development indicators as parameters for the evaluation. Of course, the final decisions depend on other factors, including local groups pressures and political consi-

derations, but we strongly believe that the final ranking will remain the background for the choices.

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