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PROJECT PRIORIZATION FOR THE IMPERIAL RIVER BASIN

Claudio A. Garuti
Fulcrum Ingenieria Ltda.
Luis Thayer Ojeda 0180 Of. 1004
Santiago. Chile

I. INTRODUCTION

The "Priorization of the Imperial River Basin Project" is a study developped during the last month of 1994, until March of 1995, for the Environmental Unit of the Pre-Investment Department of the Planning and Cooperation Ministry (MIDEPLAN). This project is imbedded in the context of the more general study "Ranking of Basins" sponsored by BID_MIDEPLAN. The ranking of chilean basins took into account 6 hydrographical basins and a set of associated development projects, which were ranked for their execution according to the following objective: "Enhancement of the Inhabitants Social Welfare over Sustainable Basis". The results obtained by traditional method for selecting the "best" projects were not satisfactory, which gave place to the request of AHP as a new methodology to be applied on the Imperial River Basin.

A. DEFINING THE PROBLEM

The hydrographical basin of the Imperial River presents several problems affecting the quality of life of the nearby inhabitants as well as any sustainable developmment on the area. The main threats are: detriment on the cultivable layer and soil erosion, damage caused by floods and temporary increments in the river flow, hydric resources shortage, impoverishment of the water's quality and increase on the sites vulnerability facing droughts.

The situation described explains the existence of a portfolio of projects oriented to find a solution to, at least some, of the mentioned problems. However, as it is economically impossible to carry out all of them simultaneously, the need appears to establish preferences among the projects and to select on a first instance those with a higher grade of efficacy and the most economically efficient.

MIDEPLAN's portfolio comprised 35 projects related with the basin, some classified as "numerable" (those for which you can estimate the NPV) and others called "non numerable" (those who by their nature, can't have NPV computed). For each group an independent priority ranking was provided.

B. Project PLANNING

To accomplish this project, a multidisciplinary working team was organized, composed of professionals belonging to the involved institutions and by members of FULCRUM staff.

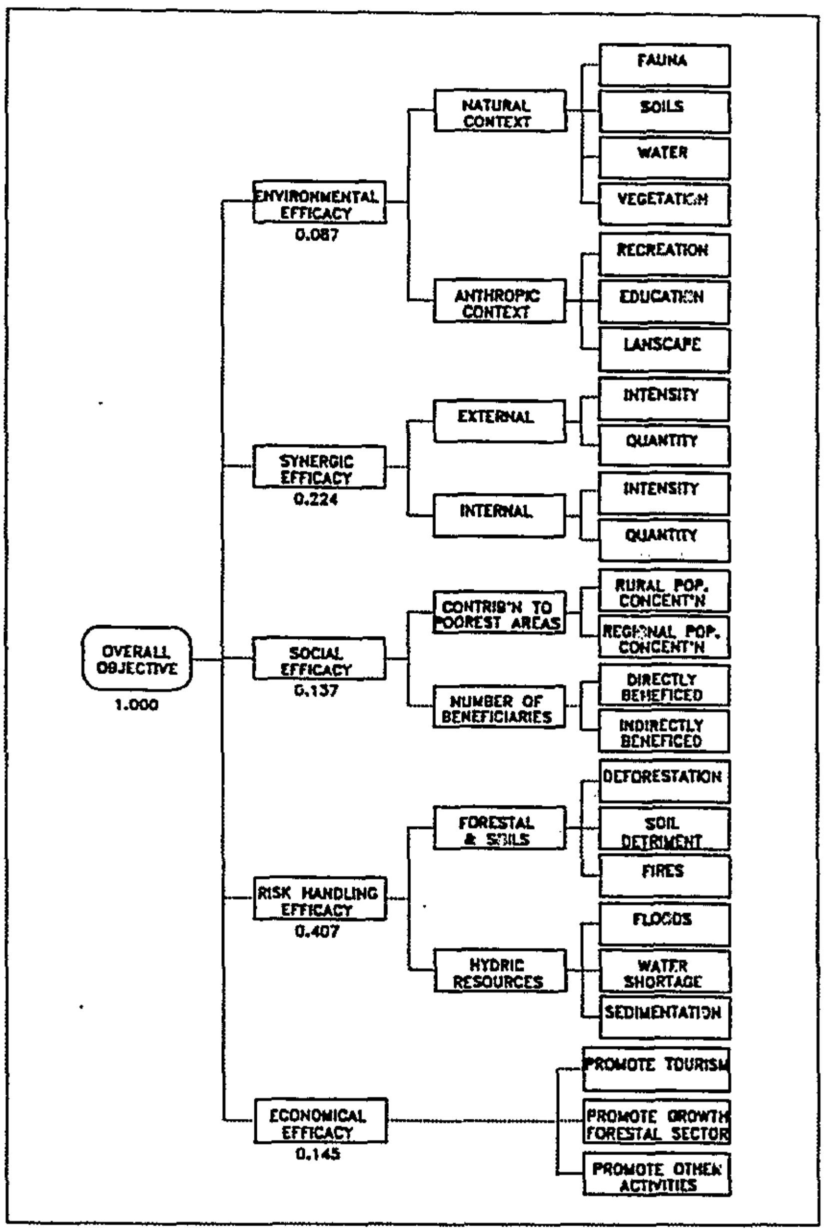
The study took around 4 months, requiring a total amount of 320 hours and chosen development software was Expert Choice V8.

II. EFFICACY HIERARCHY

For establishing a hierarchy several things were initially needed: an overall objective: "Priorization of the Portfolio Investment Projects, maximizing their Social (Welfare) ans Environmental (Sustainable Basis) Efficacy". Some general criteria as the following were to be met: Synergic Maximization, Effective Handling of the Risk Physically Present and Efficacy in the Potential Economic Growth within the River Basin. Also taken into account was the definition of stategic alternatives and the assignment of an intensity scale to the lower nevel criteria.

A. HIERARCHY'S DIAGRAM

In the next diagram the hierarchy is shown, together with the strategic weights.



B. STRATEGIC CRITERIA

The strategic criteria defined for the model are the following:

1. Environmental Efficacy

In this point we consider the physical background over which the project acts. These criteria go in pursuit of an enhancement of the basin's environmental quality and measure the efficacy of the projects that possitively modify the environmental conditions in the area.

The measure of efficacy is considered in two groups: one called "Natural Context" which includes the resources and the terminal criteria that might be affected due to the presence or execution of the projects. Under this point of view, the improvement of the existing ecosystem is encouraged or at least preserve from damage. By the other hand, the "Antropic Context" measures the contribution of the projects in terms of the man-environment relationship.

2. Synergic Efficacy

Here we consider the synergic relation among projects, this is, the capacity of a pair of projects to generate an extra possitive effect in addition to the benefits that each of the projects would produce separately. In order to attain this, the projects were grouped in such a way that measuring both the synergy between the groups (External Synergy) and the synergy within the groups (Internal Synergy) was possible.

3. Social Efficacy

This criterion measures the projects's contribution to the social conditions of the basin, expressed in terms of the project's site, this is rural or regional area. It can be divided into: "Contribution towards the poorest areas" (that measures the projects capacity to diminish the extreme poverty concentration in the area) and in "Number of Beneficiaries" associated to the projects execution.

4. Efficacy in Natural Risk Handling

Establishes the projects effectivity to diminish the main natural risks to which the area is exposed, having them a physical, climatological, geomorphological origin. The difference with the first criterion mentioned (environmental efficacy) is that this one measures the potential risks that the projects tend to avoid or diminish while the environmental efficacy tries to find a solution to exising problems.

The handling of natural risks can be divided according to the physical elements to be preserved: forestal areas, soils and hydric regions.

5. Efficacy in the Economical Potential

Measures the project's contribution to improve the development of economic activities that take place in the basin as "Tourism", "Forestal Sector" and "Other Activities" (agricultural, cattle raising, services and primary products production).

From the 24 lowest level criteria, half of them are of qualitative type.

The weights were assigned according to the systematic squeme of pairwise numerical comparison used by AHP. The global consistency ratio was found to be 95% which lies in the acceptable rank.

C. ALTERNATIVES

The alternatives are associated with the 35 projects, which in turn lie in some of the following synergy groups:

Water Level Growth Control: Includes the projects related with physical structures or works oriented to protect existing facilities, populated centers, cultivable lands or to improve river channels.

"Extension, Difussion" and Prevention: Includes the programs devoted to train and bring on people's concern toward a specific subject.

Protected Wild Areas Management: Corresponds to those projects oriented to enhance existing facilities in restricted wild areas, improvement of personnel conditions and public service capacities.

Hydric Resources Preservation and Management: Includes the preeliminary studies and programs focused towards the generation of monitoring and follow up systems, conjunctively with organization activities and improvements towards a better efficiency in management.

Forestal Conservation and Management: Deals with projects and programs oriented towards a general improvement both for institutional capacities and facilities as for people's concern.

Research and Studies about Forestal Resources: Consists mainly in preeliminary studies devoted to improve the knowledge about the ecosystems and to develop more accurate control systems for forest exploitation.

Research and Studies about Hydric Resources: Consists mainly in preeliminary studies devoted to improve the knowledge about the ecosystems and to develop more accurate control systems for water resources.

Forest and Soil Management: INcludes projects and programs oriented towards training small owners of the region about appropriate resource handling.

Irrigation: Deals with a unique project oriented to the improvement of the irrigation facilities and watering systems associated with specific channels.

D. INTENSITY SCALES FOR TERMINAL CRITERIA

Intensity scales were build to measure the performance degree of each project facing the terminal (or lowest level) hierarchy criteria. Depending on the criterion's nature, they are expressed on a qualitative or quantitative form.

The next table shows examples of the intensity scales.

Rural Extreme Poverty Concentration (cuantitative criteria)
Very High : The project affects settlements with an extreme poverty concentration above 42%.
High :The project affects settlements with an extreme poverty concentration between 33 and 42%.
Moderate : The project affects settlements with an extreme poverty concentration between 15 and 33%.
Low :The project affects settlements with an extreme poverty concentration between 0 and 15%.
Null :The project affects settlements without extreme poverty concentration.
Soil Detriment (cualitative criteria)
Strong : The project give a strongly management option in soil detriment where it apply
Moderate : The project give a moderate or indirect management option in the risk of deforestation
Low : The project give a low or very indirect management option in soil detriment where it apply
Null : The project give zero managemet option under this concept

Table 1.

When transforming the intensity scales to normalized quantitative scales as shown bellow, it is easy to see that the specialist's percepcion in evaluating a project is highly non linear: this makes usual linear scales (as grades, for instance) unapplicable as a measure of projects behavior.

Intensity Scale	Quantitative Equivalence
Very High:	1.000
High:	0.309

Moderate:	0.157
Low:	0.066
Null:	0.000

Table 2: Rural Extreme Poverty Concentration

Intensity Scale	Quantitative Equivalence
Strong:	1.000
Moderate:	0.437
Low:	0.191
Null:	0.000

Table 3: Soil Detriment

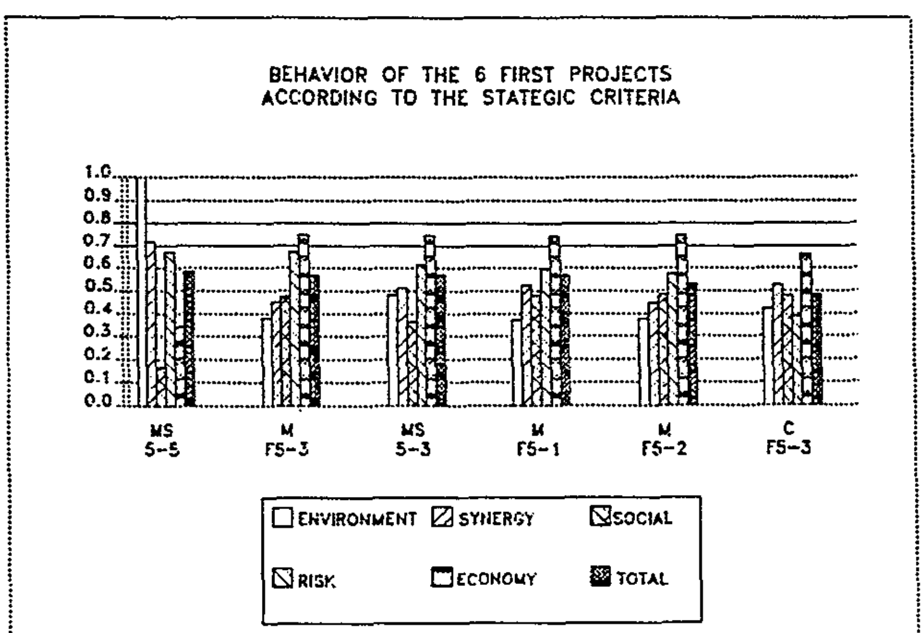
III. CLASSIFYING THE PROJECTS

Once the hierarchy has been built, the weights (or criteria contribution to the problem's overall objective) assigned and the intensity scales defined (with the corresponding quantitative equivalent values), each of the 35 projects was evaluated. A special evaluation matrix was used, and by means of the intensity scale associated with the criteria, each project had it's assigned value for each of the 25 terminal levels of the hierarchy. The team members chose projects in which to work, according to their domain of the subjects involved in a way that, in average, each project had at least 3 opinions about it's performance.

As a note of interest, half of the project's evaluation in terms of the terminal criteria, were found to have coincident opinions among the participants. On the other half, the final evaluation was attained by means of statistical technics, all of them validated by the participants.

A. EFFICACY RANKING

With the mentioned data, projects were then ranked according to their efficacy. An important result was the spread in project evaluations results. The "best" project reached only a 59.5% and the one considered "worst" met just 13%.

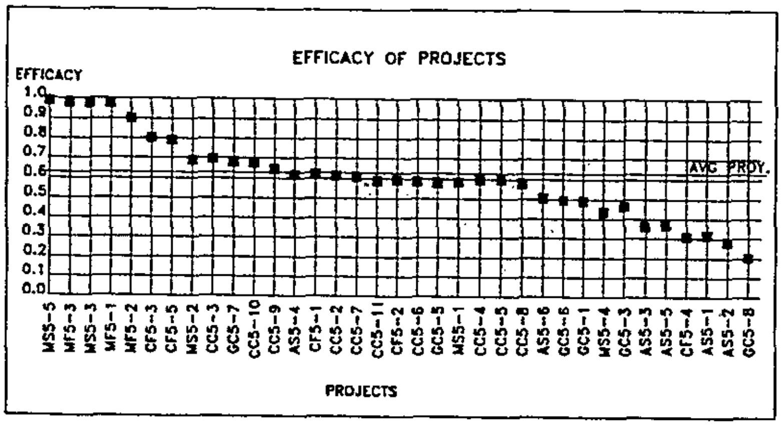


A detailed analysis helped detecting projects strong and weak points (advantages and weakness) regarding the stategic criteria. This can be seen on Figure 1, for the case of 6 projects.

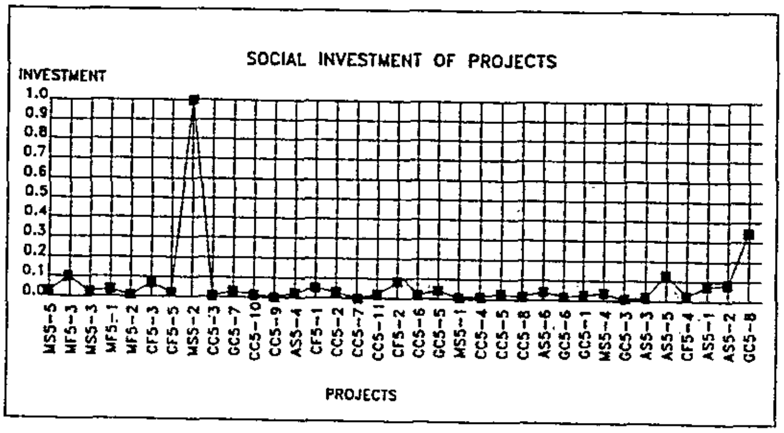
It is clear to notice, for example, that the MS5-5 project, the best classified in the group, has an excellent behavior in terms of environmental efficacy but a very low social efficacy. Analyzing the other projects, they show a good performance from an economical point of view and a rather fair performance from the environmental point of view.

B. EFFICIENCY RANKING

Once the efficacy ranking was obtained by AHP, the next step was to build an efficiency index, which was given by the ratio Efficacy/Social Investment. It must be noted that with the proposed approach all projects belong to a unique rank, no matter if they have or not a rentability value (NPV). Figures 2, 3 and 4 show the project's behavior in terms of efficacy, social investment and efficiency index.

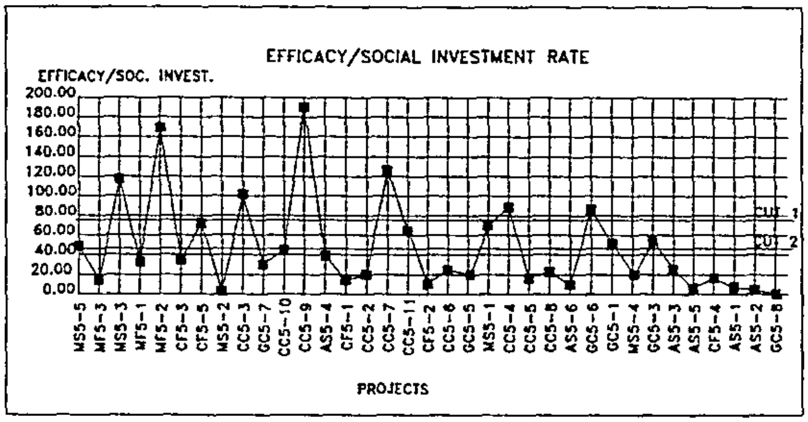


The horizontal line in the above figure shows the "average project" possition, associated to the minimun desirable efficacy level.



This figure shows a rather homogeneous distribution in the social investment values, with few and localized peaks.

Finally Figure 4 shows projects behavior from an efficiency perspective. The difference of the resulting ranking when compared to the efficacy graph (Figure 2) can be observed. The cutting horizontal lines correspond to the projects classification in groups as listed on Table 4.



This Table shows the final project ranking proposal for MIDEPLAN, for the project portfolio in the Imperial River Basin.

Classification	Project	Effic./Soc. Invest.	Investment Thous. US$	Cumulative Investment
Good	CC5-9	191,13	42,23	
Good	MF5-2	170,12	66,30	
Good	CC5-7	122,29	61,43	
Good	CC5-3	101,21	84,45	
Good	MS5-3	94,54	127,40	
Good	GC5-6	91,49	70,21	
Good	CC5-4	90,24	78,89	530.910
Average	CF5-5	72,19	134,16	
Average	MS5-1	68,83	104,04	
Average	CC5-11	65,30	113,46	
Average	GC5-3	55,89	101,09	

Classification	Project	Effic./Soc. Invest.	Investment Thous. US$	Cumulative Investment
Average	GC5-1	49,87	125,75	
Average	MS5-5	48,45	254,17	1.363.580
Below Average	CC5-10	43,91	187,10	
Below Average	AS5-4	38,76	202,37	
Below Average	MF5-1	31,30	380,91	
Below Average	GC5-7	27,27	309,69	
Below Average	AS5-3	25,91	172,51	
Below Average	CC5-8	24,17	285,39	
Below Average	CC5-6	23,62	308,39	
Below Average	MS5-4	20,18	280,00	
Below Average	GC5-5	19,94	362,16	
Below Average	CC5-2	19,85	382,65	
Below Average	CC5-5	16,17	440,27	
Below Average	CF5-4	14,47	284,70	
Below Average	CF5-3	14,18	700,60	
Below Average	CF5-1	12,57	622,55	
Below Average	AS5-6	11,56	562,14	
Below Average	MF5-3	9,82	1237,24	
Below Average	CF5-2	8,66	853,14	
Below Average	AS5-1	5,90	694,96	
Below Average	AS5-2	4,22	859,01	
Below Average	AS5-5	2,60	1684,28	
Below Average	MS5-2	0,70	12313,97	
Below Average	GC5-8	0,63	4381,41	28.868.720

Tabla 4.

This table shows the projects final ranking according to the proposed efficiency index. The last column (Cumulative Investment) shows the ammount of dollars needed for the execution of all projects located between the first level and the cutting line. These cutting lines help classifying the projects in three major groups, and noting that an important number of them are in the "Below Average" region.

With the sorting efficiency index, two kinds of projects are favored: those with a very high efficacy and those who need a very low investment.

According to MIDEPLAN, in this opportunity no minimun efficacy level constraint was applied to the projects. Nevertheless, this can be directly taken into account from the AHP ranking, by reducing the set of eligible projects to be analyzed.

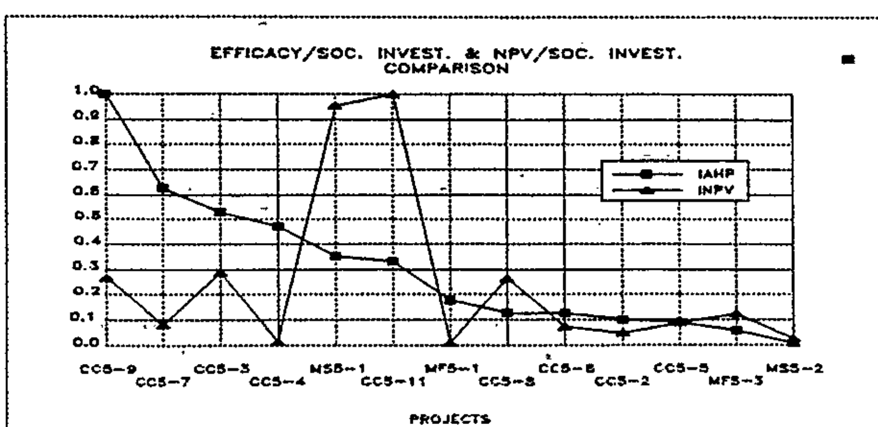
IV. CONCLUSIONS

A. COMPARISON OF RESULTS

Once knowing the results the sorted projects were compared with the project ranking MIDEPLAN possessed. The first important difference lies in the fact that with AHP all projects were sorted in a unique list, condition that had been impossible to accomplish by using the traditional selection method.

Therefore the results were compared separately for "numerable" and "non numerable" projects.

The poor relation found between the AHP ranking and the existing ranking for the "numerable" projects (sorted by computing the INPV = NPV / (Social Investment)) is shown on Figure 5.

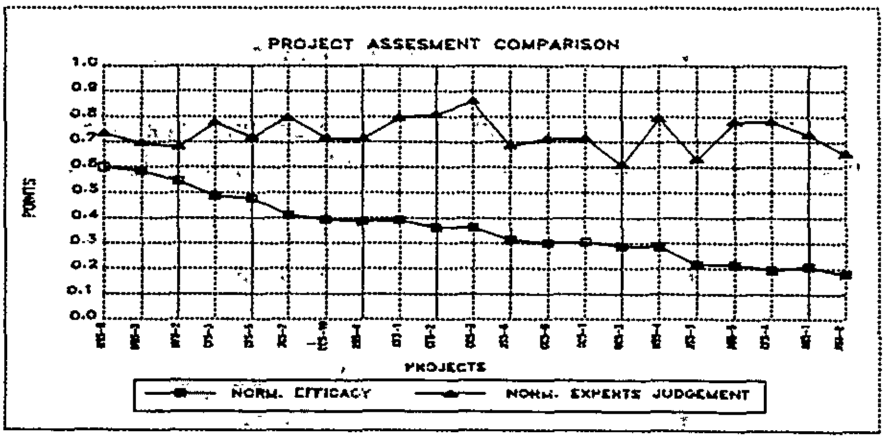


As it can be observed, the projects ranking deduced from the NPV ammount has no relation with the same project's efficacy to resolve pending problems in the area. The strong difference betseen both curves is due to the fact that the evaluation models try to accomplish different objectives. While INPV cares just for the projects economical rentability, AHP looks for an efficacy level in terms of the overall objective and action strategies. This means that throughout the hierarchy model it was possible to capture several relevant factors that were not considered in the economical evaluation of the "numerable" portfolio projects.

On the other hand, the difference is also due to existing limitations on the rentability index computation model, for example, it cannot take into account elements without market price. The question that raises is: "What would the INPV be if we could include (measure in monetary terms) aspects as: Sinergy, Risk, Social Efficacy, Environmental Efficacy, ..."? There seems to be no easy answer, evenmore, there is a whole economic school studying the point.

What looks attractive is that now <u>measuring</u> these elements is no longer unfeasible, it is possible even without the need of market simulation models which, due to their complexity and the great ammount of assumptions made, are generally considered as giving low reliable results and hence are not in use in the traditional projects evaluation.

For the other hand, the "non numerable" projects were evaluated with the help of Delphi technique by a team of experts, and classiffied from best down to worst. The following figure shows both sorting systems behavior.



In this case, projects evaluations are compared in absolute terms, from the efficacy and from the expert group point of view. Again it can be seen that there is not much relation between both curves, that the projects were systematically evaluated with higher scores by the expert group and that, in general, the ranking is quite even (which is represented by an oscillating function). On the other hand, by means of AHP it is possible to find a clear difference between the first and tha last places represented by a decreasing function).

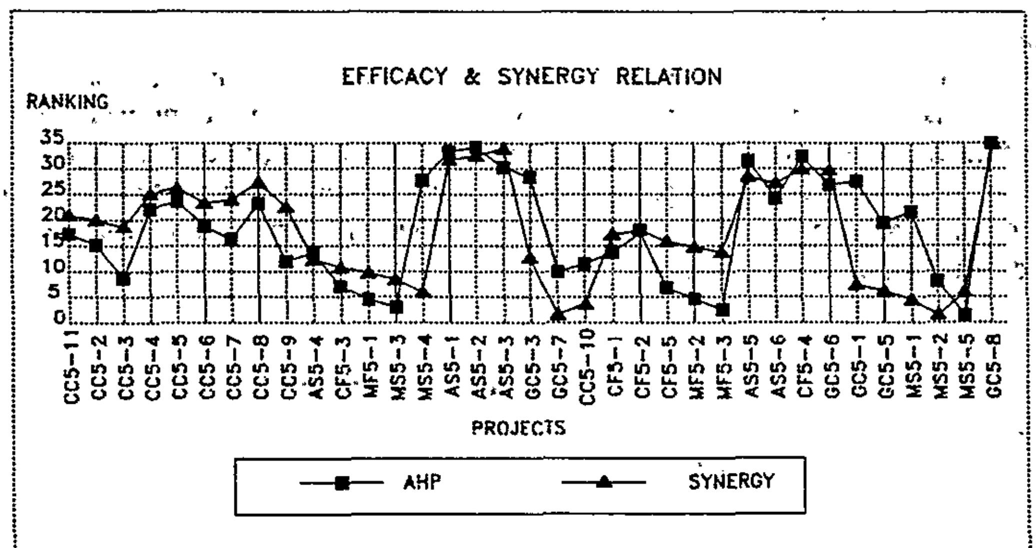
Among the advantages found in AHP are, in the first place, the transparency in project evaluation, given by the hierarchy model and weights; the process used to transform the measure scales used for the terminal criteria to normalized 0-1 scales which avoids the problem of adding "ordinal scales" and the project evaluation process in itself. In the second place was the control flexibility offered by AHP in order to measure and update the consistency reached by the given judgements and finally, in the third place, the on-running learning process that takes place among the participants as they openly share, discuss or prove the judgements given.

Note: Project numbered as GC5-8 is not shown on the initial rankings since its associated NPV was a negative value. In this case, the constraint of having a possitive value was applied as a filter, in order to compete for investment funds. By doing this, the "operational impossibility" (in the NPV computing) of building a ranking with possitive and negative values was excluded.

It must be noted that in the AHP ranking thew GC5-8 project is also ranked in the last place, but it is not "a priori" filtered or discarded by the analysis, and no concept as "operational impossibility" exists.

B. ANALYSIS OF SYNERGY MANAGEMENT

The next figure shows the projects ranking in terms of their total efficacy (AHP) and their sinergy towards the rest of the portfolio projects.



In general terms it can be seen that the curves have quite similar shapes, indicating a good correlation between the sinergy and the total efficacy of the projects. The correct analysis of the graphic is not that the first places in the efficacy ranking assure that those projects have the highest sinergy but that can happen with a high probability.

C. SENSIBILITY ANALYSIS

The sensibility analysis is a very powerfull tool when there is no possible understandiing among the parts, specially when assigning importance to the strategic criteria. Thus the raising of representative "sceneries" for the perceptions or position of the different opinion groups.

This was the case when determining the weights for hydric risks versus forest + soils risks, in the Risk Management branch of the hierarcgy. A sensibility analysis was performed, considering Scenario1 as the one with hydric risk predominance (55%) versus 45% for the other risks, and Scenario 2 as the one with the inverse situation. The results of both rankings were substancially the same: for the 15 projects considered, their location in the ranking was not altered. Among the first 10 projects, there was one permutation between the 2 first projects and another permutation between projects number 8 and 9. It is important to notice that no "new" projects appeared among the first 10. The sensibility analysis proved great stability in the results.

D. ADVANTAGES OF THE METHOLOGY

The fullfilement of this experience, where the muticriteria methodology AHP has been used for the first time in the allocation resource probleme in our country, has shown the following possitive and advisable features:

Ad-Hoc Model
The hierarchy model designed was concieved looking after the objectives of this experience, including the relevant criteria for the Imperial River Basin and the associated portfolio projects, both of the qualitative and quantitative type. In this sense, no theoretical "skeleton", filter or preliminary model was forced to fit. In the same way, when analyzing the projects evaluation, intensity scales were built an used according to each terminal criterion. The number, definition and type of hierarchy levels were specifically determined for this problem.

Graphic Representation
The graphic representation of the model that contains the hierarchy and the direct way of observing how each element contributes toward the overall abjective, allow a fast and effective reexamination of the decision model, its representativity (how well it does fit with reality) and the validation of the objetives involved.

Ease of Use
Even though the proposed methodology was new to all the members of the team, a detailed initial explanation helped the quick start of the work. The features of AHP were appreciated in practice without the need of going through reference books or manuals as a previous requirement.
The additional support offered by Expert Choice software helped easily adding modifications to the hierarchy. This meant that modifying the weights or introducing new aspects or the problem was not inhibited nor avoided by the team.

Flexibility
The methodology can be applied to a wide range of problems. In this case, for managing a high number of investment projects, the Absolute Measurement modality was used.
The AHP methodology was complemented with a traditional evaluation method, so a project evaluation index could be built in a way that represented the participants interests.
In the same way, other appropriate methods for decision making problems (PLE, CPM, Non Linear Programming) could also be used.

Agreement
The process that took place was eminently "participative"; the design and construction of the hierarchy model and the scales, the realtive importance assignment and the evaluation process were all jointly developped. The opportunity to express out lous the opinions, knowledge, doubts and preferences allowed members of the team to share and learn from the rest. This means that the results obtained in the several sessions had a high representative level, both in the technic and strategic criteria.

Consistency
Consistency was a reference tool permanently used. The aim was not to impose values that assured a certain recommended consistency level, but to know and control the groups consistency levels up to acceptable values.

Decision Problem Reproduction
Through the use of AHP, the priorities with which the criteria contribute towards the overall objective are explicitated, which grants for greater transparency and clearness in the decision making process. Once having the hierarchy and the assigned weights, it is easy to reproduce and explain the selection in process and the alternative sorting.

Interdisciplinary Work
An important feature of AHP is that both the model hierarchy design and the weights assignments are done in an open way by means of all participants contribution. The presence of different specialists, as well as the representation of the several entities concerned, generated a working atmosphere rich in experiences and knowledge that guaranteesan integral analysis of the subjects.

Homogeneous Conditions for Projects Evaluation
Given the big amount of projects involved in the portfolio, the model transforms itself in the one and clear element that establishes the specific pattern by which all projects are evaluated. In this way, possible time variations in the evaluation criteria are avoided (for instance, between the first evaluated projects with respect to the last evaluated).

Qualitative and Quantitative Variables Management
The model design allows including all the relevant problems aspects. In this particular case, about half of the terminal criteria were of the qualitative type.

On of the remarkable aspects was the risk and sinergy management; criteria that up to date were not explicitly considered in the evaluations, due to the difficulties that arose when trying to incorporate them in the traditional methods for project evaluation and funds allocation.

Sensibility Analysis
AHP is based upon a search for agreement, to foster which it possesses special tools, in addition to consider the possibility of developping 2 or more alternative lines, which in turn are transformed in evaluation sceneries.

Mathematical Background
One of the important aspects of AHP is its mathematical background. Once the hypothesis have been satisfied, weights and criteria assigned, the use of matrix theory for obtaining eigenvectors associated to the preference scale, gives back a set of values that can be considered as preference measures. Further more, as computing eigenvalues is a highly non linear process, this technic assures that the results can't be prepared in advance and guarantees the numerical stability of the results in cases of non drastic opinion changes.

E. LIMITATIONS OF THE METHODOLOGY

As any other methodology, AHP can not be applied without coution. Here are some of the main limitations to be taken into account.

Managing the Methodology
The methodology's apparent ease of use induces to consider it as a tool that can be handled without proper skills nor with specialized aid. This is even more the case when owning the associated software tools. It is important to depend on reliable support, mastering the main operating aspects of the methodology is not enough. Another important fact to be considered is that the hypothesis stated must be satisfied in order to obtain valid results. If the type or the complexity of problems makes it impossible to fullfil the hypothesis, it is furthermore important to recognize AHP extensions and branches to properly modelate the situation at hand.

Optimization Methods
There are some situations, as border conitions for example, that can't be directly resolved by means of AHP. In these or similar cases the type of optimization process applied must be identified, for complementing the final AHP result with the appropriate mathematical optimization technic.

Working Team
When looking for the biggest possible benefit, a competent working team, with actively participating members, must be conformed. For optimum specialist time use, some convenient points to take into account are: develop a good schedule for working sessions, timely distribution of reports and data

to be used in next sessions and a training level in accordance with the the time and the subject members take part in the process.

Automatic or Operative Decisions
AHP is not an appropriate tool for the automatic decision making process , since its scope is precisely the opposite: making knowledge explicit and reaching concensus in each topic, as a guarantee to make the best decision. This process usually needs much more time than the available in some automatic decision problems.

F. FINAL CONCLUSIONS

The main conclusions can be summed up in the following points:

1. A model for the Problem

With the methodology's aid it is possible to identify and include in a unique hierarchy model all the relevant factors related to a decision making problem as the one proposed. This means that it is no longer necessary to neglect essential decision aspects just because they are not of quantitative nature or because of no established method for assigning them a market price. These qualitative aspects, that are sometimes simulated with variable results, show up in almost every problem affecting the decision in a low or high degree and most of the time are even ignored in traditional methodologies because of their inherent complex handling.

2. Measuring Efficacy

Once the hierarchy oriented to measure the projects efficacy in solving the main Imperial River Basin problem was created, measuring scales could be defined, by means of which the real degree of contribution of each project to effectively diminish the problems was established. The degree of completion of the identified relevant facts was measure through scales that are natural to each component.

3. Unique Ranking for the Portfolio Projects

The AHP methodology has allowed the building of a unique efficacy ranking for all the portfolio, concentrating in a single unit the two previously obtained independent sortings.

4. Efficacy and Efficiency Analysis

In this study the efficiency aspect was included, in order to complete the projects analysis, generating the final ranking for the problem at hand.

By means of AHP it could be possible, for instance, to establish the expected lower efficacy bounds for the competitive projects, as a requirement to procede with the efficacy analysis. This would reduce the ammount of feasible projects and assure that only "minimum quality" projects would be carried out; concept that is closely related with Total Quality Management, that leading companies apply.

5. Traditional Method Enhancement

The efficiency approach has helped establishing that AHP does not exclude other methodologies. On the contrary, it complements them with a different point of view. Even more, using them jointly in a correct and structured way allows new and very interesting aspects of the analysis of the chosen alternatives to raise.

6. Training

The solid mathematical background and all the extensions of AHP require, as any other methodology, a user with certain knowledge level. This does not mean that each occasional member of the working team is asked to have a complete domain of AHP, but that project leaders and the directly related and permanent team members must comprehend the involved concepts. Very technical operating aspects or numerical calculations can be addressed to computing programs or other external support groups, once properly identified and delimited. For the members participating in the overall objective definition, or in the identification of strategic criteria and in their associated weights, it is advisable to have a previous opportunity to learn about the general aspects of the methodology.

The training also helps diminishing the time avocated to the solution of problems and concentrating the time in those activities where the experience of specialists, important or very busy people is essential.

7. Quality of Life

An important conclusion is related with the possibility offered by AHP to operate with rich and extensive concepts such as "Quality of life". The proposed projects are involved with enhancing the life conditions of the Imperial Basin inhabitant in particular and of the Araucanía Region people in general.

It can be observed that with the used model, the behavior of projects was evaluated in aspects directly related with peoples welfare. For example, polution or environmental degradation directly affect people, as they face nature and anthropic reality daily. Aprotected, well kept and preserved environment improves peoples perception of the place where they live and hence, their quality of life.

On the other hand, the model was focused in a way to favor those projects with the greatest benefit covering and whose action could be perceived in the poorest areas of the region. Acting upon the poorest areas, a direct incidence over the population's quality of life is expected.

Beside the above mentioned, the possibility to prevent, diminish and, when possible, end with physical and natural risks or with situations in which man plays an extremely important role (floods control, water supply, fires, erosion, sedimentation, etc..) is essential in terms of populations life expectancy and in their life condition.

Finaly, the intention was also to prefer those projects that promote or induce a development in the regions economic potential through different activities. This means an economical growth of the area, generated both by governmental and private initiatives and which in turn can produce new activities and labor places, and gradually improve the habitat, educational and wealth conditions as well as other different facts also included in the quality of life concept.

Setting the conditions for this kind of studies to be carried out is part of the commitment taken by the government, in which attainment a great number of projects are under construction.