Factors affecting the financial implementation of 3rd Community Support Framework projects: The Final Beneficiaries and Managing Authority point of view of a Greek Regional Operational Program

GRAVVANI, Politimi

This dissertation is submitted in partial fulfilment of the requirements of Staffordshire University for the award of Master in Business Administration

February 2007

EXECUTIVE SUMMARY

The 3rd Community Support Framework contribution to the economic development of Greece and its convergence with the most developed European Union countries has been broadly acknowledged as important.

Something that is not broadly acknowledged is the automatic decommitment of any part of the European Union funds for which the Union has not received from Greece an acceptable payment application by the end of the second year following the year of the commitment, in other words the (n + 2) rule.

The basic part of the 3rd Community Support Framework is its 24 Operational Programs, 11 sectoral and 13 regional ones. Each Operational Program consists from a certain number of axes, subdivided into measures. Every measure may contain from a few to hundreds of projects, depending on its nature and budget. All projects data are gathered in the 3rd Community Support Framework Management Information System.

The aim of this research was to define the factors affecting the financial implementation of the European Union co financed projects of a Regional Operational Program, to prioritize them according to their negative influence and to make suggestions about proper actions to be taken from the interested parties, so as funds losses due to the application of (n+2) rule to be avoided.

The factors definition in the basis of the relative literature and the 3rd Community Support Framework implementation rules leaded to the next six: Final Beneficiaries' Organization, Technical Abilities, Operational Abilities, Coordination Operation, the role of the Supportive Mechanisms and the external factors.

Following, the "problematic" projects from the financial point of view were identified using the Two Step Cluster analysis in the Regional Operational Program projects data, as they were entered in the 3rd Community Support Framework Management Information System.

The Analytical Hierarchy Process was selected as the multi criteria decision method to be applied. Thus, problematic projects factors' prioritizing was asked from the respective Final Beneficiaries and the Program Management Authority responsible executives through the completion of a pair wise factors comparison matrix.

External factors were ranked as the most negative ones in projects financial implementation in overall and partial ranking, while Final Beneficiaries' Coordination Operation and Organization covered the third and last position respectively.

Another main finding was the differentiated ranking of Supportive Mechanisms from the two involved parties.

Finally, it was noticed a factors ranking differentiation in projects that could be connected with the legal and/or institutional operational context of the Final Beneficiary.

Since the (n+2) rule remains slightly differentiated in the forthcoming European Union programming period 2007 – 2013, the recommendations concern both periods. For the present period they have as follows:

- The 3rd Community Support Framework Management Authority has to take care so as necessary changes in government regulations and lows to be released in time, accompanied with proper Final Beneficiaries training in their application
- The Final Beneficiaries' Senior Management has to improve its coordination abilities
- Organization's importance in projects' implementation has not to be degraded from Final Beneficiaries and Program Management Authority
- Program Management Authority should improve its operation as Program Manager

- Differences in legal and institutional operational context among the Final Beneficiaries categories should be taken into consideration whenever Final Beneficiaries support is planned.

For the forthcoming period 2007-2013:

- Early preparation of the administrative and legal context within which the next Operational Programs will be implemented
- Prompt potential Final Beneficiaries information and training
- Introduction of project Management issues in potential Final Beneficiaries Senior Management
- Strengthening of Program Management Authority's role as Program Manager
- Management Information System transformation to a Decision Support System.

Taking into account the limitations of this research, it is expected to consist the occasion for further research in the field of factors that affect the co financed projects implementation.

To my beloved family – Makis, Konstantinos, and Anastasia; and to my beloved parents, who continue to support my efforts

To my colleagues in Program Management Authority of Region of Thessaly and to Babis Hatzidakis for their valuable help

To my supervisor Pantelis Ipsilandis

CONTENTS **PAGE NUMBER**

FACTORS AFFECTING THE FINANCIAL IMPLEMENTATION OF 3RD CSF PROJECTS: *THE FINAL BENEFICIARIES AND MANAGING AUTHORITY POINT OF VIEW OF A GREEK REGIONAL OPERATIONAL PROGRAM*

1. INTRODUCTION

1.1. Project Background

1.1.1 European Union Regional Policy

Although the European Union (EU) is one of the richest parts of the world, there are striking internal disparities of income and opportunity between its regions. The entry of 10 new member countries in May 2004, with their incomes well below the EU average, has widened these gaps. Regional policy transfers resources from affluent to poorer regions. It is both an instrument of financial solidarity and a powerful force for economic integration. The two words, solidarity and cohesion, sum up the values behind regional policy in the EU:

- Solidarity because the policy aims to benefit citizens and regions that are economically and socially deprived compared to EU averages.
- Cohesion because there are positive benefits for all in narrowing the gaps of income and wealth between the poorer countries and regions and those which are better off.

Big differences in prosperity levels exist both between and within member states. Even before enlargement, the ten most dynamic regions of the EU had a level of prosperity, measured by Gross Domestic Product per capita (GDP), which was nearly three times higher than the ten least developed regions.

The dynamic effects of EU membership, coupled with a vigorous and targeted regional policy, can bring results. The gap between richest and poorest regions has narrowed over the years. The case of Ireland is particularly heartening. Its GDP, which was 64% of the EU average when it joined in 1973, is now one of the highest in the Union.

The EU policy to reduce regional disparities is built on four structural funds:

- The European Regional Development Fund (ERDF)
- The European Social Fund (ESF)

- The section of the EU's common agricultural fund devoted to rural development (EAGGF)
- Financial support for fishing communities as part of the common fisheries policy (CFP).

These funds will pay out about €213 billion, or roughly one third of total EU spending, within programming period 2000 and 2006.

A further €18 billion was allocated to the Cohesion Fund, set up in 1993 to finance transport and environment infrastructure in member states with a GDP less than 90% of the Union average at the time (Greece, Ireland, Spain and Portugal).

Unlike the Cohesion Fund, poor or disadvantaged regions in all EU countries can benefit from the four structural funds according to certain criteria or objectives:

- A total of 70% of funding goes to so-called Objective 1 regions where GDP is less than 75% of the EU average and sparsely populated regions of Finland and Sweden and the most remote regions. About 22% of the Union population lives in the 50 regions benefiting from these funds, which go to improving basic infrastructure and encouraging business investment.
- Another 11.5% of regional spending goes to Objective 2 regions (areas experiencing economic decline because of structural difficulties) to help with economic and social rehabilitation. Some 18% of the EU population lives in such areas.
- Objective 3 focuses on job-creation initiatives and programmes in all regions not covered by Objective 1. 12.3% of funding goes towards the adaptation and modernisation of education and training systems and other initiatives to promote employment.

There are also four special initiatives, accounting between them for 5.35% of the structural funds. They cover cross-border cooperation, programs for urban renewal and fair access to labour markets (http://europa.eu.int/comm/regional_policy/).
Greece is a peripheral European Union (EU) country. The country is divided in thirteen NUTS II regions according to EC No 1059/2003 (Official Journal of the European Communities, 2003). In alphabetic order, they are: Attica, Central Macedonia, Continental Greece, Crete, Eastern Macedonia, Epirus, Ionian Islands, North Aegean,

Peloponnese, South Aegean, Thessaly, Western Greece and Western Macedonia. All the Greek Regions are depicted in the following figure. Thessaly is in the center of Greece, colored with light blue:

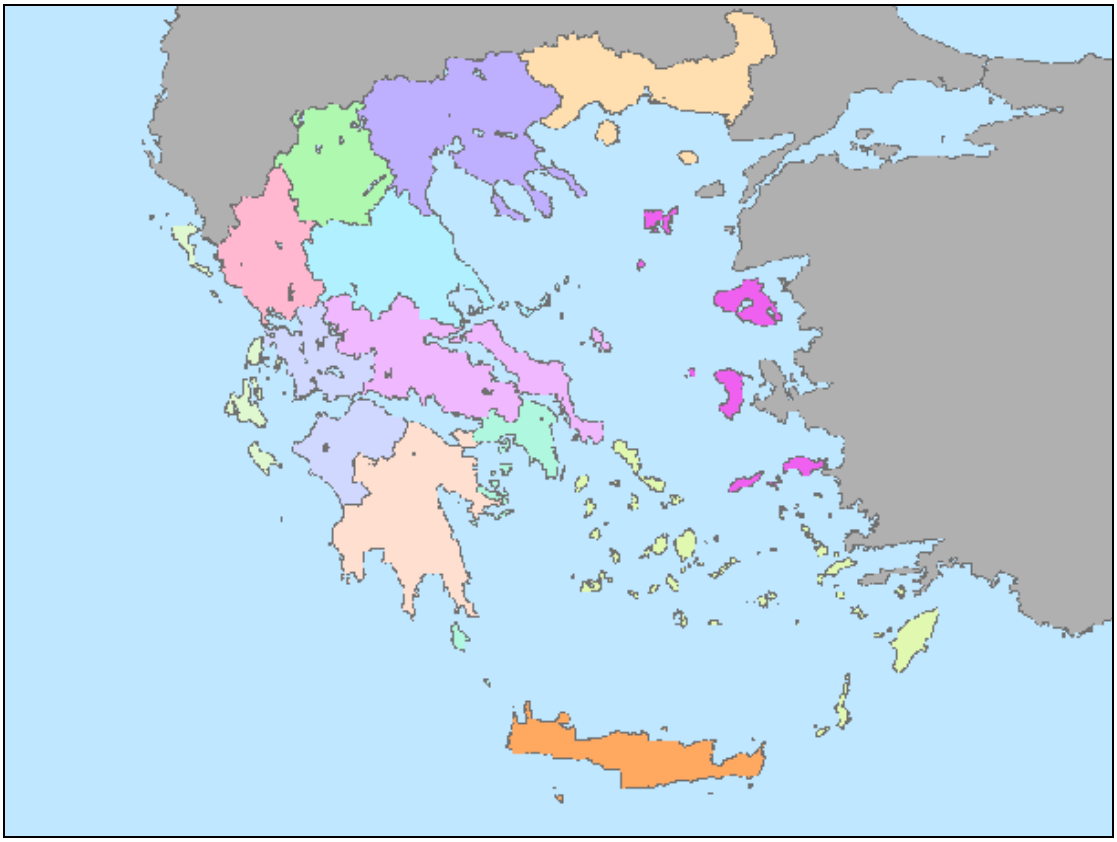

Figure 1.1: The 13 Greek Regions

Source: www.ypes.gr/periferiakh.htm

In 2000-06 programming period, all the Greek regions qualify for EU Objective 1 assistance. This assistance, added to Cohesion Fund budget for Greece, as well to the budget of four special initiatives, constitutes the financial resources of the 3rd Community Support Framework (CSF) for Greece (www.hellaskps.gr).

CSF is a document that represents an agreement between the European Commission and Greece as an individual member-state, and it outlines the regional development purposes and targets to which both European and member state financial resources will be directed. Within CSF more specific actions are defined in the form of Operational Programs and other measures, including the provision of global grants to designated authorities (Roberts, 2003).

Within the context of 3rd CSF are included 24 Operational Programs: 13 regional ones and 11 sectoral programs. Information Society, Competition, Environment, Culture,

Employment and Professional Training are some sectoral programs (Pantouvakis & Alesta, 2004).

Each of the 24 Operational Programs is managed by a specifically established Programme Management Authority (PMA). Every PMA is coordinated by a Manager and consists of four Units: The Programming and Evaluation Unit, the Monitoring and Administration Unit, the Audit Unit and the Organization and Support Unit (Greek Low, 2860, 2000).

1.1.2 Regional Operational Program of Thessaly

Coming to Thessaly, Regional Operational Program (ROP) is called to face Region's structural problems and accelerate its convergence with the more developed regions of EU using the Objective 1 assistance. ROP's structure is presented in Figure 1.2. The total number of measures in the 6 priority axes is equal to 41. Each measure finances a number of projects. The number depends on measure's nature and funds.

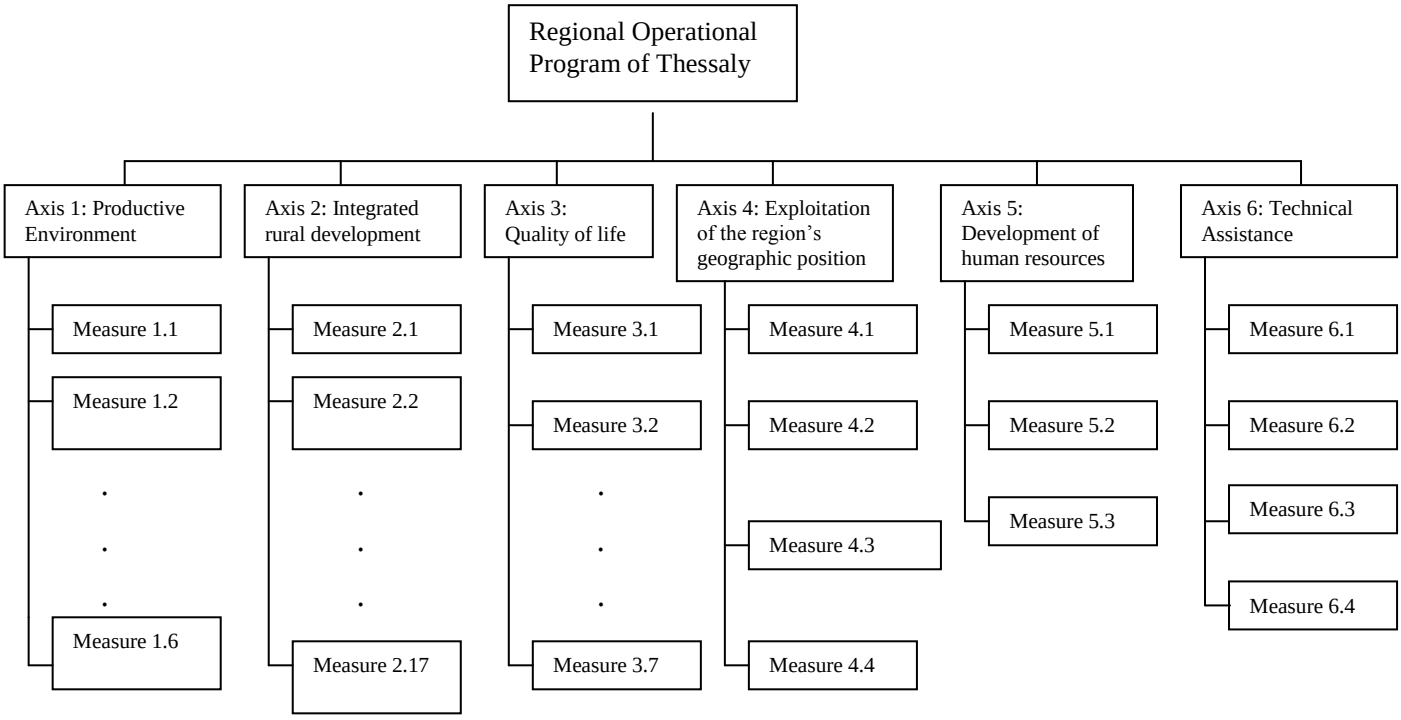

Figure 1.2: Structure of the ROP of Thessaly

Source: www.thessalia.gr/pep

The basic targets of each ROP's priority axis are described in Appendix I. Its total cost is analysed in EU contribution, Public aid and private contribution and is distributed on annual basis throught the intervention period. The total budget of the 3rd CSF dedicated to ROP involves community support funds (585,4 million euros), investment funds from

the public sector (196,5 million euros) and funds from the private sector (144,5), creating total resources of 926,4 million euros. The sum of the community support and public funds consists ROP's public spending (www.thessalia.gr/pep/pepcomple.el.asp). ROP's contribution to Thessaly's economic development and convergence is important. It constitutes a considerable driver for regional development, contributing to Gross Peripheral Product (GPP) growth and providing employment.

According to the article 31.2 of EU regulation 1260/1999, "the EU shall automatically decommit any part of a commitment for which it has not received an acceptable payment application by the end of the second year following the year of commitment", or, otherwise, will apply the (n + 2) rule (Official Journal of the European Communities, 1999).

Hence, a key priority of the national authorities is the absorption of as large portion of the available funds as possible. Furthermore, according to the article 93 of EU Regulation 1083/2006, the automatic decommitment rule will be applied in the forthcoming EU programming period 2007-2013 with a slight difference: for the first two years of programs implementation, automatic decommitment will be executed by the end of the third year following the year of commitment ((n+3) rule), while, for the rest years, by the end of the second year following the year of commitment (n+2 rule) (Official Journal of the European Communities, 2006).

On the other hand, the absorption of ROP funds throughout 2005 was only 123.487.412 Euros (www.thessalia/pep), instead of 155.680.169 Euros in public spending terms, according to the ROP's approved financing tables (www.thessalia.gr/pep/pep_texts/2000GR161P0006-04-5712-Dec.pdf).

1.1.3. Operational Programs implementation, monitoring and control main bodies

Based on the experience from the previous CSFs implementation, and taking into account the EU regulations demands, Greece has developed a system to programme, monitor, evaluate and control 2000-2006 co financed projects (Greek Low 2860, 2000). According to this, the bodies involved in the Operational Programs implementation are:

- The 3rd CSF Managing Authority
- The 24 Operational Programme Management Authorities
- The Single Paying Authority (SPA),
- The Financial Control Committee (FCC),

- The 3rd CSF Steering Committee,
- The 24 Operational Programmes Steering Committees,
- The European Commission
- The co financed Projects Final Beneficiaries.

The operational correlation of these parties is depicted in the following figure, while the description of their main responsibilities can be found in Appendix I as well as the mission and the main responsibilities of Management and Organization Unit (MOU), the supportive mechanism of 3rd CSF implementation.

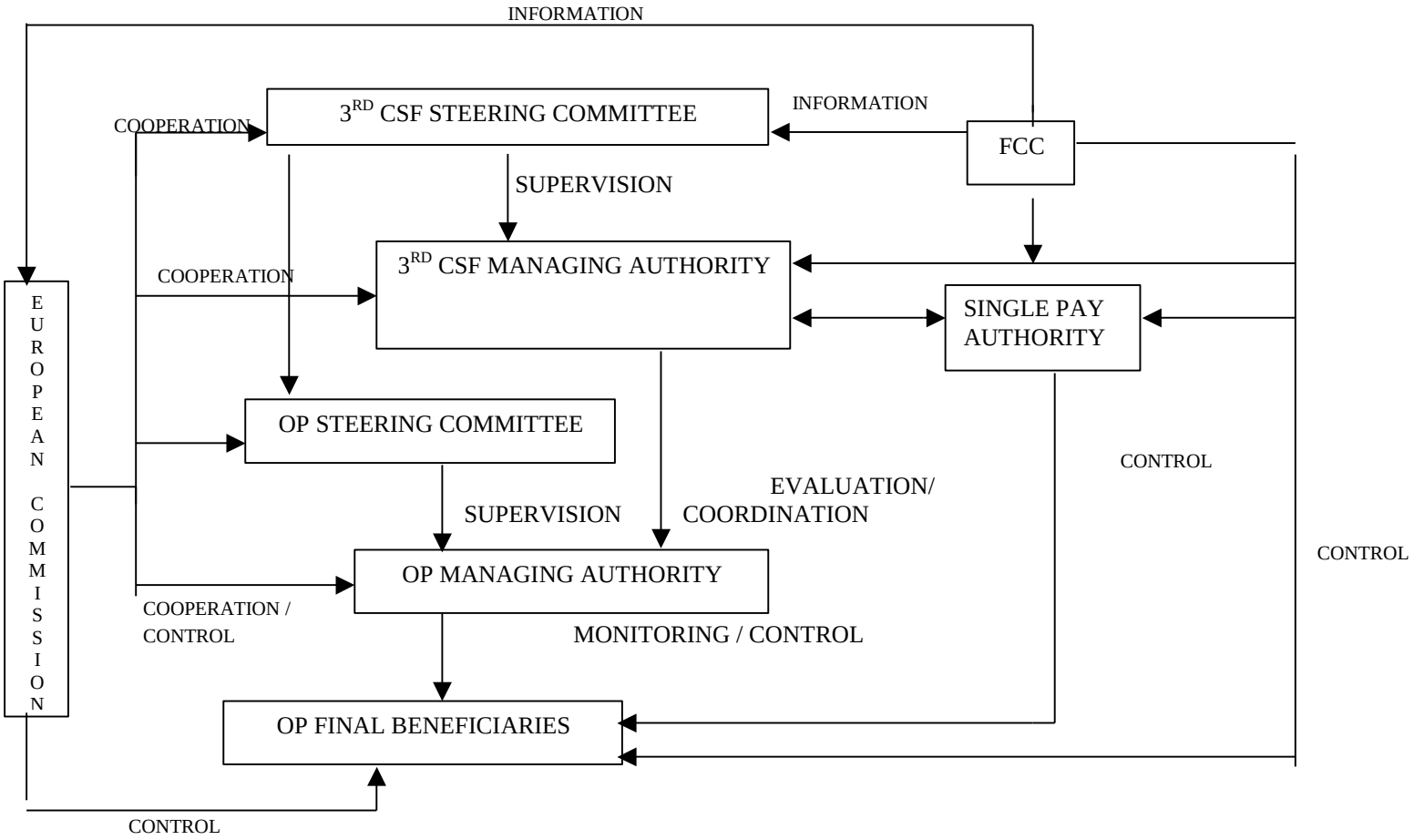

Figure 1.3: Operational Correlation of 3rd CSF main bodies

Source: Greek Ministry of Finance, 2001

1.1.4. ROP's stakeholders

Naylor, 2004, defines stakeholders as the individuals or groups, inside or outside the organization, who have a meaningful stake in its performance.

According to this definition ROP's and, thus, PMA's stakeholders are all the bodies referenced in the previous section as well as the Thessalian population.

1.1.5. Evaluation and Approval of submitted proposals in ROP

The evaluation of proposals submitted in response to a call for proposals, is a typical example of a knockout workflow process: if anyone of the involved steps reports a reason of rejection, the proposal is rejected. Only proposals that successfully pass all evaluation steps are accepted. The overall objective of the process is to select and proclaim those projects that implement the best way the objectives set by the measure of the Axis the call for proposals is referred to.

The evaluation of a submitted proposal is performed through the following steps:

a) Proposal Registration: it includes proposal receipt and data capture. The proposing potential final beneficiary completes a standard document called "Technical Project Sheet" (TPS). All data presented in TPS are recorded in a distributed database system, the Integrated Management Information System (MIS). In Appendix III, a description of the basic features of TPS and MIS is given. Proposals submitted without a TPS are rejected. This step has a maximum duration equal to 5 days.
b) First-Level Proposal Evaluation: An evaluator from PMA's Monitoring and Administration Unit performs eligibility, consistency and completeness checks on the received proposal. This step lasts at most 15 days.
c) Second-Level Proposal Evaluation: An evaluator from the Audit Unit performs either direct evaluation or comparative evaluation (the proposal call notifies the procedure to be followed). In both cases, the evaluation will document the level of substantiality for each received proposal. This step results in the completion of a formal document, the "Evaluation Form" that is signed by the PMA manager and the responsible operator. The maximum step duration has been set equal to 20 days.
d) Submission of Evaluation results and Coordination: All evaluation details are recorded in the MIS System. The proposals that have passed successfully the above checks are submitted to those ministries that are competent to perform the final proposal evaluation, as well as to the 3rd CSF Managing Authority. Corresponding answers are expected within 15 working days. After a successful evaluation, the

General Secretary of Region of Thessaly signs a co financing approval decision and the Final Beneficiary has to be prepared for call for tenders releasing (Gerogiannis *et al.*, 2004). The main points of this decision are described in Appendix IV and are entered in MIS.

After the end of the call for tender the Final Beneficiary selects the contractor and signs the project implementation contract and the implementation phase of the project starts. It is emphasized that one project may have more than one sub-projects and thus contracts. The Final Beneficiary is obliged to provide to PMA the Monthly Spending Declaration Report on the financial progress of the project or sub-projects, in case they exist (Mavrotas *et al.*, 2005).

1.1.6. Financial implementation monitoring of co financed projects

On annual basis the PMA submits to the SPA the ROP's spending forecast. This is the sum of each project-spending forecast. In an ideal case, there should be an agreement between the spending declared in the TPS and the real spending of each project throughout the year. Thus, the only action remaining to PMA would be to use the respective MIS report.

In real life, many changes occur in initially planned project spending, even in the planned in the beginning of each year. Some reasons are changes in national or European legislation, late project releases and delays in project contractor selection. On the other hand, PMA must diminish the data uncertainty and ambiguity and know any time the real "picture" so as to inform in time the ROP's Steering Committee for possible funds losses with parallel suggestions of corrective budget allocations in the ROP's meters. PMA's tools in this task are the co-financed project's Monthly Spending Declaration Report and the Tri-monthly Natural Object Monitoring Report examining. In the last, the Final Beneficiary has, not only to write down existing project implementation problems and delays, but also to warn PMA for forthcoming ones. Whenever necessary, PMA organizes ad hoc technical meetings with the Final Beneficiaries in order both sides agree certain steps to overcome the existing or forthcoming problems and delays (www.thessalia.gr/PEP/uploads/legislations/projects.implemetation.system.doc).

1.2 Aims and objectives of the research

Considering the presented above, it was estimated that the research of factors negatively affecting ROP's funds scheduled absorption in order improvement suggestions to be made, would contribute to Thessaly's further development and convergence with the most developed European Union Regions.

It is obvious that all the bodies involved in ROP's implementation influence, more or less, it. Also, it is obvious that the role of the Final Beneficiaries is the most crucial in terms of program's funds absorption. This becomes clearer taking into account the basic national legislation regarding to projects' contracting and implementation:

Greek Low 1418/1984 about public works implementation states, "…Projects' monitoring, control and administration is responsibility of the technical department of the public Authority (Final Beneficiary), who takes all the necessary measures for the proper and in time projects implementation…".

Furthermore, Greek Low 3316/2005 about studies and relative services implementation mentions, "…the public Authority (final beneficiary) defines one or more of its executives as responsible for studies or services implementation. They must possess the knowledge and the technical abilities to supervise the implementation…"

In parallel, and within the context of ROP's Axis 6, the Final beneficiaries support aiming in improvement of co financed projects implementation is eligible. This support, as has mentioned in Appendix II, is also one of MOU's basic objectives. But the questions coming up were: which are the main factors that influence negatively final beneficiaries' operation in relation with projects implementation? These factors should be determined and prioritized, in order proper suggestions to follow.

This research, apart from its social value, presents a personal interest for me. I am one of the 26 executives working in ROP's PMA (www.thessalia.gr/pep/). More specifically, one of my basic responsibilities is the insurance of effective usage of ROP's Axis 6 "Technical Assistance" funds. Thus, this research results could be a useful tool for a more effective use of Technical Assistance's Funds for the rest of this programming period ending 31 of December 2008.

Furthermore, Region of Thessaly has entered in the last phase of preparation for the next programming period 2007 – 2013 and an amount of 10 million Euros is afforded for preparatory actions through ROP's meter 6.4 (www.thessalia.gr/pep/). The problems in ROP implementation is one of the issues to be examined so as the proper actions to be scheduled and financed in time. Hence, the definition of causes of problems in co

financed projects financial implementation not only from PMA's point of view but also from Final Beneficiaries' point of view, as well as their prioritisation, was estimated as useful in decision making about next programming period preparatory actions.

1.3 Structure of dissertation

The dissertation is structured in seven chapters, introduction included. The titles of the rest six chapters and their indicative contents are:

- Literature Review: includes the review of the research theoretical background. Thus Program and Project Management subjects, Cluster Analysis techniques, Multi Criteria Decision Aid methods, a review of Information Systems categories as well as research carried out in similar fields are presented.
- Methodology: here in the data requirements are identified and analyzed, the secondary and primary data sources are defined and the research design is developed taking into account the relative Literature.
- Empirical Study: includes the secondary data analysis results on the basis of which the respondents, FB and PMA, were selected. Following, the responses completion and collection procedure is described.
- Results: The collected primary data process and the process findings were described and discussed.
- Conclusions and Recommendations: Based on the research findings conclusions were extracted and suggestions about proper actions to be taken were stated.
- Reflections on Learning: the personal experience of Dissertation carrying out was described.

2. LITERATURE REVIEW

2.1 Program, Program & Project Management

2.1.1 Definitions

A program is a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually (Project Management Institute, 2006).

According to Pellegrinelli, 1997, a program is a framework for grouping existing projects or defining new projects and for focusing all the activities required to achieve a set of major benefits. These projects are managed in a coordinated way, either to achieve a common goal or to extract benefits, which would not be realized if they were managed independently.

A project has a definite beginning, definite ending, and has several interdependent tasks. Unfamiliarity and uniqueness are also often described as characteristics of a project. Project management is concerned with completing a project on time, within budget, and according to the project specifications while satisfying both the customer and project team expectations. As a discipline, project management is assuming importance similar to other disciplines in an organization such as engineering (Rad & Levin, 2002 in Anantatmula, 2004).

Programs are well placed to establish a bridge between projects and the strategic goals of an organization As such, they move into the traditional domain of strategic change management and organizational development.

Influencing, lobbying, negotiating, manipulating, co-opting, leveraging diverse sources of power and applying pressure are part of the daily life of the program managers. They operate as objective professionals while recognizing political agendas and addressing the needs of multiple stakeholders (Pellegrinelli, 2002).

Lyccet *et al.*, 2004, define Program Management (PM) as “the integration and management of a group of related projects with the intent of achieving benefits that would not be realized if they were managed independently”.

Murray-Webster and Thiry, 2000 in Thiry, 2002, define PM as “a collection of change actions (projects and operational activities) purposefully grouped together to realize strategic and / or tactical benefits”.

Project Management Institute, 2006, defines PM as “the centralized coordinated management of a program to achieve the program’s strategic benefits and objectives”.

2.1.2 Program & Project Management characteristics

Central Computer and Telecommunications Agency, 1999, in Thiry, 2004, states that there are two characteristics that make program management the most suitable methodology to ensure successful implementation of strategies. They are:

- The concept of *a cyclic process*, which enable regular assessment of benefits, evaluation of emergent opportunities and pacing of the process,
- An emphasis on the "*interdependability"* of projects, which ensures strategic alignment.

It is to be noted that multi-project management does not take those two characteristics fully into account: they typically concentrate on human resources and cost and seldom have a systemic view of the program (Thiry, 2004).

Mullaly, 2004, agrees with the above thesis, referring to the importance of human resources part. He states that while many organizations look to project management primarily as a means of ensuring performance on time and on budget, the ability to deliver to these targets is still today a matter of the quality and perseverance of individuals and teams. Although the goal for most organizations is to attain a level of consistency and repeatability in their processes, the reality is that there is still very little consistency in organizational practices and a wide range of understanding within organizations of the processes and capabilities that exist and how they are to be utilized. Process capabilities continue to be less rigorous and mature than many organization managers expect or believe, and while some organizations are leading examples of best-in-class process capabilities, many more are still struggling with some of the fundamental principles of project management.

In the next table, a comparative overview of Project and Program Management is presented:

Table 2.1. Comparative Overview of Project and Program Management

Project	**Programs**
Projects have a narrow scope with specific deliverables.	Programs have a wide scope that may have to change to meet the benefit expectations of the organization.
The project manager tries to keep changes to a minimum.	Program managers have to expect changes and even embrace it.
Success is measured on budget, on time and products delivered to specification.	Success is measured in terms of Return On Investment (ROI), new capabilities and benefit delivery.

Leadership style focuses on task delivery and directive in order to meet the success criteria	Leadership style focuses on managing relationships, and conflict resolution. Program manager's needed to facilitate and manage the political aspects of the stakeholder management.
Project managers manage technicians, specialists, etc.	Program managers manage project managers.
Project managers are team players who motivate using their knowledge and skills	Program managers are leaders providing vision and leadership.
Project managers conduct detailed planning to manage the delivery of products of the project.	Program managers create high-level plans providing guidance to projects where detailed plans are created.
Project managers monitor and control tasks and the work of producing the projects products.	Program managers monitor projects and ongoing work through governance structures.

Source: Project Management Institute, 2006, p. 8

From the above overview it is obvious that the rationale for program management lies in strategic management rather than in the technical level; the focus is on the organization rather than the team and instead of talking about deliverables, one talks about benefits. In addition, the program environment is complex: there are multiple stakeholders with differing and often conflicting needs, emergent inputs are always affecting the process and ambiguity is high. Because of the fact that programs are typically of a longer duration than projects, needs and expectations will evolve, intermediate results will affect the final output and interdependencies will further complicate matters. Processes that are applicable to project management cannot be readily applied to program management as programs have an uncertain finality, which requires processes that are both cyclic and aimed at reducing ambiguity; typically: identification of needs and expectations, value management, ongoing negotiation and group decision-making (Thiry, 2004).

On the other hand, it is characteristic that even those who advocate that programs are more than just large projects and need to address strategic benefits still promote a project paradigm to run programs. For example, the recently developed Program Management Maturity Model (PMM) points out that most organizations still consider "organization", "issues and risk", "planning" and "accounts and finance" as key to the

success of programs whereas “achievement of benefits”, “stakeholders management”, “communications” and “configuration management” seem less important (Thiry, 2002).

2.1.3 Program and Project Management phases

According to Thiry, 2004, Program Management life cycle consists of five phases (FOrDAD model):

- Formulation (sense making, seeking of alternatives, evaluation of options, and choice).
- Organization (strategy planning and selection of actions)
- Deployment (execution of actions – projects and support operational activities and control)
- Appraisal (assessment of benefits, review of purpose and capability, and repacing, if required)
- Dissolution (reallocation of people and funds, knowledge management and feedback).

BSI, 2002, states that all projects tend to go through a similar life cycle. In large schemes the elements may be very clearly separated, in smaller works they may be linked and/or blurred. In general, it is useful and possible to identify the work that is carried out, as follows:

- Conceptualization and basic ideas
- Feasibility tests for technical, commercial and financial viability
- Evaluation and application for funds and stating risks
- Authorization and setting any conditions
- Implementation including design, procurement, fabrication, installation, etc.
- Control / Accountability, periodic reviews and updates
- Completion and handover to client
- Operation and inclusion in normal revenue planning / control procedures
- Close Down and cease operations
- Termination including disposal of residual assets (liabilities).

Effective project management may be broken down into five elements:

- Planning
- Organizing
- Motivating

- Implementing
- Control by review and accountability.

Senior management is responsible for establishing the objectives and constraints within which the project has to be delivered. They should set realistic criteria and ensure that adequate planning has been done. This should establish the proposed expenditure and test the realism and acceptability of the expected benefits being put forward as justification.

Sub-standard project performance often results from failures at the planning stage causing a series of subsequent alterations/classifications that push up expenditure and create delays.

Increasingly projects cut across departmental boundaries. In these cases management has to ensure that the appropriate organization is in place to run a project. This organization will often be a temporary arrangement, but will generally call for a project manager supported by a team of staff with the appropriate skills for the needs of the project (BSI, 2002).

2.1.4 Sense making

The first premise of good program management is to fully understand stakeholders' needs and expectations. Louis, 1980, in Thiry, 2002, describes sense making as "a recurring cycle comprised of a sequence of events occurring over time. The cycle begins as individuals form unconscious and conscious anticipations and assumptions, which serve as predictions about future events".

In ambiguous situations, Quinn, 1996, in Thiry, 2002, advocates what he calls "good conversation". It could be associated with sense making and requires the following features:

- "Issues-oriented", focusing on specific problems and alternative courses of action;
- "Rational", meaning "intelligible, reasonable and well argued";
- "Imaginative", in the sense that it encourages "open social interaction", and
- "Honest", in that inputs must be true and agreed outputs "honored".

2.1.5 Monitoring and control

Control is the act of reducing the difference between plan and reality (Meredith & Mantel, 2003).

A core element of program management is tracking progress on projects and taking action. Monitoring the financial spend and resource utilization is relatively straightforward since they are additive across the projects over time. It is a matter of technical convenience how and in what format the information is collected. The continuity of a program facilitates the analysis of the business benefits realized by project deliverables, and the use of this information as an input into the planning and execution of current projects within the program. For a goal-oriented program this may be essential feedback in determining future direction (Pellegrinelli, 1997).

2.1.6 Uncertainty – Ambiguity

Uncertainty is produced due to lack of data, while ambiguity is produced due to lack of clarity or consistency of data.

Uncertainty and ambiguity each require a different level of medium richness, where "richness is defined as the potential information-carrying capacity of data". Whereas uncertainty can be dealt with through the quantity of information with simple written medium lacking richness, ambiguity needs to be dealt with through the quality of information and requires a rich medium like face-to-face (Thiry, 2001).

Organization, planning and cost management, as well as risk management reduce uncertainty. On the other hand, ambiguity reduction is linked with softer issues such as benefits, stakeholders and communications (Thiry, 2002).

Partington, 2000 in Thiry, 2002, argues that programs require integration across strategic levels, controlled flexibility, team-based structures and especially, an organizational learning perspective, which is able to accept paradox and uncertainty. An «ambiguity-reduction» process that needs to take place before any attempt is made at uncertainty reduction must support these various concepts about program management. It is supported by: learning, value management, sense making, information sharing, group decision support and "shared construction" of statements.

Additionally, in the current organizational context and culture of accelerated change, managers are required to process a large flow of, often contradictory, information in a short time. Program managers, in particular, are caught right between the ambiguous,

soft, “fuzzy” realm of strategic management and the concrete, hard place of implementation. They have to deal with both high ambiguity and high uncertainty at the same time (Thiry, 2002).

2.1.7 Program Management of EU co financed Programs

While it is difficult to talk about a single management process in the context of a multi-level, multi-agency system like the EU, the following basic functions can be identified within the different levels of management (supranational, national and local), which in theory link together (Levy, 1996 & 1998 in Levy, 2001):

- Authorization: approval to access funds and the processes of transfer of funds to approved bodies
- Administration: planning, setting goals and targets, problem solving, managing and storing information, establishing operating systems, reporting to line managers
- Audit: technical, legal and regularity
- Review and evaluation: comprehensive, effectiveness and program evaluation.

Levy, 2001, proposes a set of eight Performance Indicators (PI) based on the above four functions of program management. The fundamental approach is to build up a quantified portfolio of evidence on the quality of key management activities. These are:

1. *Levels of budget utilization by program:* Over- or undershooting budgetary allocations can be seen as an indicator of poor management ceteris paribus. The closer actual spending is to the initial allocation, the better. Over- and under-utilization are always remarked upon negatively.
2. *The maintenance of program and project schedules and evidence of delays*
3. *The quality and coverage of management information and information systems:* includes provision of adequate management information for managers and auditors within the framework of clearly understood nomenclature. Comprehensive and comprehensible accounts are an essential part of any management information system.
4. *The level of controlling, checking and audit activity:* Evidence of poor control could include both a lack of regular control activity and the existence of poorly designed or ineffective controls.
5. *The level of irregularity in procedures and payments:* Instances of irregularities in procedures show a lack of consistency and legitimacy in procedure design or a

failure of the management system to enforce procedures. Irregular payments are a sub-set of this indicator.

6. *Evidence of inter-agency coordination:* in the narrow sense, examples could include the sharing of information; the harmonization of systems, joint controls and audits.
7. *The degree of planning and targeting:* Presence / absence of planning goals and specific target setting.
8. *The degree of impact assessment and program evaluation:* Evidence of these activities confirms the existence of the feedback loop, which runs through routine controls, checks and auditing into the next round of decision making and program adjustment relevant to all levels.

2.2 Computer-based information systems

Information management has been defined as the organization-wide capability of creating, maintaining, retrieving and making immediately available the right information, in the right place, at the right time, in hands of the right people, at the lowest cost, in the best media for use in decision-making (Langemo, 1980 in Adeoti-Adekeye, 1997).

The basic tool of information management is Information Systems (IS). Duff and Assad, 1980, in Adeoti-Adekeye, 1997, define them as "a collection of people, procedures, a base of data and hardware and software that collects, processes, stores and communicates data for transaction processing at operational level and information to support Management decision making".

Hartono et al., 2006, classify these systems in the following categories: Decision support systems (DSS), Expert Systems, Data Warehouses, Group Decision Support Systems, and Executive Information and Management Information Systems (MIS). The definition and the characteristics of these systems are presented in Appendix V.

Argyris, 1991, in Adeoti-Adekeye, 1997, states that "…a MIS is a system using formalized procedures to provide management at all levels in all functions with appropriate information based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible".

On the other hand, the concept of Decision Support System (DSS) is very broad due to many approaches to decision-making and to the wide range of domains in which decisions are made. In general, it can be said that a DSS is a computerized system for

helping make decisions, where a decision is a choice between alternatives, based on estimates of the values of these alternatives.

Supporting a decision means helping people working alone or in a group, gather intelligence, generate alternatives and make choices. Supporting the choice making process involves supporting the estimation, the evaluation and / or the comparison of alternatives. In practice, references to DSS are usually references to computer applications that perform such a supporting role.

According to Keen and Scott Morton, 1978, a DSS couples the intellectual resources of individuals with the capabilities of the computer to improve the quality of decisions. Sprague and Carlson, 1982, define DSS as the "interactive computer-based systems that help decision makers utilize data and models to solve unstructured problems" while Keen, 1980, claims that it is impossible to give a precise definition including all the facets of the DSS. He states that "there can be no definition of decision support systems, only of decision support" (www.wikipedia.org).

Executive support systems (ESS) are computer-based systems that provide top managers with the capability to attain easy access to internal and external information that is relevant to strategic decision-making and other executive responsibilities.

The opportunity for strategic advantage through technological exploration is now available through the use of ESS technology (Nord and Nord, 1995).

Independently of the IS used, it has been well recognized that the implementation of corporate strategy requires functional strategies that are well integrated and coordinated. The need for such integration and coordination has been widely discussed at a theoretical level, both in the general strategic management literature and in the IS management literature. There has been a consistent emphasis in the IS management literature on the need for a proper fit between organizational and IS goals and strategies. Henderson and Sifonis, 1988, in Ragu-Nathan et *al*, 2001, pointed out that effective strategies provide internal consistency between Information Technology (IT) goals and firm goals. Frenzel, 1992, in Ragu-Nathan *et al*, 2001, extended this line of thinking by proposing that the alignment of IT goals and strategies with the firm's goals and strategies should be regarded as a critical success factor for the IT organization.

Coming to ROP's MIS, although it is very well structured, and it holds a vast amount of information, accessed easily by project and program managers, its design conforms to the typical characteristics of a management information system rather than a decision support system. With regard to the information needed for management decisions in

PMA, the main weaknesses of MIS are first that it provides only historical information on project progress and costs, as they are reported by final beneficiaries without any validation or crosscheck between financial information against the progress of a project and second, that it has no forecasting capacity about possible cost and time deviations (Ipsilandis, 2006).

2.3 Cluster Analysis

2.3.1 Cluster Analysis characteristics

Cluster Analysis is the organization of a collection of patterns (usually represented as a vector of measurements or a point in a multidimensional space) into clusters based on similarity. Intuitively, patterns within a valid cluster are more similar to each other than that they are to a pattern belonging to a different cluster (Jain *et al*., 1999, in Rubinov *et al.*, 2006).

The main difference between classification and clustering is that in the case of classification the alternative activities are to be put in already known categories, while clustering aims to create categories which will include activities with similar characteristics (Doumpos & Zopounidis, 2001).

Cluster analysis is not as much a typical statistical algorithm as it is a family of different algorithms that "put points into clusters". Cluster analysis methods are mostly used when we do not have any a priori hypotheses about the patterns embedded in the data. It doesn't rely on the target class information of data points and the underlying model of the data points. Cluster analysis finds the clusters of data points by optimizing a given criterion or simply using certain heuristics (Ye & Li, 2002).

2.3.2 Data clustering algorithms

Data clustering algorithms can be hierarchical or partitional. Hierarchical algorithms find successive clusters using previously established clusters, whereas partitional algorithms determine all clusters at once. Hierarchical algorithms can be agglomerative (bottom-up) or divisive (top-down). Agglomerative algorithms begin with each element as a separate cluster and merge them in successively larger clusters. Divisive algorithms begin with the whole set and proceed to divide it into successively smaller clusters.

A key step in hierarchical clustering is to select a distance measure. A simple measure is Manhattan distance, equal to the sum of absolute differences for each variable. The name comes from the fact that in a two-variable case, the variables can be plotted on a

grid that can be compared to city streets, and the distance between two points is the number of blocks a person can walk.
A more common measure is Euclidean distance, computed by finding the square of the distance between each variable, summing the squares, and finding the square root of that sum. In the two-variable case, the distance is analogous to finding the length of the hypotenuse in a triangle (www.wikipedia.org).
Other popular distance measure methods are the Centroid Method, the Nearest neighbor or Single-linkage method, the Farthest-neighbor or Complete-linkage method, the Average-linkage method and the Wald's method (SPSS, 2005).
Partitional methods seek to obtain a single partition of the input data into a fixed number of clusters. They usually produce clusters by (locally) optimizing an adequacy criterion. To improve cluster quality, the algorithm is run multiple times with different starting points and the best configuration obtained from the total runs is used as the output clustering (Carvalho et al., 2006).
K-means clustering, QT (Quality Threshold) Clust algorithm, Fuzzy c-means clustering and Spectral clustering as well as Two-Step Cluster Analysis are some of the algorithms that can be used (www.Wikipedia.org).

2.3.2.1 K-means method

The k-means method is a well-known geometric clustering algorithm based on work by Lloyd in 1982. Given a set of n data points, the algorithm uses a local search approach to partition the points into k clusters. A set of k initial cluster centers is chosen arbitrarily. Each point is then assigned to the center closest to it, and the centers are recomputed as centers of mass of their assigned points. This is repeated until the process stabilizes. It can be shown that no partition occurs twice during the course of the algorithm, and so the algorithm is guaranteed to terminate.
The k-means method is still very popular today, and it has been applied in a wide variety of areas (www.stanford.edu).
The main advantages of this algorithm are its simplicity and speed, which allows it to run on large datasets. Its disadvantage is that it does not yield the same result with each run, since the resulting clusters depend on the initial random assignments. It maximizes inter-cluster (or minimizes intra-cluster) variance, but does not ensure that the result has a global minimum of variance (www.wikipedia.org).

2.3.2.2 Fuzzy c-means method

In fuzzy c-means clustering, each point has a degree of belonging to clusters, as in fuzzy logic, rather than belonging completely to just one cluster. Thus, points on the edge of a cluster may be in the cluster to a lesser degree than points in the center of the cluster. For each point x we have a coefficient giving the degree of being in the k_{th} cluster $u_k(x)$. Usually, the sum of those coefficients is defined to be 1, so that $u_k(x)$ denotes a probability of belonging to a certain cluster (www.wikipedia.org).

2.3.2.3 Two-Step method

Two-Step Cluster Analysis is based on a distance measure that enables data with both continuous and categorical attributes to be clustered. This is derived from a probabilistic model in which the distance between two clusters is equivalent to the decrease in log-likelihood function as a result of merging (Chiu *et al.*, 2001 in Okazaki, 2006).
In the first step, original cases are grouped into preclusters that are then used in place of the raw data in the hierarchical clustering. Based upon its similarity to existing preclusters, each successive case is added to form a new precluster, using a likelihood distance measure as the similarity criterion. Cases are assigned to the precluster that maximizes; in the second step, the preclusters are grouped using the standard agglomerative clustering algorithm, producing a range of solutions, which is then reduced to the best number of clusters on the basis of the Shwartz's Bayesian Inference Criterion (BIC) that is known as one of the most useful and objective selection criteria, because it essentially avoids the arbitrariness of traditional clustering techniques. In addition, both background noise and outliers can be identified and screened out (Okazaki, 2006).

2.4 Multiple Criteria Decision Making

2.4.1 Historical Evolution

Multi-Criteria Decision Making (MCDA) is a well-known branch of decision-making. It is a branch of a general class of operations research models, which deal with decision problems under the presence of a number of decision criteria. This major class of models is very often called MCDM (Pohekar & Ramachandran, 2004).
Pareto's study in 1896 is the first scientific attempt in multi-criteria analysis field. In his study, Pareto introduced the "efficiency" term, one of the most basic terms in this field.

In 1951, Koopmans extended Pareto's efficiency term by introducing the "effective total" term. This term means the total of the alternative activities that are not dominated by any other alternative activity (non-dominated set of alternatives). In about the same time period, Von Neumann and Morgenstern, 1944, developed the Utility Theory. Utility functions are widely used for preferential modeling purposes. In the simplest additive case the utility function can be formally stated as follows:

$U(g) = \sum u_j(g_j) \in [0,1]$, for j = 1, …, m,

where $u_j(g_j)$ is the marginal utility function of criterion g_j.. Each marginal utility function provides a mechanism for transforming the scale of the corresponding criterion into utility/value terms. The major advantage of using such a transformation mechanism is that it enables the consideration of both quantitative and qualitative criteria. Most existing quantitative modeling forms require a quantification of the qualitative criteria in order to enable their use in a quantitative function. On the contrary, using a utility function the quantification of the criteria's qualitative scales is not a required at the input, but at the output of the model development process.

The global utility of an alternative a_i constitutes an overall measure of the performance of an alternative when all criteria are considered. Thus, the global utility serves as an index used to decide upon the classification/sorting of the alternatives into the predefined groups. The classification is performed through the comparison of the global utilities of the alternatives to some utility thresholds that define the lower bound of each class (Zopounidis & Doumpos, 2002).

Charnes and Cooper, 1961, connected the linear programming theory with multi-criteria analysis, while Fishburn, 1965, extended the Utility Theory in solving decisions problems in multiple criteria environment. In 1968, Roy developed the outranking relations theory (Doumpos & Zopounidis, 2001). The outranking relation is a binary relation that enables the assessment of the outranking degree of an alternative a_i over an alternative a_p. The outranking relation allows concluding that a_i outranks a_p if there are enough arguments to confirm that a_i is at least as good as a_p (concordance), while there is no essential reason to refute this statement (discordance). Within the context of classification/sorting problems the outranking relation is used to estimate the outranking degree of an alternative a_i over a reference profile r_k that distinguishes the classes C_k and C_{k+1}. Each reference profile r_k is defined as a vector of individual profiles for each criterion $g_1, g_2, \ldots, g_m$: $r_k = (r_{k1}, r_{k2}, \ldots, r_{km})$. In order to determine whether an

alternative a_i outranks a reference profile r_k, all paired comparisons (g_{ji}, r_{kj}) and (r_{kj}, g_{ji}) should be performed for all criteria g_j. The former comparison enables the assessment of the strength $\sigma(a_i, r_k)$ of the affirmation "the alternative a_i is at least as good as the profile r_k", while the latter comparison leads to the assessment of the strength $\sigma(r_k, a_i)$ of the affirmation "the profile r_k is at least as good as the alternative a_i". Typically, an alternative a_i is preferred to a profile r_k ($a_i P r_k$) if $\sigma(a_i, r_k) \geq \lambda$ and $\sigma(r_k, a_i) < \lambda$ (λ is a pre-specified cut-off point). If $\sigma(a_i, r_k) \geq \lambda$ and $\sigma(r_k, a_i) \geq \lambda$, then a_i and r_k are considered as indifferent ($a_i I r_k$). Finally, if $\sigma(a_i, r_k) < \lambda$ and $\sigma(r_k, a_i) < \lambda$, then a_i and r_k are considered as incomparable ($a_i R r_k$). Incomparability arises in situations where an alternative has an outstanding performance on some criteria and, simultaneously, very low performance on other criteria (Zopounidis & Doumpos, 2002).

Over the past quarter of the century, the field of MCDM has developed rapidly and, in the process, a number of divergent schools of thought have emerged. A range of tools and approaches are available today to assist decision makers in dealing with the ever-present difficulties of seeking compromise or consensus between conflicting interests and goals (Norese, 2006).

In the following figure Roy, 1985, in Doumpos & Zopounidis, 2001, presents a general context of phasing multidimensional decision-making problems that characterizes absolutely the philosophy of all methodologies in this field.

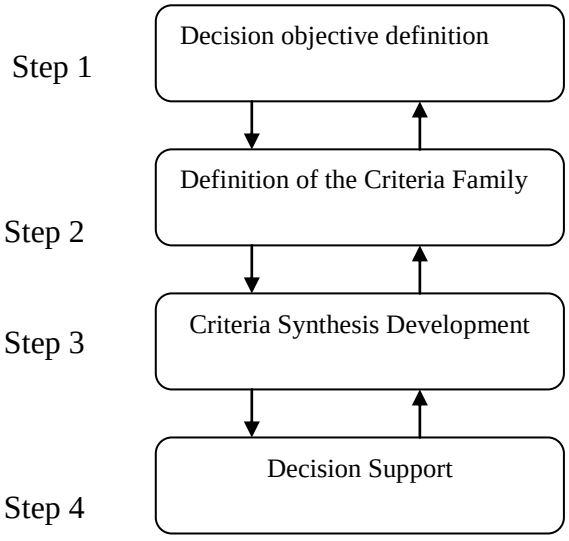

Figure 2.1. The basic steps of decision making within the multicriteria analysis context

"Decision objective" is the way in which the alternative activities have to be examined so as the analysis result to respond clearly to the problem under examination. Alternatives represent the different choices of action available to the decision maker. Usually, the set of alternatives is assumed to be finite, ranging from a few to hundreds, and this set is screened, prioritized and eventually ranked. Multiple attributes represent the lowest level of decision criteria. Different attributes may conflict with each other, and may be expressed in different units. Decision weights are assigned to the attributes. Usually, these weights are normalized to add up to one (Gilliams *et al.,* 2005).

2.4.2 Multiple Criteria Decision Making Categories

MCDM is further divided into Multi-Objective Decision Making (MODM) and Multi-Attribute Decision Making (MADM). In MODM, the alternatives are not predetermined but instead a set of objective functions is optimized subject to a set of constraints. The most satisfactory and efficient solution is sought. In this identified efficient solution it is not possible to improve the performance of any objective without degrading the performance of at least one other objective. In MADM, a small number of alternatives are to be evaluated against a set of attributes that are often hard to quantify. The best alternative is usually selected by making comparisons between alternatives with respect to each attribute (Pohekar & Ramachadran, 2004). MADM requires both intra and inter-attributes comparisons and involve explicit tradeoffs that are appropriate for the problem explained. Each decision matrix in MADM models has three main parts, namely: a) Alternatives, b) Criteria and c) Relative importance of each criterion (weight). In the decision matrix all the elements must be normalized to the same units so that we can consider all the possible criteria in our decision problem (Shanian & Savadogo, 2006).

Roy, 1985, in Zompounidis & Doumpos, 2002, states that when considering a discrete set of alternatives described by some criteria, there are four different kinds of analyses that can be performed in order to provide significant support to decision-makers:

- To identify the best alternative or select a limited set of the best alternatives
- To construct a rank ordering of the alternatives from the best to the worst ones
- To classify/sort the alternatives into predefined homogenous groups
- To identify the major distinguishing features of the alternatives and perform their description based on these features.

The former three approaches (choice, ranking, classification/sorting) lead to a specific evaluation outcome. In deriving this outcome, both choice and ranking are based on relative judgments and consequently the evaluation result depends on the considered set of alternatives. On the other hand, in taking a classification/sorting decision, the decision-maker needs to perform absolute judgments. Since the groups are usually specified independently of the alternatives under consideration, the classification / sorting of the alternatives requires their comparison to some reference profiles that distinguish the groups.

2.4.3 Multi-criteria techniques

In real life, it is not easy to find a decision-making problem with only one goal. When there are several goals and there is a trade-off between them, then multi-criteria techniques are appropriate: the Multi Attribute Utility theory, the ELECTRE and PROMETHEE outranking procedures and the Analytic Hierarchy Process (AHP) (Tudela *et al.*, 2006) are some of the most widely used. Also, the weighted sum method is the most commonly used approach, especially in single dimensional problems (Pohekar & Ramachadran, 2004). Following, these methods are presented.

2.4.3.1 Multi-Attribute Utility Theory (MAUT)

Multi-attribute Utility Theory takes into consideration the decision maker's preferences in the form of the utility function, which is defined over a set of attributes. The utility value can be determined by determination of single attribute utility functions followed by verification of preferential and utility independent conditions and derivation of multi-attribute utility functions. The utility functions can be either additively separable or multiplicatively separable with respect to single attribute utility. The multiplicative form of equation for the utility value is defined as follows:

$$1 + ku(x_1,x_2,\ldots,x_n) = \prod_{j=1}^{n} (1+kk_ju_j(x_j))$$

In this equation, j is the index of attribute, k is overall scaling constant (greater than or equal to –1), k_j is the scaling constant for attribute j, $u(.)$ is the overall utility function operator, $uj(.)$ is the utility function operator for each attribute j (Keeny & Raiffa, 1976, in Pokehar & Ramachandran, 2004).

2.4.3.2 Elimination and Choice Translating Reality (ELECTRE)

ELECTRE method was the first to use an outranking approach. Various types of this method have been developed:

ELECTRE II is a method for dealing with the problem of ranking alternatives from the best to worst. It uses the true criteria where no thresholds exist and the differences between criteria scores are used to determine which alternative is preferred. In this preference structure, the indifference relation is transitive (Wang & Triantafyllou, 2006).

Roy in 1978 and Roy & Bouyssou, 1994, to incorporate the fuzzy nature of decision-making by using thresholds of indifference and preference, originally developed ELECTRE III. The indifference threshold (q) and the preference threshold value (p) are defined for a certain criterion g as:

$g(a) - g(b) \leq q$ (alternative a is indifferent to alternative b and b to a for criterion g)

$g(a) - g(b) > p$ (alternative a is preferred to alternative b for criterion g).

A third important threshold value for this technique is the veto threshold (v) that is defined as:

$g(b) > g(a) + v$ (alternative a is not as good as alternative b for criterion g).

When threshold values are specified and a weight is set for each criterion, a ranking of the alternatives can be derived. It is fundamentally non-compensatory in the meaning that a good score on another cannot compensate a bad score on one criterion. The technique is further characterized by incomparability, which occurs when there is no clear favor of one alternative over another. The resulting rankings are not transitive, and generally the result is a partial ordering (Gilliams *et al*, 2005).

In ELECTRE IV it is possible to rank alternatives without using the relative criteria importance coefficients. This method is equipped with an embedded outranking relations framework. ELECTRE IS is a method used for modeling situations in which the data are imperfect. Finally, ELECTRE TRI is designed to classify the alternatives in various categories. These categories are separated by "reference alternatives". As the comparison is done between alternatives and reference alternatives, this method permits the decision maker to deal with many alternatives (Shanian & Savadogo, 2006).

From the above, it is obvious that ELECTRE method yields a whole system of binary outranking relations between the alternatives. Because the system is not necessary complete, the ELECTRE method is sometimes unable to identify the preferred

alternative. It only produces a core of leading alternatives. This method has a clearer view of alternatives by eliminating less favorable ones, especially convenient while encountering a few criteria with a large number of alternatives in a decision making problem (Goicoechea *et al,* 1982 in Pohekar & Ramachadran, 2004).

2.4.3.3 Preference Ranking Organization METHod for Enrichment Evaluation (PROMETHEE)

This method uses the outranking principle to rank the alternatives, combined with the ease of use and decreased complexity. It performs a pair-wise comparison of alternatives in order to rank them with respect to a number of criteria. Brans *et. al.,* 1986, in Pohekar & Ramachadran, 2004, have offered six generalized criteria functions for reference: usual criterion, quasi criterion, criterion with linear preference, level criterion, criterion with linear preference and indifference area, and Gaussian criterion. The method uses preference function $P_j\ (a,b)$ which is a function of the difference d_j between two alternatives for any criterion j ($d_j = f(a, j) - f(b, j)$, where $f(a, j)$ and $f(b, j)$ are values of two alternatives a and b for criterion j. The indifference and preference thresholds q' and p' are also defined depending upon the type of criterion function. Two alternatives are indifferent for criterion j as long as d_j does not exceed the indifference threshold q'. If d_j becomes greater than p', there is a strict preference. Multi-criteria preference index, $\pi\ (a,b)$, a weighted average of the preference functions $P_j\ (a,b)$ for all the criteria is defined as:

$$\pi\ (a,b) = \sum_{j=1}^{j} w_j\ P_j\ (a,b) \,/\, \sum_{j=1}^{j} w_j$$

$$\varphi^{+}\ (\alpha) = \sum_{A} \pi\ (a,b)$$

$$\varphi^{-}\ (\alpha) = \sum_{A} \pi\ (a,b)$$

$$\varphi(\alpha) = \varphi^{+}\ (\alpha) - \varphi^{-}\ (\alpha)$$

where w_j is the weight assigned to criterion j; $\varphi^{+}\ (\alpha)$ is the outranking index of a in the alternative set A; $\varphi(\alpha)$ is the net ranking of a in the alternative set A. The value having maximum $\varphi(\alpha)$ is considered as the best.

2.4.3.4 Analytical Hierarchy Process (AHP)

AHP was proposed as a method of solving socio-economic decision making problems and has been used to solve a wide range of problems. The AHP is a comprehensive framework that is designed to cope with the intuitive, the rational and the irrational when multi-objective, multi-criterion and multi-actor decisions are made and there is no certainty for any number of alternatives. The basic assumptions of AHP are that it can be used in functional independence of an upper part or cluster of the hierarchy from all its lower parts and the criteria or items in each level (Lee & Kim, 2001).

AHP is a decision-aiding tool for dealing with complex, unstructured and multi-attribute decisions. Thomas L. Saaty developed it during the 1970s. Since its initial development AHP has been applied in a wide variety of decision areas.

There are three steps in using AHP: the description of a complex decision problem as a hierarchy, the prioritization procedure and the calculations of results. The first step in the application of AHP is disintegrating the unstructured decision into components and then arranging them in a hierarchical order. In a typical hierarchy, the top level reflects the overall objective of the decision problem. The elements affecting the decision are called criteria and they are represented at the intermediate levels. Criteria can be subjective or objective depending on the means in evaluating the contribution of the elements below them in the hierarchy. Furthermore, criteria are mutually exclusive and their priority or importance does not depend on the elements below them in the hierarchy. The lowest level comprises the decision options or alternatives. The number of criteria or alternatives should be reasonably small to allow consistent pair wise comparisons. The hierarchy does not have to be complete, that is, an element at the intermediate level is not required to function as a criterion for all elements in the lowest level. Thus, a hierarchy can be divided into sub hierarchies sharing only a common topmost element.

Once the hierarchy has been constructed, the decision maker begins the prioritization procedure to determine the relative importance of the elements in each level.

Elements in each level are compared pair wise with respect to their importance to an element in the next higher level and, starting at the top of the hierarchy and working down, a number of square matrices called preference matrices are created in the process of comparing elements at a given level.

The decision maker can express his preference between every two elements verbally as equally important (or preferred, or likely), moderately more important, strongly more

important, very strongly more important or extremely more important. These descriptive preferences would then be translated into numerical ratings 1,3,5,7 and 9, respectively, with 2,4,6, and 8 (9 points scale) intermediate values for compromises between two successive qualitative judgments. The nominal scale used in AHP enables the decision maker to incorporate experience and knowledge in an intuitive and natural way. This scale is insensitive to small changes in a decision maker's preferences, thereby minimizing the effect of uncertainty in evaluations.

After forming the preference matrices, the process moves to the third step of deriving relative weights for the various elements. The relative weights of the elements of each level with respect to an element in the next higher level are computed as the components of the normalized eigenvector associated with the largest eigenvalue of their comparison matrix. The composite weights of the decision alternatives are then determined by aggregating the weights throughout the hierarchy. Following a path from the top of the hierarchy to each alternative at the lowest level and multiplying the weights along each segment of the path do this. The outcome of this aggregation is a normalized vector of the overall weights of the options (Partovi, 1992).

One of the major advantages of AHP is that it calculates the inconsistency index as a ratio of the decision maker's inconsistency and randomly generated index. This index is important for the decision maker to assure him that his judgments were consistent and that the final decision is made well. The inconsistency index should be lower than 0.10 (Pohekar & Ramachandran, 2004).

2.4.6 Weighted sum method (WSM)

According to this method, if there are M alternatives and N criteria then the best alternative is the one that satisfies the following expression:

$$A^*_{WSM} = Max \sum_{i}^{j} a_{ij} w_j \text{ for } i = 1, 2, 3, \ldots, M$$

where A^*_{WSM} is the WSM score of the best alternative, N is the number of the decision criteria, a_{ij} is the actual value of the i^{th} alternative in terms of the j^{th} criterion, and w_j is the weight of importance of the j^{th} criterion. The total value of each alternative is equal to the sum of products. Difficulty with this method emerges when it is applied to multi-dimensional decision-making problems. In combining different dimensions, and

consequently different units, the additive utility assumption is violated (Pokehar & Ramachandran, 2004).

2.5 Research carried out to date in 3rd CSF implementation

No published research was found about the factors that affect the 3rd CSF co financed projects normal implementation either from final beneficiaries' point of view or from PMAs' point of view. Thus, research carried out in similar fields was reviewed. Pantouvakis & Alesta, 2004, made an analysis of the infrastructure ERDF project audits in Greece. FCC conducted these audits within 2003. Analysis showed that the major problems found in the implementation of the infrastructure projects could be classified in four main categories:

- Managerial problems are due to a variety of reasons such as: lack of capable Management Information Systems which would monitor projects and control information flows, incomplete or fuzzy technical bulletins, lack of qualified and experienced personnel working in the project leading to organizational structural problems.
- Legal problems such as non-acceptable additional contracts. Irregularities revealed concerned the contractual situation of a project, leading it to an increase of up to 50% of the signed contractual cost. This cost increase is accepted only under special conditions that are rarely met.
- Quality of designs: due to lack of on time approval of environmental design and of a quality plan, work executed is based on incomplete design studies leading to rework, delay and cost increase of projects.
- Safety regulations on site since the not strict application of safety regulations on site resulted in accidents and loss of productivity.

In 2005, Mavrotas *et al.* developed a model on cash flow forecasting and early warning for multi-project programs. Its aim was to work as a tool for effective planning the funds from public expenditures that are required in specific feature periods from the Operational Program for the Information Society in Greece in order to cover needs according to (n+2) rule. Cash flow forecasting is realized through a bottom-up approach, from the lowest level of sub-project (which corresponds to a contract) till the highest level of the program itself. Thus, the forecasting module starts from the cash flow of each sub-project. The concept behind the method is the following: a cash flow profile,

which is represented by the well-known S-curve, is assumed for each sub-project. The cash flow forecast for each sub-project is taken from this S-curve for a specific time in the future. For those sub-projects that there are available payment data (amount and date of payment), the S-curve is fitted appropriately to these data in order to provide more updated forecasts. In essence, the proposed method is a special curve fitting technique from quantitative forecasting, combined with the notion of S-curve from the project management paradigm.

Ipsilandis, 2006, conducted an empirical analysis of a specific case study based on historical data for two sub programs of the sectoral Operational Program on Education and Initial Training in Greece. This study showed that forecasting project expenditure S-curves could be useful to PMAs in many ways: first of all they provide a tool for producing an aggregate public expenditure forecast for the entire program. S-curves can be developed using reported data from project organizations and can be continuously updated. Furthermore, program envelope curves can be used in establishing a range of normal variations in the pattern of absorption of funds within a program or part of it. Projects that follow a trend leading outside established limits are flagged for review since they present a risk to the program. Finally, established S-curve envelopes can be used for monitoring new projects as the program expands.

Apart from the research conducted in co financed by 3rd CSF projects, there are numerous published articles about public sector projects implementation. In one of them, Shen *et al.*, 2006, grouped the risks affecting public sector projects into the following major categories:

- Project-related risks: include cost and time overruns, poor contract management, contractual disputes, delays of tendering and selection procedures, poor communication between project parties
- Government-related risks: consist of inadequate approved project budgets, delays in obtaining permissions, changes in Government regulations and laws, lack of project controls, administrative interference
- Client-related risks: include inadequate project budgets, poor project brief, variations in project specifications, delays in the settlement of contractor's claims, lack of project control
- Design-related risks: represent inadequate soil investigation, delays in design, ambiguities and inconsistencies in design and design changes.

- Contractor-related risks: include inadequate estimates, financial difficulties, and lack of experience, poor management, and difficulty in controlling nominated subcontractors.
- Consultant-related risks: these risks represent lack of experience, performance delays, and poor communication with other project parties.
- Market-related risks: they include increase in wages, shortages of technical personnel, materials inflation, shortage of materials, shortage of equipment required.

3. METHODOLOGY

3.1 Data Requirements

The objective of this research was the definition and the prioritization of the factors affecting negatively the financial implementation of ROP's co financed projects (following referred as projects), from the Final Beneficiaries' (following referred as FB), and PMA's point of view. Its aim was to contribute to the improvement of ROP's financial implementation, since the above prioritization should help to the definition of the proper actions to be taken.

The milestone dates of a project's financial implementation are the date of co-financing approval Decision, the date of implementation contract signing and the completion date, as comes up from the sections 1.1.5 and 1.1.6. The project's paying off percentage (project payments divided by the project's contract(s) budget) is the basic index of its financial implementation. These secondary data are entered in MIS, as it was described in Appendix III, and can be easily accessed by submitting a standardized inquiry to PMA.

Factors affecting projects' financial implementation were defined taking into account the following:

- The five elements consisting the effective Project Management, as described in Section 2.1.3.
- The Performance Indicators of EU co financed projects, as analyzed in Section 2.1.7
- The findings of the FCC conducted audits, as categorized in Unit 2.5
- The risks affecting the public sector projects, as presented in Unit 2.5
- The FB main responsibilities, as analyzed in Appendix II
- The supportive abilities given to FB through ROP's Axis 6 "Appliance", as presented in Appendix II
- The MOU's role, as described in Appendix II.

From the above consideration the factors presented in the following table came from:

Table 3.1 Factors affecting projects' financial implementation

Factor	Description
Organization	Operation according to standardized procedures, organized files, approved internal operational regulation, legal Support in projects' implementation, internal audit
Technical Abilities	Experienced and properly educated executives, in a sufficient number in relation to the needs
Operational Abilities	Adequate planning and control throughout project life cycle and necessary expenditures provision.
Coordination Operation	Frequency and effectiveness of coordination and supervising of the project by the Senior Management.
Supportive mechanisms	MOU's expert teams, financed by ROP's Technical Assistance Consultants, ad hoc hired project experts financed by the FB
External factors	Changes in government regulations and lows, delays in obtaining permissions, administrative interference

3.2 Research design

Saunders *et al*., 2003, p. 83, state that the inductive approach is more appropriate than the deductive one in the case the researcher is interested in understanding why something is happening rather than being able to describe what is happening. ROP's financial implementation deviation from the scheduled one is a fact, as it was analyzed in Section 1.1.2. Since the cause of this deviation was the subject of the research, the inductive approach was followed.

3.2.1 Cluster Analysis

The first step was the Cluster Analysis of ROP's projects in order the most problematic ones from the financial implementation point of view to be defined. Cluster Analysis was selected instead of classification since, as it is described in Section 2.3.1, in classification the categories are already known, while in the current research there was no a priori hypotheses about the patterns embedded in the data. Analysis into clusters was based in projects' similarity in the following three characteristics:

- Number of days from the date of co-financing approval Decision release till today (following referred as "number of days").
- Contracting percentage that equals to project's contract(s) budget(s) divided by the project budget (following referred as "contracting percentage").
- Paying off percentage that equals to project payments divided by the project's contract(s) budget (following referred as "payments percentage").

"Number of days" is an index of how "old" the project is within the ROP context. It is expected the "old" projects to have high contracting and, respectively, high payments percentage taking into account the FBs' obligations as they were presented in Appendix II, point 5. When an "old" project presents low contracting and / or payments percentage, it is an indication that there is no agreement with its planned financial implementation declared by the FB in the TPS on the basis of which it was approved for co financing. Mention that this declared implementation per year is considered as the project's contribution in the achievement of (n+2) rule, as it is explained in section 1.1.6.

The technique selected was the Two-Step Cluster Analysis. As it is referred in sub-section 2.3.2.3, this technique uses the Shwartz's Bayesian Inference Criterion (BIC) that is known as one of the most useful and objective selection criteria, because it avoids the arbitrariness of traditional clustering techniques. Also, it identifies and screens out the outliers.

3.2.2 Decision-making technique

The second step was to define which decision-making technique should be used. As it was concluded from sections 2.4.2 and 2.4.3, multi-criteria techniques with the direct participation of the decision maker are appropriate for a decision-making problem.

Among them, the Analytical Hierarchy Process Method (AHP) was selected for the following reasons:

- It doesn't' require the definition of indifference and preference thresholds from the decision maker, in contrary with the ELECTRE and PROMETHEE family methods
- It can be applied in multi-dimensional decision-making problems in contrary with the Weighted Sum Method.
- The nominal scale used in AHP enables the decision maker to incorporate experience and knowledge in an intuitive and natural way
- The insensitivity of this scale to small changes in a decision maker's preferences minimizes the effect of uncertainty in evaluations
- The consistency of results can be calculated.

The last reason consists one of the basic evaluation criteria of different multi criteria methods according to Mahmoud &Garcia, 2000.

In the following figure, the structure of the applied AHP method is presented:

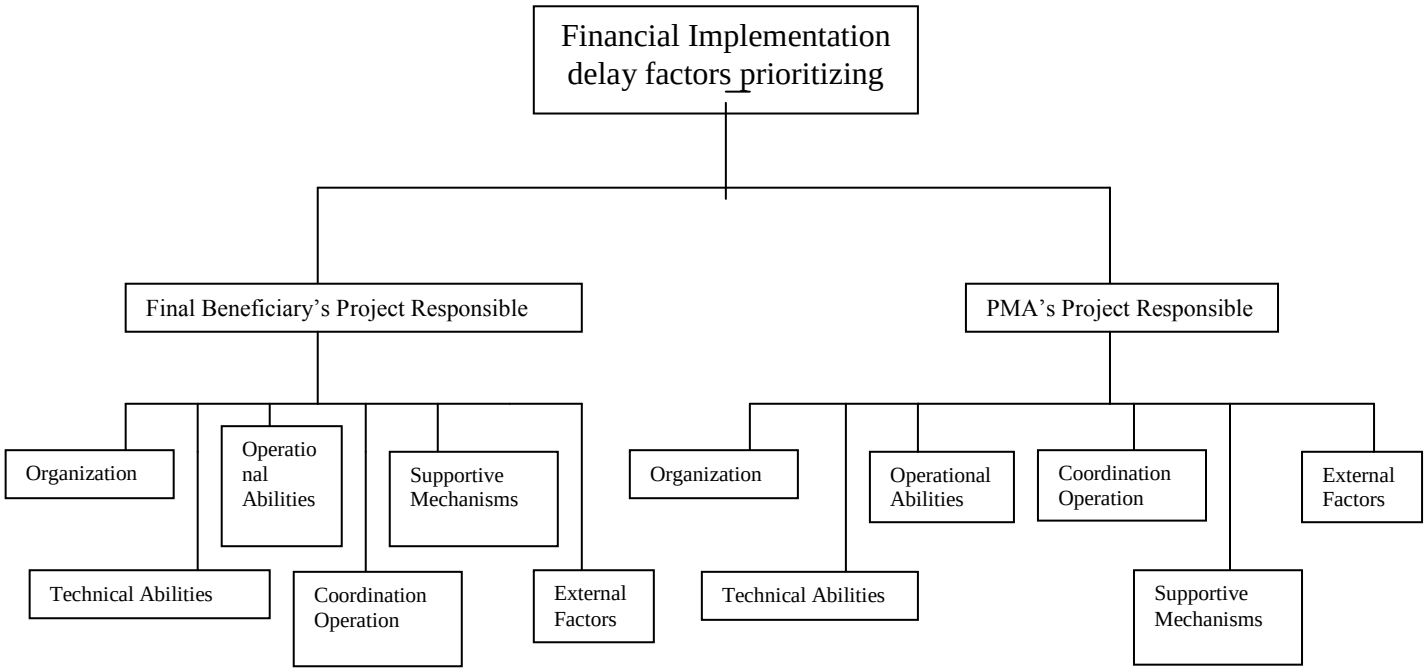

Figure 3.1: the AHP method structure

3.2.3 FB and PMA opinions collection

The third step was the collection design of the opinions of the FB and the PMA about the prioritizing of the factors affecting negatively the “delayed” projects financial implementation.

In multi criteria decision methods, the decision makers are called to answer to certain questions as it is derived from the methods presentation in section 2.4. On the other hand “the questionnaires work best with standardized questions that you can be confident that will be interpreted the same way by all respondents and can therefore be used for descriptive research, such as opinion questionnaires” (Robson, 2002, in Saunders *et al*., 2003, p.281). Thus, the questionnaires were the selected technique of data collection. The standardized questions were the factors pair wise comparisons according to AHP method.

4. EMPIRICAL STUDY

4.1 Cluster Analysis Results

The Two-step Cluster Analysis method was applied in all 3rd CSF projects, recorded in MIS till the 1st of October 2006 (ROP's projects in Appendix VI). The ROP's projects number was 989 and their total co financing approval decision budget was 984 million Euros. This number is greater than ROP's budget, analyzed in section 1.1.2, since the projects contracts discounts were not subtracted. 3rd CSF Projects were clustered on the basis of the three characteristics described in Section 3.2.1 consisting three continuous variables and on the basis of a nominal variable with values 0 and 1: 1 for pre-co financed projects (contracting date precedes the date of co financing approval). Software used was SPSS 14.0 (Appendix XXIII).

Five clusters were created, each with the following characteristics:

Table 4.1: Two-Step Cluster Analysis Results

Group	Group Name	Average Number of Days	Average Contracting Percentage	Average Payments Percentage
1	Finished Projects	1370 (StD* 353 days)	89% (StD 15%)	89% (StD 16%)
2	Pre-co financed projects	1137 (StD 591 days)	97% (StD 15%)	72% (StD 34%)
3	New projects	130 (StD 70 days)	0,2% (StD 2%)	2% (StD 2%)
4	Problematic projects	651 (StD 347 days)	3% (StD 9%)	2% (StD 12%)
5	Normal projects	636 (StD 302 days)	91% (StD 14%)	17% (StD 21%)

* StD = Standard Deviation

The projects belonging to the first group were named "finished" due to their high contracting and payments percentage. «Pre-co financed" projects were named so because their contracting date precedes the date of co financing approval. The third group projects were named "new" due to the short time period passed from the co financing approval decision release. Fourth group consists of projects with low contracting and payment percentage compared with the number of days passed from the date of co financing approval that varies between 303 and 998 days. For this reason they were named "problematic". The fifth group was named "normal projects" since they had a normal execution. At last there was a outlier project with budget 393,6 thousand Euros.

The number of projects per group as well as the percentage of their co financing approval decision budget is presented in the following table:

Table 4.2: Projects per Cluster Analysis Group

Group Name	**Number of Projects**	**Co Financing Decision Approval Budget *(in million Euros)***	**Percentage of category's Co Financing Decision Approval Budget**
Finished Projects	438	388	39 %
Pre-co financed projects	59	94	10 %
New projects	125	125	13 %
Problematic projects	131	112	11 %
Normal projects	235	265	27%
Outlier	1		
TOTAL	**989**	**984**	

A graphical depiction of the above results follows:

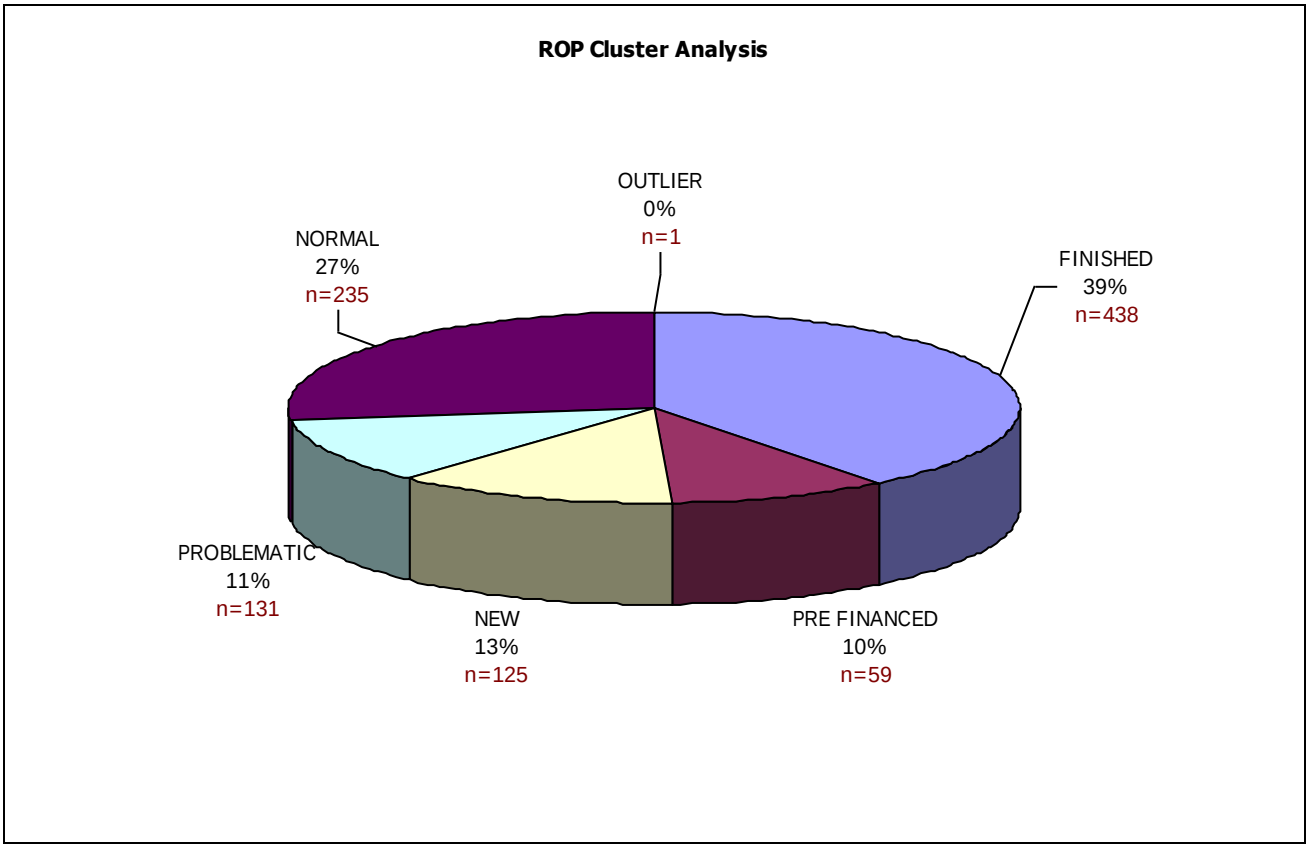

Figure 4.1: ROP's Cluster Analysis Results

4.2 Respondents Selection

4.2.1 FB Selection.

Group 5 "Problematic Projects" is presented in Appendix VII. Among them, there were selected the ones whose FB belonged to one of the following categories: Units under the Region of Thessaly Administration, Thessalian Prefectures, Thessalian Municipalities with population over 20.000 (National Statistics Service of Greece, 2006), Municipal Waste Management Enterprises as well as the National Employment Organization.
The above FB categories were selected for three reasons:

1. The projects under their responsibility covered more than the 50% of the total ROP's projects budget in October 1st, 2006 according to MIS report presented in Appendix VI
2. They represent five different categories of Final Beneficiaries on the basis of the legal context they operate
3. The budget of problematic projects under their responsibility covers the 88% of this group's total budget, as it is analyzed in the next table:

Table 4.3: Selected FB

FB Category	**FB Name**	**Projects Number**	**Co Financing Decision Approval Budget *(in Euros)***
Region of Thessaly	Public Works Unit	2	23.900.000
Region of Thessaly	Development & Planning Unit	2	4.197.667
Region of Thessaly	Rural Development Unit	5	39.000.091
Region of Thessaly	Forests Unit	1	2.930.927
Prefectures	Prefecture of Karditsa	2	1.990.000
Prefectures	Prefecture of Larisa	3	143.900
Prefectures	Prefecture of Magnesia	1	2.400.000
Main Municipalities	Municipality of Volos	4	792.808

Main Municipalities	Municipality of Karditsa	4	436.315
Main Municipalities	Municipality of Larisa	4	349.600
Main Municipalities	Municipality of Nea Ionia	3	395.842
Main Municipalities	Municipality of Trikala	6	869.090
Municipal Waste Management Enterprises (MWME)	MWME of Skopelos	1	4.280.000
Municipal Waste Management Enterprises (MWME)	MWME of Skiathos	1	1.280.000
Municipal Waste Management Enterprises (MWME)	MWME of Elassona	1	600.000
Municipal Waste Management Enterprises (MWME)	MWME of Agia	1	3.863.898
Municipal Waste Management Enterprises (MWME)	MWME of Farsala	1	3.970.000
National Organization	Employment National Organization	6	7.634.746
	TOTAL	**48**	**99.034.883**

4.2.2 Respondents Definition.

As soon as FB and, thus, projects were selected, the respondents' names were found in the respective TPS: they were the FB's executives declared in the TPS as project responsible. Their names and addresses were given from the PMA's executives who are responsible for the monitoring of the certain projects. The last ones were the respective PMA respondents.

4.3 Responses collection procedure.

Since the AHP method was selected, respondents were asked to make pair wise comparisons in a matrix form, attached in Appendix XXII, for the factors presented in Section 3.1.

Project responsible was the person expected to have the best knowledge about project's financial implementation progress and problems. Hence, it was important him to be the respondent. As Witmer *et al*., 1999, in Saunders *et al.,* 2003, p.283 state "email offers greater control because most users read and respond to their own mail at their personal computer". Thus, it was decided the matrix to be sent by e-mail.

An explanatory note accompanied the matrix as well as a FB's data form to be completed. All of them are presented in Appendix XXII. Also, a completed pair wise comparison matrix is attached.

The PMA's respondents received the same material by e-mail also. Previously, there has been a personal contact with them, kindly asking the matrix completion within the next month and sending it back by e-mail.

In the case of FB respondents, there has been a telephone communication in which it was also asked the same as above.

In some cases, the projects responsible persons either from FB's side or from PMA's side were responsible for the implementation or monitoring, respectively, of more than one "problematic" projects. Thus, there were sent e-mails to 24 FB project responsible and 7 PMA members. Mention that in the explanatory notes it was asked from any participant to complete the matrix, as many times as the number of projects he was responsible for. Also, there was a commitment that the answers given should be used only for the purposes of this research.

Within one month, all PMA responsible responded.

Also, all FB responsible responded except one: the responsible for the 6 National Employment Organization projects. In the relative telephone contact, she declared that a

research participation approval from the headquarters of the Ministry of Employment was necessary in order to respond. When asked about the time needed for this approval she estimated that it exceeds the two months. As a problem with the timetable of research was created it was decided the Organization's projects to be subtracted from the examined ones reducing the number of problematic projects to be examined to 42.

5. RESULTS

5.1 Factors prioritizing from Final Beneficiaries point of view

The responses of the selected "problematic" projects FB are presented in Appendixes VIII and IX, as well as the respective pair wise matrixes. The projects were characterized by their MIS code and were classified according to the FB's category: Region of Thessaly, Prefectures, Main Municipalities and Municipal Waste Management Enterprises (MWME). Two pair wise matrixes were created for the following reason: the value of any pair wise matrix cell was calculated as the geometric mean of the respective cell of the pair wise matrixes completed by all respondents. Excel function "GEOMEAN" cannot calculate the geometric mean of more than 30 numbers. Since the responses were 42 they were separated in two equal parts. The total FB pair wise matrix follows and its cells values are equal with the geometric mean of the respective cell values of pair wise matrixes FB1, FB2:

Table 5.1:FB Pair Wise Comparison Matrix

	Organization	**Technical Abilities**	**Operational Abilities**	**Coordination Operation**	**Supportive Mechanisms**	**External Factors**
Organization	1,000	0,457	0,543	0,405	0,394	0,275
Technical Abilities	2,188	1,000	0,642	0,673	0,587	0,308
Operational Abilities	1,842	1,559	1,000	0,562	0,409	0,341
Coordination Operation	2,468	1,486	1,780	1,000	0,748	0,324
Supportive Mechanisms	2,538	1,703	2,442	1,337	1,000	0,637
External Factors	3,633	3,248	2,934	3,086	1,569	1,000
Column Totals	*13,670*	*9,453*	*9,341*	*7,063*	*4,708*	*2,885*

The numbers in the matrix were divided by their respective column totals to produce the normalized matrix that follows:

Table 5.2:FB Normalized Matrix

	Organization	**Technical Abilities**		**Coordination Operation**	**Supportive Mechanisms**	**External Factors**
Organization	0,073	0,048	0,058	0,057	0,084	0,095
Technical Abilities	0,160	0,106	0,069	0,095	0,125	0,107
Operational Abilities	0,135	0,165	0,107	0,080	0,087	0,118
Coordination Operation	0,181	0,157	0,191	0,142	0,159	0,112
Supportive Mechanisms	0,186	0,180	0,261	0,189	0,212	0,221
External Factors	0,266	0,344	0,314	0,437	0,333	0,347

The factor evaluation numbers that determine the priorities for the six factors were calculated by finding the average of the various rows from the normalized matrix:

Table 5.3: FB Factors Prioritizing

Factor	**Factor evaluation number (Priority)**
Organization	0,0693
Technical Abilities	0,1102
Operational Abilities	0,1152
Coordination Operation	0,1568
Supportive Mechanisms	0,2083
External Factors	0,3401

As it was described in detail in subsection 2.4.3.4, one of the major advantages of AHP is that it calculates the consistency ratio (or inconsistency index), which is important for the decision maker to assure him that his judgments were consistent and that the final decision is made well. The consistency ratio should be lower than 0.10.

To arrive to the inconsistency index, the weighted sum vector was determined. Multiplying the factor evaluation number for the first factor times the first column of the original pair wise comparison matrix did this. The second factor evaluation number was

multiplied times the second column and so on. Finally, the values over the rows were summed and the weighted sum vector was:

$$\text{Weighted sum vector} = \begin{bmatrix} 0{,}42148 \\ 0{,}6683 \\ 0{,}7040 \\ 0{,}9628 \\ 1{,}2798 \\ 2{,}0990 \end{bmatrix}$$

The next step was to determine the consistency vector. Dividing the weighted sum vector by the factor evaluation values determined previously gave this result:

$$\text{Consistency vector} = \begin{bmatrix} 0{,}4215 / 0{,}0693 = 6{,}08 \\ 0{,}6684 / 0{,}1102 = 6{,}07 \\ 0{,}7040 / 0{,}1152 = 6{,}11 \\ 0{,}9629 / 0{,}1568 = 6{,}14 \\ 1{,}2799 / 0{,}2083 = 6{,}14 \\ 2{,}0990 / 0{,}3401 = 6{,}17 \end{bmatrix}$$

In order the consistency ratio (CR) be computed the values for two more terms, lambda (λ) and consistency index (CI) had to be computed. The value for lambda is simply the average value of the consistency vector. The CI formula is $CI = (\lambda - n) / (n - 1)$, where n is the number of factors evaluated. The results of the calculations were as follows:

$\lambda = (6{,}08 + 6{,}07 + 6{,}11 + 6{,}14 + 6{,}14 + 6{,}17) / 6 = 6{,}12$

$CI = (\lambda - n) / (n - 1) = (6{,}12 - 6) / (6 - 1) = 0{,}024$

Finally, the CR is equal to the CI divided by the random index (RI), which is determined from a table. The random index is a direct function of the number of alternatives or factors being considered. When n = 6, RI = 1,24 and

$CR = CI / RI = 0{,}024 / 1{,}24 = 0{,}019 < 0{,}10$, that means that FB's responses were relatively consistent.

The way of AHP method applied above is extracted from Render *et al.*, 2003.

5.2 Factors prioritizing from Program's Management Authority point of view.

In Appendixes X and XI the PMA responses and the respective pair wise comparison matrixes PMA1 and PMA2 are presented. The projects were characterized by their MIS

codes and classified according to FB's category. In Appendix XII all the above described calculations leaded to CR = 0,01 (< 0,10) and to the next table:

Table 5.4: PMA Factors Prioritizing

Factor	Factor evaluation number (Priority)
Organization	0,0588
Technical Abilities	0,1953
Operational Abilities	0,1454
Coordination Operation	0,1807
Supportive Mechanisms	0,1077
External Factors	0,3121

5.3 Overall prioritizing

In order to reach to the overall prioritizing, the first step was to determine the factor weights of the factors FB and PMA. In comparing them it was determined that FB were strongly to very strongly preferred over PMA (number 6) taking into account each party's responsibilities in projects implementation, as they are described in Appendix II. Under this assumption, the overall prioritizing was calculated as presented in Appendix XIII (Mention that the ranking of factors didn't change even when FB were extremely preferred over PMA).

The results were:

Table 5.5: Overall Factors Prioritizing

Factor	Factor evaluation number (Priority)
Organization	0,0678
Technical Abilities	0,1224
Operational Abilities	0,1195
Coordination Operation	0,1603
Supportive Mechanisms	0,1940
External Factors	0,3361

5.4 Factors prioritizing per Final Beneficiary Category

5.4.1 Region of Thessaly

10 projects belong in this category. The ranking results from PMA's and FB's point of view were calculated in Appendixes XIV and XV respectively and are presented below. In all categories CR was less than 10%.

Table 5.6: PMA and FB Factors Prioritizing for FB category "Region of Thessaly"

Factor	FB Factor evaluation number (priority)	PMA Factor evaluation number (priority)
Organization	0,0734	0,0693
Technical Abilities	0,0963	0,1202
Operational Abilities	0,0996	0,1983
Coordination Operation	0,1148	0,1648
Supportive Mechanisms	0,2594	0,0851
External Factors	0,3565	0,3623

5.4.2 Prefectures

6 projects belong to this category. In Appendixes XVI and XVII the ranking calculations of the factors of this category are presented. The results are:

Table 5.7: FB and PMA Factors Prioritizing for FB category "Prefectures"

Factor	FB Factor evaluation number (priority)	PMA Factor evaluation number (priority)
Organization	0,0462	0,0591
Technical Abilities	0,0965	0,1435
Operational Abilities	0,0774	0,2056
Coordination Operation	0,1620	0,1882
Supportive Mechanisms	0,2047	0,0753
External Factors	0,4131	0,3282

5.4.3 Main Municipalities

21 projects belong to this category. The prioritizing calculations from PMA's and FB's point of view are presented in Appendixes XVIII and XIX respectively, while the factors evaluation numbers in the next table:

Table 5.8: PMA and FB Factors Prioritizing for FB category "Main Municipalities"

Factor	FB Factor evaluation number (priority)	PMA Factor evaluation number (priority)
Organization	0,0649	0,0464
Technical Abilities	0,1127	0,2458
Operational Abilities	0,1065	0,1023
Coordination Operation	0,1688	0,1377
Supportive Mechanisms	0,2146	0,1261
External Factors	0,3326	0,3417

5.4.5 Municipal Waste Management Enterprises

The last category calculations are presented in Appendixes XX and XXI for PMA and FB respectively. The relative factor evaluation numbers follow:

Table 5.9: PMA and FB Factors Prioritizing for FB category "Municipal Waste Management Enterprises"

Factor	FB Factor evaluation number (priority)	PMA Factor evaluation number (priority)
Organization	0,1158	0,0791
Technical Abilities	0,1254	0,1822
Operational Abilities	0,2839	0,1500
Coordination Operation	0,1720	0,4050
Supportive Mechanisms	0,0945	0,0909
External Factors	0,2084	0,0929

5.5 Findings

A synopsis of the above analytical results is presented in the next table. The factor evaluation numbers have been replaced from the respective factor ranking numbers 1 to 6 in order possible ranking similarities or dissimilarities to be noticed easier:

Table 5.10: FB and PMA factors ranking for all FB categories

	ALL FB CATEGORIES			REGION		PREFECTURES MUN/LITIES		MWME			
Factors	**FB**	**PMA**	**Overall Ranking**	**FB**	**PMA**	**FB**	**PMA**	**FB**	**PMA**	**FB**	**PMA**
Organization	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**5**	**6**
Technical Abilities	**5**	**2**	**4**	**5**	**4**	**4**	**4**	**4**	**2**	**4**	**2**
Operational Abilities	**4**	**4**	**5**	**4**	**2**	**5**	**2**	**5**	**5**	**1**	**3**
Coordination Operation	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**1**
Supportive Mechanisms	**2**	**5**	**2**	**2**	**5**	**2**	**5**	**2**	**4**	**6**	**5**
External Factors	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**4**

From the above table it can be seen that:

- External Factors were ranked as the most negative factor in projects financial implementation in overall ranking and in all project categories from both FB and PMA point of view, except from the MWME category
- Organization was the factor with the less negative influence in overall ranking and in all project categories for both FB and PMA responses, with a slight differentiation in MWME category from the FB point of view
- Coordination Operation was third in overall ranking and in all categories from both FB and PMA point of view, excluding the PMA's ranking for MWME.
- FB's Supportive Mechanisms ranking was high in contrary with PMA's ranking with the exception of MWME
- The fourth FB category (MWME) was differentiated in both FB and PMA responses, compared with the other three categories.

5.6 Findings Discussion

The fact that the external factors were prioritized as the most negative ones in projects financial implementation is consistent with Thiry's statements presented in detail in section 2.1.2. According to these, Program Managers go on considering Programs as large projects; seldom they have a systemic view of the program and give less importance in issues such as "communications" and "stakeholders management". The relatively high ranking of Coordination Operation by all but one respondents categories agrees with Mullaly's opinion, developed in detail in section 2.1.1: process

capabilities continue to be less rigorous and mature than many organization managers expect or believe. As a result, many organizations are still struggling with some of the fundamental principles of project management and the Coordination Operation has to play a crucial role. Also, it is consistent with BSI, 2002, presented in detail in section 2.1.3: since increasingly the projects cut across departmental boundaries, the role of senior management is to ensure that the organization is in place, often with a temporary arrangement, to run the project.

Mullaly's opinion agrees also with Organization's ranking as the least negative factor in projects financial implementation in almost all responses. Even today, many organizations consider that their ability to ensure project performance on time and on initially approved budget is a matter of the quality and perseverance of individuals and teams and neglect the fact that effective projects result from effective procedures. The goal for most of them to attain a level of consistency and repeatability in their processes is far from the reality, where very little consistency in organizational practices and procedures exists.

As it was analyzed in Section 2.1.4, the first premise of good program management is to fully understand stakeholders' needs and expectations. The Supportive Mechanisms ranking differentiation between the two respondent parties in the three of four FB categories is an indication that there is not common perception of the FB needs from both respondent parties.

The examination of the phases of a project life cycle as presented in section 2.1.3, shows that the institutional and legal context within which a project is planned and implemented determines in degree the possible problems to be met. That is consistent with MWME category differentiation in factors ranking.

6. CONCLUSIONS AND RECOMMENDATIONS

ROP's management within the 3rd CSF context is a very demanding and challenging task. One of its most critical success factors is the avoidance of funds losses due to the application of the (n + 2) rule, stemming from the basic structural funds regulation (EC) 1260/99.

This research was carried out in order the factors negatively affecting ROP's financial implementation to be defined and ranked and, according to findings, proper actions for financial implementation improvement to be suggested.

Since the external factors were ranked as the most negative ones, the 3rd CSF Managing Authority has to take care so as government-related problems such as changes in government regulations and lows, delays in obtaining permission and administrative interferences to be avoided during the programming period, within its overall responsibility context for the 3rd CSF implementation. Whenever changes are obligatory, planning and funds for FB ad hoc training seminars must be provided in time.

The high ranking of Coordination Operation factor shows that FB's Senior Management doesn't coordinate effectively the respective projects throughout their life cycles. Also, it may hint the lack of sufficient project management since its sufficiency would support Senior Management in many of its responsibilities such as the insurance of adequate planning and the establishment of realistic constraints and criteria within which the project has to be delivered. However, the low overall ranking of Operational Abilities factor, combined with its differentiated ranking among the respondents categories, doesn't permit certain conclusions to be extracted about FB's project management adequacy.

The Organization's ranking as the less negative factor shows that both FB and PMA consider it plays a secondary role in projects financial implementation. In any case, the importance of organization in implementing, monitoring and control of a project should not be underestimated from both parties.

Supportive Mechanisms high ranking from FB and low ranking from PMA in three out of four FB categories can be explained in two ways: either two parties have different perceptions about FB's role in project implementation or PMA ignores
FB's needs. In both cases, and taking into account that PMA is responsible for ROP's monitoring and control, it has to play its role as Program Manager avoiding to run the ROP in project paradigm.

To this direction, FB should be faced as stakeholders whose problems', needs' and expectations' identification is necessary for ROP's successful implementation. Sense making, communication and common decision-making about projects implementation problems solving are methods that could be used.

MWME category differentiation in factors ranking from FB and PMA, as well as the slight differentiation of Main Municipalities category, shows that there is a relationship between the FB's legal context and the kinds of problems they face in projects financial implementation. This fact should be taken into account from PMA in ROP's payments forecasting procedure as well as in possible FB's support through ROP's Technical Assistance Funds.

Coming to the next programming period and taking into account the limitations of this research, the following suggestions should be done to the Ministry of Economy and Economics, the responsible Greek Authority for the preparation of National Strategic Reference Context 2007-2013, that is the name of the 3rd CSF successor:

- Early definition and preparation of the administrative and legal context within which the next Operational Programs will be implemented, followed with the release of the necessary lows and regulations
- Prompt potential FB information and training in the application of the above lows and regulations in projects planning and implementation
- Introduction of project Management issues in potential FB Senior Management in order the proper actions for a broad application of effective project management to be undertaken
- Strengthening of PMA's role as Program Manager so as the program's strategic benefits and objectives to be achieved
- MIS transformation to a Decision Support System so as to help Program Management to solve Operational Programs problems, often characterized by high ambiguity.

Estimating that this research was a little contribution to Region of Thessaly development, it is expected to consist the occasion for further research in the field of factors that affect the co financed projects implementation.

7. REFLECTIONS ON LEARNING

Dissertation carrying out lasted seven months and was the final phase of my postgraduate studies in Business Administration that started more than two years ago. Reflecting on this seven months "journey" there were certain difficulties and certain profits for me in various fields.

The basic difficulty I met was that there were not found existing researches in the same area. Even in similar fields, as European Union projects implementation risks or Co financed projects public spending forecasting methods the literature found was limited.

Coming to the profits and first of all, the factors ranking will help me in my suggestions about ROP's Technical Assistance funds allocation to my hierarchy.

In parallel, the Program Management Literature Review, combined with the research findings, strengthened my point of view referring to the importance of the PMA's role as program manager in order ROP's strategic targets to be achieved, although it was not originally intended.

Second, my theoretical background was enriched in issues such as Multi Criteria Decision Analysis and Cluster Analysis. Both of them could be applied in my working field. For instance, the proper Cluster Analysis techniques could be used for further projects clustering in order issues connected with projects natural object implementation to be examined.

Third, my "feeling" that the FB problems are connected with their legal and institutional context was confirmed, within the research limitations.

Also, I learnt in practice how a research has to be planned and carried out. This knowledge is useful for me since in my work there is often need various researches to be monitored and evaluated

Finally, the FB response was a pleasant surprise for me showing that they are willing to support the projects financial implementation improvement trials.

If I were to start all over again, I would plan more time for responses in Dissertation's time schedule. Some more information about certain points would be asked too, taking into account the prompt responses. For instance, apart from the pair wise matrix completion, the respondents could be called to identify which exactly External Factor created the projects financial implementation delay through a multiple-choice procedure. Thus, the research results would be more exact.

Closing, my estimation is that the Dissertation's carrying out was a worthwhile experience for me and I expect to consist the fist step for further and broader research in this field.

REFERENCES

1. Adeoti-Adekeye, W., B., 1997, "The importance of management information systems", Library Review, Vol. 46, No 5, pp. 318-327.
2. Anantatmula, V.S., 2004, "Advancing PM tools beyond quantitative methods", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 4.
3. BSI, 2002, "Project Management", British Standard Institute, BS 6079-1: 2002, pp.4-5.
4. Carvalho, F., Souza, R., Chavent, M., Lechevallier, Y., 2006, « Adaptive Hausdorff distances and dynamic clustering of symbolic interval data », Pattern Recognition Letters, Vol. 27, pp. 167-179.
5. Cioffi, D.F., 2005, "A tool for managing projects: an analytic parameterization of the S-curve", International Journal of Project Management, Vol. 23, pp.215-222.
6. Doumpos, M., Zopounidis, K., 2001, «Multicriteria classification techniques: theory and applications », "Klidarithmos editions, ISBN 960-209-449-4, pp.77-81 *(in Greek).*
7. Gerogiannis, V., Sirakoulis, K., Ipsilandis, P., 2003, «Business Process Simulation to support Project Management of a Regional Operational Programme", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 3.
8. Gilliams, S., Raymaekers, D., Muys, B., Orshoven, J.V., 2005, "Comparing multiple criteria decision methods to extend a geographical information system on afforestation", Computers and electronics in agriculture, Vol. 49, pp. 142-158.
9. Greek Common Decision of Ministers, 24812, 2001, "On the MIS Data entered in", Official Journal of Greek Democracy (*in Greek*).
10. Greek Low 2860, 2000, "Laying down general provisions for the management and control system for assistance granted by the Structural Funds in Greece", Official Journal of Greek Democracy (*in Greek*).
11. Greek Low 1418, 1984, "Public Works and arrangements of relative issues", Official Journal of Greek Democracy (*in Greek*).
12. Greek Low 3316, 2005,"Execution of public contracts for studies and relevant services implementation and other issues", Official Journal of Greek Democracy (*in Greek*).
13. Greek Ministry of Finance, 2001, "Monitoring and Control Systems of the 3rd CSF Operational Programs".
14. Hartono, E., Santhanam, R., Holsapple, C.W., 2006, "Factors that contribute to management support system success: An analysis of field studies", Decision Support Systems, Vol. 43, Issue 1, February 2007, pp. 256-268
15. Hwee, N.G., Tiong, R.L.K., 2002, "Model on cash flow forecasting and risk analysis for contracting firms", International Journal of Project Management, Vol. 20, pp. 351-363.
16. Ipsilandis, P., 2006, "Qunatitative tools for Programme budget related Risks", The Proceedings of the 20th IPMA World Congress on Project Management, Shangai 15-17 October, 2006, ISBN 7-111-04703-6, pp. 644-650.
17. Lee, J.W., Kim, S.H., 2001, «An integrated approach for interdependent information system project selection", International Journal of Project Management, Vol.19, pp. 111-118.
18. Levy, R., 2001, "EU Programme Management 1977 – 96: A Performance Indicators Analysis", Public Administration, Vol. 79, pp. 423-444.
19. Lyccet, M., Rassau, A., Danson, J., 2004, «Programme management: a critical review», International Journal of Project Management, Vol.22, pp. 289-299.

20. Mavrotas, G., Caloghirou Y., Koune J., 2005, «A model on cash flow forecasting and early warning for multi-project programmes: application to the Operational Programme for the Information Society in Greece", International Journal of Project Management, Vol.23, pp. 121-133.
21. Mahmoud, M.R., Garcia, L.A., 2000, "Comparison of different multicriteria evaluation methods for the Red Bluff diversion dam", Environmental Modelling and Software, Vol. 15, pp. 471-478.
22. Meredith, J.R., Mantel, S.J, 2003, "Project Management – A managerial approach", Fifth Edition, John Wiley & Sons, Inc., ISBN 0-471-07323-7, p.559
23. Mullaly, M.E., 2004, "PM Success in Organizations: Trends, Best Practices and Next Steps", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 2.
24. National Statistics Service of Greece, "Real population of Greece. Census 2001", 2002, authorized in Official Journal of Greek Democracy (*in Greek*).
25. Nord, J., H., Nord, G., D., 1995, «Why managers use executive support systems: selecting and using information technology for strategic advantage", Industrial Management and Data Systems, Vol. 95, No 9, pp. 24-28.
26. Naylor, J., 2004, "Management", Second Edition, Prentice Hall, Financial Times, ISBN 0 273 67321 1, p.141.
27. Norese, M.F., 2006, "ELECTRE III as a support for participatory decision-making on the localization of waste-treatment plants", Land Use Police, Vol. 23, pp. 76-85.
28. Official Journal of the European Communities, 1999, Regulation (EC) No 1260/1999 laying down general provisions on the Structural Funds, L161, pp. 1-42.
29. Official Journal of the European Communities, 2003, Regulation (EC) No 1059/2003 on the establishment of a common classification of territorial units for statistics (NUTS) by reason of the accession of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia to the European Union, L154, pp. 1-41 (NUTS).
30. Official Journal of the European Communities, 2006, Regulation (EC) No 1083/2006, laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999, L210, pp. 25-78.
31. Okazaki, S., 2006, "What do we know about mobile Internet adopters? A cluster analysis", Information & Management, Vol. 43, pp. 127-141.
32. Pantouvakis, J.P., Alesta, K., 2004, "Lessons learned from the implementation of large EU co-funded infrastracture projects in Greece", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 3.
33. Partovi, F.Y., 1992, "Determining what to benchmark: An Analytic Hierarchy Process Approach", International Journal of Operations & Production Management, Vol.14, pp. 25-39.
34. Pellegrinelli, S., 1997, "Programme management: organizing project-based change", International Journal of Project Management, Vol.15, pp. 141-149.
35. Pellegrinelli, S., 2002, "Shaping context: the role and challenge for programmes", International Journal of Project Management, Vol. 20, pp. 229-233.
36. Pohekar, S.D., Ramachandran, M., 2004, "Application of multi-criteria decision making to sustainable energy planning – a review", Renewable & Sustainable Energy Reviews, Vol. 8, pp. 365-381.
37. Project Management Institute, 2006, "The Standard for Program Management", Four Campus Boulevard, Newton Square, PA 19073-3299 USA, p.4.

38. Ragu-Nathan, B., Ragu-Nathan, T.S., Tu, Q., Shi, Z., 2001, "Information management (IM) strategy: the construct and its measurement", Journal of Strategic Information Systems, Vol. 10, pp. 265-289.
39. Render, B., Stair, R.M.Jr., Hanna, M.E., 2003, "Quantitative Analysis for Management", eighth edition, Prentice Hall, CD-ROM Modules, Module 1, ISBN 0-471-42907-4.
40. Roberts, P., 2003, "Partnerships, programmes and the promotion of regional development: an evaluation of the operation of the Structural Funds regional programmes", Progress in Planning, Vol. 59, pp. 1-69.
41. Rubinov, A.M., Soukhorokova, N.V., Ugon, J., 2006, "Classes and clusters in data analysis", European Journal of Operational Research, Vol. 173, pp. 849-865.
42. Saunders, M., Lewis, P., Thornhill, A., 2003, "Research Methods for Business Studies", Prentice Hall, Financial Times, ISBN 0 273 65804 2, pp.83, 281.
43. Shanian, A., Savadogo, O., 2006, "A material selection model based on the concept of multiple attribute decision making", Materials and Design, Vol. 27, pp. 329-337.
44. Shen, L.Y., Platten, A., Deng, X.P., 2006, "Role of public private partnerships to manage risks in public sector projects in Hong Kong", International Journal of Project Management, article in press, www.sciencedirect.com
45. SPSS, 2005, "SPSS Advanced I", SPPS BI Greece S.A., p.5.
46. Thiry, M., 2001, "Sense making in value management practice", International Journal of Project Management, Vol.19, pp. 71-77.
47. Thiry, M., 2002, "Combining value and project management into an effective programme management model", International Journal of Project Management, Vol.20, pp. 221-227.
48. Thiry, M., 2004, ""For DAD": a programme management life-cycle process", International Journal of Project Management, Vol.22, pp. 245-252.
49. Tudela, A., Akiki N., Cisternas R., 2006, «Comparing the output of cost benefit and multi-criteria analysis. An application to urban transport investments », Transportation Research, Part A, Vol. 40, pp. 414-423.
50. Wang, X., Triantaphyllou, E., 2006, "Ranking irregularities when evaluating alternatives by using some ELECTRE methods", The International Journal of Management Science, available on line 14 February 2006.
51. Ye, N., Li, X., 2002, «A scalable, incremental learning algorithm for classification problems », Computers & Industrial Engineering, Vol. 43, pp. 677-692.
52. Zopounidis, C., Doumpos, M., 2002, «Multicriteria classification and sorting methods: a literature review", European Journal of Operational Research, Vol. 138, pp. 229-246.
53. http://ec.europa.eu/regional_policy/funds/prord/prord5_en.htm (visited October 4, 2006)
54. www.hellaskps.gr (visited October 4, 2006) (*in Greek*)
55. www.mou.gr (visited October 4, 2006)
56. www.stanford.edu (visited November 9, 2006)
57. www.thessalia.gr/pep/pepcomple.el.asp (visited December 11, 2006) (*in Greek*)
58. www.thessalia.gr/pep/publicity_general.el.asp (visited October 4, 2006) (*in Greek*)
59. www.thessalia.gr/pep/pep_texts/entypa/oth_apofent.doc (visited October 4, 2006) (*in Greek*)
60. www.thessalia.gr/pep/pep_texts/2000GR161P0006-04-5712-Dec.pdf (visited December 11, 2006).
61. www.thessalia.gr/pep/td_deltio_ergon_ypodomon.doc (visited November 11, 2006) (*in Greek*)

62. www.thessalia.gr/pep/uploads/legislations/projects.implemetation.system.doc (visited December 20, 2006) (*in Greek*)
63. www.Wikipedia.org (visited November 20, 2006)
64. www.ypes.gr/periferiakh.htm (visited January 16, 2007) (*in Greek*).

APPENDIXES

APPENDIX I: BASIC TARGET AND STRUCTURE OF ROP

The Regional Operational Program of Thessaly (ROP) has the target of achieving growth through the promotion and conservation of a competitive economy. Building on the central geographic location of the region, the ROP aims at developing networks, improving interregional and regional connections, developing the land, urban developments, as well as, creating innovations like the "Society of Communication".

The targets of the ROP are achieved through the six (6) priority axes (41 measures) and a total budget of 926,4 million Euros.

Axis 1: "Reinforcement of the Productive Environment"

The public spending budget of this area comes out to 51,02 million Euros and comprises 6,52% of the public spending of the ROP. The target is to improve competitiveness, support investments, improve the quality of products and services, modernize organizational and development processes of small medium-sized businesses and promote new technology and innovations.

Axis 2: "Integrated Development of the Outdoors"

The spending budget for this area comes out to 254,023 million Euros and comprises 32.49% of the public spending of the ROP. This area is being developed under the auspice of a united strategy called "complete development of the outdoors" with the target of reinforcing the competitiveness of the agricultural sector and the viability of the outdoor areas in Thessaly. It can be split into the following two sub-areas: I. Interventions to the sector, targeted at "Reinforcing the competitiveness of the structures and substructures of the outdoors of Thessaly." II. Interventions in the region, targeted at the complete development of mountainous, secluded and island areas, including activities to protect and efficiently manage the environment.

Axis 3: "Quality of Life"

The public spending budget of this area comes out to 179,93 million Euros and comprises 23.01% of the public spending of the ROP. It includes activities for the completion of health and welfare infrastructures, for the reinforcement and creation of

educational infrastructure, pertaining to civil intervention measures and the irrigation system, for the completion of administrative systems for solid and liquid waste, for the development of tourist and social canters for the assurance of urban growth in small local areas.

Axis 4: "Development of the Region into a Network Hub"

The public spending budget of this area comes out to 231,53 million Euros and comprises 29.61% of the public spending of the ROP. It includes measures for completing the interregional road network in order to connect Thessaly with West Macedonia, Ipiros and Sterea Hellas, the improvement of the inter-prefecture road network, the creation of a commercial centre in the region, the modernization of the railroad infrastructure and ports and the development of big urban and semi-urban centres (inner and outer peripheral road network, signage, electrical lighting and establishment of information systems).

Axis 5: "Development of Human Resources"

The public spending budget of this area comes out to 48,27 million Euros and comprises 6,17 % of the public spending of the ROP. It includes activities for training and career development, creating opportunities for female employability and sustaining equality between the two genders. The measures are diffused in the entire program and are complementary to activities that specifically pertain to Areas #2 and 3 as described above.

Axis 6: "Application"

The public spending budget of this area comes out to 17,17 million Euros and comprises 2,2 % of the public spending of the ROP. It includes measures that deal mostly with planning, design, preparation, development, monitoring, publicity, application and control of the program. Also, the weak Final Beneficiaries support in projects implementation is co financed within this Axis.

APPENDIX II

1. MISSION AND RESPONSIBILITIES OF 3RD CSF MANAGING AUTHORITY

1. The CSF managing authority has overall responsibility for the programming and implementation of the CSF. Its particular purpose is to secure the efficient and lawful management and implementation of the CSF, as well as to coordinate the programming and implementation of the operational programmes and to coordinate the work of the operational programme managing authorities. The CSF managing authority has the following powers and responsibilities:
a) monitors and coordinates the implementation of the CSF, taking particular care to ensure its compatibility with national policies

b) Coordinates the managing authorities of the individual operational programmes of the CSF and ensures the implementation of the decisions of the CSF Monitoring Committee

c) Issues instructions and provides guidelines on management, evaluation, control and any activity within the remit of the operational programme managing authorities. In particular it issues instructions to regulate the conditions for briefing interested parties by the operational programme managing authorities on all categories of measure, the procedure for submission of proposals and the accompanying information, the deadline for submission of proposals for all categories of project, the more specific procedure for evaluation of proposals and all other related issues

d) Is responsible for the running of the Management Information System (M.I.S.) … in respect of the CSF, and ensures that the system responds to the needs of the managing authorities, the monitoring committees, the payment authority, the audit authorities and the Commission

e) Is responsible for conducting the mid-term evaluation of the CSF…. Processes the findings of the mid-term evaluation of the CSF and operational programmes and recommends to the CSF monitoring committee modifications to the CSF and operational programmes

f) Briefs the operational programme managing authorities on community and national law. Monitors and gathers the latest information on the relevant actions of the operational programme managing authorities, to ensure compatibility of the operational programmes and projects with national and community law, especially in respect of the provisions on competition, public contracts, protection of the environment, elimination of inequalities and the promotion of gender equality, and recommends the taking of appropriate measures for effective implementation of these rules by the competent

agencies at the national and regional levels

g) Elaborates and proposes modifications of the CSF to the CSF monitoring committee

h) Prepares - in association with the Commission - the indicators to be used for allocation of the performance reserve … and recommends the allocation of this reserve to the CSF monitoring committee, as well as the allocation of the programme reserve.

i) Organises and monitors the CSF publicity procedure, in association with the Commission, and establishes a framework of principles for publicity for the operational programme managing authorities, to ensure uniformity, cohesion and coordination of the CSF and operational programme information and publicity measures,

j) Compiles and submits to the Commission, after approval by the CSF monitoring committee, the annual CSF performance report

k) Attends the annual meetings of the managing authorities of the operational programmes and of the Commission.
l) Provides the Commission with the necessary data for verification of additionality, in the sense defined in article 11 of the regulation

m) Recommends the categories and criteria for eligible spending, and

n) Provides secretarial support for the CSF monitoring committee

(Extract from Law 2860/2000 on management, monitoring and control of the Community Support Framework and other provisions)

2. MISSION AND RESPONSIBILITIES OF OPERATIONAL PROGRAMMES MANAGING AUTHORITIES

The managing authority of each operational programme is responsible for securing the efficiency and regularity of the management and its application. In this context:

a) It implements the Programme Complement

b) It recommends to the Special or General Secretary of the Ministry or Regional Authority the approval of projects in the measures of their individual operational programmes

c) It ensures the compatibility of the approved projects in the operational programme with national and community law, as well as national and community policies, especially in respect of provisions on competition, public contracts, environmental protection, elimination of inequalities and promotion of gender equality. To this end it provides all possible support to the final beneficiaries in association with the competent public agencies to help them fulfil their obligations

d) It monitors the progress of implementation of the operational programme and prepares proposals for its revision, which it submits to the operational programme monitoring committee

e) It collates the appropriate economic and statistical data and enters them into the M.I.S.

f) It prepares proposals for adjustment of the programme complement, which it submits to the operational programme monitoring committee

g) It compiles the annual reports and the final report of the operational programme and submits them to the programme monitoring committee and the CSF managing authority

h) It organises and monitors the mid-term evaluation of the operational programme in association with the CSF managing authority and elaborates proposals for the appropriate action on the evaluation findings

i) It monitors compliance with the individual accounting allocation for each project by the final beneficiaries

j) It cooperates with the CSF managing authority, the operational programme monitoring committee and the Commission and provides them with all information they require

k) It conducts audits, takes the necessary action on the basis of the findings of these audits, briefs the Commission, the payment authority and the financial audit committee of the Ministry of Finance and takes the necessary compliance measures at the recommendation of the above authorities

l) It implements the publicity actions of the operational programme in association with the CSF managing authority, the operational programme monitoring committee and the Commission. It monitors final beneficiaries' compliance with their obligations in respect of publicity and provision of information on the projects they are implementing

m) it provides secretarial support to the operational programme monitoring committee.

(Extract from Law 2860/2000 on management, monitoring and control of the Community Support Framework and other provisions)

3. Mission and responsibilities of the Single Payment Authority (SPA)

The Single Payment Authority is responsible for securing financial flows from the structural funds for the CSF operational programmes. In this general context the Payment Authority:

a) Compiles and submits to the Commission the payment applications and statements … for all the CSF interventions and receives the payment approvals from the structural funds in respect of these interventions

b) Defines the beneficiaries of the credits approved for each operational programme and structural fund, and briefs the Ministry of Finance on the disbursement of the corresponding sums, from the accounts it holds at the Bank of Greece

c) Monitors the process of transfer of the relevant credits to the final beneficiaries and ensures that the transfer is completed fully in the shortest possible time

d) Submits the forecasts and estimates to the Commission by the 30 April of each year.

e) Collaborates with the CSF managing authority in defining the M.I.S. operating rules in respect of processing of the information it will use in carrying out its duties

f) Conducts controls and audits.

(Extract from Law 2860/2000 on monitoring, management and control of the Community Support Framework and other provisions)

4. MISSION AND RESPONSIBILITIES OF THE OPERATIONAL PROGRAMS MONITORING COMMITTEES

Together with the managing authority, the Member States also set up a "monitoring committee" for each programme. The committee's task is to ensure the quality and effectiveness of the implementation of assistance. The monitoring committee is in close contact with the European Commission - which participates in its discussions on a consultative basis - and is thus in a position to guarantee the smooth running of the programming. This role is reflected in its specific responsibilities:

- It confirms the programme complement and any adjustment made to it by the managing authority; it may also request an adjustment.
- It approves criteria for selecting the operations financed.
- It periodically assesses the progress made towards achieving the specific objectives of the assistance.
- It examines the results of implementation and, in particular, the result of the mid-term evaluation before it is forwarded to the Commission.
- It approves the annual and final implementation reports before they are forwarded to the Commission.
- It approves any proposal to amend the contents of the decision on the contribution of the Funds.
- Generally speaking, it may suggest to the managing authority any adjustment it deems necessary to improve the management of assistance *(ec.europa.eu/regional_policy/funds/prord/prord5_en.htm)*

5. MISSION AND RESPONSIBILITIES OF FINAL BENEFICIARIES

Final Beneficiaries are called the public and private bodies or enterprises, which are responsible for the co financed projects implementation (Extract from Law 2860/2000 on monitoring, management and control of the Community Support Framework and other provisions).

Their main responsibility is the appliance of the co financing approval decision rules. The most important of them are:

a) Compliance with the EU and national legislation throughout project life cycle
b) Keeping of low time intervals among financing approval decision, calling for tender and contracting

c) Project implementation according to contract's timetable
d) PMA's standardized information about project's implementation progress through Monthly spending declaration reports and Tri-monthly natural object monitoring reports
e) Standardized Declaration of project completion submission to PMA
f) Project file existence including all the necessary information (*www.thessalia.gr/pep/publicity_general.el.asp)*.

6. MISSION AND RESPONSIBILITIES OF FINANCIAL CONTROL COMMITTEE (FCC)

The FCC is responsible for the legal financial implementation of the third CSF. Within this context, it:

a) Audits the monitoring and control systems of the PMA as well as of the SPA. It also controls the eligibility of final beneficiaries expenditures.
b) Evaluates the results of the Audits implemented by the PMA and SPA.
c) Evaluates the actions taken by the responsible authorities as follow up in its audits
d) Cooperates with EC in audits coordination of the operational programs.

(Extract from Law 2860/2000 on monitoring, management and control of the Community Support Framework and other provisions)

7. MISSION AND RESPONSIBILITIES OF MANAGEMENT AND ORGANIZATION Unit S.A. (MOU)

The Community Support Framework Management Organisation Unit (MOU) S.A. is a support mechanism founded in 1996, operating under the guidance and control of the Ministry of Economy and Finance, but external to its civil service structure. The law establishing the MOU (L.2372/96) came into force on February 28, 1996. A new law (L. 2860/00), was adopted by the Greek Parliament on November 14, 2000. This law set out new provisions as regards the management of the CSF 2000-2006. Under this new law, the MOU assumes a supporting role as regards the overall implementation and organisation of the 3rd CSF. More specifically, the MOU's role is to assist public administration authorities by meeting specific needs in highly specialized human

resources and know-how, which are necessary for the successful management of CSF – Funded Programs. The legal status of the Unit is such that, although it bypasses the administrative and economic constraints characterizing the Greek civil service, it maintains and enhances the supervisory and coordinating role of the Ministry of Economy and Finance.

MOU, in order to support the Final Beneficiaries, establishes expert teams to provide them advisory, managerial and technical support. The MOU expert teams are:

- Task Force for remote and island areas
- Expert Team for European Social Fund projects
- Expert Team for minority groups' projects
- Technical Support Unit for solid waste and waste water management projects
- Management Information System Expert Team.

(www.mou.gr)

APPENDIX III

1. Technical Project Sheet (TPS)

The Final Beneficiary guarantees the validity of all information presented in TPS and more specifically the Final Beneficiary's executive who is declared in the TPS as project responsible. Usually this person undertakes the Final Beneficiary's obligations that derive from the co finance approval decision.

The most important information presented in the respective fields of TPS is:

- Axis and Measure of ROP, in the context of which the project is suggested
- Project Title
- Project Budget
- Natural Object Description
- Geographical Location of the project
- Aim of the project and expected results
- Natural and financial object implementation time schedule.

The TPS has to be resubmitted any time a serious change in project characteristics or timetable implementation occur (www.thessalia.gr/pep/td_deltio_ergon_ypodomon.doc)

2. Integrated Management Information System (MIS)

Integrated Management Information System (M.I.S.) is the information system operated at the Ministry of National Economy, on which are entered all data concerning the 3rd CSF, including community initiatives, the Cohesion Fund, private investments and the Public Investment Program of Greece.

The information entered in M.I.S. mainly concerns the definition of projects, the involved agencies and persons, the physical, financial and technical characteristics of the projects, the anticipated results and impact, details of the administrative procedures associated with the approval of the projects, procedures and data on implementation of the projects up to their completion and the findings of controls and audits conducted by the competent authorities.

(Extract from Law 2860/2000 on management, monitoring and control of the Community Support Framework and other provisions).

The data referring to projects' implementation are entered via the use of standardized reports about the realized financial progress and the progress of their natural object.

Analytically, in M.I.S. are entered:

- The majority of information included in Technical Project Sheet within 5 days from its submission (Mention that each project takes its exclusive MIS code, as soon as its TPS is entered into MIS)
- The Co financing approval decision within 10 days from its release
- The scheduled natural object progress and financial progress of each project, according to the relative contract, within 30 days from its signing
- The financial progress of each project on a monthly basis, within 15 days from the end of the respective month. The progress is declared through a standardized report, the Monthly Spending Declaration Report that is submitted by the Final Beneficiary
- The natural object progress per project every three months, within the next month. This progress is presented through a standardized report, the Tri-monthly Natural Object Monitoring Report, submitted by the Final Beneficiary.
- The project completion Declaration, submitted by the Final Beneficiary.

Final Beneficiaries and PMA are responsible for the validity of the above information and its early entering in M.I.S., according to their responsibilities each.
(Extract from Greek Common Decision of Ministers, 24812/2001 on the MIS Data entered in).

APPENDIX IV

Co Financing Approval Decision structure and contents

This Decision is a contract between PMA and the co-financed project Final Beneficiary. It is signed by the General Secretary of the Region, in the case of regional programs, or of the Ministry, in the case of sectoral programs.

The Decision consists of three parts:

1. The Decision identity
2. The national and EU legislation that has to be applied throughout project implementation
3. The description of the Decision's object
4. The final beneficiary's obligations.

In Decision's object part the following are included: the project title, the MIS code number of the project, the description of project's natural object, the timetable of project implementation on an annual basis, and, especially, the dates of starting and ending of the natural object and project payments. Mention that the TPS is attached in co-financing Decision and consists a part of it. Thus, whenever a new version of TPS is submitted for approval a new Decision is released.

In final beneficiary's obligation part emphasis is given in Monthly Spending Declaration Report and Tri-monthly Natural Object Monitoring Report submission. Furthermore the final beneficiary is obliged to inform immediately the PMA any time a deviation in project implementation timetable occurs *(www.thessalia.gr/pep/pep_texts/entypa/oth_apofent.doc).*

APPENDIX V: Computer based information systems types and definitions

System types	Definitions
Decision Support System	A system that includes a body of knowledge that describes some aspects of the decision maker's world, that specifies how to accomplish various tasks, that includes what conclusions are valid in various circumstances, that has an ability to acquire and maintain descriptive knowledge and other kinds of knowledge, to present knowledge on an ad hoc basis in various customized ways as well as in standard reports, to select any desired subset of stored knowledge for either presentation or deriving new knowledge in the course of problem recognition or problem solving, and to interact directly with a decision maker or a participant in a decision making in such a way that a user has a flexible choice and sequence of knowledge management activities.
Expert System	A system that mimics the behavior of human experts by encapsulating their expertise in solving problems in a particular domain.
Data Warehouse	A system that functions as a specially prepared repository of data created to support decision-making. The data are extracted from source system, cleaned/scrubbed, transformed and placed in data stores.
Group Support System	A system that combines communication, computer and decision support tools and processes to support problem formulation and solution by a group.
Organizational Decision Support	A system that utilizes communication, data and problem-solving technologies to support organizational decision processes.
Executive Information System	A system that provides executives with easy access to internal and external information that is relevant to their critical success factors.
Management Information System	A system that monitors the decision environment, evaluate captured information and presents timely analyses for senior management.

REFERENCES

65. Adeoti-Adekeye, W., B., 1997, "The importance of management information systems", Library Review, Vol. 46, No 5, pp. 318-327.
66. Anantatmula, V.S., 2004, "Advancing PM tools beyond quantitative methods", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 4.
67. BSI, 2002, "Project Management", British Standard Institute, BS 6079-1: 2002, pp.4-5.
68. Carvalho, F., Souza, R., Chavent, M., Lechevallier, Y., 2006, « Adaptive Hausdorff distances and dynamic clustering of symbolic interval data », Pattern Recognition Letters, Vol. 27, pp. 167-179.
69. Cioffi, D.F., 2005, "A tool for managing projects: an analytic parameterization of the S-curve", International Journal of Project Management, Vol. 23, pp.215-222.
70. Doumpos, M., Zopounidis, K., 2001, «Multicriteria classification techniques: theory and applications », "Klidarithmos editions, ISBN 960-209-449-4, pp.77-81 *(in Greek)*.
71. Gerogiannis, V., Sirakoulis, K., Ipsilandis, P., 2003, «Business Process Simulation to support Project Management of a Regional Operational Programme", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 3.
72. Gilliams, S., Raymaekers, D., Muys, B., Orshoven, J.V., 2005, "Comparing multiple criteria decision methods to extend a geographical information system on afforestation", Computers and electronics in agriculture, Vol. 49, pp. 142-158.
73. Greek Common Decision of Ministers, 24812, 2001, "On the MIS Data entered in", Official Journal of Greek Democracy (*in Greek*).
74. Greek Low 2860, 2000, "Laying down general provisions for the management and control system for assistance granted by the Structural Funds in Greece", Official Journal of Greek Democracy (*in Greek*).
75. Greek Low 1418, 1984, "Public Works and arrangements of relative issues", Official Journal of Greek Democracy (*in Greek*).
76. Greek Low 3316, 2005,"Execution of public contracts for studies and relevant services implementation and other issues", Official Journal of Greek Democracy (*in Greek*).
77. Greek Ministry of Finance, 2001, "Monitoring and Control Systems of the 3rd CSF Operational Programs".
78. Hartono, E., Santhanam, R., Holsapple, C.W., 2006, "Factors that contribute to management support system success: An analysis of field studies", Decision Support Systems, Vol. 43, Issue 1, February 2007, pp. 256-268
79. Hwee, N.G., Tiong, R.L.K., 2002, "Model on cash flow forecasting and risk analysis for contracting firms", International Journal of Project Management, Vol. 20, pp. 351-363.
80. Ipsilandis, P., 2006, "Qunatitative tools for Programme budget related Risks", The Proceedings of the 20th IPMA World Congress on Project Management, Shangai 15-17 October, 2006, ISBN 7-111-04703-6, pp. 644-650.
81. Lee, J.W., Kim, S.H., 2001, «An integrated approach for interdependent information system project selection", International Journal of Project Management, Vol.19, pp. 111-118.
82. Levy, R., 2001, "EU Programme Management 1977 – 96: A Performance Indicators Analysis", Public Administration, Vol. 79, pp. 423-444.
83. Lyccet, M., Rassau, A., Danson, J., 2004, «Programme management: a critical review», International Journal of Project Management, Vol.22, pp. 289-299.

84. Mavrotas, G., Caloghirou Y., Koune J., 2005, «A model on cash flow forecasting and early warning for multi-project programmes: application to the Operational Programme for the Information Society in Greece", International Journal of Project Management, Vol.23, pp. 121-133.
85. Mahmoud, M.R., Garcia, L.A., 2000, "Comparison of different multicriteria evaluation methods for the Red Bluff diversion dam", Environmental Modelling and Software, Vol. 15, pp. 471-478.
86. Meredith, J.R., Mantel, S.J, 2003, "Project Management – A managerial approach", Fifth Edition, John Wiley & Sons, Inc., ISBN 0-471-07323-7, p.559
87. Mullaly, M.E., 2004, "PM Success in Organizations: Trends, Best Practices and Next Steps", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 2.
88. National Statistics Service of Greece, "Real population of Greece. Census 2001", 2002, authorized in Official Journal of Greek Democracy (*in Greek*).
89. Nord, J., H., Nord, G., D., 1995, «Why managers use executive support systems: selecting and using information technology for strategic advantage", Industrial Management and Data Systems, Vol. 95, No 9, pp. 24-28.
90. Naylor, J., 2004, "Management", Second Edition, Prentice Hall, Financial Times, ISBN 0 273 67321 1, p.141.
91. Norese, M.F., 2006, "ELECTRE III as a support for participatory decision-making on the localization of waste-treatment plants", Land Use Police, Vol. 23, pp. 76-85.
92. Official Journal of the European Communities, 1999, Regulation (EC) No 1260/1999 laying down general provisions on the Structural Funds, L161, pp. 1-42.
93. Official Journal of the European Communities, 2003, Regulation (EC) No 1059/2003 on the establishment of a common classification of territorial units for statistics (NUTS) by reason of the accession of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia to the European Union, L154, pp. 1-41 (NUTS).
94. Official Journal of the European Communities, 2006, Regulation (EC) No 1083/2006, laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999, L210, pp. 25-78.
95. Okazaki, S., 2006, "What do we know about mobile Internet adopters? A cluster analysis", Information & Management, Vol. 43, pp. 127-141.
96. Pantouvakis, J.P., Alesta, K., 2004, "Lessons learned from the implementation of large EU co-funded infrastracture projects in Greece", http://dde.sdo.teilar.gr/IPMA_World_Congress/Main.htm, Stream 3.
97. Partovi, F.Y., 1992, "Determining what to benchmark: An Analytic Hierarchy Process Approach", International Journal of Operations & Production Management, Vol.14, pp. 25-39.
98. Pellegrinelli, S., 1997, "Programme management: organizing project-based change", International Journal of Project Management, Vol.15, pp. 141-149.
99. Pellegrinelli, S., 2002, "Shaping context: the role and challenge for programmes", International Journal of Project Management, Vol. 20, pp. 229-233.
100. Pohekar, S.D., Ramachandran, M., 2004, "Application of multi-criteria decision making to sustainable energy planning – a review", Renewable & Sustainable Energy Reviews, Vol. 8, pp. 365-381.
101. Project Management Institute, 2006, "The Standard for Program Management", Four Campus Boulevard, Newton Square, PA 19073-3299 USA, p.4.

102. Ragu-Nathan, B., Ragu-Nathan, T.S., Tu, Q., Shi, Z., 2001, "Information management (IM) strategy: the construct and its measurement", Journal of Strategic Information Systems, Vol. 10, pp. 265-289.
103. Render, B., Stair, R.M.Jr., Hanna, M.E., 2003, "Quantitative Analysis for Management", eighth edition, Prentice Hall, CD-ROM Modules, Module 1, ISBN 0-471-42907-4.
104. Roberts, P., 2003, "Partnerships, programmes and the promotion of regional development: an evaluation of the operation of the Structural Funds regional programmes", Progress in Planning, Vol. 59, pp. 1-69.
105. Rubinov, A.M., Soukhorokova, N.V., Ugon, J., 2006, "Classes and clusters in data analysis", European Journal of Operational Research, Vol. 173, pp. 849-865.
106. Saunders, M., Lewis, P., Thornhill, A., 2003, "Research Methods for Business Studies", Prentice Hall, Financial Times, ISBN 0 273 65804 2, pp.83, 281.
107. Shanian, A., Savadogo, O., 2006, "A material selection model based on the concept of multiple attribute decision making", Materials and Design, Vol. 27, pp. 329-337.
108. Shen, L.Y., Platten, A., Deng, X.P., 2006, "Role of public private partnerships to manage risks in public sector projects in Hong Kong", International Journal of Project Management, article in press, www.sciencedirect.com
109. SPSS, 2005, "SPSS Advanced I", SPPS BI Greece S.A., p.5.
110. Thiry, M., 2001, "Sense making in value management practice", International Journal of Project Management, Vol.19, pp. 71-77.
111. Thiry, M., 2002, "Combining value and project management into an effective programme management model", International Journal of Project Management, Vol.20, pp. 221-227.
112. Thiry, M., 2004, ""For DAD": a programme management life-cycle process", International Journal of Project Management, Vol.22, pp. 245-252.
113. Tudela, A., Akiki N., Cisternas R., 2006, «Comparing the output of cost benefit and multi-criteria analysis. An application to urban transport investments », Transportation Research, Part A, Vol. 40, pp. 414-423.
114. Wang, X., Triantaphyllou, E., 2006, "Ranking irregularities when evaluating alternatives by using some ELECTRE methods", The International Journal of Management Science, available on line 14 February 2006.
115. Ye, N., Li, X., 2002, «A scalable, incremental learning algorithm for classification problems », Computers & Industrial Engineering, Vol. 43, pp. 677-692.
116. Zopounidis, C., Doumpos, M., 2002, «Multicriteria classification and sorting methods: a literature review", European Journal of Operational Research, Vol. 138, pp. 229-246.
117. http://ec.europa.eu/regional_policy/funds/prord/prord5_en.htm (visited October 4, 2006)
118. www.hellaskps.gr (visited October 4, 2006) (*in Greek*)
119. www.mou.gr (visited October 4, 2006)
120. www.stanford.edu (visited November 9, 2006)
121. www.thessalia.gr/pep/pepcomple.el.asp (visited December 11, 2006) (*in Greek*)
122. www.thessalia.gr/pep/publicity_general.el.asp (visited October 4, 2006) (*in Greek*)
123. www.thessalia.gr/pep/pep_texts/entypa/oth_apofent.doc (visited October 4, 2006) (*in Greek*)

124. www.thessalia.gr/pep/pep_texts/2000GR161P0006-04-5712-Dec.pdf (visited December 11, 2006)
125. www.thessalia.gr/pep/td_deltio_ergon_ypodomon.doc (visited November 11, 2006) (*in Greek*)
126. www.thessalia.gr/pep/uploads/legislations/projects.implemetation.system.doc (visited December 20, 2006) (*in Greek*)
127. www.Wikipedia.org (visited November 20, 2006)
128. www.ypes.gr/periferiakh.htm (visited January 16, 2007) (*in Greek*).